

Changes in Management Intensity, Management Wage Premium, and Employment Growth Across the U.S. Economy 2002 to 2020

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With 228 matched U.S. industries for 2002 and 2020, aggregated data has slightly rising management intensity (MI), defined as management's share of total employment, and minimally declining management wage premium (MWP), defined as the average wage for management divided by the average wage for all other workers. Meaningful pattern differences in MI and MWP across economic sectors are found along with unconditional divergence from 2002 to 2020 in MI, but unconditional convergence in MWP from 2002 to 2020. No association is found between MI and total employment growth, but a negative association between MWP and total employment growth exists.

Keywords: management wage premium, management intensity, wage convergence, wage dispersion, management growth, management compensation

INTRODUCTION

In both the academic research literature and the mainstream business press, it is common to read arguments that the U.S. economy suffers from excessive layers of management (Hamel & Zanini, 2016), or that management is over compensated relative to management's actual contributions to the value of production (Gordon, 1996; Harford, 2006; Leicht and Brady, 2011; Perelman, 2011). Alternatively, the argument regularly is made that too many businesses place too much emphasis on short-term growth in net earnings which leads to excessive reductions in managerial and other staffing and lost long-run productivity and profit growth (Goesaert, Heinz and Venormelingen, 2015; Sucher and Gupta, 2018). Similarly, concerns about inadequate compensation making it difficult to attract or keep qualified managers are regularly found in the literature (Wade et. al., 2006). Other frequent arguments for growth in management's share of total employment include strategic use of titles to avoid overtime payments (Cohen, Gurun, and Ozeal, 2020), expanding management's role in the growth of so-called "bullshit jobs" (Delucchi et al, 2021; Graeber, 2019), and increasing technological intensity of production leading to greater usage of managers (Doms et al, 1997). If the technology drivers of capital for labor substitution (Wadley, 2021) make it easier

to substitute capital for non-management labor than for management labor, then management's share of total employment will be rising. Some, however, argue that fears of automation related job loss are overstated (Willcocks, 2020).

Other arguments support a declining share of management in total employment including the "fewer managers, fewer meetings, more agility" movement (De Smet, Aaron, et al. 2020), and greater usage of flat instead of hierarchical organizations (Remenova, Skorkova, and Jankelova, 2018). Multiple forces have been identified which may increase management's wage premium relative to other workers in an industry including greater experience and higher performance (Medoff and Abraham, 1981) as well as providing vision and adding shareholder's wealth (Rotemberg and Saloner, 2000). At a broader economy level, skills-based wage premiums associated with synthesis and critical thinking skills have risen in the past 30 years (Liu and Grusky, 2013). In many industries the synthesis and critical thinking requirements for managers will exceed the requirements for the average worker, contributing to a rising management wage premium. Given the U.S. economy has more than 150 million workers and produces more than 20 trillion dollars of output annually, it is not surprising that many anecdotes exist that are consistent with these various conflicting arguments on whether managements' share of total employment should be rising or falling, or if the management wage premium should be rising or falling.

Rather than focus in depth on one or a few industries, this research investigates changes from 2002 to 2020 across a large swath of the U.S. economy. Specifically, we contribute to the research literature by examining changes in the relative intensity of U.S. management employment, and the relative compensation to U.S. management, across 228 different industries from 2002 to 2020. For each industry, management intensity of production (MI) is defined as the percentage of total employment in an industry from all management occupations in the industry. The management wage premium (MWP) in an industry is defined as the average wage across all management occupations in the industry divided by the average wage for all other occupations in the industry.

By examining changes in the distribution of values for MI and MWP across these industries from 2002 to 2020, insights can be gained on which economic sectors have seen changes in the importance of management to the production process. We also assess the degree of convergence or divergence across industries in MI and MWP since 2002 to see if the importance of management across industries is becoming more, or less, similar over time. Lastly, we test for relationships between the total employment growth of an industry from 2002 to 2020 and its values for MI and MWP.

The rest of the paper is organized as follows: Section 2 Data, Section 3 Methods and Results, and Section 4 Conclusion.

DATA

The U.S. Bureau of Labor Statistics, Occupational Employment and Wage Statistics program (OEWS, 2022) produces employment and wage estimates annually for nearly 800 occupations. Beginning in 2002, the program reports occupation data separately for industries at the four-digit level using the North American Industrial Classification (NAIC) system. With 2020 as the most recently available data, we analyze the data for the 228 four-digit NAIC industries that can be matched in 2002 and 2020 to have the longest possible time span of matched detailed industry data. Across these 228 industries, total reported employment is 88.1 million in 2002 and 98.5 million in 2020. Given total nonfarm employment monthly averages of 130.6 million in 2002 and 142.3 million in 2020 (CES, 2022), our sample provides coverage of 67.4% in 2002 and 69.2% in 2020 of total nonfarm employment. This coverage is broad enough that we can be confident our findings reflect activity in much of the U.S. economy.

Aggregating outcomes across all 228 industries, we find a slight rise in management occupations' share of total employment from 5.51% of total 2002 employment to 5.83% of total 2020 employment. Clearly, at the aggregate level there is no evidence of excessive growth in management over these 18 years as management's share of total employment rose by only 5.8% over the 18 years ($5.83/5.51 = 1.058$). Given there was modest growth, however, the data also does not support the counter narrative that middle and lower-level management ranks have been sharply culled in recent decades.

In contrast to the slight gain in management’s share of total employment at the aggregated level, there is a small decline in average management wages relative to all other workers. Across the 228 industries, the unweighted average value for the ratio (management earnings / all other workers earnings) declined from 2.49 in 2002 to 2.43 in 2020. Weighting each industry by its share of employment also finds a slight decline in this earnings ratio from 2.27 in 2002 to 2.22 in 2020. At the aggregate level, there is no evidence of escalation in management earnings relative to all other workers.

To investigate industry-specific measures for any given industry “i” and year “t”, we define management intensity (MI) and the management wage premium (MWP) in industry “i” (i = 1 – 228) as follows:

$$MI_i = \frac{\text{sum employment across all management occupations in industry } i}{\text{total employment in industry } i} \quad (1a)$$

$$MWP_i = \frac{\text{average earnings across all management occupations in industry } i}{\text{average earnings across all other workers in industry } i} \quad (1b)$$

The distribution of MI and MWP in 2002 and 2020 is shown in Table 1. The growth in MI seen in the aggregated data was due to growth in MI in the upper half of the distribution of industries by MI. The 10th/25th/50th percentile values of MI saw declines from 2002 to 2020. For example, management employment as a share of total employment was 3.1% for the 10th percentile industry in 2002, but that value fell to 2.7% by 2020. In contrast, MI at the 90th percentile rose from 10.0% to 12.0% from 2002 to 2020. Unlike the MI distribution, for the MWP distribution there were modest declines from 2002 to 2020 across the entire distribution of one to three percent. For example, at the 10th percentile the earnings ratio declined 1.8% (1.82/1.88) and at the 90th percentile it declined 2.9% (3.00/3.09). In sum, from 2002 to 2020 we see more dispersion of MI across industries and less dispersion of MWP.

TABLE 1
DISTRIBUTION OF MANAGEMENT INTENSITY (MI) AND MANAGEMENT WAGE PREMIUM (MWP), 2002 AND 2020

Year	MI 2002	MI 2020	MWP 2002	MWP 2020
min value	0.6%	0.9%	1.29	1.28
10th p-tile	3.1%	2.7%	1.88	1.82
25th p-tile	3.9%	3.6%	2.15	2.11
50th p-tile	5.5%	5.1%	2.47	2.43
75th p-tile	7.1%	8.0%	2.78	2.73
90th p-tile	10.0%	12.0%	3.09	3
max value	20.5%	25.1%	4.15	3.57

METHODS AND RESULTS

The aggregated across industries data, however, does not provide any insights into the variation across different types of industries in management intensity or wage premiums. Nor does the aggregated data examine if management intensities or wage premiums across industries are stable, converging, or diverging across industries over time. Next we examined both the patterns of management intensity and wage premiums across both industry and time.

Across Industry Variation in Management Intensity (MI) and Management Wage Premium (MWP)

By grouping the four-digit NAIC industries into their one-digit sectors, patterns of management intensity across the economy in 2020 become more evident. In Table 2, the number of four-digit NAIC industries in a sector by the industry's management intensity decile ranking is summarized. The highest management intensity industries are disproportionately from four-digit industries in the information, finance/insurance/real estate, and other professional services sector as this sector accounts for only 16.2% of the industries (37/228) but 60.9% of the industries in the highest decile of management intensity (14/23). The least management intensive industries are disproportionately from the trade, transport, and warehousing sector with 20.8% (11/53) of these industries in the lowest decile of management intensity. This analysis was repeated with 2002 data, but findings were very similar so not reported here.

TABLE 2
4-DIGIT NAIC INDUSTRIES BY YEAR 2020 DECILE OF MANAGEMENT INTENSITY
(1 LOWEST DECILE)

Sector/Decile	1	2	3	4	5	6	7	8	9	10	Total
1 Ag, Forest, Fishing	2			1							3
2 Mining, Utilities, Construction		2		1	4		3	4	2	2	18
3 Manufacturing	2	9	8	6	9	9	5	7	5	2	62
4 Trade, Transport, Warehousing	11	6	7	7	3	4	3	6	6		53
5 Info, FIRE, Professional Services	3	1	3		2	2	3	3	6	14	37
6 Education, Health Care	3	2	3	2	4	4	2	2	1	2	25
7 Arts, Recreation, Hospitality	1	2	1	2	1	1	4	1	1		14
8 Other Services	1	1	1	3		2	1		1	3	13
9 Public Administration						1	1		1		3
Total	23	23	23	22	23	23	22	23	23	23	228

To examine the management wage premium across their one-digit sectors in 2020, the 4-digit NAIC industries again were allocated across the 2020 deciles for the management wage premium as show in Table 3. The highest management wage premium industries are in the manufacturing sector which accounts for 69.6% (16/23) of the top decile industries but are only 27.2% (62/228) of all the industries in the sample. The industries with the lowest earnings premium for managers are relatively concentrated in the public administration and education/health care sectors. All of the public administration industries are in the lowest earnings ratio decile while 28.0% (7/25) of the industries in education/health care are in the lowest decile. These two sectors account for 43.5% (10/23) of the lowest earnings decile industries, but just 12.3% (28/228) of all industries in the sample. This same analysis was done for the 2002 data with very similar results which are not reported here.

TABLE 3
4-DIGIT NAIC INDUSTRIES BY YEAR 2020 DECILE OF MANAGEMENT WAGE PREMIUM
(1 LOWEST DECILE)

Sector	1	2	3	4	5	6	7	8	9	10	Total
1. Ag, Forest, Fishing								1	1	1	3
2. Mining, Utilities, Construction	2	3	7	5	1						18
3. Manufacturing	1	2	2	3	7	6	2	13	10	16	62
4. Trade, Transport, Warehousing	6	3	1	3	7	8	12	4	7	2	53
5. Info, FIRE, Professional Services	3	6	6	7	1	6	2	1	2	3	37
6. Education, Health Care	7	7	2	1	3	3	2				25
7. Arts, Recreation, Hospitality	1	2			2		4	2	2	1	14
8. Other Services			5	3	2			2	1		13
9. Public Administration	3										3
Total	23	23	23	22	23	23	22	23	23	23	228

In sum, the patterns seen in Tables 2 and 3 indicate that the manufacturing sector is somewhat of an outlier in that it is not among the most management intensive of the nine sectors, but also has the highest concentration of high management wage premium industries across these sectors.

Formal Tests of Convergence or Divergence in Management Intensity or Wage Premium

While comparing the 2002 and 2020 distributions for MI and MWP in Table 1 is informative, this does not directly test for evidence of convergence or divergence across the 228 industries in their values for MI and MWP. We test for evidence of convergence or divergence using the widely applied concept of unconditional β convergence. There is a large literature testing for per capita wealth or income unconditional β convergence across nations or regions (Barro and Sala-i-Martin, 1992; Barro, 1996; Dobson and Ramlogan, 2002; Kangasharju, 1998; Mankiw, Romer, and Weil, 1992). The technique also has been used to assess the degree of convergence in outcomes for a variety of social and economic indicators such as population age profiles (Kashnitsky, de Beer, and van Wissen, 2017), mortality rates (Janssen et al, 2016), wine demand (Dal Bianco, Boatto, and Caracciolo, 2014), and labor productivity (Freeman and Yerger, 2001; Kinfermichael and Morshed, 2019).

Unconditional β convergence for MI and MWP is tested using regression equations 2a and 2b below, see Sali-i-Martin (1996) for complete details of the methodology. If β is found to be negative and statistically significant, this is evidence that industries with higher values in 2002 grew more slowly so there is some degree of catching up by 2020 for those industries with lower values in 2002. Alternatively, finding β to be positive and statistically significant means a growing divergence across the 228 industries since industries with higher values in 2002 also grew faster from 2002 to 2020.

$$\% \text{ Change } MI_{i,2002,2020} = \alpha + \beta * MI_{i,2002} + \varepsilon_{i,t} \tag{2a}$$

$$\% \text{ Change } MWP_{i,2002,2020} = \alpha + \beta * MWP_{i,2002} + \varepsilon_{i,t} \tag{2b}$$

where

$$\% \text{ Change } MI_{i,2002,2020} = \left(\frac{MI_{i,2020} - MI_{i,2002}}{MI_{i,2002}} \right)$$

$$\% \text{ Change } MWP_{i,2002,2020} = \left(\frac{MWP_{i,2020} - MWP_{i,2002}}{MWP_{i,2002}} \right)$$

MI and MWP as previously defined in equations 1a and 1b
 “i” ranging from 1 to 228 for each of the four-digit NAIC industries.

These results are presented in Table 4. Given the positive and statistically significant β coefficient in the regression for management intensity (MI), we have evidence of unconditional divergence in MI across the 228 industries from 2002 to 2020. Industries with higher values for MI in 2002 had faster growth rates of MI than did industries with lower values of MI in 2002. For the management wage premium (MWP) however, we find evidence of convergence in MWP across the 228 industries since the β coefficient is negative and statistically significant. Industries with higher 2002 MWP values grew more slowly from 2002 to 2020 than did industries with smaller 2002 MWP values.

TABLE 4
REGRESSION TESTS FOR UNCONDITIONAL CONVERGENCE OR DIVERGENCE
OF MANAGEMENT INTENSITY (MI) AND MANAGEMENT WAGE
PREMIUM (MWP) FROM 2002 TO 2020

Dependent Variable	α (p-value)	β (p-value)	Independent Variable	R ²
%Change MI _{i,2002,2020}	-0.068 -0.046	1.269 -0.01	MI _{i,2002}	0.029
%Change MWP _{i,2002,2020}	0.18 (< .001)	-0.08 (< .001)	MWP _{i,2002}	0.12

Note: Results from estimates of equations 2a and 2b, n = 228 in all regressions

Examining Links Between Total Employment Changes and MI or MWP

We next looked for evidence across the 228 industries of general linkages between management intensity or the management wage premium and the percentage change in total employment from 2002 to 2020. Several different MI and MWP variables were used, and these regression results are summarized in Table 5. As seen in the first three rows of reported regression results, there is no evidence of a statistically significant relationship between industries MI values in 2002 or in 2020 and their percentage change in total employment as the β coefficient is statistically insignificant in all three regressions. For the management wage premium, however, there is consistent evidence of a negative association between industries percentage change in total employment from 2002 to 2020 and their MWP values, given that the β coefficient in the last three reported regressions is always negative and statistically significant.

TABLE 5
REGRESSION TESTS FOR RELATIONSHIP BETWEEN % CHANGE TOTAL INDUSTRY
EMPLOYMENT AND MANAGEMENT INTENSITY (MI) OR WAGE PREMIUM (MWP)

Dependent Variable	α (p-value)	β (p-value)	Independent Variable	R ²
% Change Total Employment _{i,2002,2020}	-0.019 (-0.828)	1.353 (-0.286)	MI _{i,2002}	0.005
% Change Total Employment _{i,2002,2020}	-0.012 (-0.875)	1.2 (-0.247)	MI _{i,2020}	0.006
% Change Total Employment _{i,2002,2020}	-0.02 (-0.815)	1.339 (-0.252)	Average of MI _{i,2002} and MI _{i,2020}	0.006
% Change Total Employment _{i,2002,2020}	0.741 (<.001)	-0.272 (-0.001)	MWP _{i,2002}	0.046
% Change Total Employment _{i,2002,2020}	0.638 (-0.003)	-0.237 (-0.007)	MWP _{i,2020}	0.032
% Change Total Employment _{i,2002,2020}	0.766 (<.001)	-0.286 (-0.002)	Average of MWP _{i,2002} and MWP _{i,2020}	0.043

Note: n = 228 in all regressions

CONCLUSION

The popular press commonly has both articles bemoaning the problems of excessive managerial bureaucracy, or alternatively the costs of excessive reductions in management staff caused by “rightsizing” and other business restructuring efforts. This paper finds that in the U.S. at the aggregate level the rise in managerial intensity has been quite modest since 2002 and that the management wage premium in fact has declined slightly. The ongoing efforts at increased business professionalism across the economy this century may be playing a role in the observed pattern of some convergence in the management wage premium across industries (Claussen et al, 2014; Grunau and Pecoraro, 2017; Longnecker and Ariss, 2002; Mohamed et al, 2012). The many differences across industries in their capital intensity, rate of tech innovations, degree of unionized workforce, and exposure to foreign competition likely contribute to the observed pattern of slight divergence in management intensity across U.S. industries since 2002. Future work should include efforts to determine the importance of these various factors, and others, in the divergence of management intensity. In terms of how total employment in a U.S. industry is impacted by changes in management intensity or the management wage premium, it appears there is no linkage with management intensity. Higher management wage premiums however, associate with lower total employment growth since 2002. This negative link between total employment growth and the management wage premium is broadly consistent with those who argue that managers act to extract economic surplus from the workforce in order to raise their compensation (Gordon, 1996; Lambert, 2020) or that the interests of managers is more cohesive with owners than with other workers (Tavani and Vasudeven, 2014). Future work should assess if this result is unique to the U.S. or if it appears in other industrialized nations as well.

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