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# A Cross-Country Comparison of Dynamics in the Large Firm Wage Premium

By EMANUELE COLONNELLI, JOACIM TÅG, MICHAEL WEBB AND STEFANIE WOLTER\*

\* Stanford University, emacol@stanford.edu; Research Institute of Industrial Economics (IFN), joacim.tag@ifn.se (corresponding author); Stanford University, mww@stanford.edu, Institute for Employment Research, stefanie.wolter@iab.de. We thank David J. Price and John Van Reenen for comments. Joacim thanks the Marianne and Marcus Wallenberg Foundation for financial support and Victor Ahlqvist and Charlotta Olofsson for research assistance.

We provide stylized facts on the existence and dynamics over time of the large firm wage premium for four countries. We examine matched employer-employee micro-data from Brazil, Germany, Sweden, and the UK, and find that the large firm premium exists in all these countries. However, we uncover substantial differences among them in the evolution of the wage premium over the past several decades. Moreover, we find no clear evidence of common cross-country industry trends. We conclude by discussing potential explanations for this heterogeneity, and proposing some questions for future work in the area.

## I. Data

We examine matched employer-employee micro-data from Brazil, Germany, Sweden, and the UK. For comparability, we closely follow Bloom et al. (2017) and restrict attention to men aged 20-65 that work full time.

We calculate firm sizes before any restrictions on the sample, by counting the total number of employees employed by the firm at any point in time in a given year. For Brazil, Sweden, and the UK, we define firms as enterprises, that is, legal entities that can consist of several establishments (i.e., local units); the German data only has information at the establishment level.<sup>1</sup> For comparison across industries we map the industry codes in Bloom et al. (2017) for the US to the local equivalent in each country. Wage data for each country are from the job with highest earnings in the year, CPI-adjusted, logged, and treated as follows in each country.

*Brazil.* The data come from the Relação Anual de Informações Sociais (RAIS), which is

<sup>1</sup> The level of aggregation is important. For Sweden, we can calculate the premium both with respect to establishment size and with respect to firm size. The premium calculated for firm size is

substantially lower (in the 0.01 to 0.02) range and stays relatively flat over time, while the premium calculated for establishment size rises over time from about 0.02 to about 0.05).

a matched employer-employee database managed by the Ministry of Labor and covering the universe of formal sector workers in Brazil. A few categories of workers are excluded, such as self-employed individuals and elected politicians. Wages are reported as average monthly wage over the months worked in a given year, and include all taxable income and worker payments to Brazilian social security contributions. For workers with multiple employment spells in a given year, we keep one observation per type of legal entity (public administration, private sector, non-profit, individual, international organization), choosing the oldest highest-paying job of the individual in each of these categories.<sup>2</sup>

*Germany.* For Germany we use the Sample of Integrated Employment Biographies. This a 2% sample of all employment biography spells starting in 1975. Self-employed and civil servants are excluded. Wage data are in spell format giving daily earnings. As hours worked are not reported we use only fulltime employees that worked at least 13 weeks in a year and part-time employees that earned at least the equivalent of the German minimum wage for a fulltime employee (68 Euros = 8.50

Euros per hour times 8 hours). The earnings data is winsorized at the statutory pension insurance limit which is about the 90th percentile of the earnings distribution.<sup>3</sup>

*Sweden.* For Sweden we use the Statistics Sweden LISA database.<sup>4</sup> This contains registry-based information on 100% of all legal residents above age 16. Income data comes from tax filings and consists of total amounts of labor income in a year from the main source of gainful income. Labor income includes all income taxed as labor income in a given year; base salaries, stock option grants, bonus payments, and benefits qualify as taxable labor income. We drop sole-proprietors, workers with substantial ownership stakes in the firms they work for (entrepreneurs), and one-person firms. Sweden has no minimum wages, but rather entry wages are set in collective agreements and vary by sector. To avoid including those that work part time or switched jobs in the middle of a year, we exclude workers earning below 50% of the average annual labor income per year among the sample of men aged 20 to 60.<sup>5</sup>

*UK.* For the UK, we use the Annual Survey of Hours and Earnings. This covers a 1%

<sup>2</sup> See Colonnelli and Prem (2017) for more details on the data and on standard restrictions applied.

<sup>3</sup> We verify that our analysis is mostly unchanged when we use data winsorized at the same level for all countries in the sample.

<sup>4</sup> See <http://www.scb.se/lisa-en> and Olsson and Tåg (2017) for details on the data.

<sup>5</sup> For the industry classifications, we use SNI92 codes at the two-digit level until 2001, then SNI2002 codes until 2010. The SNI92 to SNI2002 codes overlap at the two-digit level, except for 85 that we map to 80.

random sample of employees, and is available from 1997. Data is collected from firms; self-employed workers are excluded. Pay is defined as average gross hourly earnings for the firm's self-reported pay period, which may be one week, two weeks, four weeks, or a calendar month. Earnings include incentive payments, and hours include overtime. Since we do observe hours, we include only workers earning above the contemporaneous minimum wage, and only those who worked for more than 10 hours per week in the reference period. This includes 93.8% of (male) workers in the sample. The minimum wage was introduced in 1999, so we begin from this year. Our measure of enterprise employment is taken from the Inter-Departmental Business Register, the UK government's central database of firms.

## II. Dynamics of the Large Firm Wage Premium

Figure 1 displays the dynamics of the large firm wage premium over time for each country. Each point represents the regression coefficient on log firm size from a worker-level regression of log wages on log firm size for a given year for men aged 20-65 and working full-time. We exclude the public administration sector.

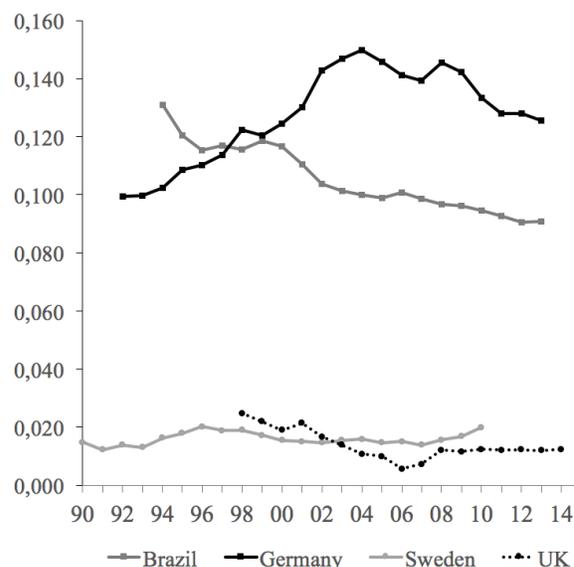


FIGURE 1. DYNAMICS OF THE LARGE FIRST WAGE PREMIUM PER COUNTRY

*Note:* This figure displays the regression coefficients from country-specific regressions at the individual level of log wages on log firm size for men aged 20-65 that work fulltime outside of the public administration sector.

We find that the dynamics of the premium differ substantially across countries. In Germany, the large firm wage premium rises sharply and almost monotonically until 2005, when it starts declining until 2014 as it reaches its 2001 level again. The pattern is the opposite in the UK, where the premium first declines substantially, reaching a minimum in 2007, then rises through 2009, and is constant thereafter. In Sweden, the premium rises from 1991, peaks in 1996, declines through 2001, then rises more gently over the following decade. Finally, the premium in Brazil declines almost monotonically over its sample period, with a slight bump around 2000. This heterogeneity suggests that the factors driving

changes in the large firm wage premium are likely to be country-specific, with the effects of common global trends likely to be quantitatively less significant.

To explore the heterogeneity further, we consider industry-level variation. Figure 2 plots the dynamics of the large firm wage premium by industry and country. Each point is the regression coefficient on log firm size from a worker-level regression of log wages on log firm size for a given year and a given industry, after applying the same sample restrictions as in Figure 1. We find that the industry trends are relatively homogeneous within countries. For example, in Germany, the large firm wage premium for each industry shares the pattern of a sharp rise until 2005 and a subsequent decline, although the decline is more pronounced for some industries than others. Similarly, there are no obvious cross-country trends for a given industry in any of the countries we study: with some minor exceptions, each industry reflects its own country's general pattern rather than common cross-country industry trends. Interestingly, this is also true for industries highly exposed to international trade, such as manufacturing.

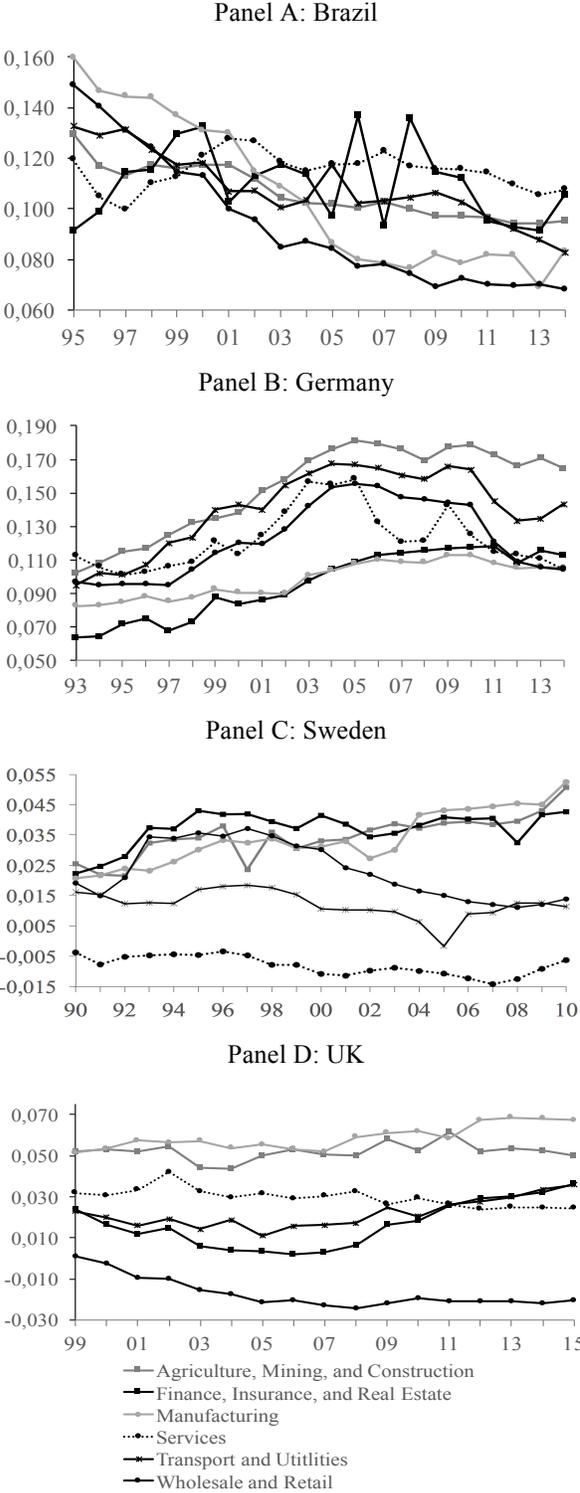


FIGURE 2. THE DYNAMICS OF THE LARGE FIRM WAGE PREMIUM PER COUNTRY AND INDUSTRY

*Note:* This figure displays the regression coefficients from country- and industry-specific regressions at the individual level of log wages on log firm size.

### **III. Related Literature and Potential Explanations for the Heterogeneity**

The existing literature on the large firm wage premium, started by Moore (1911), is today large and growing (see Brown and Medoff 1989 and Oi and Idson 1999 for surveys). As such, we are not the first to document the existence of large firm wage premia in Brazil (Alvarez et al, 2018), Germany (Gerlach and Schmidt 1989, Gerlach and Hübler 1998, Lehmer and Möller 2010), Sweden (Holmund and Zetterberg 1991, Arai 2003, Heyman 2007) and the UK (Main and Reilly 1993, Hildreth and Oswald 1997). The magnitude of the large firm wage premium we estimate here is similar to what has previously been found in each country. Some of these papers also discuss the variation in firm pay premiums over time, even though the evidence is scarcer and the mechanisms are largely unexplored. Our paper presents matched employer-employee evidence for the universe of formal sectors workers in each country, and for the longest panel to date (25 years), as well as the first cross-country and industry analysis over this period. For the US, Bloom et al (2017) report a declining trend in the large firm wage premium since the 1980s, similar to what we observe for Brazil since the early 90s, but not for Germany, Sweden, or the UK.

The literature has advanced several explanations behind the existence of a large firm wage premium (Brown and Medoff 1989, Oi and Idson 1999). Central plausible mechanisms include that (i) large firms may employ different workers, and, in particular, more skilled workers that are better paid; (ii) larger firms are more unpleasant to work for because they have higher productivity standards which lead to compensating differentials; (iii) larger firms have more market power and thus more rents to share with workers; (iv) larger firms pay efficiency wages to deter shirking due to more difficulty in monitoring workers; and (v) larger firms pay higher wages because of the threat of unionization.

Can any of these possible explanations explain the cross-country trends we find? While our objective is to document facts, and provide a basis for subsequent work in this area, the lack of a common trend across countries, and the lack of common trends within industries across countries, provide some basic insights. First, the evidence seems to run counter to an explanation based on technological development that potentially could have caused changes in either the composition of workers in small versus large firms, in compensating differentials for

working for large firms, or in the optimality of using efficiency wages in large firms. Second, unlike the case of the US (Bloom et al, 2017), the dynamics we observe seem unlikely to be driven by changes in a country's industry composition, as we find that the large pay premium follow a similar pattern across most sectors of each given country.

#### **IV. Conclusion**

Using matched employer-employee data from Brazil, Germany, Sweden, and the UK, we document stylized facts about the dynamics of the large firm pay premium over the past 25 years. We find that while the premium exists and is large in all countries, it follows significantly different patterns across countries.

These findings pose several questions for future research that are worth investigating. Why are the dynamics of the large pay premium of US and Brazil so similar, even as they experienced opposite changes in inequality over the same period? Why do pay premia differ so drastically between two similar labor markets such as Sweden and Germany? Why are there so large level differences in the premia across countries? More generally, what are the leading channels behind the widely different patterns observed across countries?

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