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WAR, INFLATION, AND WAGES: THE LABOR MARKET IN FINLAND, 1910-1925

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The First World War was an immense economic shock also for the Finnish economy. As the war began, Finland, as the Grand Duchy of Russia, was cut off from its main export market in Western Europe. During the first war years, however, Russian war-related demand boosted Finnish exports and industry (metal and textiles). This boom ended in bust after the Russian revolution. Furthermore, the Finnish Civil War in 1918 aggravated the crisis. The peg of the Finnish currency markka *to the ruble (until 1917) and a deficit in state finances fueled inflation: the price level increased about elevenfold before the* markka *was stabilized in the early 1920s. Because the labor movement lost the civil war, its political position was rather weak after 1918. This paper analyzes these turbulent years from the viewpoint of the labor market in examining the development of nominal and real wages of manufacturing workers, focusing on the four main industries: sawmill, paper and pulp, metal and textile industries. We show that the asymmetrical shocks they faced caused great variation in their wage and employment development. A comparison with Sweden, France, the United Kingdom, and the United States shows that the relative position of manufacturing workers (real earnings/real GDP per capita) developed more favorably in the deflation economies (Sweden, the UK, and the USA) than in the inflation economies (Finland and France).*

Introduction

The First World War was, besides being an immense political and human disaster, a huge economic shock. It terminated the first, five-decade long era of globalization and put the world economy on a deglobalization path.[1] Although the war was a global economic shock, its consequences varied a lot—between and within nations. This paper analyzes the effects of the "Great War" in the Finnish labor market with a focus on manufacturing workers. We examine the changes in their nominal, real and relative wages from 1910 to 1925. We put the Finnish case in an international context by comparing it with the developments in Sweden, France, the United Kingdom, and the United States.

One important economic consequence of the First World War was the collapse of the global gold standard (Eichengreen 1992, 67-99). Letting the gold anchor of the currencies go led to inflation everywhere, but the magnitude of price increase varied notably, depending on the economic and political destinies of the nations. Hyperinflation raged in several European countries (Austria, Germany, Hungary, and Poland), whereas in some countries (Denmark, Netherlands, Norway, Sweden, and the United Kingdom) the price level rose "only" two- to threefold. In the latter countries inflation was contained at the turn of the 1920s and reversed to deflation in the process of returning to the gold standard at prewar dollar parities. Between these extremes were the countries, where prices kept rising after the early 1920s and the currencies of which were heavily depreciated when they were brought back to the gold standard around 1926. In Belgium, France, and Italy the price level increased five- and sixfold. In Finland the inflationary surge was a bit stronger but did not reach hyperinflation level: prices increased elevenfold (Feinstein, Temin, and Toniolo 2008, 39-46; *The Cost of Living in Foreign Countries* 1927). Did nominal wages keep up with rising prices in Finland? Did inflation treat all worker groups equally? These questions are discussed by comparing the development of wages in Finland's four main manufacturing industries: sawmill, paper and pulp,

[1] On the economics of the First World War, see Hardach (1977); Broadberry and Harrison (2005); Findlay and O'Rourke (2007); Feinstein, Temin, and Toniolo (2008).

textile and metal industries. A quick comparison with agricultural wages is also made.

The development of workers' real wages during and after the First World War is related to a larger question of economic inequality. How did the relative economic position of wage laborers change? We approach this question by contrasting the change of real wages to the real gross domestic product (GDP) per capita in Finland and the four comparison countries (Sweden, France, UK, and USA). According to Thomas Piketty (2014; 2015) world wars have been major turning points in the history of inequality. Besides economic shocks, he "emphasizes the role of political conflict in relation to inequality"; moreover, wars and revolutions "play a large role in my account of inequality dynamics," Piketty writes (2015, 85). He provides an example of the movement toward a more progressive taxation which, according to him, would not have happened without "the violent military, political, and ideological shocks induced by World War I" (Ibid.). The role of taxation stands outside the scope of this paper, since we examine pretax wage earnings. But, we may ask whether the political shocks had an effect on wages. Comparison with the four countries, based on our limited data, offers hypotheses rather than conclusive results.

The paper is organized as follows. Firstly, we describe the macroeconomic development in Finland from 1910 to 1925 in international comparison. Next, we describe institutional developments in the labor market as well as changes in manufacturing employment. Thirdly, we explain the construction of nominal and real wage series and compare the development in real wages in the four main manufacturing industries. Fourthly, we compare Finland with Sweden and further with France, the United Kingdom, and the United States; in these comparisons, we discuss the effects of deflation and inflation on the relative position of manufacturing workers. Following the fourth section, we conclude our arguments.

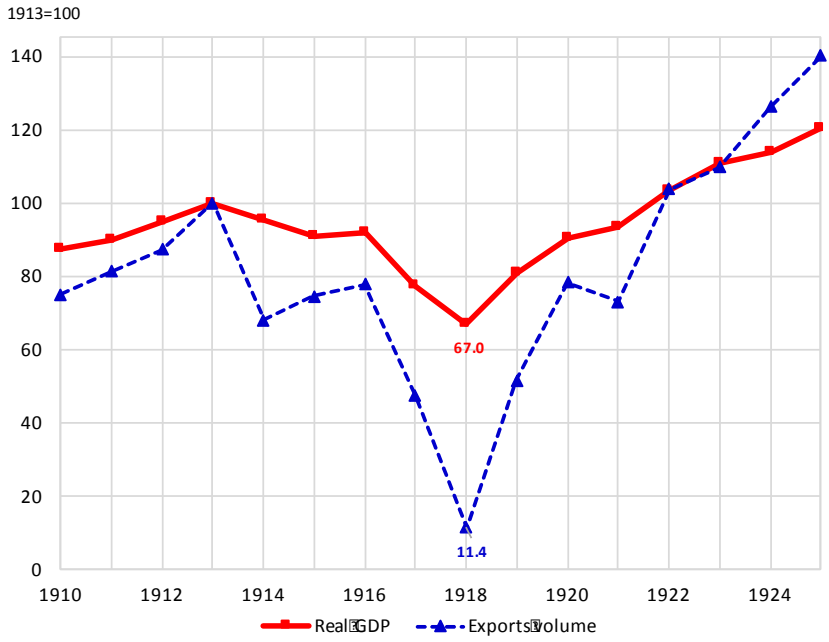
Multiple Economic Shocks

Finland did not participate directly in the First World War. Therefore, the economic effects of the war were different for Finland than for the belligerent nations, where fiscal, military, and human costs were high (Broadberry and Harrison 2005). Yet, Finland could not be neutral in the same manner as her neighbor Sweden, since from the point of view of international law Finland was not a sovereign state, but was then still part of the Russian Empire—although an autonomous Grand Duchy. The political and economic limits of Finland's autonomy, however, became evident when the war broke out. Foreign trade and the currency system were the main channels, through which the economic effects of the war were transmitted to the Finnish economy 1914-1917. As the Russian empire collapsed, Finland declared herself independent in December 1917, thereby joining the ranks of the newly independent European states separated from Russia or established on the ruins of the Austro-Hungarian Empire. Soon after the declaration of independence, a revolution broke out in Finland and from January to May 1918 Civil War raged. Socialist "Reds" lost the war which was followed by a violent retribution by the victorious "Whites" (Hentilä 1999, 101-112).[2]

Since Finland was a small open economy with a high exports-to-GDP ratio (22.9 percent in 1910-1913), the difficulties of exports therefore had a significant impact on the Finnish economy. Before the war, less than 30 percent of Finnish exports went to Russia and over 70 percent went out to Western Europe and beyond through Øresund. This route was blocked after the outbreak of the war in August 1914 as the German navy controlled the Baltic (Kaukiainen 1993, 128). As Finland was cut off from her main export markets, Britain being foremost among them, Russia became practically the only viable export destination. The volume of exports diminished by a third in 1914 but bounced back in the following two years (1915 and 1916) thanks to armaments orders of the Russian army that increased especially the export of metal and engineering

[2] The death toll of Reds (died in action, in prison camps, or executed) was 24,300, that of Whites 4,600 (War victims in Finland, 1914-22, http://vesta.narc.fi/cgi-bin/db2www/sotasurmaetusivu/stat2).

industries. In 1917 even the exports to Russia were practically down to zero in 1918. Finland had also lost the Russian market without yet having gained access to the lost western market.



Sources: Hjerppe (1989); Latola (1954); Oksanen and Pihkala (1975); Pihkala (1970).

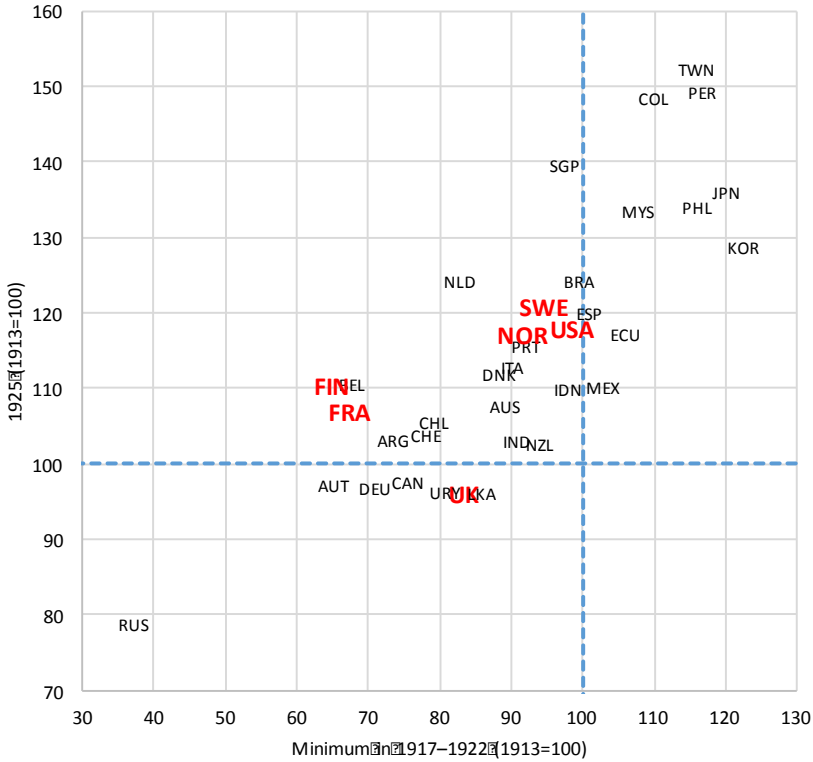
Figure 1
Finland's Real Gross Domestic Product (GDP) and Volume of Exports, 1910-1925

Furthermore, the trade and maritime agreement with Germany, which sent troops to help the "Whites" during the civil war, subordinated Finnish foreign trade to German interests (Hentilä 1999, 117). As a result, the volume of exports in 1918 was only 11.4 percent of the 1913 level—less than 4 percent in relation to GDP. After Germany's defeat and the Armistice of November 1918 exports recovered, but it took years to attain the prewar level: this happened in 1922 (see Figure 1).

As Figure 1 shows, the collapse of exports led the Finnish economy into deep contraction in 1918 with a GDP one third below the 1913 level. Manufacturing and forestry industries suffered even more: in 1918, the output of manufacturing was a mere 46.2 percent of the prewar level; in forestry the ratio was 55.2 percent. With the help of rapidly growing exports, the Finnish economy recovered and had, by 1922, caught up with GDP level of 1913 and was already a fifth bigger in 1925. The exports-to-GDP ratio was a bit higher than before the war: 24.3 percent in the period 1923-1925 (Oksanen and Pihkala 1975; Hjerppe 1989).

Figure 2 puts the Finnish economic bust and recovery, measured in real GDP per capita, into international comparison. Finland was among those European countries with a very huge decline in real GDP per capita (i.e., far left on the horizontal axis). Only in Russia was the trough still deeper. Of the four comparison countries, France suffered almost as big a bust as Finland (or Austria and Belgium), whereas the British economy contracted notably less. In Sweden and in the United States the minimum of real GDP per head in 1917-1922 was just a bit below the 1913 level. When it comes to recovery, measured on the vertical axis (1925/1913), Finland's performance was a bit better than France's, but in both countries the recovery was stronger than in Britain, where real GDP per capita in 1925 was still smaller than in 1913.[3] Sweden and the United States were in a league of their own with real GDP per head about a fifth bigger in 1925 than in 1913.

[3] According to Hills et al. (2015) for the series used here, the real GDP per capita of the UK in 1925 was 4.1 percent smaller than in 1913. According to Angus Maddison's 1995 statistics, it was 2.4 percent smaller, but according Maddison 2003 (the estimate also used by the Maddison Project) in 1925 it was 4.5 percent *bigger* than in 1913. The cause of this obvious error is not traceable, but it may stem from Maddison's mistake in break-adjusting the series in order to take into account the change of UK borders in 1920, i.e. the exclusion of southern Ireland.



Sources: Finland: Hjerppe (1989); France: Villa (1993 and 1997); Sweden: Schön and Krantz (2015); UK: Hills et al. (2015); USA: Carter et al. (2006); all other countries: Maddison Project Database.

Figure 2
The Decline and Recovery of Real Gross Domestic Product (GDP) Per Capita, 1910-1925

The First World War crushed the gold standard and started a period of inflation, the mechanism and the rate of which varied from one country to another. Although Finland had its own currency, the *markka*, and its own monetary system, exchange-rate policy was not perfectly sovereign but had to take into account political pressure from Russia. As Russia financed

her warfare with depreciating paper rubles, Finland's Bank could not quote the ruble at its own true, low value, but had to maintain a higher "political" exchange rate. As the Bank of Finland was compelled to redeem rubles at this inflated rate, the Russian war inflation spread to Finland. In 1917, after the Russian revolutions, the *markka* was released from its political peg to the ruble. But now, however, domestic inflation speeded up, because of the deteriorating state finances, which were shored up with the help of short-term credit from the Bank of Finland—paper money, that is. When inflation peaked in 1921, the value of the Finnish currency *markka* against the dollar was only one ninth of 1913 value. As inflation was halted, the *markka* appreciated and in 1924 was stabilized to a level of about one seventh of the 1913 exchange rate. This level was maintained as Finland returned to the gold standard from the beginning of 1926 (Autio 1992; Kuusterä and Tarkka 2011, 394-482).

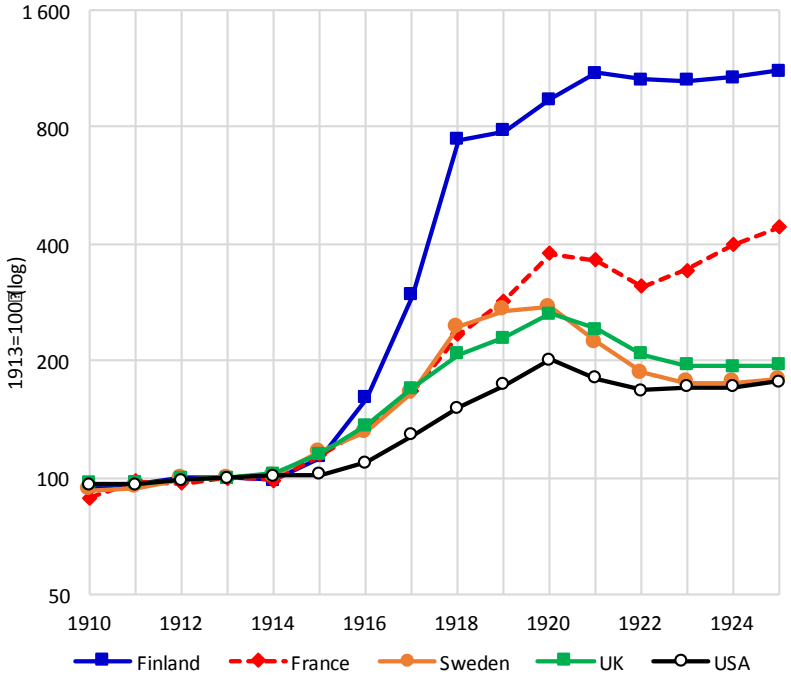
Rapidly rising prices was a phenomenon that economic actors were not used to during the relatively stable price levels during the gold standard decades. To gauge the effects of war-time inflation, an economic policy novelty was adopted: the cost of living index. It was needed for instance, or perhaps especially, for estimating the change of real wages, as a review of the cost of national living indices published by the National Industrial Conference Board in 1927, which stated:

> The development of index numbers showing changes in the cost of living is comparatively recent. Although prior to the World War the gradual rise in the prices of commodities attracted considerable attention among those concerned with economic and social problems, and discussion of the increased cost of living did not become acute and did not enter into the field of industrial relations until the economic disturbances of the war and its aftermath enhanced process to such an extent that the discrepancy between them and prevailing wage levels became clearly evident. (*The Cost of Living in Foreign Countries* 1927, 1)

This generalization applies also to Finland, where the calculation of the official cost of living index was started in 1921 with the first half of the year 1914 as a base. From a modern point of view, one peculiarity of the index was that it included taxes as an expenditure item. We have recalculated the index leaving taxes out and making some other modifications and have then linked the index to our pre-1914 index.[4]

Figure 3 compares the inflation in Finland with the change of consumer prices in our four comparison countries. Within this group, inflation was fastest in Finland with the price level increasing more than elevenfold from 1913 to 1925. The figure shows that the rate of inflation was exceptionally fast during the years of war and revolution, 1916-1918. After 1921 the trend of prices was to flatten out. In the United States, inflation was most subdued: consumer prices rose "only" twofold from 1913 to 1920. In Britain and Sweden, prices rose a bit more, 2.7-fold in 1920, but thereafter declined when they returned their currencies to the 1913 par value against the dollar. As mentioned above, France and Finland did not choose the deflationary route but depreciated their exchange rate when returning to the gold standard. In France, by contrast to Finland, prices kept rising after 1922 and in 1925 reached a level 4.4-times higher than that of 1913. Was inflation or deflation better for workers? We return to this question when we examine the development of real wages relative to real GDP per capita in Finland and in the four comparison countries.

[4] For housing rents, we have used Eero Heikkonen's (1971) index. For food prices 1917-1919 *Statistical Yearbook of Finland 1921* gives two series: regulated and black market prices. We have taken a weighted geometric average with two-third weight on regulated and one-third weight for black market prices. The recalculated index has been chained to our index for 1910-1913 (Heikkinen 1997, 228) on the basis of food prices from *Arbetsstatistisk Tidskrift 1914-1915* [The Journal for Labor Statistics] and housing rents from Heikkonen (1971).



Sources: Finland: own calculations (see text); France: Villa (1993) and *The Cost of Living in Foreign Countries* (1927); Sweden: Edvinsson and Söderberg (2010); UK: Hills et al. (2015); USA: Carter et al. (2006).

Figure 3
Consumer Prices in Finland, France, Sweden, UK and USA, 1910-1925

Labor Markets in Turmoil

The years of revolution, 1917 and 1918, were a turning point in Finnish labor markets. Both workers and employers had organized before the world war. The central organization of trade unions was established in 1907 as was the employers' general confederation. Before the war, trade unions succeeded in concluding only one nation-wide collective labor agreement in the printing and publishing industry, besides of which, there were local collective agreements. The scope of collective bargaining thus remained quite limited before the war (Bergholm 2003; Hannikainen and Heikkinen 2006).

During the world war, employers were already preparing to follow the example of other Nordic countries and accept collective agreements. Then, however, the Finnish Civil War changed the course of events. Trade unions had had a close relationship with the political left and therefore their position was quite weak after the "Reds" were defeated in the civil war. The labor movement was split into its social democratic and communist wings, and the division was also felt in the trade unions. The more the radical left gained ground in the trade unions, the more categorically employers refused to conclude collective agreements.[5] Collective bargaining, again, became the primary aim of the trade unions during the 1920s and the 1930s association, an aim that was reached only after the Second World War (Knoellinger 1960; Mansner 1981). Labor markets, therefore, functioned during the Great Depression in a different manner in Finland than, for instance, in Sweden, where collective agreements made wages stickier than in Finland (Lundh 2010; Heikkinen and Lundh 2013).

Although organized labor suffered a setback in the aftermath of the civil war, one accomplishment that remained from the revolutionary year 1917 was the eight-hour working day. The average working week in manufacturing in 1909 was 58.3 hours or 9.7 hours per day. Saturday was two, three hours shorter, so that the other working days were about 10 hours long (Heikkinen 1997, 155). Shortening the working day was an old aim of the labor movement and with the support of a strike wave, the law on the eight-hour working day was passed in November 1917. Tables were turned in 1918, however, after the defeat of the labor movement in the civil war. Employers tried to postpone the implementation of the law and water it down with exceptions, but in 1920 the eight-hour day was the rule in the manufacturing industries (Ala-Kapee and Valkonen 1982). In this respect Finland did not lag behind the rest of the world, since also in many other countries the eight-hour working day was institutionalized in the

[5] In the early 1920s, the communist-controlled federation of trade unions also expressed a reserved attitude toward collective agreements, whereas social democrats adopted an unreservedly positive stand toward them (Helelä 1963).

aftermath of the world war—in 1919-1920 for instance in Sweden, France, Britain and the United States (Bengtson and Molinder 2016; Cross 1984; Scott and Spadavecchia 2011; Whaples 1990).

The multiple economic shocks described above caused broad swings in labor demand. The overall tightness of labor markets can be gauged on the basis of public, mainly urban, employment statistics reporting the number of applications for work, vacancies offered and filled (Vattula 1983, 395). A crude labor market tightness index[6] suggests that, in relative terms, labor demand was surging in 1915 and 1916. This was caused partly by the extensive fortification works of the Russian army, as well as the growth of the war material industry mentioned above. In 1917 and 1918, the situation changed and unemployment swelled. Economic recovery increased the demand for labor in 1920, and the international depression of 1921 slowed Finland's economic growth only slightly (Hjerppe 1989, 48). In 1923, labor market tightness peaked, although not to the 1916 level, and slacked after that. It was only during the winter of 1924-1925 that general unemployment reappeared (Harmaja 1933, 110).

How tight or slack the labor markets were in practice is difficult to measure. The working-age population (15-64 years),[7] which can be regarded as the upper limit of the labor supply in the economy, grew by an annual rate of 1.3 percent from 1910 to 1925 and, in absolute numbers, far more than employment in manufacturing. Although manufacturing industries were, of course, not the only industries tapping into the labor pool, we may consider the labor supply as being rather elastics. In this sense, the demand for labor was in general the primary determinant of the

[6] Geometric mean of two indices: open vacancies/applications and open vacancies/vacancies filled. Tightness indicator (1910-1913=1) hits its lowest value in 1918 (0.924) and its highest in 1916 (1.493), 1.233 in 1923 and 0.949 in 1925.

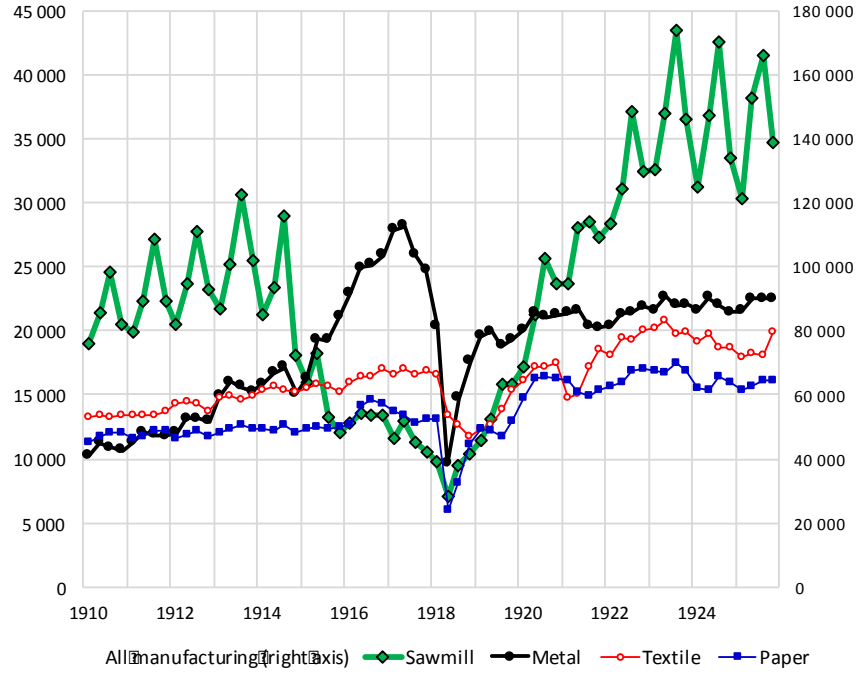
[7] Calculated here as a mean population; Statistics Finland, Historical time series: National accounts 1860-2015, http://pxnet2.stat.fi/ PXWeb/ pxweb/en/StatFin/StatFin__kan__vtp/210_vtp_tau_210.px/?rxid=c76efa c2-55b7-461a-8437-79542dbd5b35.

employment. Yet there were two exceptional years: 1918 and 1919, when the working-age population grew by only 0.3 and 0.4 percent, respectively, due mainly to the death toll of the civil war (see note 2). Then during 1921-1925 the working-age population grew notably faster than on average: 1.6-2.1 percent per year.

According to manufacturing statistics, which have quarterly[8] employment data, the number of manufacturing workers reached the prewar peak of nearly 114,000 in summer 1914. This level was more or less maintained up to the first half of 1917. During the civil war, i.e. the first months of 1918, manufacturing employment contracted and was at lowest only half of the prewar peak. The recovery was, however, swift and in summer 1920 the 1914 level had already been surpassed. After the backlash of 1921, the employment levels increased until summer 1923, where they then prevailed during 1924 and 1925 (see Figure 4).

There were, however, notable differences between industries. In the following, we focus on the four main manufacturing industries: sawmill, paper and pulp, textile, and metal industries. Before the war, the sawmill industry was the largest of them with 24.5 percent of the total manufacturing employment during 1909-1913. The textile industry's employment share was 14.6 percent, the metal industry's 13.3 percent, and the paper and pulp industry's share was 12.5 percent; the remaining industries amounted to 35.1 percent. The trajectories of the four main manufacturing industries diverged drastically. During the war, the sawmill industry lost its export market as foreign trade to Britain and to other western markets was blockaded. In consequence, the number of sawmills dropped to fewer than half in 1916 and to a third in 1918. As Figure 4 shows, the recovery of the sawmill industry —after a rebound of exports—was the main driver of the increase in manufacturing employment.

[8] The number of workers is reported for the first of January, April, July and October.



Sources: Statistical Yearbook of Finland, 1910-1926; Manufacturing statistics, Official Statistics of Finland XVIII, 1910-1925.

Figure 4
Employment in Finnish Manufacturing Industries, 1910-1925
(by quarter)

The other segment of the forest industry, paper and pulp production, was also an export industry, but its markets were in Russia. This is why it did not suffer the same kind of collapse as the sawmills did. Employment actually kept growing until summer 1916 and did not diminish much in 1917 either. Then in 1918, employment also fell in the paper industry. But as paper and pulp producers succeeded in conquering new markets in Western Europe—with the help of the new export cartels established in 1918 (Heikkinen 2000) and in the wake of the depreciated currency—employment surpassed prewar levels in 1920 but did not expand over that.

The textile industry was oriented toward domestic markets, although it also exported somewhat to Russia. Contracts from the Russian army helped to keep employment growing during the war years, when the collapse of western imports alleviated the situation of the industry. Employment diminished also in the textile industry in 1918, but less than manufacturing on average. After the war, the prewar trend of gradual expansion pretty much returned.

The fluctuation of employment was greatest in the metal industry. Orders from the Russian army transformed it into biggest among the Finnish manufacturing industries in 1915. Employment grew until the beginning of 1917, when the number of workers was 80 percent higher than in 1913. The fall from these heights was steep in 1918, when employment diminished by two thirds. However, and perhaps surprisingly, the metal industry succeeded in returning to its long-term growth trend indicating that its expansion was not solely based on the Russian demand for armaments or that it succeeded in turning the war-based growth into peaceful, domestic-market-based development.

These widely diverging developments resulted in an industrial structure not very different from the prewar situation. During the period 1921-1925 the employment shares were as follows: the sawmill industry 25.4 percent, the metal industry 16.5 percent, the textile industry 14.3 percent, the paper and pulp industry 12.4 percent, and all other industries 31.5 percent.

Real Wages

In order to be able to analyze the development of real wages, first we have to construct a consistent series on nominal wages for the years 1910-1925, since such series do not exist. Therefore, the primary empirical objective of this paper is to construct indices of hourly earnings for the four Finnish manufacturing industries—sawmill, paper and pulp, metal and textile industries—and a general index for manufacturing that is based on them. This has to be done using less than perfect data. Wage statistics are, in historical perspective, one of the least developed fields of what is otherwise considered rather advanced official statistics of Finland. This concerns especially wages in manufacturing industries, the wage

statistics of which were published only from 1936 onward. On other non-agricultural industries, there is even scantier data, so that agriculture is the only major trade, from which we have official and uniform wage data for the period 1910-1925. In constructing nominal wage indices for manufacturing workers we have to rely on the scattered data available and complement it with different computations and estimates.

Our main strategy is to base our calculations on the only consistent statistics, the manufacturing statistics. This set contains the number of female and male workers by quarter and their total annual wage bill.[9] Thus the wage indicator that we can directly compute from these figures for each and every industry is the average annual earnings per worker. We can hope, however, that the average number of workers per year, based on quarterly data, efficiently captures the changes in annual working days.[10] Thus we assume that year-to-year changes of average daily (or weekly) earnings were those implied by the indices of annual earnings. To proceed from daily (or weekly) earnings to hourly earnings we should know the length of the working day (or the number of hours per week). In the four industries examined in this paper, the eight-hour working day was introduced already in 1917 (Ala-Kapee and Valkonen 1982). Thus we have estimated hourly earnings assuming that the working week was 57 hours long until 1916, 52 hours in 1917, and 47 hours from 1918 onwards. Unfortunately, possible variations in daily working hours, e.g. because of shorter working days, cannot be estimated.

Besides lacking information on working hours, the second main problem with manufacturing statistics is related to the effects of changing composition of labor forces, especially the fluctuations of the respective shares of female and male workers. If the composition of the labor force changed notably, for instance so that the share of women increased, this of

[9] White-collar workers are not included in the number of the workers, neither are their salaries in the wage bill, which should include all wage payments in money—but presumably not benefits in kind.

[10] We have calculated the annual average of workers in year t as an average of quarterly (Q) data with the following weights: t (Q1) = 0.125, t (Q2) = t (Q3) = t (Q4) = 0.250, $t+1$ (Q1) = 0.125.

course, had an effect on the crude average wage calculated by dividing the wage bill by the number of workers, since the wages of women were substantially lower than those of men. Before the First World War, the average wage of female workers in manufacturing was 55 percent of male workers' wages and in 1936 the ratio was not much higher: 58 percent (Hannikainen and Heikkinen 2006, 170). To circumvent this dilemma we have calculated the number of "male-equivalent" workers by multiplying the number of women by the female-male wage ratio specific to each industry, but constant through the whole period.[11] The division of the wage bill by the number of male equivalents then provides average earnings, hopefully not distorted by changes in the gender composition of the labor force. The effects of possible short-term changes in female-male wage ratio are, of course, not reflected in our calculations, but it seems improbable that they could have a large effect on average earnings.

The final step in constructing the hourly earnings indices is to compare the wage calculations on the basis of manufacturing statistics with the actual wage statistics available on daily or hourly wages. This data is rather scanty. There is data on workers' average hourly earnings in the sawmill industry 1910-1913, 1920-1924, in the metal industries during the periods 1910-1913, 1920-1925, and data on average daily earnings in the textile, sawmill, and paper and pulp industries for the period 1920-1925.[12] The comparison supports quite well the estimates made on the basis of manufacturing statistics. Furthermore, there are statistics on daily earnings in all manufacturing industries in July 1914 and 1915, which has also been used.[13] When converting daily wages to hourly wages we have assumed, as above, that the transition to the eight-

[11] Female–male wage ratios have been calculated as averages of prewar ratios and the earliest postwar ratios available. The ratios used were: the sawmill industry 0.565, the paper and pulp industry 0.567, the metal industry 0.525, and the textiles industry 0.583.

[12] Series are available in the appendix.

[13] *Arbetsstatistisk Tidskrift* 1915, 395-417.

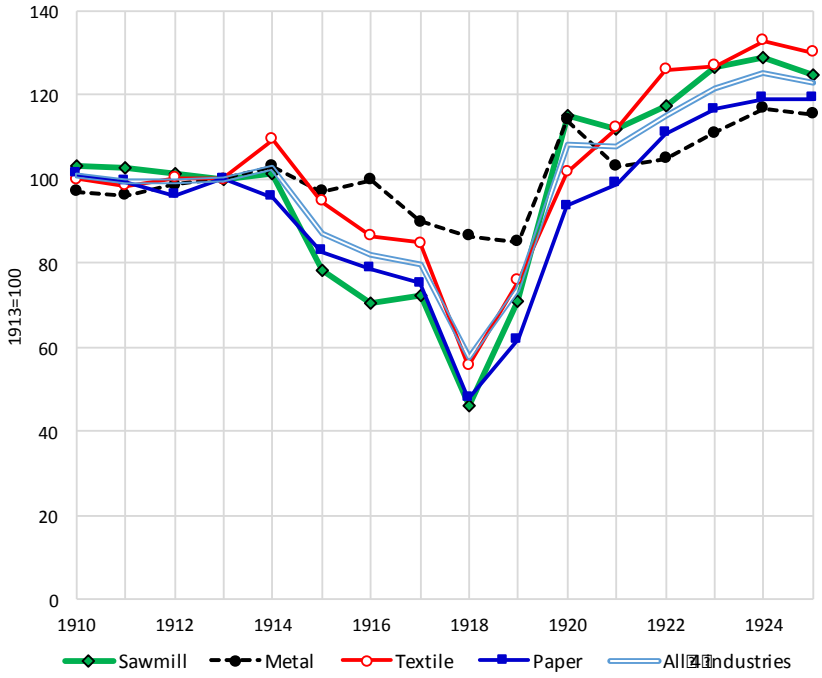
hour working day was made in 1917. The final hourly wage indices for the four manufacturing industries have been compiled by using the best possible wage series available: hourly wages when they are available, then daily wages and finally the "male-equivalent annual earnings" computed in the manner explained above.[14]

We believe that these indices well reflect the levels of hourly wages for 1920-1925 compared with 1910-1913. Concerning the years in between, 1914-1919, we cannot, of course, be sure that our indices reflect only the changing hourly wages, since possible variations in the average length of the working day in different industries cannot be estimated. It is possible that the indices for the war years might overestimate the fall of hourly wages, since our indices do not capture the effects of temporarily shortened working days. The sawmill industry, which the world war hit hardest (see Figure 4), adjusted its labor force to the collapsing demand by several means: firing workers, cutting weekly working hours, and lowering wages. All these tactics were employed especially from September 1914 until the end of 1915. The number of workers was immediately cut by a third and even further in the months to come. Of those left with a job, 41.6 percent worked normal weekly hours with a usual weekly wage, 46.9 percent had normal hours but a reduced wage, 4.8 percent worked less than normal hours but maintained the old wage, and 6.7 percent had to settle for a shortened working week and a reduced wage. From the beginning of 1916, those left with a job worked mostly normal weekly hours with the usual compensation.[15]

The sawmill industry was probably exceptional, since it faced a more dramatic fall in demand than other industries, but it is of course possible that the same kind of methods were also used in other industries.

[14] For years 1916-1919 our hourly wage series, thus, rely on our male-equivalent wage indices. When linking the hourly wages of 1920 or 1921 to 1915 levels, we have estimated annual changes according to the trend deviations from the exponential trends of our male-equivalent wage indices.

[15] *Arbetsstatistisk Tidskrift* 1917, 41.



Sources: Statistical Yearbook of Finland, 1910-1926; Manufacturing statistics, Official Statistics of Finland XVIII, 1910-1925; Vattula 1983; Social Tidskrift [Social Journal] 1920:4; Työpalkkakomitean mietintö KM 1934:1 [Report of The Wage Committee 1934]

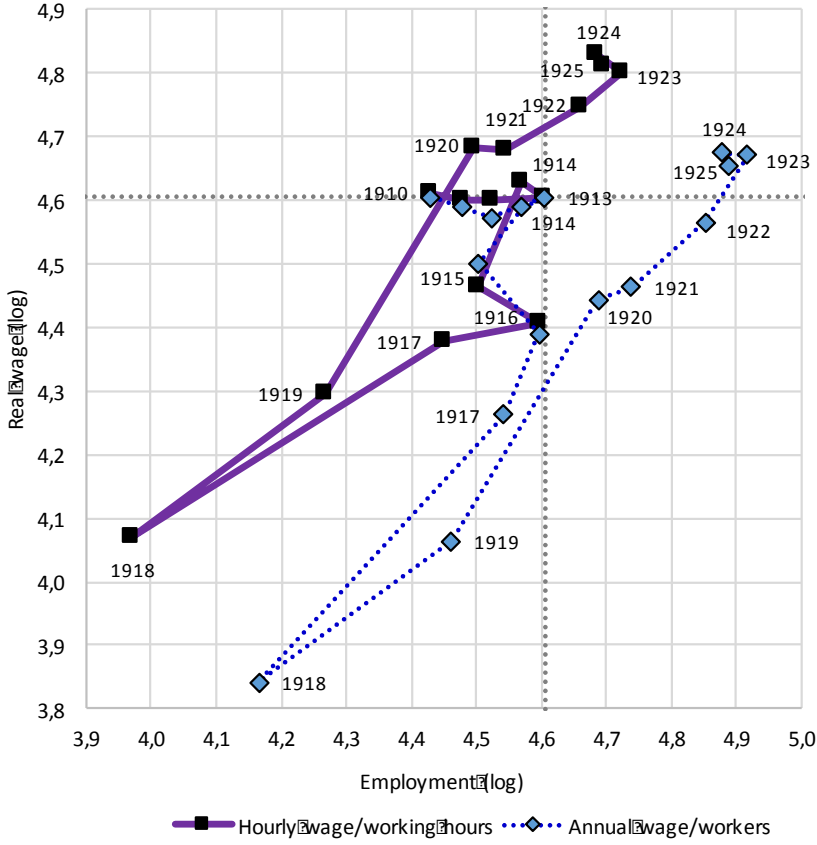
Figure 5
Real Hourly Wages in Finnish Manufacturing Industries, 1910-1925

Deflating the hourly nominal wage (earnings) indices with our cost of living index results in hourly real wage (earnings) indices, presented in Figure 5. The indices of four industries are combined into a general index by weighting them with employment in 1913. The general, hourly real-wage index of the four manufacturing industries started to decline in 1915 and was, in 1918, 58 percent of the 1913 level. Economic recovery, together with a shorter working day, pushed the average real wage over its prewar level already in 1920, and in 1924 the estimated average hourly real wage was 25 percent higher than in 1913. The decline of annual real wages was even more dramatic and the recovery more modest. In 1918, the annual real-wage index for the four manufacturing industries was 46 percent of the 1913 level, which it exceeded by 5-7 percent during the period 1923-1925.

For analyzing the covariation of real wages and employment, Figure 6 plots changes in real wages against the changes in employment. There are two alternative curves: one for employment measured in number of workers and wages as annual wages, and the other for employment measured in working hours and wages as hourly wages.[16] The looping curves suggest a division of the 15 years into four different phases: 1) the prewar years 1910-1913/1914; 2) the years of world war 1914-1916, 3); the revolutionary years 1917-1918; and 4) the years of recovery 1919-1925. We interpret these phases, rather speculatively, from the point of view of an interaction of labor supply and demand plus the role of inflation.[17]

[16] It should be noted that the number of working hours is an estimation, based on the number of workers and the average working week. Thus, possible short-term changes in the length of the working week are not taken into account.

[17] The real wage calculated here is the real consumption wage, i.e. the nominal wage deflated by the consumer price index. From the point of view of labor demand, the product real wage, i.e. the nominal wage deflated by producer prices, would, of course, be the proper one.



Sources: See Figures 4 and 5 and the text.

Notes: Figures refer to the sum of sawmill, paper and pulp, metal, and textiles industries. Employment in hours is calculated assuming the working week to be 57 hours until 1916, 52 hours in 1917 and 47 hours from 1918 onwards. Natural logarithms are calculated from employment and wage indices (1913=100).

Figure 6
Real Wages and Employment in Finnish Manufacturing Industry, 1910-1925

The first phase, from 1910 to 1913/1914, was characterized by stable real wages and increasing employment. In a labor supply–demand framework, assuming that the labor market was in equilibrium, this could be interpreted as a development, where both the labor supply and demand curves are shifting to the right, leaving real wages unchanged. The winding curve from 1914 to 1916 associates declining real wages with stagnating employment. The fall of real wages could be interpreted as resulting from diminishing labor demand as well as from galloping inflation: prices were starting to rise faster, and the workers not accustomed to this new phenomenon may have suffered from a money illusion.

The two curves separate in 1917 because of the introduction of the eight-hour working week in 1917 and 1918.[18] Annual earnings diminished more than did the hourly wages, whereas the reduction in the number of workers was less than of working hours. Yet, in 1918 the labor demand curve was definitely shifting to the left, and perhaps we may assume that the labor supply curve was moving to the right, as the employment in alternative labor markets was diminishing (at least according our labor-market tightness index, see footnote 6). The vigorous decline of real wages is thus not a surprise. During the fourth phase, from 1919 to 1925, the shape of the two curves was again identical, since we have assumed that the length of the average working week did not change. During these years, increasing employment was associated with real wage growth. According to our hourly wages curve, in the early 1920s labor markets seem to have been situated in the same equilibrium (i.e. the same level of real wages and employment) as ten years earlier. Thereafter, stabilized consumer prices promoted the rise of real wages as employment kept rising until 1923 with real hourly wages and the number of working hours exceeding the prewar levels. The other curve, plotting annual real wages against the number of workers, tells a bit different story. According to this story, the prewar level of real annual earnings was attained only in 1923, when employment measured in the number of workers was already more than a third higher than in 1913. This suggests that the labor supply—in

[18] The transition may have been more gradual, also extending to the years after 1918, because exceptions to the law could be granted.

terms of workers—was rather elastic. The 1923 level of real wages prevailed in the final years, 1924 and 1925, when manufacturing employment slightly diminished—as did the general tightness in the labor markets, according to our indicator.

The economic shock of the First World War thus treated the four industries in an asymmetric manner. The main export industries, the sawmill industry and the paper and pulp industry, suffered most during the war years. In the sawmill industry, which lost its western markets, real wages fell notably already in 1915 and 1916. After bottoming out in 1918, real wages regained as export channels to the west opened again. The depression in Britain and other markets in 1920-1921 stopped the rise of real wages, which started again in 1922. In the paper and pulp industry, real wages diminished during the war years a bit less than in the sawmill industry. This is understandable, since paper exporters still had their Russian markets. These markets were, however, lost in 1918, which shocked the industry. The recovery was a tougher job than in the sawmill industry, since paper and pulp exporters had to acquire new markets in the west. As they succeeded, also paper industry workers benefitted in the form of rising real wages. In the sawmill industry during the period 1923-1925, real wages were over a quarter and in the paper and pulp industry almost a fifth above the prewar level (see Figure 5).

The metal industry was exceptional among the four industries insofar as real wages maintained the prewar level up to 1916, before diminishing in 1917 and 1918—however, significantly less than in other industries. One may wonder why real wages did not rise during the war-material-demand boom, when the number of workers almost doubled (see Figure 4). One possible explanation, besides inflation, could be the changing composition of the workforce: the average skill level of workers might have declined and contained the rise of the average wage measured here. After the war, employment diminished (see Figure 4), because domestic demand obviously did not succeed in compensating for the vanished Russian markets. However, although development of real wages was less favorable in the metal industry than in the manufacturing on average, the real hourly wage did exceed the prewar level by 15 percent in 1925. For the textile industry, the war-related demand from Russia was less important

than for the metal industry, but also in textile manufacturing relative wages developed better than average for the period 1914-1916. The contraction in 1918 was huge but temporary, as from 1919 onwards real wages recovered quickly, exceeding the prewar level by almost a third in 1924. The textile industry, which was oriented toward domestic markets, obviously succeeded in competing with imports—perhaps with the help of depreciating currency making imports more expensive in *markka* terms.

Finnish Manufacturing Workers' Wages in Comparison

How well did the Finnish manufacturing workers do economically during and after the First World War? Answering this question demands comparison. We do it, firstly, by comparing wage developments in Finland and Sweden. Secondly, we compare the development of manufacturing real wages to changes in real GDP per capita in Finland, Sweden, France, the United Kingdom, and the United States.

Macroeconomic performance over the course of the First World War in Sweden was definitively better than in Finland. Domestic product declined only slightly in Sweden and was in 1925 considerably higher than in Finland, as compared with the prewar level (see Figure 2). Furthermore, inflation was moderate for the standards of the era (see Figure 3). It is no wonder, therefore, that the development of real wages was more favorable in Sweden than in Finland. In Sweden, real hourly earnings of male manufacturing workers declined from 1913 to 1918 by 9 percent (Edvinsson and Söderberg 2010; Prado 2010), whereas in Finland real wages fell 42 percent. In 1921, deflation pushed real wages in Swedish manufacturing 62 percent over the 1913 level. This was a one-year peak, but hourly real earnings were, however, 44 percent over the prewar level in 1925, when Finnish real wages were just 23 percent higher than in 1913.

The more dramatic decline in Finland of manufacturing workers' wages than in Sweden also resulted in a different development in their relative wages, compared with agricultural workers' wages. In both countries, agricultural workers' nominal wages before the war were about 50 percent higher than manufacturing workers' wages

(Vattula 1983; Prado 2010; Lundh and Prado 2015).[19] In Sweden the manufacturing–agriculture nominal wage gap was reduced a bit below 50 percent during 1917-1918, but in Finland the gap practically disappeared during 1916-1917. In both countries, rising manufacturing wages widened the wage gap after the war so that it clearly exceeded prewar figures in 1925. Yet, Sweden was ahead of Finland also in this respect with nominal wages of manufacturing being ca. 2.3 times those of agriculture in 1925, whereas in Finland they increased 1.9-fold. Real wage gaps were much narrower. Lundh and Prado have estimated that accounting for urban–rural cost-of-living differentials alone reduces the gap from 130 to 70 percent (Lundh and Prado 2015, 72, 81; see also Lundh 2012). The same kind of correction should also be made for the Finnish wage gap, but we do not have an estimation for its size for this period. Before the war, adjusting real wages for cost-of-living differences reduced the urban–rural wage gap in Finland by half of the nominal (Heikkinen 1997, 124).

Manufacturing workers thus did do better in Sweden than in Finland, when measured by the growth of hourly real earnings, or when compared to agricultural workers' wages. It seems that differences in the introduction of the eight-hour working day played a role here. As mentioned above, the working day was shortened to eight hours in Finnish manufacturing during 1917-1918, and in Sweden two years later, in the beginning of 1920. In both countries, the shortening concerned manufacturing but not agriculture. In Sweden, the working day was shortened without cutting the daily wage, contrary to employers' demands (Bengtson and Molinder 2016).

This obviously explains, at least partly, why the Swedish manufacturing workers' earnings gains were larger than Finnish workers'

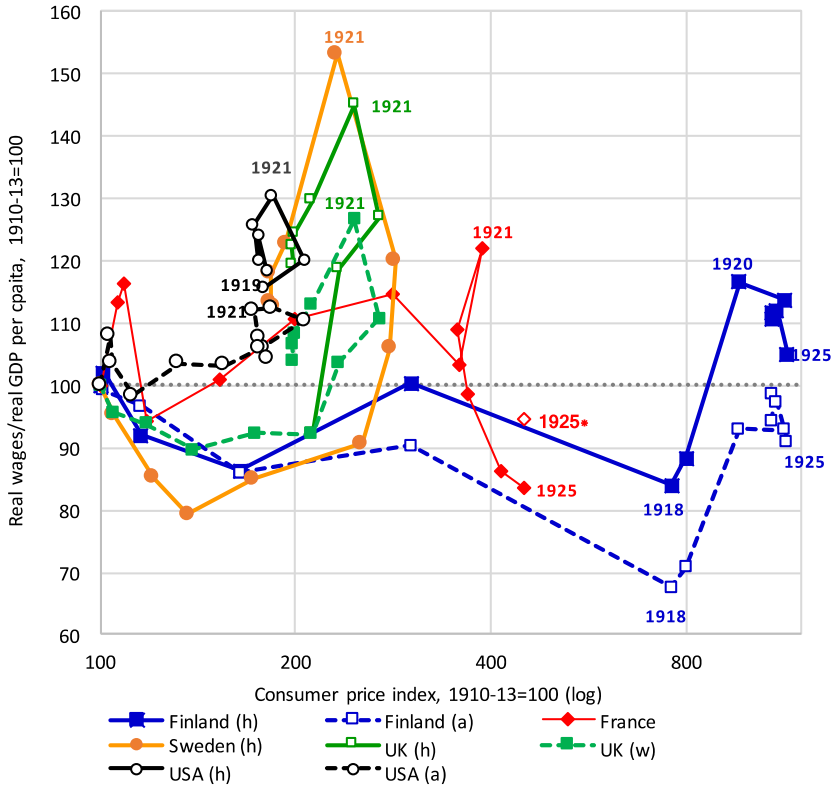
[19] Agricultural workers' wages in Finland are taken from Vattula 1983. They are the average of summer and winter daily wages of male laborers (a category not including food and housing as in kind payment). Daily wages are divided by 9.5. Manufacturing wages are calculated on the basis of our hourly earnings index by linking it to the 1913 level derived from manufacturing statistics (male-equivalent average wage).

wage increases during the first half of the 1920s. Assuming that Swedish employers' demands were fulfilled and daily wages were cut, the real hourly earnings of Swedish manufacturing workers in 1925 would not have been much higher than that of Finnish workers, when compared with the prewar levels. This implies that trade unions after the First World War in Sweden had a stronger position than in Finland, which is congruent with the received wisdom of the politico-historical narrative emphasizing the long shadow cast by the defeated Finnish revolution of 1918.

Finally, we place the real wage development of Finnish manufacturing workers into wider international comparative context and compare the hourly real earnings with changes in real GDP per head[20] in Finland, Sweden, France, the United Kingdom, and the United States. Thus, we compare the relative changes in real wages against the changes in the economy at large. Figure 7 displays real wage/real GDP ratio (vertical axis) against consumer price inflation (horizontal axis). We have presented both hourly and weekly/annual wages when available. British hourly wages are calculated from weekly series, assuming that the working week shortened in 1919 from 53.5 to 46.7 hours (Scott and Spadavecchia 2011, 1273). For the French wage data the temporal information is missing.[21] For 1925, we have therefore calculated an alternative estimate (=1925*) assuming that wage data refers to weekly earnings and that in 1925, the working week was 49.0 hours long compared with 55.5 before 1919 (Scott and Spadavecchia 2011, 1273).

[20] It should be noted that wages are deflated with the consumer price index, GDP per head with GDP deflator.

[21] We have used Kuczynski's (1967) series, since we have assumed (trusting Piketty 2001) that they are the best available for these years. Piketty uses series for all workers (agriculture and manufacturing), while we use the series for manufacturing workers only.



Sources: Wage data: Finland: see Figure 5; France: Kuczynski (1967); Sweden: Prado (2010); UK: Hills et al (2015) and Scott and Spadavecchia (2011); USA: Carter et al (2006); real GDP per capita: see Figure 2; consumer price indices: see Figure 3.

Notes: a = annual earnings, h = hourly earnings, w = weekly earnings.

Figure 7

Real Wages in Manufacturing Relative to Real GDP per capita and Consumer Prices in Finland, France, Sweden, UK and USA, 1914-1925

Figure 7 shows, first of all, a divide between deflation and inflation economies. In Sweden, the United Kingdom, and the United States, inflation stopped in 1920 and became deflation. In all three countries, real wages in relation to GDP per capita peaked in 1921, declined

in the following years, but in 1925 ending 13-19 percent higher than before the war (1910-1913). Besides Sweden and the USA, which were both growing, it also happened in Britain, whose economic performance was dismal in the 1920s. In inflationary Finland and France, workers' relative position developed less favorably. In Finland, the fall in the revolutionary year 1918 was deep, but thereafter hourly, real earnings of manufacturing workers relative to real GDP per capita rose more than in France. In Finland, the real hourly wages were 5 percent above the prewar level, relative to real GDP per capita. In France they were 5 (according to our * estimate) or 16 percent below the prewar level.[22] To what extent these divergent outcomes were the result of inflationary and deflationary forces, and how large was the role of political factors, e.g. the strength of trade unions, is a question, to which our limited data does offer an answer. Yet, the fact that Finland was lagging behind not only the UK and the USA, but also neighboring Sweden with many similar economic traits, suggests that the power of workers in Finland was too limited to have an effect on income distribution at the introduction of the eight-hour working day. We assume that these divergent wage developments in different countries had implications also for macroeconomic performance and unemployment (cf. Broadberry 1990; Broadberry and Ritschl 1995; Bengtson and Molinder 2016), but what kind of implications, is a theme for further study.

[22] It is possible that Kuczynski's series underestimate the growth of nominal wages, since Villa's general index of hourly wages, excluding agriculture, in 1925 were 5.5 times the 1913 level, whereas Kuczynski's index grew 4.4-fold (http://www.cepii.fr/francgraph/bdd/villa/mode.htm; LONG_1938, series WHPE1). Using this series would drive the French curve above 100 in 1925 to 6 percent above the prewar level, to about the same level as in Finland.

Conclusion

The First World War and its aftermath shook the Finnish economy and labor market in several ways. Economic shocks treated manufacturing industries and their workers asymmetrically. The curtailment of exports to Western Europe shocked the main export industry, the sawmill industry, the employment of which diminished quickly. The paper and pulp industry, exporting mainly to Russia, was hurt less, whereas the metal industry and to lesser extent the textile industry experienced a short boom caused by the Russian war material demand. This boom ended in the Russian revolution, which opened the door to Finland's independence but also aggravated the political situation that culminated in the civil war of early 1918. Real wages halved, but as the economy recovered after the war also real wages returned to the prewar levels. The recovery was rapid especially in the sawmill industry, which regained its old export markets in the west. After the war, real wage development was least favorable in the metal industry, which had lost its lucrative war-material markets in Russia. The metal workers' real wages did not return to prewar levels during the first half of the 1920s.

The years of war and revolution put the labor market in turmoil also politically. Trade unions enjoyed their new freedom of action in 1917, as the wartime ban on strikes was abolished, and they pressed for the eight-hour working day. The goal was attained in the main industries already in the spring of 1917 and at the end of year the law shortening the working day, which did not concern agricultural workers, was passed. Collective agreements were the other main goal of trade unions, but after the defeat of the labor movement in the civil war, the political balance of power turned to the advantage of employers, which categorically turned down the idea of collective bargaining. Despite this the eight-hour working day remained the lasting achievement of the trade-union surge of 1917. It lifted workers' living standards: not by raising the weekly or annual earnings, but by guaranteeing workers about 500 hours more leisure time per year as the annual working hours diminished from 3,000 to 2,500 hours.

A comparison with Sweden, France, the United Kingdom, and the United States shows that workers' real earnings relative to real GDP per

head developed more favorably in economies experiencing deflation in the early 1920s (Sweden, the UK, and the USA) than in economies with stronger and longer inflation (Finland and France). Finnish manufacturing workers did not reap as large of economic benefits from the introduction of the eight-hour working day as did the workers in Sweden (and obviously also in the UK and the USA). It is tempting to interpret this as the result of the failed Finnish revolution and the lost civil war (1918), leaving the labor movement in a rather weak position during the early years of independent Finland. The comparison with France, however, suggests that the idiosyncratic factors of Finnish politics cannot be the whole explanation for this, but that deflationary and inflationary forces (not totally apolitical, of course) played their own roles as well.

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APPENDIX

Table A1 (used in Figure 1)

Finland's real GDP and volume of exports, 1910-1925, 1913=100

	Real GDP	**Exports volume**
1910	87.4	75.1
1911	89.9	81.3
1912	94.9	87.3
1913	100.0	100.0
1914	95.6	68.2
1915	90.7	74.5
1916	92.1	77.9
1917	77.3	47.3
1918	67.0	11.4
1919	80.9	51.7
1920	90.5	78.3
1921	93.6	73.1
1922	103.3	103.7
1923	111.0	109.7
1924	113.9	126.1
1925	120.3	140.2

Table A2 (used in Figures 3 and 7)

Consumer prices indices, Finland, France, Sweden, UK and USA, 1910-1925, 1913=100

	Finland	France	Sweden	UK	USA
1910	93.9	89.0	92.8	96.4	95.8
1911	96.8	97.8	93.9	96.6	95.8
1912	100.0	96.7	98.9	99.4	98.3
1913	100.0	100.0	100.0	100.0	100.0
1914	98.7	98.4	101.3	102.5	100.8
1915	113.1	114.7	116.4	115.4	101.7
1916	160.2	135.1	131.6	136.2	109.2
1917	294.6	166.3	166.0	170.6	128.6
1918	740.3	234.4	243.9	208.1	151.3
1919	781.7	285.7	269.2	229.1	173.9
1920	940.9	378.0	274.3	264.4	201.7
1921	1,104.2	364.2	223.7	241.7	179.8
1922	1,062.0	311.0	186.2	207.8	168.1
1923	1,056.5	342.2	176.1	195.4	171.4
1924	1,076.4	398.3	176.1	194.0	171.4
1925	1,117.9	441.2	179.1	194.6	176.5

Table A3 (used in Figure 4)

Employment in Finnish manufacturing industries, 1910-1925

(number of workers by quarter)

Year	Quartal	All manufacturing	Metal	Paper	Sawmill	Textile
1910	1	82,369	10,277	11,333	19,009	13,326
	2	87,158	11,259	11,716	21,381	13,419
	3	94,919	10,909	12,070	24,635	13,201
	4	88,134	10,618	12,082	20,452	13,368
1911	1	84,178	11,254	11,593	19,834	13,389
	2	90,275	12,089	11,761	22,340	13,466
	3	101,361	11,881	12,249	27,160	13,381
	4	94,230	11,783	12,257	22,357	13,664
1912	1	90,166	11,970	11,662	20,538	14,338
	2	96,478	13,130	11,841	23,639	14,504
	3	106,900	13,114	12,171	27,746	14,326
	4	98,116	12,889	11,772	23,177	13,671
1913	1	96,301	14,874	12,025	21,709	14,833
	2	103,141	16,035	12,343	25,204	14,879
	3	113,579	15,633	12,587	30,627	14,657
	4	104,230	15,258	12,322	25,443	14,929
1914	1	97,535	15,869	12,314	21,262	15,327
	2	102,551	16,696	12,244	23,395	15,683
	3	113,604	17,130	12,695	28,967	15,407
	4	90,691	15,101	12,010	18,072	15,285
1915	1	90,494	16,203	12,379	15,960	15,501
	2	98,483	19,326	12,459	18,288	15,742
	3	99,962	19,240	12,400	13,219	15,669
	4	97,126	21,043	12,508	12,024	15,257
1916	1	99,178	22,973	12,681	12,793	15,981
	2	104,804	24,901	14,111	13,560	16,450
	3	111,171	25,092	14,552	13,343	16,457
	4	109,296	25,885	14,244	13,340	16,972
1917	1	105,729	27,876	13,744	11,659	16,516
	2	106,986	28,154	13,469	12,892	16,970
	3	102,365	25,941	12,742	11,337	16,562
	4	98,345	24,682	13,062	10,513	16,924

Table A3 (used in Figure 4), continued

Year	Quartal	All manufacturing	Metal	Paper	Sawmill	Textile
1918	1	87,874	20,289	13,062	9,794	16,560
	2	55,835	9,620	5,992	7,091	13,448
	3	72,140	14,721	8,172	9,503	12,636
	4	78,928	17,553	11,176	10,358	11,723
1919	1	84,060	19,534	12,331	11,444	12,293
	2	87,634	19,947	12,218	13,162	12,639
	3	95,318	18,813	11,685	15,809	13,782
	4	98,666	19,314	12,892	15,790	15,417
1920	1	101,111	20,050	14,701	17,209	16,185
	2	111,957	21,375	16,203	21,320	17,106
	3	122,002	21,057	16,481	25,639	17,235
	4	117,467	21,224	16,202	23,639	17,436
1921	1	110,407	21,343	16,076	23,711	14,795
	2	114,148	21,547	15,159	28,073	15,049
	3	120,644	20,358	14,966	28,459	17,201
	4	119,602	20,231	15,437	27,265	18,466
1922	1	119,440	20,367	15,738	28,273	18,136
	2	126,243	21,298	15,892	31,029	19,373
	3	139,410	21,397	16,832	37,014	19,275
	4	134,278	21,861	17,030	32,480	20,099
1923	1	130,129	21,547	16,889	32,525	20,227
	2	138,779	22,621	16,754	36,875	20,789
	3	151,262	21,925	17,479	43,377	19,663
	4	139,964	22,055	16,813	36,422	19,897
1924	1	126,735	21,565	15,464	31,155	19,098
	2	136,081	22,600	15,310	36,732	19,707
	3	146,553	21,942	16,394	42,548	18,710
	4	134,175	21,431	15,938	33,439	18,685
1925	1	125,421	21,500	15,432	30,228	17,952
	2	137,217	22,473	15,662	38,174	18,180
	3	147,447	22,464	16,082	41,463	18,123
	4	139,496	22,524	16,136	34,661	19,839

Note: 1 = January 1.; 2 = April 1.; 3 = July 1.; 4 = October 1.

Table A4 (used in Figures 5 and 6)

Hourly wages in Finnish manufacturing industries, 1910-1925, 1913=100

	Nominal wages				
	Metal	**Paper**	**Sawmill**	**Textile**	**All 4 industries**
1910	91.1	95.0	96.8	93.9	94.6
1911	92.9	96.0	99.3	95.1	96.3
1912	98.5	96.1	101.4	100.1	99.5
1913	100.0	100.0	100.0	100.0	100.0
1914	101.6	94.4	100.1	107.9	101.1
1915	109.6	93.7	88.4	107.1	98.2
1916	159.8	125.7	112.8	138.6	131.4
1917	264.7	221.5	212.8	250.0	234.3
1918	640.4	353.2	342.2	412.4	427.3
1919	664.9	484.0	552.8	592.2	574.4
1920	1,072.6	879.7	1,080.1	956.6	1,015.4
1921	1,138.0	1,091.1	1,234.7	1,237.9	1,187.5
1922	1,113.1	1,176.3	1,247.7	1,338.1	1,223.9
1923	1,173.7	1,230.6	1,338.1	1,341.2	1,282.0
1924	1,256.1	1,280.3	1,384.7	1,428.9	1,346.3
1925	1,290.8	1,329.5	1,391.7	1,454.8	1,371.3

Table A4 (used in Figures 5 and 6), continued

Hourly wages in Finnish manufacturing industries, 1910-1925, 1913=100

	Real wages				
	Metal	**Paper**	**Sawmill**	**Textile**	**All 4 industries**
1910	97.0	101.2	103.1	100.0	100.7
1911	96.0	99.2	102.5	98.3	99.5
1912	98.5	96.1	101.4	100.1	99.5
1913	100.0	100.0	100.0	100.0	100.0
1914	102.9	95.7	101.4	109.3	102.4
1915	96.9	82.8	78.1	94.7	86.8
1916	99.8	78.5	70.4	86.5	82.1
1917	89.9	75.2	72.2	84.9	79.5
1918	86.5	47.7	46.2	55.7	57.7
1919	85.1	61.9	70.7	75.8	73.5
1920	114.0	93.5	114.8	101.7	107.9
1921	103.1	98.8	111.8	112.1	107.5
1922	104.8	110.8	117.5	126.0	115.2
1923	111.1	116.5	126.7	126.9	121.3
1924	116.7	118.9	128.6	132.8	125.1
1925	115.5	118.9	124.5	130.1	122.7

Table A5 (used in Figure 6)

Annual wages in Finnish manufacturing industries, 1910-1925, 1913=100

	Nominal wages				
	Metal	**Paper**	**Sawmill**	**Textile**	**All 4 industries**
1910	91.1	95.0	94.8	93.9	93.8
1911	92.9	96.0	96.1	95.1	95.1
1912	98.5	96.1	94.0	100.1	96.7
1913	100.0	100.0	100.0	100.0	100.0
1914	99.8	92.1	94.9	101.7	97.0
1915	116.6	100.0	92.4	104.6	101.9
1916	155.3	125.4	111.9	134.7	129.2
1917	229.4	200.0	192.2	221.8	208.5
1918	490.5	285.9	278.9	330.7	339.5
1919	497.9	388.6	449.6	474.8	455.1
1920	785.2	700.6	876.8	766.9	800.3
1921	934.0	861.9	1,000.4	992.4	958.6
1922	991.3	953.1	1,022.4	1,097.8	1,019.2
1923	1,093.6	1,052.5	1,162.9	1,164.4	1,127.5
1924	1,161.9	1,118.5	1,163.7	1,155.8	1,153.4
1925	1,200.0	1,136.5	1,156.6	1,202.9	1,172.9

Table A5 (used in Figure 6), continued

Annual wages in Finnish manufacturing industries, 1910-1925, 1913=100

	Real wages				
	Metal	**Paper**	**Sawmill**	**Textile**	**All 4 industries**
1910	97.0	101.2	101.0	100.0	99.9
1911	96.0	99.2	99.3	98.3	98.3
1912	98.5	96.1	94.0	100.1	96.7
1913	100.0	100.0	100.0	100.0	100.0
1914	101.1	93.3	96.1	103.1	98.3
1915	103.1	88.4	81.7	92.4	90.1
1916	97.0	78.3	69.9	84.1	80.7
1917	77.9	67.9	65.3	75.3	70.8
1918	66.3	38.6	37.7	44.7	45.9
1919	63.7	49.7	57.5	60.7	58.2
1920	83.5	74.5	93.2	81.5	85.1
1921	84.6	78.1	90.6	89.9	86.8
1922	93.3	89.7	96.3	103.4	96.0
1923	103.5	99.6	110.1	110.2	106.7
1924	107.9	103.9	108.1	107.4	107.2
1925	107.3	101.7	103.5	107.6	104.9

Table A6 (used in Figure 6)

Employment in Finnish manufacturing industries, 1910-1925, 1913=100

Metal, paper, sawmill and textile industries

	Number of workers, male equivalents	Annual working hours, male equivalents
1910	83.9	83.9
1911	88.1	88.1
1912	92.1	92.1
1913	100.0	100.0
1914	96.5	96.5
1915	90.3	90.3
1916	99.1	99.1
1917	94.0	85.8
1918	65.1	53.7
1919	86.6	71.4
1920	108.5	89.5
1921	114.2	94.2
1922	128.0	105.5
1923	136.5	112.6
1924	131.4	108.3
1925	132.5	109.3

Table A7 (used in Figure 7)

Real wages in manufacturing relative to real GDP per capita in Finland, France, Sweden, UK and USA, 1914-1925, 1910-13=100

	Finland		France		Sweden	UK		USA	
	Hourly	**Annual**		*	**Hourly**	**Hourly**	**Weekly**	**Annual**	**Hourly**
1914	102.0	99.1	113.3		95.2		95.6	107.9	109.9
1915	92.0	96.7	116.4		85.1		93.9	103.5	
1916	86.3	85.9	94.1		79.2		89.7	98.3	
1917	100.3	90.3	101.1		85.0		92.4	103.6	
1918	83.9	67.5	110.5		90.7	92.1	92.1	103.1	
1919	88.3	70.8	114.7		105.9	118.7	103.6	106.0	115.6
1920	116.5	92.9	103.1		120.0	126.8	110.7	110.3	120.0
1921	113.6	92.9	121.8		153.1	144.9	126.5	112.3	130.4
1922	111.7	94.1	108.8		122.6	129.5	113.1	112.0	125.7
1923	110.6	98.5	98.4		117.9	124.2	108.4	107.5	119.9
1924	112.0	97.2	86.1		113.1	122.2	106.6	105.8	123.8
1925	105.0	90.9	83.5	94.6	112.5	119.2	104.1	104.4	118.4