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The Effects of  
Trade Restrictions and Monetary Policy  
during  
The Great Depression

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## **Abstract**

Many factors are considered when analysing how countries managed to recover from the Great Depression. Leaving the gold standard and the increased protectionism are considered important variables regarding the length and depth of countries recessions. This work aims to estimate which variables allowed for or hindered the world's economies to combat the economic turmoil during the 1930s. In this context, the high rates of unemployment is closely related to the decline in industrial production.

To measure how the variables depreciation and tariff rates affected the industrial production, several multivariate regressions were performed. Data from relevant countries between 1929 and 1938, along with a dummy variable for observations pegged to gold, was used in the data analysis. The results showed that the depreciation of a country's currency in relation to gold had a significant positive effect on industrial production. An individual country's tariff rates showed to have no statistically significant effect, rather the international average tariff rate proved to have a strong negative effect on countries industrial production. Although the effects of depreciation and the international average tariff rate varied depending on how the regressions were specified, both variables proved to have a significant effect on industrial production.

These results suggests that an individual country could not increase their industrial production by pursuing a policy of limited trade restrictions. Rather, it was the collectively high tariff rates that affected industrial production. Instead, the more countries that left the gold standard and decreased trade restriction, the more countries could benefit from the positive effects of depreciation and lower average tariffs, thereby recovering industrial production and in the extension, unemployment.

Key words: Great Depression. Gold standard. Protectionism. Industrial production. Unemployment.

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# 1. Introduction

Few events have been as formative on economic policies and theory as the Great Depression of the 1930s. Nearly a century after the events, no definite agreement exists as to what the effects of the economic policies enacted were, and what lead to the recovery of the world's economies. Libraries of literature have been written on various aspects of the Great Depression, and this work aims to contribute, be it a small part, to this vast body of work.

Several economic recessions had been experienced before 1929, both domestically and internationally. The Great Depression, however, proved to be without comparison in scope and depth. Banks closed their doors, industrial production plummeted, and unemployment soared. It is perhaps the latter that embodies the Great Depression in the popular imagination.

Many countries experienced a recession during the 1930s, but they varied substantially in their recovery. Using the Gross Domestic Product (GDP) as a somewhat simplistic indicator of economic recovery, European countries like Great Britain and the Scandinavian countries had returned to their 1929 values of GDP by 1935, while countries like the United States and Belgium did not return to their 1929 GDP value until the late 1930s (Jordà, Schularick, & Taylor, 2017).

As the depression spread internationally, countries employed different strategies to combat the effects of the recession. One common trend for the time was the extensive turn to protectionist policies. This change to isolationist trade policies were not equal among countries. Instead, countries varied substantially in the extent of the use of protectionist policies. Countries had different motivation as how to act considering the new realities of financial crisis. Some countries left the gold standard soon after the onset of the recession, while others stayed on for several years. Others introduced extensive exchange control measures.

Although the events of the 1930s may seem distant to the present time, many lessons are still exceedingly relevant. During the latter half of the 20<sup>th</sup> century many of the world's countries have integrated their economic systems and international trade has become an integral part of the modern world. In the last decades, however, the prospect of trade wars has become a plausible reality, with major economic powers posturing and threatening with trade restrictions and economic sanctions. Economic turmoil and financial crisis have not spared the modern world. The financial crisis of 2008 is still in the public consciousness, and future crises are still a possibility.

The purpose of this thesis is to examine the monetary policies and trade restrictions enacted by various countries and examines how they allowed for, or hindered, the recovery of industrial production in the various economies. The choice to focus specifically on industrial production is due to its close relationship to unemployment, since it was arguably the mass unemployment that made the Depression Great. This thesis argues that trade restrictions on export goods increased the unemployment in industrial sectors that were heavily dependent on export.

The fundament of this paper is based on previous research about the Great Depression that links the economic recovery of countries to their abandonment of the gold standard. The focus of this work is limited to the United States, Canada, and relevant European countries. Limiting the work to these countries is motivated by the availability of credible data, that these countries were most effected by the recession, and the reasonable scope.

This work consists of three main parts. First, relevant history and concepts are presented, along with a presentation of the strategies used to combat the recession. The reader will be familiarized with the historical context and development of monetary and trade policies. Furthermore, previous research, on which this paper builds and takes inspiration, is presented. Secondly, data is analysed with an econometric regression, to see how tariff rates, exchange rates and the gold standard contributed to the decline in industrial production and its recovery. Furthermore, the connection between industrial production and unemployment is examined. In this part, the data used is presented and potential measurement problems are discussed. Lastly, conclusions and limitations from the data analysis are discussed and possibilities for further research are suggested.

## **2. Background**

### **2.1 Previous research on trade and monetary policy during the Great Depression**

To avoid a repetition of the Great Depression, much economic research of the latter half of the 20<sup>th</sup> century was dedicated to the subject. Different economic schools of thought interpret the causes and effects differently. Whether the crisis was due to a failure of private business or due to a failure of government is not agreed upon. Here, a brief overview of the two dominant economic schools regarding the Great Depression is presented.<sup>1</sup> The Keynesian school of thought argue that a decline in investments led to a decline in aggregate demand, which in turn led to increased unemployment. Therefore, Keynesians argue, that the cure to a recession is to increase government spending, even running at a deficit, while expand the money supply and lowering interest rates (Keynes, 1936).

The other major economic school of thought, the Monetarists, argue that the Great Depression was a failure of the banking system. In what is called “The Great Contraction”, monetary supply decreased by 35% which led to high deflation. They argue that lowering the interest rates and increasing the monetary supply would have prevented the banking system from collapsing. Furthermore, the failure of the Federal Reserve to save the private banks decimated the money supply and private savings. Thus, the Federal Reserve was to blame for turning what would be a recession into a major Depression (Friedman & Jacobson Schwartz, 1980). Both the Keynesian and Monetarist schools of thought pay relatively little attention to international trade, but the subject has not been left unexplored by economists.<sup>2</sup>

Eichengreen and Irwin (2009) explore which factors led countries to impose different methods to combat the regression. They argue that countries who stayed on the gold standard, and thereby keeping their exchange rates fixed, were more likely to restrict foreign trade. With other countries leaving the gold standard and gaining a competitive advantage at their expense, they introduced trade restrictions to stem the outflow of gold. The authors argue that countries who remained on the gold standard hoped that price and wage deflation would restore trade balances. Other countries who left the gold standard tried to stem the outflow of gold by

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<sup>1</sup> For a detailed account, see Keynes, 1936, and Friedman & Jacobson Schwartz, 1980

<sup>2</sup> Economists like Barry Eichengreen, Douglas Irwin, Peter Temin, and Jakob Madsen, to mention a few, have done extensive research on international trade during the Great Depression.

imposing exchange controls, which effectively replicated the gold standard. Finally, some countries left the gold standard and did not impose exchange controls, and thereby let their currencies depreciate. However, the authors also suggest, that countries who experienced economic instability in the 1920s, like Austria, Germany, and France, were reluctant to leave the gold standard. It is within this framework that this work will proceed.

## **2.2 The end of the Gold Standard**

The use of a commodity to back the value of a national currency is a phenomenon observed in many civilisations historically, such as the Chinese and the Roman. Old coins would be minted as an alloy of various metals, which meant that the coins had an intrinsic value (Encyclopædia Britannica, online, n.p.). If the currency were completely based on the commodity, there would be no need for any government control whatsoever. The monetary supply would be wholly dependent on the efficiency of the extraction of the commodity (Friedman, 1962, p.40). Some of the virtues of the gold standard are the relatively stable inflation rate, which would ensure stable prices, a goal governments find attractive (Friedman 1962, p.41).

This evolved to the use of paper currency, where a particular metal, such as silver or gold, is used to back the value of a paper currency. In theory, a bank note would be worth a specified amount of the commodity and could be traded for the given amount of the commodity. The commodity backed paper currency, almost inevitably, lead to a mixed system, where the amount of paper currency did not correspond to the amount of the commodity (Friedman 1962, p.41).

The common use of the gold standard, and thereby practically fixed exchange rates between countries, provided an effective venue for the movement of goods and capital (Eichengreen & Irwin, 2009, pp.5-6). This system was the orthodoxy until the Great War of 1914-1918, where much of the world economy temporarily abandoned the gold standard for a fiat money system. The system of fiat money means that the paper money has no intrinsic value, but is maintained by the government, and the users agreed upon value (Encyclopædia Britannica, online n.p.). The gold standard was largely reintroduced in the interwar period, but this iteration differed from the one used before the Great War.

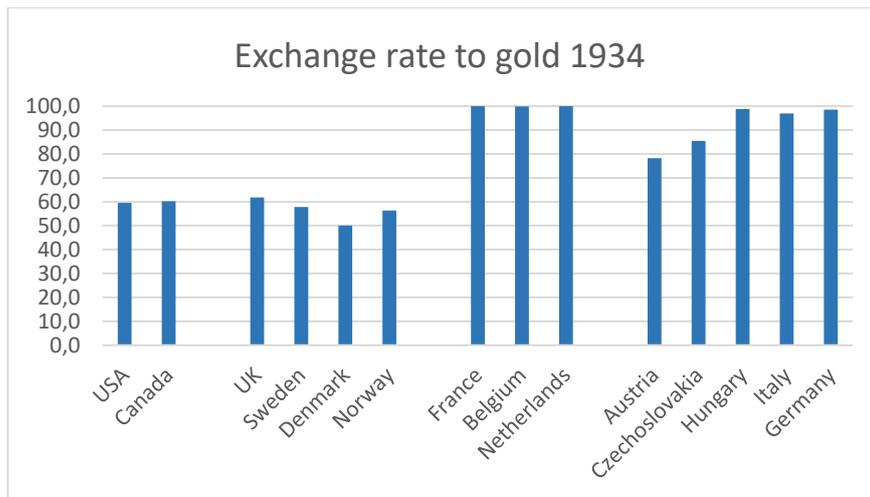
Eichengreen and Irwin (2009) describes how the patterns of trade had been disrupted because of the Great War. They argue that as governments returned to pre-war exchange rates without lowering price levels, the ratio of gold to currencies in circulation decreased. The gold shortage resulted in some countries being dependent on the currencies of foreign nations, where a country did not themselves possess the gold reserves to back their currencies, but instead relied on the gold reserves of a foreign nation. They claim that massive instability would spread throughout the international market this foreign nation would refuse to convert the currency to gold at a fixed price. Therefore, according to the authors, this iteration of the gold standard was less robust than its pre-war counterpart (Eichengreen & Irwin, 2009, p.7).

When Britain left the gold standard in September 1931, the countries pegged to the British Pound Sterling, for instance the Scandinavian countries, followed suit shortly thereafter. Some countries remained staunch advocates of the gold standard and maintained it until much later into the recession. The US Dollar finally went off the gold standard in 1933, while some European countries, the so-called Gold Bloc, maintained the gold standard until 1936.

A currency with floating exchange rates means that the value of the currency depends on the supply and demand of the currency, not an underlying commodity. Leaving the gold standard led to a depreciation of the national currencies compared to those pegged to gold. The depreciated exchange rates gave a competitive advantage to these countries since their exported goods were cheaper in comparison to countries who maintained fixed exchange rates. Thus, the demand for the produce increases, and thereby the production of exporting goods increases (Eichengreen & Sachs, 1984, pp.2-4). This is one of the avenues by which countries with floating exchange rates were able to increase the demand for their domestic goods, increase industrial production, and make their way out of the recession.

This competitive depreciation was not well received by all. The countries remaining on the gold standard experienced a lack of competitiveness compared to the depreciating economies. This resulted in gold flowing extensively from countries pegged to gold to those with a floating exchange rate. The common practice regarding fiscal policy at the time was for the government to run a balanced budget, even during a recession (Eichengreen & Sachs, 1984, pp.2-4). To achieve a balanced budget some countries would increase the cost of importing foreign produce and redirect the demand towards the domestic market rather than imports. Others introduced strong exchange controls, thereby replicating the gold standard, to counter the foreign depreciation.

**Chart 1**



Depreciation in relation to gold, where a currency pegged to the gold has the index value of 100.<sup>3</sup>

Economic research generally agrees that countries that left the gold standard early, and therefore let their currencies depreciate, recovered faster, and countries that stayed on for longer experienced longer recessions (Choudhri & Kochin, 1980, Eichengreen & Sachs, 1984, and Eichengreen and Irwin, 2009).

It is debated whether pursuing depreciatory monetary policy is to be considered a beggar-thy-neighbour policy. Eichengreen and Sachs (1984) finds that leaving the gold standard was mutually beneficial if both countries pursued depreciation. They argue that the depreciation could have been beneficial for all if it was carried out in an organized fashion. However, since some countries staunchly maintained their gold parity, the depreciation of other currencies was indeed at their expense (Eichengreen & Sachs, 1984, pp.21-24).

## **2.3 Trade in the interwar period**

In the period before the Great War, Europe had an integrated system of international trade. This pattern of trade was shattered during the war and did not recover in the interwar period. In fact, the world trade did not return to pre-1914 values until the 1970s (Krugman, Obstfeld & Melitz, 2018, pp.44-45).

The world trade did, however, recover somewhat in the 1920s. The world's industrialized economies were perhaps most intertwined by the network of foreign loans. After

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<sup>3</sup> League of Nations (1938) pp.227-230

the Great War, the defeated Germany had to pay massive war reparations, mainly to Great Britain and France. Due to the post war domestic, economic, and political turmoil, Germany was unable to pay the reparations without American loans. Further, both Great Britain and France were heavily indebted to the United States due to wartime lending.

As American credit decreased substantially following the bank failures of 1929 and 1930, the recession began to transmit to the indebted European countries. As the world started to experience the effects of the recession, international trade decreased. In the period between 1929 and 1932 world trade in the industrialized countries decreased by 30% (Madsen, 2001, p.848). At the onset of the recession, many countries turned to protectionist trade policies.<sup>4</sup>

Although the increased protectionism during the 1930s was not the cause of the Great Depression, it can be argued that it worsened and prolonged it. In fact, the world trade had decreased rapidly before the introduction of increased trade restrictions. Such a collapse of the world trade as experienced in the 1930s would likely have tremendous ramifications in the 21<sup>st</sup> century, but exports constituted a relatively small portion of most countries GDP in the 1930s. Noticeably, export constituted a mere 5.1% of the US Gross Domestic Product (Jordà, Schularick, & Taylor 2017). While the recession cannot be explained by the collapsing world trade alone, it can shed light on certain aspects of the recession.

When the international trade system collapsed, the industrial production of many countries plummeted. As the industrial production decreased, the demand for labour in the industrial sector decreased, leading to higher rates of unemployment in the effected sectors.

## **2.4 Trade Restrictions**

In the fateful year of 1930, the United States congress voted to enact the tariffs proposed by senator Reed Smoot and representative Willis. C. Hawley, which raised the average tariffs on imported goods by 20%. The initial goals of the tariffs were to protect the agricultural industry from foreign competition but came to include many other sectors of the economy. The enactment of the Smoot-Hawley tariff act severely dampened the agricultural exports of the United States (Rothbard, 1963, pp.213-215).

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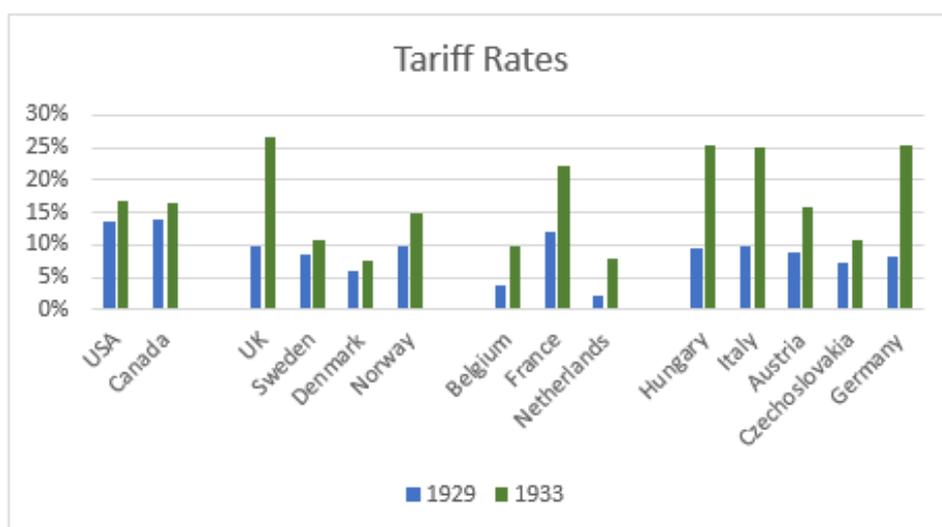
<sup>4</sup> The turn to protectionism was not, however, equally distributed across countries. For further discussion on the subject, see Eichengreen & Irwin, 2009.

The trade interruptions caused by the tariffs lead to many foreign countries enacting retaliatory trade blockades of their own, aimed against the United States markets. Canada, the primary trade partner of the United States, enacted tariffs on several products, which accounted for about 30% of the US exports. By 1933, exports to Canada had decreased by about 77%, (MacDonald, O'Brien, & Callahan. 1997, pp.806-809, US Department of Commerce, 1941, p.523), while exports to the United Kingdom fell by about 61%, and the total decrease in value of US exports decreased by 60% (US Department of Commerce, 1945, p.544).

Despite the timing of the Smoot-Hawley tariffs, and its effect on the American depression, it cannot be considered a reaction to the Great Depression. The bill had been drafted in early 1929 and, although it was not introduced until 1930, few rates had been changed in the final draft. Further, American tariff rates increased even more until its peak in 1933. While the tariffs certainly damaged international trade and provided a prerequisite for other countries to impose tougher trade restrictions, it cannot be entirely to blame for the collapsing world trade. Relatively few countries increased their tariffs in the immediate aftermath of the introduction of the Smoot-Hawley tariffs (Eichengreen & Irwin, 2009 p.10-11).

In 1934, the year after leaving the gold standard, the US congress passed the Reciprocal Tariff Act, which allowed the United States to negotiate tariff agreements with separate nations, especially countries in Latin America (Hiscox, 1999. pp.669–698). Thus, the United States tariff rates gradually decreased. This followed the United States leaving the gold standard in 1933. US export started to increase in 1934, but it would not return to 1929 levels until 1941 (Jordà, Schularick, & Taylor, 2017).

**Chart 2**



Tariff rates for various countries in 1929 and 1933.<sup>5</sup>

The United Kingdom had long been a net importer and the 1930s were no exception. Possessing a large colonial empire and dominions from which to draw resources, the island nation seldom lacked a market to buy and sell produce. When the United Kingdom left the gold standard in 1931, it shocked the international trade system. Rather than decreasing the tariff rates, as has been suggested, the United Kingdom instead increased their tariff rates substantially after the depreciation. Eichengreen and Irwin (2009) suggest that domestic political motives caused this break from the trend (Eichengreen & Irwin, 2009, pp.14-15). The British did not keep high tariff rates towards every foreign country. Instead, they kept lower tariffs towards their imperial dominions. Furthermore, in 1933, the United Kingdom negotiated a series of trade agreements with the Scandinavian countries. Although the United Kingdom was the dominant partner in the negotiations, and the terms were largely beneficial for the British, it provided a market for the Scandinavians to sell their produce more readily (Rooth, 1986, pp.69-71).

As previously suggested countries who stayed on the gold standard longer and those who imposed exchange controls maintained tougher restrictions on trade. The Gold Bloc countries all increased their tariff rates. Belgium and the Netherlands both abandoned their policies of free trade and roughly doubled their tariff rates from 1929 to 1933 while France tripled theirs (Mitchell, 2013). Some of the exchange control countries present some interesting context for the time. Germany, Austria, and Italy were all run by fascist governments during

<sup>5</sup> Mitchell, 2013. For calculations of tariff rates, see the Chapter 3. "Empirical Test".

the 1930s. Fascism generally promotes self-reliance and discourages international trade. This lean towards autarky can partly explain the high tariff rates in these countries.

## **2.5 Unemployment in the industrial sector**

At the height of the Great Depression, soaring unemployment was all but universal (Mitchell, 2013). Besides the economic repercussions related to unemployment, it can mean severe socio-political consequences. For the individual, long term unemployment can mean an erosion of human capital, depression, and even declining health (Dixon, 1992, pp.3-6). For the society, high rates of unemployment obviously means that the labour capacity is not fully utilised, but it can also lead to other problems, such as crime (Raphael & Winter-Ebmer, 2001, pp.280-281). Further, high unemployment can lead to political instability and civil unrest.<sup>6</sup>

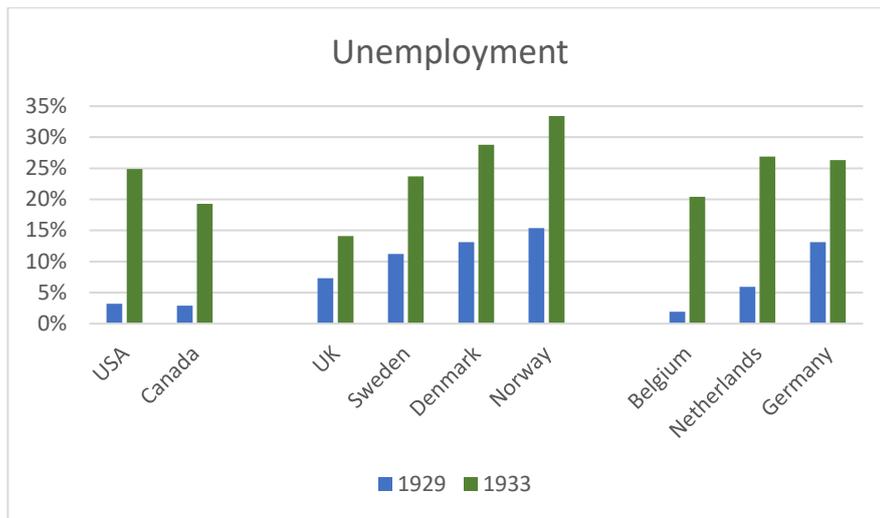
The classical theory of unemployment classifies different types of unemployment. Classical unemployment, where wages are higher than employers can afford. Frictional unemployment, wherein a labourer is temporarily unemployed while in between two jobs. Structural unemployment, where a change in the labour market creates a mismatch between the skills supplied and demanded, leading to an unemployment in specific affected sectors (Borjas, 2016 pp.503-504). Keynes argued that the unemployment levels of the 1930s could not be explained by these classical forms of unemployment. Rather, the Keynesian theory argues that the unemployment was caused by a decline in aggregate demand, where there were simply not enough jobs available for those willing to work. This is commonly referred to as cyclical unemployment (Keynes, 1936, chap. 10, part 6 & chap. 5).

While the Keynesian theory of unemployment can be used to explain the increase in unemployment during the Great Depression, the focus is on domestic demand. Within the Keynesian framework, the rampant unemployment in these export dependent sectors can be explained by a lower foreign demand for domestic goods. Indeed, the unemployment in the 1930s was not equally distributed across the labour markets. Some sectors were virtually unaffected by the widespread unemployment, while others even increased their active labour force. Other sectors, however, were shocked by a rampant increase in unemployment. Industries heavily dependent on exports experienced higher unemployment than others (US Department of Commerce, 1935, pp.316-318).

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<sup>6</sup> The high unemployment in Germany is often given as a reason for the rise of National Socialism in the 1930s.

**Chart 3**



Unemployment in various countries in 1929 and 1933.<sup>7</sup>

In the United States, for instance, the unemployment rate increased from a pre-depression levels of 3.2% to a peak level of just under 25% in 1933 (Mitchell, 2013). Indices of employment levels show that in 1933, employment in textile industries decreased by 27%, in lumber industries by 57%, in rubber industries by 41%, in stone, clay and glass industries by 52%, and in iron and steel industries by 48% (US Department of Commerce, 1935, pp.316-318). Similar patterns can be seen in other countries. In the Scandinavian countries and the United Kingdom, the unemployment rate roughly doubled from their pre depression levels to a peak level in 1933 (Mitchell, 2013). Like in the American case, industries dependent on export, such as the mining, forestry, and manufacturing industries, experienced relatively high levels of unemployment (Board of trade, 1940, pp.141-144, Socialstyrelsen, 1933, p.134, Statistiske department., 1933, p.115, Statistiske centralbyrå, 1934, p.138).

France stands out as experiencing a relative mild recession, as they never exceeded 5% unemployment. This is indeed remarkable numbers for the depression. The French recession started later than elsewhere, and they experienced no major banking crisis. Further, they did not pursue a deflationary policy until 1934 (Beaudry & Portier, 2001, pp.75-76). The other Gold bloc countries were not as successful in avoiding the recession. Belgian unemployment rose from 1,7% in 1929 to 20,2% in 1932 (Mitchell, 2013). In the Netherlands, unemployment rose from 5,9% in 1929 to over 20% in 1932 (Mitchell, 2013).

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<sup>7</sup> Mitchell, 2013

The recession hit Germany hard, and unemployment soared to 30% (Mitchell, 2013). Memories of hyperinflation in the 1920s made the government wary of high government spending and leaving the gold standard. The high unemployment bolstered the support for the National Socialists and the Communist parties of Germany. When the National Socialists took power in 1933 labour unions were curbed and centralised in the state-run German Labour Front (Hamburger, 1944, p.932). This allowed the National Socialists to cut wages, and together with large public works and increasing rearmament, unemployment started to decline. Throughout the 1930s the Germans maintained high tariff rates, and even increasing them at their turn to autarky, while never devaluating the Mark.

### **3. Empirical test**

#### **3.1 Data**

This chapter runs several regressions, using panel data from 14 countries between the years 1929 and 1938, to estimate how exchange rates, tariff rates and the gold standard effected industrial production. These estimations are based on relatively limited data. All observations used in these tests is merely 138, by which it is difficult to make any certain estimations. This is a problem that a lot of macroeconomic research faces, due to the limited number of countries and years. However, results from the following regressions show high statistical significance and the estimations can be deemed to have a reasonable statistical certainty and the number of observations used sufficient.

Ending the analysis in 1938, while some countries were still suffering from the recession, was decided upon due to the onset of the Second World War. Some datapoints were still eliminated due to the lack of available data for said year. Specifically, due to German occupation before the second world war, data for Czechoslovakia and Austria from 1938 is unavailable.

The Tariff rates were calculated by dividing the revenue gained from tariffs by the total value of imported goods for each year from 1929 to 1938. The data on value of imports, as well as the revenue from tariffs, was acquired from Mitchell's (2013) International Historical Statistics. Estimating trade restrictions in relationship to Industrial production might seem counter intuitive at first glance, since it would be exports, rather than import that would affect industrial production. Here, however, tariff rates are simply a measure of trade restrictions, where retaliatory trade restrictions are assumed. A better measure would be an average tariff rate imposed on a specific country's exports, but reliable data for such a variable is not readily available. Hence, this work follows the steps of previous research on the subject regarding tariff rates. The average tariff rate of all countries is also used as a variable. This measures the average trade restrictions between all countries and does to some extent address the previously stated limitation.

Exchange rates for all countries are measured as their value compared to gold. Therefore, depreciation of currencies is measured relative to their value in gold. Data is gathered from the League of Nations Monetary Review 1938 (League of Nations, 1938, pp.227-230). The data is constructed as an index, where a currency pegged to gold will have an index value

of approximately one hundred (with small variation). A depreciation relative to gold is measured as a decrease in the index. A gold dummy is added that denotes observations who were either pegged to gold or maintained exchange rate controls that artificially maintained the exchange rate and therefore replicated the gold standard.

Industrial production is measured as indices related to respective 1929 values, where the 1929 value is 100, and increase or decrease in industrial production is in relation to the 1929 index value of 100. The data is gathered from the International Historical Statistics (Mitchell, 2013).

Statistics on unemployment is measured as a percentage of the labour force and is gathered from the International Historical Statistics (Mitchell, 2013). Unfortunately, this source did not report unemployment for all countries in the recession. Since having data from one source is preferable to data from different sources that might vary in data measurement methods, data for missing countries is not included in the statistics on unemployment.

## 3.2 Results from Regressions

### 3.2.1 Unemployment

Table 1: Regression results for change in Unemployment

	(1)	(2)	(3)
<b>Constant</b>	1.427*** (0.291)	1.078** (0.508)	1.446*** (0.355)
<b><math>\Delta</math>Production</b>	-0.366*** (0.030)	-0.311*** (0.052)	-0.409*** (0.034)
<b>R<sup>2</sup></b>	0.629	0.441	0.754
<b>F</b>	149.55	36.34	122.67
<b>N</b>	90	48	42

Standard errors are reported in parentheses. \*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively. Regression (1) includes all countries. Regression (2) includes countries not on gold only. Regression (3) includes countries on gold only.

This first set of regressions are for the purpose of description, rather than research, to show the integral connection between unemployment and industrial production. These regressions measure the effect of a change in industrial production ( $\Delta$ Production) on the change in unemployment ( $\Delta$ unemployment). The variable  $\Delta$ Production is the change in the production index, where 1929 is 100, while  $\Delta$ unemployment is the change in the percentage of unemployed, where +1 means a 1 percentage increase in unemployment. When running the regression on all countries irrespective of exchange rate policy (1), the coefficient  $\Delta$ Production is estimated to -0.366, and the constant is estimated to 1.427. In other words, a positive change in production by 1% would decrease the percentage of unemployment by about 0.366. The P-values are low and the variables are statistically significant. The R<sup>2</sup> is measured to 0.629, which is relatively high and can be interpreted that 62.9% of the change in unemployment can be explained by the change in industrial production.

When running the regression only on observations not pegged to gold and not imposing exchange controls (2), the coefficient  $\Delta$ Production is estimated to -0.311 and the constant is estimated to 1.078. Again, the P-values are low and the variables are statistically significant.

The  $R^2$  is measured to 0.441. Although somewhat lower than in the previous regress, industrial production can be considered a reasonable explanatory variable for unemployment.

When running the regression only on observations pegged to gold or imposing exchange controls (3), the coefficient  $\Delta$ Production is estimated at -0.409 and the constant is estimated to -1.446. The P-values are again low and the variables are therefore statistically significant. The  $R^2$  is measured to 0.754, which means that industrial production is an exceedingly fitting variable to explain unemployment for countries pegged to gold.

As shown, the change in industrial production seems to have a large effect on unemployment, although somewhat lower for non-gold countries. This chapter proceeds to investigate how certain factors affected industrial production and, in the aggregate, the unemployment.

### 3.2.2 Industrial production

Table 2: Regression results for Industrial production – Fixed Effects – all countries

	(1)	(2)	(3)	(4)
<b>Constant</b>	129.097*** (7.124)	132.167*** (7.412)	188.950*** (13.165)	196.527*** (14.027)
<b>Exchange Rate</b>	-0.419*** (0.083)	-0.401*** (0.083)	-0.595*** (0.083)	-0.649*** (0.090)
<b>Tariff Rate</b>		-0.028 (0.197)		0.032 (0.021)
<b>Average Tariff Rate</b>			-0.296*** (0.056)	-0.351*** (0.067)
<b>R<sup>2</sup></b>	0.158	0.171	0.3	0.312
<b>F</b>	25.52	13.9	28.93	20.23
<b>N</b>	138			

Standard errors are reported in parentheses. \*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively.

This set of regressions measure the effect of different variables on industrial production, where all variables are constructed as indices, where the 1929 values are 100. Note that these regressions do not measure the change in the production index, but the absolute value. Running the regression with exchange rate as the only explanatory variable (1), the coefficient is estimated to -0.419 and the constant is estimated to 129.097. These estimated variables suggests that a typical country on the gold standard, and therefore an exchange rate index of 100, would have an industrial production index of 87.125. Further, a country who left the gold standard experienced a typical depreciation of about 40% (index value 60).<sup>8</sup> The estimation from the regression suggests that a country with such a depreciation would have an industrial production of value of 103.954. The P-values are low and the variables are statistically significant. Adding the national tariff rate as a variable (2) shows no statistical significance, which suggests that the variable should be omitted.

<sup>8</sup> See chart 1.

Running the regression with exchange rate and average tariff rate as explanatory variables (3), the coefficient for exchange rate is estimated to -0.595, the average tariff rate to -0.296, and the constant is estimated to 188.950. The P-values are low and the variables are statistically significant. The  $R^2$  value of 0.3 is higher than running the regression with exchange rate alone as the explanatory variable and suggests that both variables are good as estimators of industrial production.

Running the regression with exchange rate, tariff rate, and average tariff rate as explanatory variables (4), the coefficient for exchange rate is estimated to -0.649, the average tariff rate to -0.351, the tariff rate to 0.032, and the constant is estimated to 188.950. The P-value for the variable tariff rates is high and not statistically significant, which suggests that it should be omitted. The P-values for the remaining variables are low and they are statistically significant.

The variable exchange rate has low p-values irrespective of how the regression is specified. The coefficient is negative and, the estimated values are similar (although somewhat larger in combination with other variables), which suggests robust results. The variable average tariff rate also has low p-values in both the regressions where it is included and, the coefficient is similar in both regressions, which again suggests robust results. Furthermore, when the variable average tariff rate is added, the effects of exchange rate increases. These results suggests that the combination of the international average tariff rates and the domestic level of depreciation had a significant effect on the domestic industrial production of countries. Noticeably, the result from these regressions suggests that the tariff rates of an individual country does not seem to have a significant effect on industrial production. The similarities in significance and value of the coefficient suggests that the regressions do not suffer from problems of spurious relationships.

The regression with all the variables included provides significant t-values, which suggests that multicollinearity is not an issue in these regressions. Therefore, the regression with all the variables included can be considered most relevant.

Table 3: Regression results for change in Industrial production – Fixed Effects – all countries

	(1)	(2)	(3)	(4)
<b>Constant</b>	3.935*** (0.578)	3.931*** (0.580)	11.817*** (2.474)	12.086*** (2.495)
<b><math>\Delta</math>AverageTariff</b>	-0.388*** (0.031)	-0.396*** (0.036)	-0.358*** (0.032)	-0.373*** (0.036)
<b><math>\Delta</math>TariffRate</b>		0.007 (0.016)		0.014 (0.160)
<b>Exchange Rate</b>			-0.096*** (0.029)	-0.01*** (0.030)
<b>R<sup>2</sup></b>	0.531	0.532	0.5655	0.5680
<b>F</b>	154.02	76.65	87.84	58.73
<b>N</b>	138			

Standard errors are reported in parentheses. \*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively.

The next set of regressions measures the effect of different variables on the change of industrial production ( $\Delta$ Production), where the variables  $\Delta$ AverageTariff,  $\Delta$ TariffRate, and  $\Delta$ Production are constructed as changes in their respective indices, where the 1929 values are 100. Exchange rate is constructed as an Index, where the 1929 values are 100. In the first regression (1), the coefficient  $\Delta$ AverageTariff is estimated to -0.388, and the constant is estimated to 3.935. In other words, an increase in tariffs by 1% would decrease the change in Industrial production by 0.388%. The P-values are low and the variables are statistically significant. The R<sup>2</sup> is measured to 0.531 and the variable can be considered a reasonable explanatory variable. Adding the variable  $\Delta$ TariffRate as a variable (2) shows no statistical significance and suggests that the variable should be omitted.

Running the regression with  $\Delta$ AverageTariff and exchange rate as explanatory variables (3) estimates the coefficients  $\Delta$ AverageTariff to -0.358, Exchange Rate to -0.096 and the constant to 11.817. The P-values are low and the variables are statistically significant.

Running the regression with  $\Delta\text{AverageTariff}$ ,  $\Delta\text{TariffRate}$ , and exchange rate as explanatory variables (4), the coefficient for exchange rate is estimated to  $-0.01$ ,  $\Delta\text{AverageTariff}$  to  $-0.373$ , the  $\Delta\text{TariffRate}$  to  $0.014$ , and the constant is estimated to  $12.086$ . The P-value for the variable  $\Delta\text{TariffRate}$  is high and not statistically significant, which suggests that it should be omitted. The P-value for the remaining variables are low and they are statistically significant.

The variable  $\Delta\text{AverageTariff}$  has low p-values irrespective of how the regression is specified. The coefficient is negative, and the estimated values are similar, which suggests robust results. The variable exchange rate also has low p-values in both the regressions where it is included, and the coefficient is similar in both regressions, which again suggests robust results. Again, the result from these regressions suggests that the tariff rates (here  $\Delta\text{tariffRate}$ ) of an individual country does not seem to have a significant effect on industrial production. The similarities in significance and value of the coefficient suggests that the regressions do not suffer from problems of spurious relationships.

The regression with all the variables included provides significant t-values, which suggests that multicollinearity is not an issue in these regressions. Therefore, the regression with all the variables included can be considered most relevant.

These results suggest that the change in international average tariff rate and the domestic depreciation had significant impact on the change in industrial production. The change in the domestic tariff rates does not seem to have significant effect on the change of industrial production.

This section now proceeds to sort the observations by those on the gold standard or on exchange controls and those with floating exchange rates to see if there are any differences in the effects of the explanatory variables.

Table 4: Regression results for Industrial production – Fixed Effects

	(1)	(2)	(3)
<b>Constant</b>	196.527*** (14.027)	260.431*** (28.24)	156.558 (98.157)
<b>Exchange Rate</b>	-0.649*** (0.090)	-1.218*** (0.184)	-0.373 (0.970)
<b>Tariff Rate</b>	0.032 (0.021)	0.043 (0.043)	0.130 (0.023)
<b>Average Tariff Rate</b>	-0.351*** (0.067)	-0.536*** (0.161)	-0.223*** (0.071)
<b>R<sup>2</sup></b>	0.312	0.496	0.156
<b>F</b>	20.23	19.7	4.32
<b>N</b>	138	64	74

Standard errors are reported in parentheses. \*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively. Regression (1) includes all countries. Regression (2) includes countries not on gold only. Regression (3) includes countries on gold only.

Running the regression with exchange rate, tariff rate, and average tariff rate as explanatory variables only for countries not pegged to the gold and not imposing exchange controls (2), the coefficient for Exchange Rate is estimated to -1.218, the average tariff rate to -0.536, the tariff rate to 0.043, and the constant is estimated to 260.431. The P-value for the variable Tariff Rates is high and not statistically significant, which suggests that it should be omitted. The P-value for the remaining variables at the are low and they are statistically significant.

Running the regression only on observations pegged to gold or imposing exchange controls (3), the coefficient exchange rate is estimated to -0.373, the average tariff rate to -0.223, the tariff rate to 0.130, and the constant is estimated to 156.558. The P-values are high for all variables except the average tariff rate. That the variable exchange rate is statistically insignificant for countries on the gold is, of course, reasonable, since the depreciation of a country pegged to gold would all but not exist. The effects of the average tariff rate are estimated to be weaker for countries pegged to gold than for the other regressions.

The variable  $\Delta$ AverageTariff has low p-values irrespective of how the regression is specified. The coefficient is negative, and the estimated values are similar (albeit higher for countries not pegged to gold), which suggests robust results. The variable exchange rate also has low p-values in the first two regressions. The coefficient is negative, but significantly larger for observations not pegged to gold. Again, the result from these regressions suggests that the tariff rates of an individual country does not seem to have a significant effect on industrial production.

Table 5: Regression results for change in Industrial production – Fixed Effects

	(1)	(2)	(3)
<b>Constant</b>	12.086*** (2.495)	10.469** (4.109)	32.197 (42.991)
<b><math>\Delta</math>AverageTariff</b>	-0.373*** (0.036)	-0.319*** (0.050)	-0.451*** (0.056)
<b><math>\Delta</math>Tariffrate</b>	0.014 (0.160)	0.012 (0.031)	0.201 (0.195)
<b>Exchange Rate</b>	-0.01*** (0.030)	-0.074 (0.061)	-0.296 (0.432)
<b>R<sup>2</sup></b>	0.5680	0.520	0.507
<b>F</b>	58.73	21.7	24.02
<b>N</b>	138	64	74

Standard errors are reported in parentheses. \*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively. Regression (1) includes all countries. Regression (2) includes countries not on the Gold only. Regression (3) includes countries on the Gold only.

Measuring the effects Exchange Rate,  $\Delta$ Tariffrate, and  $\Delta$ AverageTariff as explanatory variables on the dependent variable  $\Delta$ Production only for countries not pegged to gold and not imposing exchange controls (2), the coefficient for exchange rate is estimated to  $-0.074$  the  $\Delta$ AverageTariff to  $-0.319$ , the  $\Delta$ tariffrate to  $0.012$ , and the constant is estimated to  $10.469$ . The P-values for the variables  $\Delta$ Tariffrate and exchange rate are high and not statistically significant, which suggests that they should be omitted. The P-value for  $\Delta$ AverageTariff is

statistically significant. The effect of the variable  $\Delta\text{AverageTariff}$  is somewhat smaller than when using all observations.

Running the regression only on observations pegged to gold or imposing exchange controls (3), the coefficient for exchange rate is estimated to  $-0.296$ , the  $\Delta\text{AverageTariff}$  to  $-0.451$ , the  $\Delta\text{TariffRate}$  to  $0.201$ , and the constant is estimated to  $32.197$ . Again, the P-values for the variables  $\Delta\text{TariffRate}$  and exchange rate are high and not statistically significant, which suggests that they should be omitted. Again, it is reasonable that the variable exchange rate would be insignificant for countries pegged to gold since the depreciation would be nonexistent. The P-value for  $\Delta\text{AverageTariff}$  is low and the variable can be considered statistically significant. The effect of the variable  $\Delta\text{AverageTariff}$  is estimated to be the highest for countries pegged to gold.

These results suggests that the effects of both the change in average international tariffs and the domestic depreciation on the change in industrial production differ when observations are grouped according to the monetary strategies. The variable exchange rate becomes statistically insignificant when the gold dummy is included, while the variable  $\Delta\text{AverageTariff}$  remains statistically significant. The variable  $\Delta\text{TariffRate}$  still shows no statistical significance.

### **3.2.3 Discussion of the Results**

The estimations from these regressions have provided some interesting results. As previous research suggests, the effects of depreciation proved to be significant. Since the effects are nonexistent for countries pegged to gold, perhaps the more accurate effects of depreciation are estimated for countries not pegged to gold. The non-significant effects of the tariff rates of a specific observation were perhaps not as expected. Although statistically insignificant, the measured coefficients of the tariff rates were positive, with a single exception. It is possible that it was this positive effect that some countries hoped to utilize. The regressions show, however, that the negative effects of the increased international average tariff rates were paramount.

Relating these results to the previously discussed findings by Eichengreen and Sachs (1984), where depreciation was mutually beneficial if both parties choose to leave the gold standard, it is clear that the more countries that pursued depreciating policies, and therefore decreased their tariff rates, the more countries benefitted from both the lower average tariff rate and the positive effects of depreciation.

When the United Kingdom and the Scandinavian countries left the gold standard in 1931, the average tariffs had yet to reach the peak level of 1933. It is reasonable therefore, that depreciation accounted for the primary effect on their recovery of levels of industrial production, at least initially. For countries who remained pegged to gold longer, it can be deduced that the average tariff rate was the only variable in our regressions that influenced industrial production. This does not, however, include the negative effects of relative appreciation. The data measures the currencies related to gold but does not account for the relative disadvantage compared to those countries who depreciated their currencies. It is possible that relative appreciation would have had a measurable effect on industrial production.

## 4. Conclusions

As have been concluded, countries implemented different strategies to combat the international recession in the 1930s. Countries differed substantially in their ability to avoid the economic recession, where country specific variances had a substantial effect. Yet this research found that certain variables effected the industrial production and, by extension, unemployment.

This work has examined the effects and relationships between certain variables. The research found that both the average tariff rates and the depreciation of a national currency had a significant effect on the industrial production, although differing somewhat depending on how the observations were grouped. The Exchange Rate to gold proved to have the primary effect on industrial production for countries who left the gold standard, while the average tariff rate was statistically significant as an explanatory variable for industrial production for all regressions. The lack of statistical significance of the tariff rates of a specific country suggests that a lone country could not significantly increase their industrial production by pursuing policies of limited trade restrictions. Rather, it was the collectively high tariff rates that influenced the industrial production.

Letting one's national currency depreciate proved to have a significant effect on industrial production, which is in line with the commonly held understanding of the gold standard during the Great Depression. Since leaving the gold standard tended to mean a decrease in the tariff rates, the end of the gold standard meant a decrease in the average tariffs, which promoted international trade, by which the world's economies could recover from the recession. This also explains the increased effect of depreciation when the average tariff rates were considered in the regressions.

As discussed in this paper, the industrial sector was especially affected by the higher rates of unemployment. The intrinsic link between industrial production and unemployment show that a country's monetary policies and the aggregate international trade restrictions had an indirect effect on a country's level of unemployment. This conclusion is in line with the Keynesian concept of cyclical unemployment, where the aggregate demand of industrial produce declined due to the collapse of international trade, by which the industrial production decreased, leading to a decline in demand for labour in the industrial sector.

## 5. Further Research

Economic research strives to better understand the economic mechanisms and their effect on the world's economies. Examining the Great Depression can help prevent and combat future economic recessions. This work, and many others, has focused on international trade, yet there is still much left to be explored. Some possible approaches to the subject that were not explored in this work, that could potentially show some interesting results, were found throughout the writing process.

A possibility for expansion upon this work could be to explore the effects of relative depreciation. Rather than depreciation compared to gold, relative depreciation could show how countries engaged in extensive trade were affected by one or both countries decision to leave the gold standard.

Further, exploring the tariffs imposed on specific countries could expand the understanding on country specific effects. Essentially, this would be exploring the effects of retaliatory trade restrictions.

This work used the variable average tariffs, where each country's tariff was equally weighed to the average. This meant that small economies had the same impact on the average international tariffs as larger ones. It would be interesting to weigh the average according to the prominence on the international market, where the larger players tariff rates effect the international average more than smaller economies.

Finally, it would be interesting to use the same variables as in this work on recessions near the present. Although the gold standard is gone, countries can still be grouped according to monetary policies, where some are using the Euro, or are pegged to it, while others are pegged to the US dollar, and yet some have floating exchange rates. Countries in the eurozone cannot depreciate, since they have no independent monetary policy, while trade restrictions within the European market have been removed. It would be interesting to investigate similarities and differences in the results from the research in this work and, for example, the 2008 financial crisis.

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