Comparing Past and Present Wage Inequality in Two Globalisation Periods

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Abstract

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Abstract

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I. Introduction

The main objective of this paper is to compare wage inequality in past and present globalisation periods with an aim to highlighting the different factors which drove wage inequality then and those which are doing so now. It is interesting to study this topic from a historical perspective because although the factors that acted in the past are the same as those currently acting in the present (globalization and technological change), we find that that the two periods record different trends in wage inequality. In the current era of globalisation, in the 1980s and 1990s, the premium paid to skilled workers is rising, resulting in increasing wage inequality in most OECD countries. However, the pattern was different during the past globalisation period (1870-1913), when wage inequality decreased in most of the Old World countries. What is the reason for the difference in wage inequality between the two globalisation periods? This is one of the questions our research aims to answer.

With this objective in mind, we document wage inequality in the past. For the countries we have data for, we construct a weighted ratio of the wages of skilled workers to the wages of unskilled workers (skill premium) considering a substantial variety of
occupations for the first period of globalisation (1870-1913) and the subsequent period of ‘deglobalisation’ (1914-1930).

The ratio of skill premium calculated has several advantages. Firstly, we have obtained this ratio using wage data, which are possibly better quality than GDP estimations. As Williamson (1996) and most recently Betrán and Pons (2004) and Van Zanden (2009) indicate, historical national account data are not only difficult to obtain, but also have large margins of error; in these circumstances, relative prices and wages offer very useful information about an economy. Secondly, data permitting, we calculate a weighted ratio for several industries. This ratio of various industries yields a better representation of the wage inequality trend than other indicators which consider only one sector, normally the building sector. We have obtained this ratio for 11 countries (a weighted ratio for France, the UK, Italy, Spain, Sweden, Japan, the USA and Denmark and an unweighted ratio for Switzerland, Australia and Germany). Finally, we have data on one sector in the case of only four countries: the building sector in Brazil, the Netherlands and Turkey and the railway industry in Canada. Thus, the sample comprises a total of 15 countries. To sum up, we will try to obtain the most complete and representative wage inequality information that data allow for the period 1870-1930 and this is one of the contributions of the paper.

Other research that compares the evolution of wage inequality between countries (New and Old world countries) from 1870 to 1930 can be found in Williamson (1996), Hatton and Williamson (1998) and O’Rourke and Williamson (1999). Inequality has been measured by ‘wage-rental’ ratios, the ratio between unskilled wages and rents of land, and ‘wage-productivity’ ratios, the ratio of average income (GDP per capita) to unskilled wages. These authors find that wage inequality increased in New World countries and decreased in Old World countries before 1914, during the globalisation period, the contrary happening after
1914. Moreover, Anderson (2001) uses a ‘relative wage of skilled labour’ mainly in the building sector and for eight developed countries. He finds the same result as the above mentioned papers for the period before 1914, but during WWI wage inequality fell and returned to pre-war levels, remaining broadly stable in the 1920s and 1930s.

However, our measure of skill premium indicates that developed New World countries recorded an increase in wage inequality during the globalisation period and a decrease in the deglobalisation period. Conversely, in developed Old Word countries, wage inequality decreased in the globalisation period and also in the deglobalisation period, although this was not always the case for developing Old World countries. Therefore, these results differ from those obtained by Williamson (1996), Hatton and Williamson (1998), O’Rourke and Williamson (1999) and Anderson (2001). The main differences observed in the globalisation period are: Spain (where according to our data inequality increased) and Denmark (where according to our data inequality decreased). In the deglobalisation period we find a substantial decrease in inequality in developed Old World countries, whereas other papers obtain stable or increasing inequality.

Once a picture of the evolution of wage inequality has been obtained, we shall compare these patterns with wage inequality in the 1980s and 1990s. The indicator we have used is the ratio between the ninetieth and tenth percentiles (90th-10th ratio) by OECD country. The advantage of comparing with the past (1870-1930) is that we are able to contemplate periods of globalisation (1870-1913) and deglobalisation (1914-1930) that are already complete. Such a historical perspective should provide us with insight into the current trend because it will allow us to observe how wage inequality reacts when globalisation forces work and when they do not.
We compare wage inequality in two globalisation periods which also coincided with an important technological change: namely the “second industrial revolution”, in the first period of globalisation 1870-1913, and Information and Communication Technologies (ICTs), with computers and internet, in the 1980s and 1990s. This technological change was and is mainly skilled-biased (see Goldin and Katz 2001, 2008, Betrán and Pons 2004, Betrán, Ferri and Pons 2010 for the past and Machin and Van Reenen 1998, Aghion, Howitt and Violante 2002 for the present). As a result, it favoured skilled labour wages in relation to unskilled labour wages and, therefore, increased wage inequality. Thus, the impact of technological change on wage inequality has gone in the same direction in both the past and present globalisation periods.

Empirical studies of the factors competing to explain wage inequality show that trade and technological change, particularly the latter, play a similar role in the two globalisation periods, increasing wage inequality. We propose that the most important difference between the past and present being the existence of offsetting factors (especially migration, education and the institutional structure of the labour market), which had a significant influence in the past, but do not appear to be acting in the present. These factors could explain why wage differentials decreased in the past in some countries, but increased in the last few decades of the twentieth century.

Hence, this paper has three main purposes: first, to compile a wage inequality database for a large and varied sample of countries for the past. Secondly, to compare past and present wage inequality, as evidence from different countries in the past globalisation period may shed light on the factors competing in the 1980s and 1990s. Thirdly, to determine the factors that explain the differences between the patterns displayed by wage inequality obtained in the past and at present.
II. Wage inequality in the past globalisation process

In this section we document the evolution of wage inequality during a period of globalisation (1870-1913) and deglobalisation (1913-1930), both of which are completed. This has been undertaken in order to assess whether the present rise in wage inequality has been unusual or if there have been precedents in the past. The contents of this section are as follows. First, we define wage inequality, secondly, we select the countries, thirdly, we discuss the data and finally, we show the pattern of wage inequality.

With respect to wage inequality, we have constructed a ratio of the wages of skilled male workers to the wages of unskilled male workers in the industrial sector. We have only considered the industrial sector because of the difficulties in obtaining data on other sectors, but also because all the changes in agriculture were directly reflected in the industrial sector (there are no skilled workers employed in agriculture and unskilled wages in the agricultural sector do not differ much from unskilled wages in industry). Moreover, although we cannot extrapolate this pattern to other countries, a recent paper by Betran, Ferri and Pons (2010) that studies UK wage inequality (1880-1913) finds that the skill premium in the service sector did not differ substantially from that of the industrial sector.

We have chosen the main industrial sectors for each country and we have compared the average wage of the skilled workers in each sector with that of the unskilled worker: the labourer. We have the main occupations in each sector for skilled workers. Whenever the availability of data permits, the labour force employed in each sector is used to construct a weighted average.

We study wage inequality under the assumption that occupations are a reasonable proxy for skills. As such, we are identifying skills with ability and job training. In this sense

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2 Women have been excluded because most of them were unskilled workers employed in agriculture, the textile and apparel sector and domestic service.
this ratio is also a proxy of the skill premium. However, we are conditioned by data sources. It is very difficult to analyse wage inequality for this period other than in terms of differences in wages between the various labour market groups and patterns of wage inequality are based on occupational averages (Margo 1999). Moreover, as occupations did not always depend on the level of education, we consider this to be a reasonable assumption.

We have differentiated between two groups of countries: the labour-scarce and labour-receiving countries (the New World countries) and the labour-abundant and labour-sending countries (the Old World countries). Amongst the Old World countries, we also distinguish between the developed and developing ones at that time. The New World countries we are going to study are Australia, Brazil, Canada and the USA. The developed Old World countries are France, Germany and the UK, with Denmark, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland and Turkey being the developing countries.

By considering a significant number of countries, we are able to obtain a broader international wage inequality trend, although this also implies the use of heterogeneous wages series. As indicated previously, the best measure of wage inequality is a weighted average of the ratio of skilled to unskilled male workers in a variety of sectors. Although it is not possible to construct this ratio for all the countries, we have managed to construct it for 11 of the 15 countries in the sample. We have wage data by sector for Australia, France, Germany, the UK, Italy, Spain, Sweden and Japan and we construct a weighted average. We construct an unweighted average for Switzerland because we do not have data on the labour force by sector. We have used already existing ratios for the USA and Denmark, although in the latter case the source does not indicate whether this is a weighted or unweighted ratio. There is data for one sector alone only in the case of four countries: we only have data for the building

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3 In the case of Australia and Germany, we have data on wage inequality for various sectors but not for the whole period and for this reason we have used the wage inequality in the building industry to interpolate for the
industry in Brazil, the Netherlands and Turkey and for the railway industry in Canada. Finally, for Turkey we only have data for the globalisation period and for Switzerland only for the deglobalisation period. The sources and procedures used to construct the ratio for each country are described in the data appendix and summarised in a table.

Having explained the ratio of wage inequality used and the data sources, we are now going to analyse the main patterns of wage inequality obtained. Table 1 and Figures 1, 2, 3 and 4 show the evolution of wage inequality in the New World, the developed Old World countries and the developing Old World countries, respectively. The main patterns we observe in the globalisation period are an increase in wage inequality in the New Word and a decrease in most of the Old World countries. During the deglobalisation period there was a wage inequality decrease in both the New World and in most of the Old World countries.

As we can see in Figure 1, wage inequality rose in the New World countries during the globalisation period in the USA and Australia. We only have data on Canada from 1900, but we also observe an increase in wage inequality from 1900 to 1908. After this year there was a decline in wage inequality but the ratio is clearly above the 1900 wage inequality level. The years we lack these data. More information about this is included in the Data Appendix.

Our data indicates that building wages are not always a good indicator of the evolution of wages for industry as a whole. There are important differences in levels and also in trends. For this reason, it is necessary to be cautious. A more detailed discussion about whether the building sector can be used as a representative sector of the evolution of wages in industry as a whole will be provided on request.

‘The Historical Statistics of Canada’ provides other data for the building industry and also for the ratio ‘supervisory and office workers/production manufacturing’. However, these data have been criticised by many researchers who consider that the Mackinnon series (see the data appendix) on the railway industry is more representative of the evolution of wages in the whole economy. Green & Green (2007) offer an estimation of wage inequality for 1911, 1921 and 1931. Unfortunately, they do not have data for the globalisation period. For the years they do have data, they obtain a similar pattern as the Mackinnon series: a decrease in wage inequality from 1911 to 1921 and a recovery from 1921 to 1931.

There are other minor problems that also appear in most of the current analyses of wage inequality. For example, for some countries such as Sweden and Switzerland we have data on earnings but not wages. Moreover, in some countries we do not have data for the whole country but only for some cities (in Australia, for Melbourne and Sydney, in Brazil for Rio de Janeiro, in the Netherlands for Amsterdam and in Turkey for Istanbul). Finally, we have hourly, daily, weekly and annual data. This can be problematic when comparing different periods if there has been a change in the number of working hours (for example, in most countries the number of working hours declined from the late nineteenth century to the twentieth century), or if there has been a change in the number of hours worked by skilled and unskilled workers, especially if we take into account that there is some evidence that in the nineteenth century high-wage workers worked fewer hours than low-wage
only case where we have not obtained a clear increase in wage inequality in this period is Brazil. The ratio of wage inequality in Brazil displays substantial fluctuations (wage inequality increases from 1880 to 1896, declines between 1896 and 1903, rises again in the period 1903-1908 and decreases from 1908 to 1914), but we must not forget that in this case we only have data for the building sector. Moreover, even within the building industry we obtain important differences in the evolution of wage inequality by occupation. During WWI inequality decreased in all the New World countries in the sample, and after the war wage inequality rose again but to lower levels than in the pre-war years, while a downward trend was observed in Australia and the USA. Wage inequality increased in Brazil and Canada from 1918 to 1930, although in Canada the level of wage inequality remained below pre-war levels, while in Brazil it rose to levels similar to those in the 1880s.

Although it is very difficult to compare the levels of wage inequality in different countries, our results do seem reasonable: the two New World countries with the highest levels of wage inequality are Brazil, an agricultural country based on large plantations and with a slave economy until the 1880s, and Canada where the data we have is from the railway industry (and in the countries we have data for this sector we have found that the level is higher than in other sectors such as building, textiles or food).

As regards the developed Old World countries, as we can see in Figure 2, all the countries considered (France, Germany and the UK) registered a decrease in wage inequality in the globalisation period (1880-1913), although Germany and the UK have higher levels of wage inequality than France. The picture is different when we consider the evolution of wage

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7 For example, wage inequality increased in some occupations (‘pedreiro (mason)/servente de obra (labourer)’ and decreased in others (‘pintor (painter)/servente de obra ’ or ‘carpinteiro (carpenter)/servente de obra ’). With respect to the ‘non-building’ data, the ratio ‘wages of the ‘operário especializado de máquinas (specialised machinery operators)/ wages of operário máquina’ increased.

8 In the case of France there is a problem with the level of the ratio because we have only used the data for small industries and other towns (excluding Paris). For Paris and large industry we only have data for a few years. The
inequality in the developing Old World countries (see Figures 3 and 4). In this case we obtain a decrease in wage inequality in Denmark, Italy, the Netherlands\(^9\) and Sweden and an increase in wage inequality in Spain. Japan also experienced a very smooth rise in wage inequality, but is the country with the lowest level of wage inequality and most of the increase was concentrated at the beginning of the period. In Japan wage inequality increased in the 1880s but decreased substantially from the 1880s to the 1890s, remaining very stable for the rest of the period. The other exception is Turkey, the country with the highest level of inequality in the group of developing Old World countries (see Figure 4).

In the so-called ‘deglobalisation process’ (1913-1930), there was decreasing inequality in all the developed Old World countries: France, Germany and the UK (see Figure 2) and three countries in the developing Old World countries: Denmark, the Netherlands and Sweden (see Figure 3). In the rest of the developing Old World countries: Italy, Japan, Spain, and Switzerland, inequality increased\(^{10}\) (see Figure 4).

So, during WWI we observe a substantial decrease in wage inequality in all the countries considered (the New and Old the World countries). The ratio rose in the first post-war years, but in most of the cases to a lower level than in the pre-war years. This general decrease in wage inequality in wartime was a consequence of the intense trade union negotiations during the war and the intervention to protect low-paid workers from the high inflation.

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\(^9\) In the Netherlands wage inequality was quite stable: it increased from 1.28 to 1.3 between 1880 and 1900 and decreased to 1.27 in 1910.

\(^{10}\) For the countries for which we have data on wage inequality, we obtain the same pattern during the period 1930-1939 as before. This is the case of Australia, Denmark, Germany, Japan and the USA. For the UK the data are not as complete because we only have data for 1933 and 1935 and we observe that wage inequality remains almost constant.
III. Wage inequality in the present globalisation process

We shall compare the pattern of the past globalisation period with wage inequality in the 1980s and 1990s. As mentioned above the present process of globalisation is not yet completed and we are therefore going to look at the pattern of wage inequality in only two decades. First we are going to comment on the data used to measure wage inequality and the countries we are interested in studying and after that we are going to outline the picture of present wage inequality which emerges.

For the present we can employ various indicators of wage inequality, but we use the percentile distribution of gross earnings\textsuperscript{11} for full-time male workers because the OECD has homogenous data for many countries. The ratio used to illustrate the earnings dispersion between the top and the bottom of the distribution is based on gross earnings levels of the 90th-percentile (P90) to the 10th-percentile (P10). The OECD labour market statistics database (2003) compiles the ratios of earnings by percentile for some of the member countries\textsuperscript{12}. We consider full-time workers and only men to maintain data homogeneity. Part-time and female employment would have augmented the earnings dispersion over time.

There are other measures of wage inequality such as the ratio of white to blue-collar wages (or non-production to production workers). The problem with this ratio is that very different occupation categories are included among the non-production workers and the composition of these categories has changed over time. The ratio of wages by occupation and the ratio of wages by education attainment are also used to measure wage inequality but data are not available for all the countries and periods\textsuperscript{13}.

\textsuperscript{11} Earnings include overtime pay, bonuses and gratuities.
\textsuperscript{12} The data are mainly from Household and Enterprise surveys. The earnings series corresponds to different time measures: hourly, daily, weekly, monthly, and annual earnings, which can affect the comparisons of levels in different countries.
\textsuperscript{13} The World Bank offers data on income inequality, but we are interested in the analysis of inequality in the labour market and income inequality includes other sources of inequality such as land rents, etc, which are not considered in this paper.
In order to shed light on the pattern of wage inequality in the present globalisation period we classify countries into developed and developing nations. We have data on wage inequality for the now developed countries studied in the past globalisation period: Australia, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, the UK and the USA. Among the developing countries, the sample we have data for is limited to four small East Asian countries and several Latin American and Eastern European countries\textsuperscript{14}. Amongst the East Asian countries, we have data for Korea, but we comment the pattern of the rest of East Asian countries using other indicators of wage inequality. In Latin America, we have data for Brazil, but again we comment the pattern of other countries thanks to several studies already carried out. In Eastern Europe, we have data for the Czech Republic, Hungary and Poland.

What is the pattern displayed by present wage inequality? Wage inequality increased in most of the presently developed countries in the 1980s, particularly in Italy, the USA, the UK and Canada\textsuperscript{15}. Australia (in the 80s), Canada (in the 90s), Denmark (in the 80s), France (in the 90s), Germany (in the 80s) and Japan (in the 90s) were the exception. In the case of Germany, the reunification of the country in 1989 produced an increase in the supply of labour from East Germany, working in unskilled jobs in the West, therefore increased wage inequality. In Figure 5, we can see the countries where wage inequality increased in the 1980s and 1990s and in Figure 6, the countries where wage inequality decreased in some of the periods.

As regards the developing countries, we find a different pattern for the four small East Asian countries, the Latin-American countries and the Eastern European countries (Figure 7). In the East Asian countries, with the exception of Hong-Kong, wage inequality decreased or

\textsuperscript{14} This is a significant limitation because we have not considered, among others, African countries.

\textsuperscript{15} For Spain we only have data for 1995. There is another source: social security records, from Bover, Bentolila
remained stable in the 1980s. On the contrary, wage inequality in Latin America increased in the 1980s, but decreased during the 1990s. Finally, wage inequality in Eastern European countries increased in the 1990s (the only period we have data for).

OECD data for Korea (South) shows that wage inequality decreased in the 1980s and increased in the 1990s. Wood (1994) documents wage inequality from the 1960s to the 1980s in the four small East Asian countries with different data sources for countries and periods, such as wages by occupation and by levels of education, but with many deficiencies in the data. In most of these countries, wage inequality narrowed in the 1960s and 1970s and in the 1980s narrowed again or remained stable (Wood 1994). Nevertheless, the recent data for Korea in the 1990s shows increasing wage inequality. A study for China by Knight and Song (2003) also documents widening wage inequality. Thus, the pattern of decreasing wage inequality seems to have changed in the 1990s in Asia.

For Latin America we only have data for Brazil from Portela (2002) who finds that wage inequality increased in the 1980s and decreased in the 1990s (Figure 7). This pattern also seems to have been present in Mexico, where wage inequality increased between 1986 and 1994 and decreased between 1994 and 1999 according to the research by Robertson (2002, 2004) using an employment-weighted non-production production per worker wage ratio. According to research by Pavcnik (2003) using plant-level data, wage inequality increased in Chile during the period 1979-1986, and according to González and Miles (2001), who used a Household survey for Montevideo, the same pattern was observed in Uruguay from 1986 to 1997.

In the Eastern European countries in the 1990s, which at the same time made economic reforms and adopted a more open international policy, wage inequality increased in the Czech Republic, Hungary and Poland (Figure 7).
IV. Comparing past and present wage inequality: factors competing in each globalisation process

As shown in the previous section, in the current era of globalisation most OECD countries have experienced an increase in wage inequality and this pattern differs from that observed during the past globalisation period (1870-1913) in which wage inequality decreased in most of the Old World countries. What factors explain the different trend in wage inequality in the present and the past globalisation period?

The present debate over wage inequality focuses on two key variables: globalisation factors (trade, migration and flows of capital) and technological change. These two factors were also at work in the past globalisation process. Globalisation forces were very strong in the period 1870-1913, mass migration to the new World being the main globalisation factor, in contrast to the present period where trade and foreign direct investment are more important. There were also important technological and organisational changes, the so-called ‘Second Industrial Revolution’, with a change in the main sources of energy (from coal to electricity and petroleum), a transport revolution, important advances in communications (with the telegraph) and extraordinary organisational changes (Fordism and Taylorism). Nowadays we are in the midst of a technological change with ICTs thanks to computers and the internet.

How did globalisation factors affect wage inequality? The Heckscher-Ohlin theory argues that countries specialise in those commodities which intensively use the factors with which they are well endowed. So, international trade growth may reduce (increases) wage inequality by increasing (decreasing) unskilled labour demand in labour-abundant countries (labour-scarce countries). Meanwhile emigration changes the relative abundance/scarcity of skilled and unskilled workers and therefore also affects wage inequality. Finally, the flow of capital may affect wage inequality when capital flows from richer countries to poorer labour-
abundant countries and this changes the relative demand for unskilled to skilled workers in capital receiving countries. Therefore, at present we expect an increase in wage inequality in unskilled-labour scarce countries, developed countries, and a decrease in unskilled-labour abundant countries, developing countries. We expect globalisation factors (trade and immigration) to have increased wage equality in labour-scarce and labour-receiving New World countries in the past, and the opposite in the labour-abundant and labour-sending Old World countries. However, the pattern we have obtained in the previous section is different to that we expected according to the theory about the impact of globalisation on inequality in the past and in the present. The reason is the existence of other factors competing in the explanation of wage inequality.

The impact of technological change will depend on the characteristics of technologies and how they affect the relative demand for skill versus unskilled workers, that is, whether technological change is skilled-biased or unskilled biased. Empirical research shows that most of the increase in inequality in the late twentieth century stems from technological change. The research by Machin and Van Reenen (1998), Aghion and Howitt (2002), Aghion, Howitt and Violante (2002) or Card and Di Nardo (2002) focuses on the effects of skill-biased technological change and how new technologies (computers and other related innovations) have relatively increased the demand for high-skilled versus low-skilled workers generating greater wage inequality than before the technological change. Although other papers concentrate in the relative primary importance of globalisation, particularly international trade (Wood 1998, Slaughter 1998, Feenstra 2000, Haskel and Slaughter 2001), most of these empirical studies fail to show that trade is an important determinant of inequality (Wood 1998), while others find that trade only explains a small portion of wage inequality change and that technological change is much more important (Feenstra and Hanson 1999).
Empirical research that contributed to a better understanding of wage inequality in the past has obtained similar results for the present: controversial conclusions about the impact of trade on wage inequality and a positive impact of technological change on inequality (thus, skill-biased technological change). According to O’Rourke and Williamson (1999), globalisation forces (trade and migration) were significant variables in explaining wage inequality, migration being the most significant. Anderson (2001), however, studied the impact of migration, trade and domestic forces on the supply and demand for skilled labour from 1870 to 1970, finding that domestic forces had a greater influence on wage inequality than globalisation factors. Neither Anderson (2001) nor O’Rourke and Williamson (1999) include technology in their explanation of the causes of wage inequality.

Most recently, Betrán and Pons (2004) estimated the importance of globalisation, technology and other factors (structural change, education, population growth and trade unions) in explaining the changes in wage inequality (the skill premium) over the period 1870-1930 by means of a panel data set for five countries (the USA, France, the UK, Italy and Spain). According to this research, trade did not have the expected effect bearing in mind the H-O theory. In some of the countries, immigration (emigration) increased (decreased) wage inequality, as did technological change. Technology was skilled-biased and the most important factor. Globalisation factors (trade and emigration) had a significant effect on wage inequality, but technological change had the greatest impact on the wage premium. This last result is in line with the work by Goldin and Katz (1996, 1998, 2001, 2008) on the origins of wage inequality in the USA. As Goldin and Katz point out, technological change increased the relative demand for skilled labour through two channels: firstly, the change from artisanal shops or factories to continuous and batch-process methods (applied in petroleum refining, dairy products, chemicals and non-ferrous metals) and second, the change from steam and
water power to electricity. Betran, Ferri and Pons (2010), constructing and using a General Equilibrium Model for the UK, also obtained similar results for the past globalisation period: international trade and the technology shock acted against the observed reduction in inequality, whereas emigration and other factors favoured the reduction in inequality. Their results support the hypothesis that technological change in the Second Industrial Revolution favoured skilled workers, as in the work by Goldin and Katz (2001, 2008) and Betrán and Pons (2004).

To sum up, the main research aimed at explaining wage inequality in the past globalisation period, like most of the research on wage inequality for the present, find that trade and technology change played a similar role in both periods. So, what explains the differences in wage inequality trends between the past and the present? The first difference is that migration played a more important role in the past than in the present. Table 2 shows the high migration rates in the past globalisation period. While in the past globalisation period immigration reached 7.5% of the world population in 1911 (the USA 14.5% and Canada 22%), in 1999 it only reached 2.5% (6.5% in the USA, 9% in Canada and 5% in the EU) (Hatton and Williamson, 2003). The main reason behind migration losing importance in the present globalisation period is the restrictive immigration policies that started at the end of the WWI (Timmer and Williamson 1998).

The second difference, underlined in the papers by Goldin and Katz (2001, 2008), Betrán and Pons (2004) or Betrán, Ferri and Pons (2010) is the existence of other factors, especially education and trade unions that, as we will try to demonstrate in the next few pages, offset wage inequality in the past and which do not seem to be acting in the present. The impact of these two factors could explain why wage inequality decreased in the past in
most countries, but increased over the last decade of the twentieth century in most developed and developing countries.

We focus on the different role played by other offsetting factors we called “institutional factors” in the past and in the present globalisation period: the role of education (Goldin and Katz 2001, 2008) and the institutional structures of the labour market (the trends in unionisation, minimum wages and collective bargaining (Lee 1999, Card, Lemieux and Ridde 2004)). As Goldin and Katz (2008) indicate, in order to understand the evolution of the skill premium it is necessary to consider not only demand factors, but also supply factors and the main determinant of the supply side is education. An improvement in education may increase the supply of skilled workers, reducing skilled wages and decreasing wage inequality. The point is to see if the supply of qualified and educated workers has followed the demand for skilled workers in the past and present globalisation periods.

For the present globalisation process, we have used the secondary school enrolment rate, because it is the indicator used in most studies that compare the level of education in a broad sample of countries (Goldin and Katz 2008). As a proxy of education in the past globalisation process, we used the illiteracy rate and primary and secondary school enrolment rates. We may expect higher rates of literacy or primary and secondary school enrolment to increase the possibility of workers acquiring qualifications.

With respect to the labour institutions, the links between ‘labour movements’ and wage differentials depend on many factors: the participation of the labour force in unions, how different skill groups are involved in unions, the importance of unions in the public and private sector, etc. At present we are witnessing an important process of de-unionisation and changes in collective bargaining coverage and minimum wages. As Card, Lemieux and Ridell (2004) showed, the disunionization process explains a substantial part of the growth in male
wage inequality in the US and the UK since the early 1980s. In the present globalisation process we consider union density, collective bargaining coverage and minimum wage legislation as indicators of labour institutional factors.

In the past globalisation period, as Betran and Pons (2004) indicated, the influence of labour unions might depend on the existence of mass or general unions in contrast to unions that mainly represented skilled worker interests. Their results showed that labour protests involving strikes contributed to the decrease in wage inequality, especially in the first part of the twentieth century. Thus, we consider the importance of strikes and workers involved in strikes as representing pressure on labour institutions.

To analyse the different factors which explain wage inequality we are going to compare the links between institutional factors (education and labour movements) and wage inequality in the different groups of countries we have classified. In the past globalisation period (1870-1913), wage inequality increased in the New World countries. According to Betrán and Pons (2004), globalisation forces (mainly immigration) and skilled-bias technological change in the USA increased wage inequality. This result could be extrapolated to other New World countries such as Canada and Australia. What was the role of institutional factors in the New World? As we can see in Figure 8, Australia, Canada and the USA made an important effort in education and these countries had relatively low illiteracy rates and high primary and secondary enrolment rates (59.3%, 62.36% and 76.43% respectively in 1910). Moreover, as Table 3 indicates, Canada and especially the USA had a large number of strikes at the end of the nineteenth century and the beginning of the twentieth century. Despite the influence of education and labour disputes, the dominant effect in the New World countries was increasing wage inequality.

In Brazil, where technological change occurred to a lesser degree, wage inequality rose less than in the rest of the New World countries. In addition, Brazil recorded one of the highest illiteracy rates (65% in 1910) and the
In Old World countries, that is, the labour abundant and sending countries, globalisation (mainly emigration) reduced wage inequality and the only factor increasing wage inequality was skilled-biased technological change. What happened with the institutional factors? As we can see in Figure 8, all the developed Old World countries and some developing countries such as Denmark, the Netherlands and Sweden had relatively low levels of illiteracy and high primary and secondary school enrolment rates (51.08%, 50.11 and 49.64% respectively for 1910). In these countries there was a significant improvement in education from 1870 to 1913; thus a higher supply of qualified workers mitigated the pressure of technological change on the wages of skilled workers. The high level of human capital at the beginning of the process of modern economic growth in countries such as Denmark, the Netherlands and Sweden may explain why inequality did not increase in this period. However, Spain, Italy and Japan (in the first years of the period) registered high rates of illiteracy (more than 50 per cent throughout most of the period) and low primary and secondary school enrolment rates (38.39%, 37.98% and 39.80% respectively in 1910). It was in Spain and Japan where inequality did not decrease in this period (the exception was Italy, where inequality was reduced thanks to the high emigration rates in those years). Labour movements also decreased wage inequality in the Old World countries, although they had a more important impact on wage inequality from WWI (Betrán and Pons 2004).

After 1914, a period of deglobalisation began with increasing protectionism and the introduction of quotas and controls on migration. What was the pattern of wage inequality when the globalisation forces disappeared? In the New World countries (Australia, Canada and the USA), wage inequality dropped. As Goldin and Katz (2001) explain, in the USA this change in the wage inequality trend was due to education and in particular to secondary school enrolment. The US high school movement started around 1900 or 1910, whereas this

lowest primary and secondary education enrolment rate (7.35% in 1910).
movement began later in Europe. For Goldin and Katz (2001, 2008) this movement was triggered by exogenous policy changes. For Williamson (2006), part of the schooling boom must have been an endogenous response to large skill premiums, schooling scarcity and a high return on education at the end of nineteenth century, when mass migration reached its crescendo. From the beginning of the twentieth century, education progressed more quickly than technology and this contributed to decreasing wage inequality together with other complementary factors, such as the sharp reduction in immigration and the unionisation process. The other offsetting factor was labour movements, which started at the end of the nineteenth century and reached higher proportions in the twentieth century. In short, the positive impact of skill-biased technological change on wage inequality in New World countries from 1914 to 1930, was compensated by the absence of globalisation factors, education and labour institutional factors, meaning that the dominant effect was decreasing wage inequality.

In Old World countries, despite the reduction in trade and emigration, wage inequality maintained its downward trend contrary to what we expected. The only countries where inequality rose were Italy, Spain and Japan. In the Old world countries, the absence of globalisation factors in addition to skill-biased technological change was offset by education and labour institutional structure. The dominant effect was decreasing wage inequality. The exceptions were the countries with less education and less important labour institutions, such as Spain, Italy and Japan.17

As Table 3 shows the labour disputes during these years (measured by the number of strikes or the workers involved in strikes) were very intense, especially at the beginning of the twentieth century. From 1900 to 1920, labour disputes were very important in New World

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17 We have not included Switzerland in the explanation, which displayed increasing wage inequality after WWI, because of a lack of data for some of these variables during and after the globalisation period, such as wage
countries (especially in the USA) and the developed Old World countries (especially the UK and Germany). Some of the developing Old World countries such as Italy, Sweden and even Spain also experienced high social instability in the first two decades of the twentieth century. However, Italy and Spain, two countries with high illiteracy rates and high labour instability in the period 1900-1920, reduced the number of strikes in the mid-1920s dramatically as a consequence of the establishment of dictatorships (Italy 1925-1943, Spain 1923-1931), raising wage inequality.

Having analysed the past globalisation process, we are now going to analyse the influence of the institutional factors in the present globalisation process following the division established between developed and developing countries, and for which there are only two decades. Empirical data might indicate that ‘institutional’ factors did not compensate for the rise in wage inequality in most of the countries in the current globalisation process. In relation to education, it is difficult to find a good indicator to monitor the increase in skills in the developed countries as ‘secondary school’ labour is relatively unskilled. On the other hand, it is not only the investment in education or enrolment in the different education levels that are important, but also how well adapted the education system is to the necessities of new technologies. Moreover, Goldin and Katz (2001) consider that in the USA the slowdown in the growth of the relative supply of more educated workers and a more rapid increase in the rate of skill-biased technological change could be the explanation for the widening wage structure in the 1980s. Thus technology outpaced education in the second half of the twentieth century, contrary to what happened in the first few decades of that century.

inequality. Switzerland had low levels of illiteracy and high levels of primary and secondary school enrolment. 

\footnote{For example, the US education system is less egalitarian than the German one, where there is homogeneity in the quality of the education across education levels, and that fact could produce higher wage inequality in the US than in Germany (Wälde 2000).}
However, in the case of the developing countries, workers with a secondary education are skilled labour. We present the data for this variable in Figure 9. The East Asian countries reached high levels of education, especially Korea, which became a skilled-labour abundant country in the 1990s. Among the Latin American countries, Brazil and Mexico continue to be relatively unskilled and labour abundant countries, the levels of secondary enrolment being relatively low in the 1980s, but increasing in the 1990s. However, Chile and Uruguay, because of the importance of secondary school enrolment, are relatively skilled and labour abundant in relation to the rest of Latin American countries\textsuperscript{19}. In the Eastern European countries which started with high levels of education, other institutional factors such as a change of political regime increased wage inequality.

In relation to the institutional structures of the labour market, there has been a reduction in the minimum wage and union density or a lower impact of collective bargaining. As Card, Lemieux and Ridell (2004) showed, the de-unionization process explains a substantial part of the growth in male wage inequality in the US and the UK since the early 1980s. There seems to be a relationship between a reduction in the minimum wage and union density and wage inequality for the countries we have this data for, or at least a relationship between these variables and a more compensating labour institution system. In Figures 10 and 11 we can observe the minimum wage over the average wage for developed and developing countries respectively and in Figure 12 the union density for all the countries. In the countries where these reductions have not taken place, Canada, France, Japan and Germany before unification, wage inequality did not increase.

We lack sufficient data on labour institutions for the developing countries, but in Korea the decrease in wage inequality in the 1980s coincided with an increase in the

\textsuperscript{19} As Berges (2009) explains, few countries in Latin America have achieved significant progress in secondary education compared with East Asia (where at least 45-50 per cent of the population has secondary education).
minimum wage and the contrary happened from 1990-96. However, the increase in the minimum wage in Poland had no impact on wage inequality, but as we mentioned before, other institutional factors are at work in Eastern European countries. In Chile, Mexico, the Czech Republic and Hungary, the minimum wage went down. The research by Gonzalez and Miles (2001) on wage inequality in Uruguay finds that most of the increase in wage inequality in this country could be explained by labour institutions, in particular a decrease in the minimum wage.

Therefore, in the present, in the developed countries with similar relative labour endowments to the New World countries in the past, empirical research indicates that globalisation and technological change raise wage inequality. However, education and labour institutions do not seem to be compensating for this. In developing countries where relative labour endowments are similar to those in the Old World countries in the past, globalisation does not produce a reduction in wage inequality. Moreover, education and labour structures do not seem to be compensating for it.

What can we learn from the past? In those countries where trade and technological change raised wage inequality, education and the improvement in labour conditions compensated for part of this increase. However, in the current globalisation process, education and labour institutions do not seem to be offsetting this.

V. Wage Inequality and institutional factors: institutional structure of the labour market and education

In this section we intend to ascertain the relationship between the institutional factors considered: institutional structure of the labour market and education and wage inequality for the past. With this objective in mind, we have calculated wage inequality each year for the
countries belonging to the sample by considering the rate of growth between the years we have no data for in order to obtain more observations. We used the labour movement and its effect on labour market standards as a proxy of the institutional structure of labour market, the variable being the number of strikes. For this variable, we have data for most of the countries of our sample, with the exception of Brazil and Turkey, although we do not have data for all the years. We have also considered another proxy variable called the labour compact index constructed by Huberman and Lewchuck (2003), but for this index we only have data for the most Old World countries studied, with the exception of Japan and Turkey, but no data for the New World countries. This index is for the years of our period: 1880, 1890, 1900 and 1913. The labour compact is a package of labour market regulations and social insurance programmes established by national authorities due to workers demanding social protection. The index incorporated 11 different types of labour market policies, from the date of the first factory act to the creation of unemployment insurance for 17 European countries. These laws restricted the labour supply of women and children, limited the length of the workday and raised the wages of unskilled male workers relative to the average worker. The labour compact provided workers with insurance because it compressed wage structures (Huberman and Lewchuk 2003).

As a proxy of education attainment, we have used the primary and secondary enrolment rate, which is the number of students enrolled in primary and secondary school as a percentage of the total school age population (5-18 years old population). We have used enrolment because it is a more reliable indicator of the expansion of formal mass schooling than literacy (Easterlin 1981) and also the most useful indicator of education output was the enrolment rate for primary and secondary school (Lindert 2004). Therefore, we are
considering that the more schooling in appropriate contents the population received, the easier it was to work in skilled and better paid jobs.

We are going to estimate this by means of an unbalanced panel regression because of data limitations. As we are only considering the effect of two variables: institutional structure of the labour market and education, there could be unobserved explanatory variables that are not included in the estimation and differences in country characteristics, such as Old World labour abundant countries and New World labour scarce countries. This could cause OLS to yield inefficient estimates and invalid standard errors. In the within-groups fixed effects estimation we eliminate the unobserved effects considering that they are fixed\textsuperscript{20}. We also estimate a random effects model because the unobserved effects could be distributed randomly and independently of the explanatory variables (X\textsubscript{j} variables)\textsuperscript{21}.

Table 4 presents the results. We have regressed each variable both separately and jointly. We also included the effect of time by means of a trend variable and a trend squared one. Firstly, as we can see in all of these regressions with fixed effects, considering the variable number of strikes as a proxy of the institutional structure of the labour market, the variables have the expected negative sign, thus the labour movement and education reduced wage inequality. In the case of education, the education effect occurs with a lag of five years. We also estimate it with random effects and we obtained the same results, the only difference being that the education variable was much less significant.

We implemented a Durbin-Wu-Hausman test to verify the estimation with fixed effects or random effects, the null hypothesis being that the unobserved effects are distributed

\textsuperscript{20} The unobserved effect is eliminated when the means values of the variables in the observations on a given country are calculated and subtracted from the data for that country. We focus on with-in country variation over time or with-in each of our countries relationship between the endogenous variable and the explanatory variables. For that reason is named as the within-groups regression model because it is explaining the variations about the means of the explanatory variables for the group of observations relating to a given country.

\textsuperscript{21} In this case, the unobserved effects or variables are randomly distributed and are treated as random variables and also these unobserved effects are distributed independently of all the explanatory variables. The random
independently. We obtained that we cannot reject the null hypothesis, which means that both fixed and random effects are consistent, but the first of them is inefficient because we use unnecessary equivalent dummy variable coefficients\textsuperscript{22}.

Secondly, we regressed the labour compact index, as a proxy of changes in the structure of the labour market for the European Old World countries we have data for and for the period 1880-1913, and the primary and secondary enrolment rate on wage inequality. As we can see in Table 4, regressions 5 and 6, we have also obtained the expected sign and significance for both variables estimating an unbalanced panel with fixed and random effects, and the coefficients for both estimations are very similar.

In short, we found that there is a negative relationship between both institutional factors: the institutional structure of the labour market and education and wage inequality in the past. Therefore, the impact of these two factors could explain why wage inequality decreased in the past in most countries, but increased during the last decade of twentieth century in most developed and developing countries.

VI. Conclusions

The main aim of this paper is to compare wage inequality in past and present globalisation periods in order to highlight the different factors which drove wage inequality then and those that are doing so now. With this purpose we have constructed a ratio of skill premium and documented the pattern of wage inequality for a varied sample of countries in the first period of globalisation (1870-1913) and the subsequent period of deglobalisation effects model is estimated by Generalized Least Squares.

\textsuperscript{22} We have tested for the best estimation between random effects and OLS estimations. The Breusch-Pagan Lagrange multiplier (LM) test is designed to test random effects. The null hypothesis of the one-way random group effect model is that variances of groups are zero. If the null hypothesis is not rejected, the pooled regression model is appropriate. If not, the random effect model would be. As we have rejected the null hypothesis, we use the random effects model.
(1914-1930). In the past globalisation period, the picture we have obtained is that in the
developed New World countries wage inequality increased in the globalisation period and
decreased in the deglobalisation period, but inequality decreased in most of the Old World
countries in both periods. The exceptions were some of the developing Old World countries.
In the present globalisation period, we have used the 90th-10th ratio, which shows that wage
inequality increased in most of the developed and developing countries in the 1980s and
1990s.

What factors explain the different trend in wage inequality in the present and the past
globalisation period? To disentangle the main factors contributing to wage inequality, we
have summarised the main empirical results obtained in the literature. According to these
studies, trade and technological change play a similar role in the past and present globalisation
periods. There are no conclusive results about the impact of trade on wage inequality and
technological change is observed to have a positive impact on inequality (thus, technological
change was/is skill-biased). Therefore, we argue that the main difference between the past and
the present is the existence of offsetting factors (migration, education and the institutional
structure of the labour market), which could explain why wage inequality decreased in the
past in most countries, but increased in the last decades of the twentieth century in most
developed and developing countries.

In most Old World countries, wage inequality decreased in the globalisation period,
globalisation factors (especially migration) and ‘institutional’ factors both reduced wage
inequality. Moreover, this explanation is reinforced by what happened to wage inequality in
the deglobalisation period, when most of the Old World countries also recorded a decrease in
wage inequality despite the disappearance of globalisation factors. The explanation may very
well be an increase in education attainment and labour institutions, because the exceptions to
the reduction in wage inequality were the countries that were less educated and/or that had dictatorships which suppressed labour disputes. We have estimated an unbalanced panel in order to ascertain the relationship between these two institutional factors and wage inequality, finding a negative relationship between them.

In the present, most countries have experienced an increase in wage inequality. In today’s developed countries, which are in relative terms labour scarce, like the New World countries in the past, globalisation factors and technological change have produced increasing wage inequality. However, institutional factors do not seem to be compensating for wage inequality in these countries. Hence, the factors that favour rising wage inequality dominate. We observe that countries that have not reduced the minimum wage or union density have not experienced increasing wage inequality. Perhaps these countries also have more egalitarian education systems or are better adapted to new technologies. In today’s developing countries, which are labour abundant, like the developing Old World countries in the past, globalisation factors (trade and FDI) have not produced a reduction in wage inequality, except in the case of East Asian countries in the 1980s. Moreover, institutional factors such as education and labour institutions do not appear to have compensated for increasing wage inequality.

If the dilemma between efficiency and equity in economics is concerned with equity, we must take into account that ‘institutional’ factors which could affect wage inequality appear not to be compensating for it at present. The education system may not be adapting to the demands of new technologies and labour institutions may not be working to reduce wage inequality.

References


DATA APPENDIX

New World Countries

Australia:


For the period 1914-1930, we have an average of weekly wage rates of a sample of twenty unskilled and twenty skilled occupations in Melbourne (Victoria) elaborated by Oxnam. Wages: weekly wages. Skilled wages: cabinet-makers, upholsterers, journeymen (boiler-making), fitters (electrical installations), mechanics (electrical trades), fitters (engineering), coppersmiths (engineering), tinsmiths (sheet-metal working), turners (engineering), shift millers (flour milling), boot makers, tailors (order), bookbinders (printing), compositors (job offices), road coach making, body makers, curriers bricklayers (surface), carpenters, plumbers and gasfitters, loco-engine drivers (5th class). Unskilled wages: labourers in saw-milling and timber yards, agricultural implement making, ironworking (engineers and moulders), gas making and supply, jam-making, textile mills, brick making, coach making (road), glass founding, building, sewerage and water supply, municipal works, gardening, packers (aerated water and cordials), porters (railway), hotel porters (day work), car washers or cleaners, track cleaners (tramways) and lift attendants (passenger).

Ratio: We have elaborated a ratio for the entire period by linear interpolation: the Allen series, 1879-1913, and the Oxnam one, 1914-1930.

Brazil:
Sectors: Building. Wages: annual for the period 1870-1930. Occupations: Skilled wages in the building industry: pedreiro, mestre pedreiro, carpinteiro, pintor. Unskilled wages: in the building industry, servente de obra. There is no labourer (pedreiro) for the period 1918-1930, and we have used the average of the operário máquinas as representative of the wages of the labourer to obtain the ratio skilled/unskilled wages. Place: Rio de Janeiro.

Ratio: We calculate the skill premium (average of skilled /unskilled wages) for the building sector.

Canada:
Sources: Mackinnon M (1996): “New evidence in Canadian wage ratios 1900-1930”. Canadian Journal of Economics nº 1. February, where there are data for the railways sector. Mackinnon (1996) argues that her series on wages is representative of the evolution of wages in the whole economy. Other authors such as Green and Green (2007) also use the Mackinnon series as representative of the evolution of wages in the whole economy.
Sectors: railway industry, 1900-1930. The occupations are: for the skilled workers: fitters and machinists, and for the unskilled, the helpers. Wages: hourly wages.

23 Oxnam (1950, p.114) consider that these data are representative of the movements in wage rates in Australia as a whole: “Melbourne was selected in preference to other capital cities for the reason that the rates prescribed by the Commonwealth Court of Conciliation and Arbitration apply in that city. Since wages in many important industries throughout Australia are regulated by this Court and since most other wage fixing tribunals tend to adopt the standards of this authority”.

32
**Ratio:** We calculate the skill premium (average skilled/unskilled wages) for the railway sector.

**The USA:**  
**Sectors:** Urban skilled workers: ratios of skilled to unskilled workers’ wages in manufacturing for the period 1870-1930.

**Old World Countries**  
**Developed countries**

**France:**  
**Source:** *Statistique Annuel de la France* (data are from the *Bulletin de la Statistique Générale de la France*).  
**Wages:** daily and hourly. Skilled wages: average wages of 34 professions up to 1911, after 37. Unskilled wages: journalier (labourer).  
**Years:** 1896, 1901, 1906, 1911, 1921, 1925, 1930.  
**Places:** Paris (we only have data for labourer in 1911 and 1921) and autres villes.  
**Ratio:** The weighted average of skilled wages belonging to this sector over labourer wages. We have weighted for the labour force by sector from Carré, J.J., Dubois, P. and Malinvaud, E. (1976). *French Economic Growth,* London, Oxford University Press.

**Germany:**  
**Ratio:** We elaborate a ratio for the Industrial sector by linear interpolation from the ratio of 17 industries, 1925-1930, and from the building ratio in all the cities and in the three main cities, 1870-1924.

**The UK:**  


Ratio: We calculate the skill premium for 10 sectors. For each sector average skilled wages belonging to this sector over labourer wages in this sector. For the weighted average: we have weighted for the labour force from British Abstract Statistics and Mitchell.

Developing countries

Denmark:

Sectors: Wages in crafts and industries, 1870-1930, Wages: hourly wages, Skilled male workers’ wages and Unskilled male workers’ wages.

Ratio: We calculated skilled labour wages over unskilled labour wages.

Italy:

**Sectors:** 1) Building: **Occupations:** muratori, imbiancatori, falegnami, stagnini and manovali. **Place:** 1871-1903 Torino and Piamonte, 1914-1929, Roma and Milano. 2) Engineering, iron and metal works: **Occupations:** congegnatori montatori, fabbri fucinatori, fonditori, tornieri, mecanini, aggiustadori and manovali. **Place:** 1871-1898, Torino, Genova, Milano, Venecia, Firence, Sampierdarena, Livorno, Napoli and Piemonte, 1909-1911: Average, 1912, Milano and Carrara, 1914, Milano and Roma, 1920, Brescia, Roma and Milano, 1925-1929: Average, Brescia, Roma and Torino. 3) Textile & Apparel: a) Woollen: **Occupations:** filatori, tintori, tessitori, preparatrice filatura. There is no information about tessitori from 1913. Moreover, the data for the preparatrice filatura is only for 1912, 1914 and 1923. As we do not have information about the labourer we have considered the wages of the labourer in the cotton industry. **Place:** 1870-1898, Vicenza, and Novara, and for the rest of the period an average. b) Cotton: **Occupations:** filatori, tessitori, and manovali. **Place** (towns): 1870-1898, Genova and Milano, and for the rest of the period an average. However for the labourer (manovali), the data is from Genova and Piemonte (problem of representativeness of the data). 4) Shoes & Leather: **Occupations:** Rifinitura e cavalletto, tinaggio and ragazzi. **Place:** 1890-93 Sassari and 1929 Regno. 5) Printing & Publishing: **Occupations:** linotipisti, composito and machinisti. As information of the manovali we only have the litografi mettisolfo for the period 1914-29. For the rest of the period we have used the labourer of the engineering sector. **Place:** 1891-1898, Vicenza, Ancora, Roma and Torino, 1911 Milano and an average, 1914-1929 Brescia, Milano and Roma. 6) Mining: **Occupations:** muratori, minatori, carretieri (1871-1911), manovali (1912-1929). **Place** (towns): 1871-1898, Sardegna, 1910-12: Torino, Vicenza, Milano, Bologne, Carrara, Napoli, Firenze and Roma, 1922-1929, Bergamo. 7) Chemistry: **Occupations:** capi laboratori and manovali. **Place:** 1871-1898, Torino and Carrara, 1911 Average, 1912 Carrara, 1925-29 average. 8) Wood & Furniture: **Occupations:** ebanisti, attrecci and manovali. **Place:** 1914-25, Milano and Roma, 1930, Torino, Milano, Roma and Padova. 9) Stone, Clay & Glass: n.a. 10) Civil Works: **Occupations:** muratori and manovali. **Place:** Average. 11) Tobacco: **Occupations:** sorveglianti and manovali. **Place:** Torino, Milano, Venecia, Roma and an average. 12) Food: **Occupations:** pastificio, fornai and apprente. **Place:** 1893-1898 Roma, and 1930 is an average, 13) Transport: n.a. **Wages:** daily and hourly wages (depends on the year). Skilled wages: average wage of different occupations for 11 sectors. Unskilled wages: the manovali (labourer) for each sector. **Years:** 1871, 1880, 1886, 1890, 1895, 1898, 1900, 1912, 1914, 1920, 1925, 1929. **Places:** See the different sectors.

**Ratio:** We have calculated the skill premium for 11 sectors. For each sector we calculate the average skilled wages belonging to this sector over the labourer wages in this sector. For the weighted average: we have weighted for the labour force from Zamagni (1984): “The Daily wages of Italian Workers in the Giolittian Period (1898-1913)”. Rivista di Storia Economica, vol 1, pp.59-93.

**Japan:**


**Sectors:** The main source is the tables of “Comparisons of various wage rates by job” in the Nihon Rodo Undo Shiryo (Records of Japan Labor Movement) 1959, vol. 10, Statistics
Section. This is a most comprehensive collection of wage statistics which have appeared in various sources. From this collection 19 jobs are selected to construct male and female wages, as well as the total series of wages, by fixed weights. The weights are the number of workers by industry. All the jobs are allocated to 13 sectors by sex. **Wage Rates by Job Data:** male. **Years:** 1880-1930. **Ratio: Industry,** the total series is a weighted average of the two series; one is for manufacturing and the other for construction. The former is constructed by several sets of fixed weights (a number of workers grouped by industry within manufacturing), dividing the entire period into several sub-periods. The latter is made simply by using a set of weights (number of workers by job). The skilled labour wage is the total series and the unskilled labour wage, the series of “Day Labourer”. There is only one series of labourer wages for the entire economy.

**The Netherlands:**

**Sectors:** For **1870 to 1910**, we have the skill premium of the construction workers’ wage rate calculated by Smiths, J. P and van Zanden, J. L. in Soltow, L. and van Zanden J.L. (1998), for the years 1870, 1880, 1890, 1900 and 1910. For **1923-1926 and for 1926 to 1930:** we have data for Amsterdam on mason wages and assistant mason wages, hourly earnings, from *ILR*, called building industry wages. **Ratio:** We cannot obtain an interpolated series of the two parts of the period, so we take the construction series for 1870-1910 for the first part and the building series from 1923 to 1930 for the second part of the period.

**Spain:**


From **1914 to 1930**, we have data on skilled and unskilled wages for the following sectors: 1) Building; 2) Engineering, Iron and metal works; 3) Textiles and Apparel; 4) Shoes & Leather: there are no unskilled wages; 5) Printing & Publishing: there are no unskilled wages; 6)
Mines, salt mines and quarries; 7) Chemistry; 8) Wood; 9) Stone, Clay and Glass: there are no unskilled wages; 11) Tobacco: there are no unskilled wages; 12) Food; 13) Transport. However, to calculate the national average we have also included: metallurgy, electricity, book, furniture, paper, agriculture industries, public shows and public services. **Wages:** daily for 1884 and hourly, for 1914-1930. In 1884, Skilled wages: for General trades, the average of skilled wage occupations in each sector from the consulates: Alicante, Barcelona, Cadiz, Madrid, Malaga and Santander which represent different regions of Spain. Unskilled wages: for General trades, the labourer of each Consulate, for the factories and mills, the labourer of each factory. For 1914-1939, skilled wages: for each sector there is a weighted average using the employed workers in the sample of the source (11,177 establishments) as a weight. Unskilled wages: the labourer of each sector is a weighted average using the employed workers in the sample of the source as a weight. **Years:** 1884, 1914, 1920, 1925, 1930. **Ratio:** In 1884, the average is unweighted for the general trades, the average of the skilled wages belonging to each occupation over the labourer wage of each Consulate. In 1914-1930, the ratio is the weighted average of skilled wages to the weighted average of unskilled wages or labourer.

**Sweden:**


**Sectors:** for the period 1894-1927: 1) Building industry, average hourly wages for skilled and unskilled workers in municipal services (skilled: joiners, carpenters, blacksmiths, pipe layers, pavers and blasters, unskilled: labourer), 1894-1930, 2) Engineering, Iron and metal works, average annual earnings for four skilled occupations (keepers, melters, topfillers, heaters) and for two unskilled occupations (calciners and labourers), and from the monographs: Boolinders Engineering Works in Stockholm and Motala Engineering Works, 3) Textile & Apparel: n.a, 4) Shoes & Leather: n.a, 5) Printing & Publishing: n.a, 6) Miners: n.a, 7) Chemistry: skill and unskilled workers from Stearine and Mon Halsinborg, 8) Wood & Furniture: sawmills: different monographs, Hellefors (skilled: sawyers and plank pilers, and edgers, and unskilled: edge helper), Mo Sawmill, Robertsfors, Domsjö, Lundvic, Sköik and the District of Härnosand, 9) Stone, Clay and Glass: skilled and unskilled wage from the monographs: cement industry (Höganas-Billeshomm, two skilled workers (hewers and brick makers) and one unskilled worker (hauliers), Linhamn Cement Works, two skilled (cement millers and craftsmen) and unskilled (packers and loaders) workers, Klagstorp Cement Works). For the glass industry: Gustavsberg China Factory, skilled (potters and oven men) and unskilled (outdoor workers) workers, and Kosta Glass works, skilled (glass blowers, stem makers, blowers, glass blowers, polishers various craftsmen) and unskilled workers, 10) Civil Works: n.a, 11) Tobacco: n.a, 12) Food: sugar industry, Mon Orebro, Landskrona, 13) Transport: railways, average annual earnings for two skilled occupations (engine-drivers and firemen) and two unskilled occupations (linemen and station staff). **Wages:** annual, daily and hourly earnings.

**Ratio:** We have calculated the weighted ratio for the sectors with average data (Building (public services), Engineering, Iron and metal works and Food (sugar)) and from the monographs (Chemistry, Wood & Furniture (wood-pulp and sawmills) and Stone, Clay and Glass (cement)) for the period 1894-1927.

**Switzerland:**

**Sectors:** For the period **1913-1930:** 1) Building, 2) Engineering, Iron and metal works, 3) Textile and Apparel, 4) Shoes and leather, 5) Printing and Publishing, 6) Miners (mines and quarries), 7) Chemistry, 8) Wood & Furniture, 9) Stone, Clay and Glass (earth and stone industry), 10) Civil Works, 11) Tobacco: n.a. (included with Food and drink), 12) Food, drink (and Tobacco), 13) Transports. Other; watch making, cartage, electricity supply, gas and water supply, store and commerce. **Wages:** average daily earnings of adult male workers for 1913, 1927-1930 for skilled and semi-skilled workers and unskilled workers. **Ratio:** unweighted ratio for all 13 sectors and 4 sub-sectors for the period 1913-1930.

**Turkey:**


**Sectors:** building industry. **Wages:** daily wages for the building industry in Istanbul, 1874-1914. Skilled wages: carpenters, cabinet makers, masons, stonecutters, ditch-diggers, plasterers, and others. Unskilled wages: “rençber” or labourer. **Ratio:** We calculate average wages for skilled workers (different occupations)/ the wages of unskilled worker (*rençber*).
## Wage Inequality data

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*Note: (*) The sources do not indicate if the average is weighted or unweighted

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**Source:** Data appendix.

**Note:** We have selected some of the years. Brazil: 1913, Canada: 100=1900, France: 100=1896, 1901, 1911, 1921, Germany: 1929, Italy: 1871, 1929, Japan: 1892, Netherlands: 1910, Spain: 100=1884, Sweden: 100=1894, Switzerland: 100=1913, 1926, Turkey: 1874, 100=1881, 1891
Figure 1. Wage inequality in the New World countries, 1870-1930
Figure 2. Wage inequality in the developed Old World countries
1870-1930
Figure 3. Wage inequality in the developing Old World countries with decreasing wage inequality, 1870-1930
Figure 4. Wage inequality in the rest of developing Old World countries, 1870-1930
Figure 5. Ratio of P90/P10 earnings in the developed countries with increasing wage inequality, 1980-1998
Figure 6. Ratio of P90/P10 earnings in the rest of developed countries, 1979-1998
Figure 7. Ratio of P90/P10 earnings in the developing countries, 1980-1998
### Table 2: Migration rate

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**Note:** Migration Rate = Net Immigration/ Total Population x 1000.

Figure 8. Illiteracy rates, 1890, 1910 and 1930

Table 3: Labour disputes

### a. Workers involved in strikes

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Figure 9. Secondary School Enrolment (%) in the developing countries, 1980-1996

Figure 10. Minimum Wage on Average Wage in the developed countries, 1980-1996

Note: The percentage of collective bargaining coverage in brackets. Minimum wage has been calculated as a percentage of average wage.
Source: OECD.
Figure 11. Minimum Wage on Average Wage in the developing countries, 1980-1996

Note: Minimum wage has been calculated as a percentage on average wage.
Source: OECD
Figure 12. Union Density (%) in all the countries, 1980-1996

Note: The percentage of collective bargaining coverage in brackets.
Source: OECD
Table 4: Wage Inequality and institutional factors, 1880-1930.

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<td>PSE lagged 5 years</td>
<td>-0.0029</td>
<td>-0.002376</td>
<td>-0.001597</td>
<td>-0.0029</td>
<td>-0.0028</td>
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</tr>
<tr>
<td></td>
<td>(-3.69)</td>
<td>(-1.90)</td>
<td>(-1.34)</td>
<td>(-3.51)</td>
<td>(-3.40)</td>
<td></td>
</tr>
<tr>
<td>Trend</td>
<td>0.03944</td>
<td>-0.000099</td>
<td>0.0415</td>
<td>0.00395</td>
<td>0.0032</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(2.42)</td>
<td>(-0.10)</td>
<td>(2.01)</td>
<td>(1.66)</td>
<td>(2.99)</td>
<td>(2.79)</td>
</tr>
<tr>
<td>Trend2</td>
<td>-0.0001</td>
<td>-0.0000424</td>
<td>-0.00010</td>
<td>-0.000092</td>
<td>-0.0001</td>
<td>-0.0001</td>
</tr>
<tr>
<td></td>
<td>(-4.02)</td>
<td>(-2.45)</td>
<td>(-3.35)</td>
<td>(-3.05)</td>
<td>(-3.96)</td>
<td>(-3.89)</td>
</tr>
<tr>
<td>R2 Within</td>
<td>0.193</td>
<td>0.253</td>
<td>0.2097</td>
<td>0.2087</td>
<td>0.4309</td>
<td>0.4303</td>
</tr>
<tr>
<td>Between</td>
<td>0.264</td>
<td>0.020</td>
<td>0.0001</td>
<td>0.0094</td>
<td>0.1095</td>
<td>0.1206</td>
</tr>
<tr>
<td>Overall</td>
<td>0.0581</td>
<td>0.006</td>
<td>0.0027</td>
<td>0.0011</td>
<td>0.0319</td>
<td>0.0367</td>
</tr>
<tr>
<td>DWH test</td>
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<td></td>
<td></td>
<td>4.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.2581)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Num. Obs.</td>
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<td>605</td>
<td>372</td>
<td>372</td>
<td>228</td>
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<tr>
<td>Num. groups</td>
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<td>13</td>
<td>13</td>
<td>13</td>
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</tr>
</tbody>
</table>

**Note:** The dependent variable is the log of wage inequality. Exogenous variables: Strikes, is the number of strikes, PSE lagged 5 years, is the primary and secondary school enrolment rate lagged 5 years. LCI, the labour compact index. T-statistics in brackets.