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# Earnings Inequality in Late Nineteenth Century America and Britain

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## Abstract

This paper studies the level and the causes of earnings inequality in late nineteenth century America and Britain using microdata from the United States Commissioner of Labor Survey in 1890 and 1891. We examine whether lessons from studies on changes in earnings inequality over time – the importance of skill, especially the skill wage premium, in explaining the changes – can be applied to explaining why America had greater earnings inequality relative to Britain in the late nineteenth century. Using Fields' decomposition methodology, we find that the skill factor is important, albeit not the most important. According to shift share analysis, the differences in earnings inequality between the two countries can be explained mainly by the greater inequality within each skill group.

*Key Words:* earnings inequality, Fields' decomposition of inequality, shift share analysis, late nineteenth century America and Britain

JEL codes: D30, N31, N33

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## I. INTRODUCTION

This paper studies the level and the causes of earnings inequality in late nineteenth century America and Britain using a cross section microdata from the United States Commissioner of Labor Survey (1891, 1892), below denoted as COLS data.<sup>1</sup> To be precise, this paper focuses on the role of returns to skill in explaining the differences in American and British earnings inequality in the late nineteenth century.

The majority of previous papers on earnings (or income) inequality examine the changes in inequality over time in an explicitly historical context for particular countries.<sup>2</sup> In several papers, Williamson and Lindert suggest that the earnings inequality of both America and Britain followed a Kuznets inverted U pattern.<sup>3</sup> They argue that British and American earnings inequality increased until the mid-nineteenth century and World War I, respectively, and decreased thereafter (Williamson (1980), Williamson and Lindert (1980, p. 95)).<sup>4</sup>

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<sup>1</sup>For more information on COLS data, see Haines (1979), pp. 205-212. Britain is a good candidate for comparative study because Britain was one of the most developed countries in the late nineteenth century and was sampled for every industry covered in America except the iron ore industry. Though the COLS data contains other European countries (Belgium, France, Germany and Switzerland) as well as Britain, they were sampled only for selected industries.

<sup>2</sup>See Bowley (1937), Soltow (1968), Thatcher (1968), Atkinson (1975, pp. 21-25), and Williamson (1980, 1985) for (earnings) inequality in Britain. See Tucker (1938) Soltow (1969, 1971), Williamson (1976), and Williamson and Lindert (1980) for (earnings) inequality in America.

<sup>3</sup>Kuznets (1955) hypothesizes that the income inequality rises during the early stages of development, reaches a peak, and then declines in the later stages. A number of papers try to confirm or refute the inverted U hypothesis. The evaluation of the hypothesis itself is beyond the scope of this paper. See Fields (1980, pp. 60-71) and Ray (1998, pp. 201-209) for an evaluation.

<sup>4</sup>Criticizing Williamson and Lindert's papers, others ask whether the historic facts match the prediction of an inverted U, especially whether earnings inequality initially increased. See Soltow (1969, 1971), Grosse (1982), Lindert and Williamson (1982), and Margo and Willaflor (1987) for the debate on America's experience. See Soltow (1968) for Britain's case.

Examining the sources of the changes in earnings inequality over time, Williamson and Lindert (e.g., Williamson (1976), Lindert and Williamson (1985)) pay attention to both the demand and supply of skilled and unskilled workers.<sup>5</sup> Lindert and Williamson (1985) provide an interesting explanation why Britain underwent a leveling of earnings inequality at the mid-nineteenth century, while the American leveling occurred after World War I. They argue that the source of Britain's earlier leveling is the decrease in demand for skilled workers caused by a productivity slowdown and the lack of immigration of unskilled workers to Britain (Lindert and Williamson (1985, p. 368)).<sup>6</sup> This contrasts with the American situation. As a result of the interaction of demand and supply of skilled and unskilled workers, the wage gap (skill wage premium) between skill groups decreased in Britain while the gap was still high in America in the late nineteenth century.

From Williamson and Lindert's explanation on American and British earnings inequality in the late nineteenth century, we may infer that, first, skill is a very important factor in explaining changes earnings inequality over time and, second, the changes in earnings inequality are mainly explained by the changes in the

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<sup>5</sup>The changes in demand and supply of skilled and unskilled workers are also a focus of recent studies on increasing earnings inequality since the 1980's. See Katz and Autor (1999) for summary of recent studies. The increase of earnings inequality recent decades is very interesting from the viewpoint of the inverted U hypothesis since it sheds doubt on the relevance of the hypothesis. See Goldin and Margo (1992) and Goldin and Katz (1999) for earnings inequality in twentieth century America which shows an U pattern, not an inverted U pattern.

<sup>6</sup>It is presumed that productivity increase is achieved by adopting new technology (James (1983)), and the new technology contributes to widening earnings inequality by increasing demand for skilled workers (capital-skill or technology-skill complementarity). Goldin and Katz (1996, 1998) point out, however, that new technology may not necessarily widen the earnings inequality. See also Davies and Wooton (1992) for effects of migration on earnings inequality related to capital-skill complementarity.

skill wage premium.<sup>7</sup> Note that Williamson and Lindert’s explanation was drawn by separately examining changes in earnings inequality for each country. It may be interesting to ask whether the explanation of Williamson and Lindert can be verified from a comparative study based on cross section data from the late nineteenth century (COLS data).<sup>8</sup> To be precise, we ask two questions.

First, “How much of the differences in earnings inequality between the two countries can be explained by the skill factor?” We answer this question using Fields’ methodology (Fields (1997)), which considers the different factors simultaneously in order to investigate which factors led to greater earnings inequality in America relative to Britain in the late nineteenth century.

Second, “How did the skill factor contribute to the greater inequality in America relative to Britain in the late nineteenth century?” We directly test whether the difference in skill wage premium was the main source of the differences in earnings inequality between the two countries in the late nineteenth century. We use a shift share analysis, based on decomposition of the variance into within-group and between-group variance, which shows the sources of differences in earnings inequality between two countries.

The paper is organized as follows. Section 2 introduces the data and describes the characteristics of the sample. In section 3, we compare the earnings

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<sup>7</sup>It is not only economic historians but also labor economists who pay attention to the skill wage premium in studying earning inequality. See, for example, Juhn, Murphy, and Pierce (1993) and Goldin and Katz (1999).

<sup>8</sup>As we will see soon, the COLS data seem to be appropriate and reliable for comparative study because the rich information on workers in America and Britain was collected by one agency.

inequality in late nineteenth century America and Britain using various inequality indices. In section 4, we compute decompositions of earnings inequality using Fields' methodology and shift share analysis in order to answer our two questions, "how much" and "how" the skill factor contributed to the greater inequality in America relative to Britain in the late nineteenth century. In section 5, we present concluding remarks.

## II. DATA

The data for this study comes from the United States Commissioner of Labor Survey of 1889-1890. The COLS data contains an extraordinary amount of information on demographic characteristics, occupations, and income sources of individuals in nine industries (bar iron, pig iron, steel, bituminous coal, coke, iron ore, cotton textiles, woolens, and glass).<sup>9</sup> It is one of the richest available sources for studying earnings inequality in the late nineteenth century.<sup>10</sup> Haines (1979, pp. 208-210) shows, in an industry to industry comparison, that the COLS data is similar in terms of employee age distribution, to 1890 census data. This strengthens our confidence in the COLS data for earnings inequality comparisons.

Of course, the COLS data are not perfect from the viewpoint of modern sam-

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<sup>9</sup>Four industry dummy variables are used in our analysis: iron and steel for the bar iron, pig iron, steel and coke industry; mining for the bituminous coal and iron ore industry; textile for the cotton textiles and woolens industry; glass for the glass industry.

<sup>10</sup>The COLS data have been used in various studies. Hill (1975), Fraundorf (1978) and Shergold (1976) study the earnings differentials between native- and foreign-born workers. Mayer (1964), Dillon and Gang (1987), and Hatton, Boyer and Bailey (1994) study union membership and union wage effects. Modell (1978) and Haines (1979) study various fertility and family income issues. Gratton (1996) studies the welfare of the elderly.

pling technique. As Haines (1979, p. 208) notes, “it is not clear whether the sample was, or was intended to be, random.” We may point out drawbacks of the COLS data. First, one may concern that it contains only nine industries. The nine covered industries represent about 12% of all employees in American manufacturing industry in 1890.<sup>11</sup> Second, one may question whether the American sample is regionally representative considering that the Middle Atlantic region respondents (3,054) consist of about half of the American sample (6,354).<sup>12</sup> In addition, we may consider the possibility that American earnings inequality may be increased substantially due to post Civil War regional wage differentials.<sup>13</sup> Third, another issue is whether the sample of Britain is comparable with that of America. It might be possible that the sample of Britain may have more sampling error than that of America because of a much smaller sample size of Britain (991).<sup>14</sup> However, the COLS data may be one of the best available data for our purposes considering that Carroll D. Wright who supervised the data collection

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<sup>11</sup>From Census Office (1894), it can be roughly computed that iron and steel, coke, cotton goods, woolen goods, and glass industry have shares of 4.5% (212,199), 0.2% (9,150), 4.7% (221,585), 1.7% (79,351) and 1.0% (45,987), respectively, of total employment in manufacturing industry (4,712,622).

<sup>12</sup>The Middle Atlantic region includes Delaware, Maryland, New York, New Jersey and Pennsylvania.

<sup>13</sup>The regional wage differentials are discussed in reference to whether there existed a unified national labor market during the nineteenth century. For this issue, see Coelho and Shepherd (1979), Rosenbloom (1990, 1996), and Margo (1998, 1999). In order to check the robustness of our results of following sections, we have also compared the earnings inequality of the Middle Atlantic region with that of Britain. Though the earnings inequality of the Middle Atlantic region was smaller than that of the entire America, the conclusion of the comparison has not been substantially changed. The results of comparison between Britain and the Middle Atlantic region of America are available from the author upon request.

<sup>14</sup>One referee suggests that it might be that the survey teams were instructed to probe many varieties of American workers, but then only go after a few “typical” worker groups in European countries.

was one of the pioneers in developing and applying sampling technique.<sup>15</sup>

Table 1 shows the mean characteristics of the sample for each country. Our sample consists of male workers aged 20-64. Workers whose occupation classification was uncertain are excluded.

While age and marital status are similar, America and Britain exhibit many differences. Workers in America earn about \$140 more than those in Britain.<sup>16</sup> Most British workers are native-born, while only half of American workers are native-born. The rate of unionization also shows a big difference, with two times as many British workers organized.<sup>17</sup> In terms of industry composition, Britain has larger employment shares for the iron and steel, mining, and textile industries, while America has a larger share for the glass industry.<sup>18</sup> Finally, the skill distributions are also different: America has relatively more unskilled workers, while Britain has more semiskilled workers.<sup>19</sup>

### III. COMPARISON OF OVERALL INEQUALITY

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<sup>15</sup>See Seng (1951) and chapter 2 in Horowitz (1985) for the contribution of Wright to the development of sampling technique. Horowitz (1985, p. 14) praises Wright's sampling work saying that "scholars have valued the detail and representativeness of the data."

<sup>16</sup>Earnings differentials between these two countries are also observed in the 1820's. See Rosenberg (1967).

<sup>17</sup>Union supporter is a worker whose family contributes to a labor organization. See Dillon and Gang (1987) p. 518.

<sup>18</sup>When the COLS data is roughly compared to the American census in 1890 (see Census Office (1894)), the iron and steel and textile industries are underrepresented, while the mining and glass industries are overrepresented in the COLS data relative to the census.

<sup>19</sup>Recent studies treat educational attainments and job market experience as main indicators of skill level. Unfortunately, the COLS data does not contain information on education or others related to human capital. Instead, skill levels are assigned on the basis of occupation. It is difficult to classify occupations into skill categories properly, hence our classification is somewhat arbitrary. This qualification should be borne in mind throughout this paper.



As a first step in our study of earnings inequality in late nineteenth century America and Britain, we compare overall earnings inequality using various inequality measures. We derive decile shares, the coefficient of variation (CV), the Gini index (G), the Theil index (T), and variance of log-earnings (VLOG).<sup>20</sup>

The coefficient of variation (CV) is the ratio of the standard deviation to the mean income level. Let the variance and the mean of earnings ( $y$ ) be  $\sigma_y^2$  and  $\mu_y$ , respectively. Then

$$CV = \frac{\sigma_y}{\mu_y}.$$

The Gini index (G) is defined as:

$$G = \frac{1}{2n^2\mu_y} \sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|,$$

where  $n$  is the population size, and  $y_i$  and  $y_j$  are earnings of person  $i$  and  $j$ , respectively.

Theil proposes a series of inequality measures derived from the notion of entropy in information theory. The measure we use is:

$$T = \sum_{i=1}^n \frac{y_i}{n\mu_y} \log \left( \frac{y_i}{\mu_y} \right),$$

where log means natural logarithm.

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<sup>20</sup>For the comparison of these measures, see Sen (1997) chapter 2 and Cowell (1995) chapter 3.

The final measure we use is the variance of log-earnings (VLOG), defined as

$$\text{VLOG} = \frac{1}{n} \sum_{i=1}^n (\log y_i - \log \mu_y^*)^2,$$

where  $\mu_y^*$  is the geometric mean of earnings.

Table 2 and Table 3 present earnings inequality measures for late nineteenth century America and Britain. These tables show that, for each measure, America had greater inequality than did Britain. This finding is reinforced with the Lorenz curves in Figure 1. The Lorenz curves do not cross, indicating Lorenz consistency. Our finding of lower earnings inequality in Britain is unambiguous.

It is worth comparing our results to those of Williamson (1980) on British earnings inequality measured using various wage censuses.<sup>21</sup> According to Williamson (1980, p. 467), the Gini index of British non-agricultural male earners in 1881 and 1901 are 0.330 and 0.325, respectively, which is much larger than our Gini index (0.182). However, the COLS data contains only nine industries. Williamson (1980, p. 464) also reports the Gini index for industries. The values of the Gini index for miners and manual workers in commodity production comparable to the COLS data are 0.095 and 0.163, respectively, which are not very different from our estimate. We find a similar pattern from the decile shares. He reports that the share of the top 10% (5%) non-agricultural male earners in 1881 and 1901 are 33.58% (25.72%) and 30.75% (22.86%), respectively. Similar to Gini index, these figures are much larger than our figures, 18.42% (10.49%) for top 10% (5%)

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<sup>21</sup>Williamson (1980) expands the wage and income data compiled by Bowley (1937).

earners. However, the shares of the top 5 percent of miners and manual workers in commodity production in 1881 are 6.67% and 9.23%, respectively.

Since our estimates for the Gini index and decile shares in Britain are not very different from those of Williamson (1980), we may safely draw conclusions on earnings inequality in late nineteenth century America and Britain from the COLS data.<sup>22</sup> The COLS data unambiguously shows that America had a far less egalitarian distribution of earnings than Britain did in the late nineteenth century.

#### IV. DECOMPOSITION OF INEQUALITY DIFFERENCE

In this section, we investigate “how much” and “how” the skill factor contributed to greater earnings inequality in America relative to Britain in the late nineteenth century. The first question (how much) and the second question (how) are answered by using two decomposition analyses, Fields’s decomposition methodology and shift share analysis, respectively.

Fields (1997) devises a new method for decomposing inequality into contributing factors. His methodology considers different factors simultaneously, using the information contained in the earnings equation in order to decompose the level of earnings inequality.<sup>23</sup> Log-earnings ( $y = \log y$ ) are regressed on a number of

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<sup>22</sup>Unfortunately, as far as we are aware, there is no study to check the reliability of our estimates on earnings inequality in the late nineteenth America. Though Williamson (1965, p. 25) and Williamson and Lindert (1980, p. 74) have a measure of income inequality (coefficient of variation), the sample of their study is not comparable to the COLS data.

<sup>23</sup>For an application of the Fields (1997) methodology, see Kattuman and Redmond (1997).

explanatory variables:

$$y = \beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k + \varepsilon. \quad (1)$$

The “relative factor inequality weight” of a factor  $k$  ( $s_k$ ) indicates the percentage of earnings inequality that is accounted for by the factor  $k$ , i.e., how important the factor is in explaining earnings inequality. The relative factor inequality weight ( $s_k$ ) is defined as

$$s_k = \frac{\sigma_{\beta_k x_k, y}}{\sigma_y^2} = \frac{\beta_k \cdot \sigma_{x_k} \cdot \rho_{x_k, y}}{\sigma_y}, \quad (2)$$

where  $\sigma_{\beta_k x_k, y}$ ,  $\sigma_y$ , and  $\sigma_{x_k}$  are the covariance of  $\beta_k x_k$  and  $y$ , the standard deviation of log-earnings, and the standard deviation of  $x_k$ , respectively, and  $\rho_{x_k, y} = \sigma_{x_k, y} / (\sigma_{x_k} \sigma_y)$ .

A factor with a large  $s_k$  contributes more to earnings inequality than do factors with smaller  $s_k$ . Factors with negative weights contribute to reducing earnings inequality. The value of  $s_k$  is independent of the inequality measure chosen, under reasonable assumptions.<sup>24</sup> We choose the variance of the log-earnings as our inequality measure in applying Fields’ method. As a first step for the Fields’ decomposition, we estimate earnings equations for America and Britain.

Table 4 reports the earnings equation estimates. Almost all of the explanatory

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<sup>24</sup>See Fields (1997), pp. 3-8. Kattuman and Redmond (1997) use Theil index as their inequality measure when applying the Fields’ methodology for analyzing income inequality in Hungary.

variables are significant. The results show that there existed earnings differentials by union status, skill level, and industry in both America and Britain. Our estimate for nativity confirms Hill's hypothesis, that immigrants in America did not face earnings discrimination.<sup>25</sup>

The regression results are used to compute the relative factor inequality weights ( $s_k$ ) in order to find out how important these factors are in explaining earnings inequality in the two countries. The Fields' decomposition results, shown in first two columns of Table 5, indicate that industry and skill level have the largest weights in earnings inequality in America and Britain, respectively.

The relative factor inequality weight ( $s_k$ ) is, in turn, used to compute the contribution of each factor to the difference in earnings inequality between America ( $A$ ) and Britain ( $B$ ). This computation formula is also independent of inequality measures, but the numerical value of contribution of a factor to the difference in inequality depends on the specific inequality measure. The contribution of a factor  $k$  to the difference in inequality between America and Britain, when the variance of log-earnings is used as inequality measure, is defined as:

$$\Pi_k(\sigma^2) = \frac{s_{k,A} \cdot \sigma_A^2 - s_{k,B} \cdot \sigma_B^2}{\sigma_A^2 - \sigma_B^2}, \quad (3)$$

where  $s_{k,t}$  and  $\sigma_t^2$  are, for country  $t = A$  and  $B$ , the relative factor inequality weight of factor  $k$  and variance of log-earnings, respectively.

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<sup>25</sup>Shergold (1976) suggests that immigrants might face discrimination in other dimensions, for example, in job security and educational facilities.

The last column of Table 5 presents the contribution of each factor to the difference in inequality between America and Britain. A positive value means that the factor contributes to greater earnings inequality in America compared to Britain. That is, American earnings inequality would be lower if the differences caused by that factor were somehow nullified.

It is clear from Table 5 that skill, industry, and union status contribute substantially to greater earnings inequality in America compared to Britain in the late nineteenth century. Their effects are large and positive. Though the skill variable is an important factor explaining the differences in earnings inequality between the two countries, its effects are not overwhelming. Industrial wage differentials may be capturing the effects of skill which are not controlled by the skill variables.<sup>26</sup> In addition to the three major variables, age also contributes to greater earnings inequality in America relative to Britain, though it has a lesser impact. Nativity is found to reduce the difference in earnings inequality between America and Britain.

Next, we answer the second question, “How did the skill factor contribute to greater earnings inequality in America relative to Britain in the late nineteenth century?” To be more specific, “Can the differences in earnings inequality between the two countries be explained by the differences in wage premium for skilled workers?” A related question is “How much did differences in distribution of skills

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<sup>26</sup>If the sample of glass industry is excluded in order to check the robustness of the results, the contribution of industry to the differences in earnings inequality between two countries is almost the same as that of skill. However, the contribution of union decreases substantially (from 10.98 % to 2.7%) when the sample of glass industry is excluded.

among workers contribute to the different levels of earnings inequality between America and Britain?"

A direct way to answer the second question is a shift share analysis.<sup>27</sup> Shift share analysis begins by decomposing the variance of log-earnings into within-group inequality and between-group inequality using the standard variance decomposition technique. This decomposition is

$$\sigma^2 = \sum_{k=1}^g \pi_k \sigma_k^2 + \sum_{k=1}^g \pi_k (\mu_k - \mu)^2, \quad (4)$$

where  $\sigma_k^2$  and  $\mu_k$  are the variance and mean of log-earnings of group  $k$ , respectively, and  $\pi_k$  is the share of earnings of group  $k$ ;  $\mu$  is the overall mean of log-earnings. The first term on the right hand side of equation (4) is the weighted mean of within-group variance and the second term is the variance of mean earnings across groups.

Based on equation (4), the differences in the variance between two countries can be decomposed as follows:

$$\begin{aligned} \sigma_A^2 - \sigma_B^2 &= \overbrace{\sum_{k=1}^g \sigma_{kA}^2 (\pi_{kA} - \pi_{kB})}^a + \overbrace{\sum_{k=1}^g \pi_{kB} (\sigma_{kA}^2 - \sigma_{kB}^2)}^b \\ &+ \underbrace{\sum_{k=1}^g \Delta_{\mu_k A}^2 (\pi_{kA} - \pi_{kB})}_c + \underbrace{\sum_{k=1}^g \pi_{kB} (\Delta_{\mu_k A}^2 - \Delta_{\mu_k B}^2)}_d, \end{aligned} \quad (5)$$

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<sup>27</sup>Shift share analysis is sometimes called sources-of-change accounting analysis. Since it is based on partitioning workers into subgroups according to only one characteristic, it cannot tell whether any single characteristic, such as union status or skill level, contributes more to inequality than do other factors.

where  $\Delta_{\mu_k t}^2 = (\mu_{kt} - \mu_t)^2$ , and  $t = A$  or  $B$ .

The effects of differences in composition between America and Britain are shown in terms  $a$  and  $c$  in equation (5). Terms  $b$  and  $d$  show the effects of differences in variance of each group (intra-group inequality), and of differences in mean earnings of each group (inter-group inequality), respectively. Terms in equation (5) with positive (negative) values contribute to increasing (leveling) inequality in America relative to Britain.

Table 6 shows the results of the shift share analysis. First of all, differences in composition of skill groups between America and Britain do not explain the difference in inequality between the two countries, because the total composition effects ( $a + c$ ) have negative signs. Second, the main reason for greater inequality in America compared to Britain in the late nineteenth century was greater inequality within each skill group (term  $b$ ). Term  $b$  explains more than 80% of total variance difference. Third, the difference in mean earnings across skill groups (term  $d$ ), i.e., the skill wage premium, explains about 20% of the total variance difference.<sup>28</sup>

Our study based on the COLS data does not confirm what Williamson and Lindert found by examining changes in earnings inequality of each country over

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<sup>28</sup>The results with respect to industry and union are very similar to those with respect to skill except that the composition of industry actually contributed to the greater inequality in America and the proportion of term  $b$  is only around 65%. One interesting note is that composition effects of unionization have large negative values, which may indicate that increased unionization would increase America's inequality. This is in contrast to recent findings which argue that the decline of unionization contributes to the rise in earnings inequality in America in recent years. See Freeman (1993).



time.<sup>29</sup> The difference in the wage premium to skill between America and Britain in the late nineteenth century was not the major factor to explain the difference in earnings inequality between two countries. It might be the case that variations of earnings inequality “over time” and those “across countries” cannot be explained by the same factors. Even though America and Britain are considered to be closest in terms of socio-economic institutions and subjects of numerous comparative studies, there might be still substantial differences in socio-economic institutions.<sup>30</sup>

## V. CONCLUSION

Late nineteenth century American and British earnings inequality has been analysed using microdata from the United States Commissioner of Labor Survey (1891, 1892). Though the data contains only nine industries, the COLS data is extremely useful for international comparisons because it surveyed not only America, but also European countries.

The literature examining changes in earnings inequality over time emphasizes the importance of the skill, especially the skill wage premium. We ask whether this phenomenon is also found in the cross-country comparisons of differences in earnings inequality in the late nineteenth century.

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<sup>29</sup>It is possible that our disaggregation into five skill groups is too coarse so as to increase the share of intra-skill group (term  $b$ ) and decrease the share of inter-skill group (term  $d$ ).

<sup>30</sup>The importance of impacts of institutions on earnings inequality is recognized in recent studies on cross-country differences in earnings inequality (Katz and Autor (1999, pp. 1546-1547))

Although we do not know the exact sampling process, the findings from the COLS data help us understand earnings inequality in late nineteenth century America and Britain.

First, according to various inequality measures, America had unambiguously greater earnings inequality than Britain in the late nineteenth century.

Second, Fields' decomposition methodology is used to examine how important the skill factor is in explaining the differences in earnings inequality between America and Britain. The skill factor, industry, and union status turn out to have large impacts on the difference in earnings inequality between America and Britain. It seems that the skill factor is not as much important as one might expect from studies of Williamson and Lindert on historical changes in earnings inequality.

Third, according to shift share analysis, compositional differences of skill groups acted to level inequality in America relative to that of Britain. However, the higher level of inequality in America relative to Britain was mainly because of greater inequality within each skill group. Though the greater inequality between skill groups contributed to greater earnings inequality in America, the impacts were not dominating.

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Table 1: Sample Means

	America		Britain	
Age	38.63	(9.82)	38.97	(9.37)
Annual Earnings (\$)	540.83**	(297.49)	399.72	(145.73)
Family Size	4.81*	(2.13)	4.96	(1.94)
Marriage <sup>a</sup>	0.99	(0.12)	0.98	(0.14)
Native <sup>a</sup>	0.55**	(0.50)	0.96	(0.20)
Union <sup>a</sup>	0.27**	(0.44)	0.54	(0.50)
Skill				
Unskilled <sup>a</sup>	0.35**	(0.48)	0.27	(0.44)
Semiskilled <sup>a</sup>	0.30**	(0.46)	0.40	(0.49)
Skilled <sup>a</sup>	0.20**	(0.40)	0.17	(0.38)
Craftsman <sup>a</sup>	0.11**	(0.31)	0.14	(0.35)
White Collar <sup>a</sup>	0.03	(0.18)	0.03	(0.16)
Industry				
Iron & Steel <sup>a</sup>	0.28**	(0.45)	0.35	(0.48)
Mining <sup>a</sup>	0.10**	(0.31)	0.16	(0.37)
Textile <sup>a</sup>	0.41**	(0.49)	0.46	(0.50)
Glass <sup>a</sup>	0.20**	(0.40)	0.03	(0.16)
Sample Size	6354		991	

Source: United States Commissioner of Labor (1891, 1892), author's own calculation.

*a.* 0 = No, 1 = Yes.

1. Standard deviations are reported in parenthesis.

2. The null hypothesis tested is that the mean of America is equal to that of Britain. \*\* and \* imply that the null hypothesis is rejected at the 5% and 10% level of significance, respectively.

Table 2: Decile Shares of Earnings

Decile	<u>America</u>		<u>Britain</u>	
	Mean		Mean	
	Earnings (\$)	Share (%)	Earnings (\$)	Share (%)
Bottom	200.77	3.71	225.53	5.64
2	306.03	5.66	278.56	6.97
3	359.92	6.66	307.68	7.70
4	405.00	7.49	335.02	8.38
5	446.88	8.26	360.95	9.03
6	494.42	9.14	384.55	9.62
7	547.70	10.13	412.70	10.33
8	636.84	11.78	450.38	11.27
9	790.12	14.61	505.53	12.65
Top	1220.68	22.57	736.34	18.42
Total	540.83		399.72	
Top/Mean	2.26		1.84	
Bottom/Mean	0.37		0.56	
Top/Bottom	6.08		3.26	

Source: United States Commissioner of Labor (1891, 1892), author's own calculation.



Table 3: Earnings Inequality Measures

	CV	Gini	Theil	VLOG
America	0.55	0.27	0.13	0.27
Britain	0.36	0.18	0.06	0.10

Source: United States Commissioner of Labor (1891, 1892), author's own calculation.

Table 4: Regression Results of Earnings Equations

	America		Britain	
Constant	5.10**	(0.08)	4.67**	(0.16)
Age/10	0.32**	(0.04)	0.47**	(0.08)
Age <sup>2</sup> /100	-0.05**	(0.00)	-0.06**	(0.01)
Native	-0.05**	(0.01)	0.21**	(0.05)
Union	0.25**	(0.01)	0.13**	(0.02)
<b>Industry</b>				
Iron & Steel	0.44**	(0.02)	0.14**	(0.03)
Textile	0.18**	(0.02)	-0.09**	(0.03)
Glass	0.61**	(0.02)	0.12*	(0.06)
<b>Skill</b>				
Semiskilled	0.26**	(0.01)	0.17**	(0.02)
Skilled	0.24**	(0.02)	-0.00	(0.03)
Craftsman	0.50**	(0.02)	0.19**	(0.03)
White Collar	0.26**	(0.03)	0.09	(0.06)
Adjusted R <sup>2</sup>	0.37		0.22	
F Value	341.20**		25.76**	
Sample Size	6354		991	

Source: United States Commissioner of Labor (1891, 1892)

1. Standard errors are reported in parentheses, and \*\* and \* mean statistically significant at 5% and 10%, respectively.

2. Reference groups are mining for industry, and unskilled for skill level.

Table 5: Relative Factor Inequality Weight

	Relative Factor		Difference in $\sigma^2$ explained by variable (%)
	Inequality Weight ( $s$ )		
	America	Britain	
Skill	0.097	0.073	11.24
Age	0.025	0.037	1.74
Native	-0.000	0.010	-0.62
Union	0.080	0.034	10.98
Industry	0.169	0.071	23.10
Residuals	0.628	0.776	53.56

Source: United States Commissioner of Labor (1891, 1892), author's own calculation.

1. Difference in  $\sigma^2$  means the difference in variance of log-earnings between America and Britain ( $\sigma_A^2 - \sigma_B^2$ ).

Table 6: Shift Share Analysis

	Within-Group		Between-Group	
	Composition	Variance	Composition	Mean Earnings
	Differences	Differences	Differences	Differences
	( <i>a</i> )	( <i>b</i> )	( <i>c</i> )	( <i>d</i> )
Skill	-0.004 (-2.38%)	0.14 (82.61%)	-0.002 (-1.49%)	0.03 (21.25%)
Industry	0.01 (4.45%)	0.11 (65.08%)	0.02 (11.73%)	0.03 (18.73%)
Union	-0.01 (-4.18%)	0.14 (83.50%)	-0.02 (-14.46%)	0.06 (35.15%)

Source: United States Commissioner of Labor (1891, 1892), author's own calculation.

1. Ratio to the total difference in variance between America and Britain (0.17) is reported in parenthesis.

2. *a*, *b*, *c*, and *d* are defined in equation (5).

Figure 1: Lorenz Curves of America and Britain in 1890

