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Small Employers, Large Employers and the Skill Premium

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Abstract

I document the comovement of the skill premium with the differential employer size wage premium between high- and low-skill workers in U.S. manufacturing during the postwar era. For the baseline specification, i.e., establishments with at least 500 employees categorized as large employers and non-production workers as high-skilled, I obtain a correlation coefficient of 0.87. Exploiting variations across subindustries while controlling for other potentially relevant factors, I estimate that an increase by ten log-points in the differential size premium is associated with an increase in the skill premium by three log-points.

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1. Introduction

An important and influential strand of labor market research analyzes wage differentials. One of the most prominent stylized facts is that larger employers pay higher wages. The *Handbook of Labor Economics* dedicates an entire chapter to the relation between wages and the size of the employer (Oi and Idson, 1999). Most of the literature investigates why even observably identical workers enjoy a wage premium at large establishments and firms.

I contribute to the literature by uncovering a close relation between the employer size wage premia and another key wage premium. Specifically, I document the comovement of the skill premium with the differential employer size wage premium between high- and low-skill workers in U.S. manufacturing during the postwar era. Most notably, the surge in the skill premium in the 1980s and 1990s coincides with the surge in the differential size premium. This suggests that differences between small and large employers play a potentially important role in explaining the recent increases in wage inequality.

The present paper is also related to the literature that stresses the role of establishments and firms in explaining the positive trend in wage inequality that so many countries have experienced over the last decades (e.g., Dunne et al., 2004; Faggio et al., 2010; Card et al., 2013; Barth et al., 2014). I complement this strand of literature by exploring the contribution of the differences between small and large employers to the rising skill premium.[1]

2. Differential Size and Skill Premia

First, I document the evolution of the differential employer size wage premium and the skill premium in U.S. manufacturing since 1947. I focus here on manufacturing since this industry is traditionally well covered. The empirical study is based on the *Census of Manufactures*, which collects information on U.S. manufacturing once every five years, combining both administrative records and establishment surveys. Production and non-production workers serve as proxies for low- and high-skill workers, respectively, since this information is consistently

[1] Stijepic (2015) studies the impact of the heterogeneous adoption across establishments of a new technology on wage inequality in a search and matching framework. The model, calibrated to match differences in inter-firm mobility between skill groups and rising productivity dispersion across establishments in U.S. manufacturing between the late 1970s and 1990s, attributes one-third of the increase in the skill premium and the entire increase in the differential establishment size wage premium to skill-neutral technical change and the technology diffusion process itself.

available over the entire sample period. I define the employer size wage premium as the wage premium enjoyed by workers at establishments with at least 500 employees relative to workers at establishments with less than 500 employees.[2] The differential size wage premium is the difference between the non-production and production workers' establishment size premia.

Figure 1 depicts the evolution of the differential employer size premium and the skill premium in U.S. manufacturing during the postwar era. The skill premium rose by 17 percentage points from 56 percent in 1947 to 73 percent in 2007. Most of the increase occurred in the 1980s and 1990s. The U.S. economy in its entirety exhibited similar trends (see, e.g., Acemoglu, 2003). The differential establishment size wage premium rose from -24 percentage points to -4 percentage points over the same time span. Most of the increase occurred after the 1970s. The correlation coefficient of the skill premium and the differential size premium is 0.87 and significant at the one percent level.

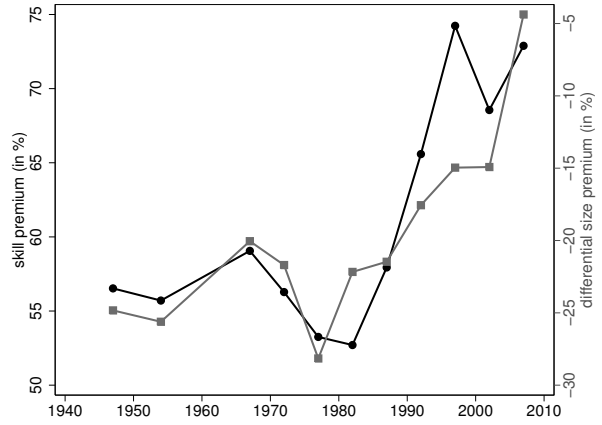

Figure 1: Skill premium and differential employer size wage premium between high- and low-skill workers in U.S. manufacturing. Size premium defined as the wage premium enjoyed by workers at establishments with at least 500 employees relative to workers at establishments with less than 500 employees. Non-production and production workers as proxies for high- and low-skill workers, respectively. Author's calculations based on the *Census of Manufactures*.

In order to shed further light on the relation between the skill premium and the differential size premium, I exploit variations across 20 subindustries while also taking into account other potentially relevant factors.[3] Let $w_{i,t}$ be the average

[2]Establishments with less than 500 employees account on average for around 60 percent of overall employment in U.S. manufacturing over the sample period.

[3]The industry classification changes from the *Standard Industrial Classification* (SIC) system

wage in the subindustry i in the year t. Furthermore, let the subscripts $s \in \{l, h\}$ and $e \in \{s, l\}$ denote the low- and high-skill workers' variables, and the small and large establishments' variables, respectively. For a given variable $x_{i,t}$, let $\Delta_s x_{i,t}$ be the difference between the high- and low-skill workers' variables, i.e., $\Delta_s x_{i,t} \equiv x_{i,t}\big|_{s=h} - x_{i,t}\big|_{s=l}$. Similarly, $\Delta_e x_{i,t}$ is the difference between the large and small establishments' variables, i.e., $\Delta_e x_{i,t} \equiv x_{i,t}\big|_{e=l} - x_{i,t}\big|_{e=s}$. Hence, the log-wage skill premium, size premium, and differential size premium are $\Delta_s log(w_{i,t})$, $\Delta_e log(w_{i,t})$, and $\Delta_s \Delta_e log(w_{i,t})$, respectively.

Formally, I estimate the econometric model

$$\begin{aligned}\Delta_s log(w_{i,t}) = \alpha \Delta_s \Delta_e log(w_{i,t}) + \beta log(prod_{i,t}) + \gamma \Delta_s log(emp_{i,t}) + \delta log(emp_{i,t}) \\ + \beta' \Delta_e log(prod_{i,t}) + \gamma' \Delta_e \Delta_s log(emp_{i,t}) + \delta' \Delta_e log(emp_{i,t}) + u_t + v_i + \epsilon_{i,t},\end{aligned}$$

where $emp_{i,t}$ and $prod_{i,t}$ denote employment and value added per worker. Furthermore, the subindustry and time fixed effects are v_i and u_t, respectively, and the unexplained residual is denoted by $\epsilon_{i,t}$. The parameter α reflects the effect of the differential size premium on the skill premium. The parameters β, γ, and δ capture the impact of the subindustry's labor productivity, skill intensity, and size, respectively, while the corresponding parameters β', γ', and δ' describe the impact of the differences between the subindustry's large and small establishments in those three variables.[4]

Table 1 displays the employment weighted ordinary least squares estimates of the effect of the differential employer size wage premium and the other covariates on the skill premium.[5] An increase in the differential employer size premium by ten log-points is estimated to be associated with an increase in the skill premium by 2.5 to 3.2 log-points.[6]

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with 20 subindustries to the *North American Industry Classification System* (NAICS) with 21 subindustries between the survey years 1992 and 1997.

[4]While there is strong evidence that a positive skill–size relation has existed in recent decades, evidence for the 19th century suggests a negative skill–size relation (Holmes and Mitchell, 2008).

[5]The year 1947 is omitted since value added in that year is only reported in unadjusted terms. Adjusted value added also takes into account the value added by merchandising operations, and the net change in finished goods and work-in-process inventories between the beginning and the end of the year.

[6]While an increase in labor productivity is estimated to decrease the skill premium, an increase in the large establishments' relative labor productivity is estimated to raise the skill premium. This pattern is not statistically significant in all the specifications here, but it suggests that differences in the adoption of technologies between establishments may play an important role in explaining the evolution of the skill premium (see, e.g., Stijepic, 2015).

	1954–1992		*1954–2007*	
	(1)	(2)	(3)	(4)
Differential size premium (α)	0.318^{**} (0.143)	0.303^{***} (0.092)	0.312^{**} (0.119)	0.249^{***} (0.082)
Basic industry characteristics				
Labor productivity (β)	-0.270^{**} (0.125)	-0.043 (0.040)	-0.211^{***} (0.067)	-0.013 (0.049)
Skill intensity (γ)	-0.100 (0.090)	-0.186^{***} (0.047)	-0.090 (0.082)	-0.163^{***} (0.046)
Size (δ)	-0.029 (0.037)	0.072^{**} (0.029)	-0.031 (0.028)	0.049 (0.030)
Employer size differentials				
Labor productivity (β')	0.061 (0.148)	0.124^{**} (0.050)	0.078 (0.077)	0.020 (0.046)
Skill intensity (γ')	0.008 (0.096)	0.109^{**} (0.049)	0.084 (0.081)	0.128^{***} (0.044)
Size (δ')	0.005 (0.031)	-0.060^{***} (0.017)	0.001 (0.027)	-0.065^{***} (0.016)
Subindustry (v_i)	–	x	–	x
Year (u_t)	x	x	x	x
R-squared	0.627	0.973	0.521	0.968
Observations	140	140	203	203

Table 1: Employment weighted ordinary least squares estimates of the effect of the displayed variables on the skill premium, with robust standard errors adjusted for clustering at the subindustry level in parentheses. Size premium defined as the wage premium enjoyed by workers at establishments with at least 500 employees relative to workers at establishments with less than 500 employees. Non-production and production workers as proxies for high- and low-skill workers, respectively. Statistical significance at the 10, 5, and 1 percent level denoted by *, **, and ***, respectively. Author's calculations based on the *Census of Manufactures*.

3. Conclusion

In the present paper, I document the comovement of the skill premium with the differential establishment size wage premium between high- and low-skill workers in U.S. manufacturing during the postwar period. Most notably, the surge in the skill premium in the 1980s and 1990s coincides with the surge in the differential establishment size premium. This suggests that differences between small and large employers play a potentially important role in explaining the recent increases in wage inequality.

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Appendix A. Data Appendix

I construct the time series by establishment size from tabulations in various *Census of Manufactures* reports:[7]

1947: U.S. Department of Commerce, B. o. t. C., 1950. *1947 Census of Manufactures. Vol. 1, General Summary.* Washington, DC: U.S. Government Printing Office. (Chapter 3, pp. 97)

1954: U.S. Department of Commerce, B. o. t. C., 1957. *1954 Census of Manufactures. Vol. 1, Summary Statistics.* Washington, DC: U.S. Government Printing Office. (Chapter 3, pp. 1)

1958–1967: U.S. Department of Commerce, B. o. t. C., 1971. *1967 Census of Manufactures. Vol. 1, Summary and Subject Statistics.* Washington, DC: U.S. Government Printing Office. (Chapter 2, pp. 4)

1972: U.S. Department of Commerce, B. o. t. C., 1976. *1972 Census of Manufactures. Vol. 1, Subject and Special Statistics.* Washington, DC: U.S. Government Printing Office. (Chapter 2, pp. 68)

1977: U.S. Department of Commerce, B. o. t. C., 1981. *1977 Census of Manufactures. Vol. 1, Subject Statistics.* Washington, DC: U.S. Government Printing Office. (Chapter 1, pp. 59)

1982: U.S. Department of Commerce, B. o. t. C., 1985. *1982 Census of Manufactures. Subject Series. General Summary. Part 2. Industry Statistics by Employment Size of Establishment.* Washington, DC: U.S. Government Printing Office. (pp. 3)

1987–2007: The series for the years 1987 onwards are directly available in machine readable formats on the website of the United States Bureau of the Census: "MC87I4-1" for the year 1987, "MC92SF4" for the year 1992, "E9731G4" for the year 1997, "ECN_2002_US_31SG105" for the year 2002, and "ECN_2007_US_31SG3" for the year 2007.

[7] Instructions on how to obtain data from the *Economic Census* are available on the website of the United States Bureau of the Census (`http://www.census.gov/econ/census07`).

In some subindustries, the statistics for some establishment size classes with few observations have not been disclosed in order to preserve confidentiality. However, the number of establishments is always disclosed. Since the total over all establishment size classes is also always disclosed, the data allows me to compute per-establishment statistics for all subindustries. Finally, the total over all subindustries in a size class and, hence, the total over all not disclosed values in a size class is provided. I exploit this information to impute the not disclosed values so that high value added subindustries remain high value added subindustries, skill intensive subindustries remain skill intensive, and so on.

I use a chain-type price index for value added in U.S. manufacturing in order to express all monetary amounts in 2005 prices. Table A.2 displays summary statistics for U.S. manufacturing subindustries in 1954–2007.

	Establishments		
	All	Small	Large
Wage premia (in %)			
Skill premium	60.558 (25.695)	70.976 (27.015)	44.181 (21.729)
High-skill size premium	10.168 (10.632)	–	–
Low-skill size premium	27.121 (17.958)	–	–
Differential size premium	−16.953 (13.775)	–	–
Basic industry characteristics			
Value added per worker	710.061 (647.561)	626.235 (519.113)	850.172 (896.108)
Skill share (in %)	27.593 (9.651)	25.823 (8.644)	30.553 (11.663)
Employment	825.988 (538.559)	516.784 (342.034)	309.201 (331.253)

Table A.2: Employment weighted statistics for U.S. manufacturing subindustries in 1954–2007, with standard deviations in parentheses. Size premium defined as the wage premium enjoyed by workers at establishments with at least 500 employees relative to workers at establishments with less than 500 employees. Non-production and production workers as proxies for high- and low-skill workers, respectively. Author's calculations based on the *Census of Manufactures*.