Big Business and Management: Too Many Bosses and Too Much Pay?

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Abstract:

The mainstream or neoclassical economics view that labor is rewarded according to its productivity has been extended to managers and management teams as justification for the levels of compensation that they receive. Additionally, the management concept of "span of management" or "span of control" has been used to explain the total number of and per employee number of managers in any organization along with the assumption that the appropriate span of management is where the marginal productivity of the last manager employed should equal his/her marginal cost, or wage. On the other hand, Marxists and institutionalists hold different views of the roles and purposes of managers within organizations and attempt to explain these through either the view of managers exploiting workers on behalf of owners or the view of managers exploiting both workers and owners in order to advance their own agenda. This research note examines managerial compensation and intensity from both traditional/mainstream and alternative views by focusing on measures of managerial salaries, employee productivity, return on owners' equity, return on assets, and rates of worker exploitation.

Keywords: bureaucracy, economic systems, managers, and productivity.

JEL codes: B51, D24

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Introduction

In most standard microeconomics courses, students are often taught the basics of marginal productivity theory which states that factors of production are compensated according to their levels of productivity, or in other words, to their level of contribution to an organization's revenues/profits. Profit maximization is stated as an organizational goal (see the textbook by Mankiw (2013) among many others) and managers are assumed to be factors in production toward that goal. Managers perform the tasks of planning, organizing, leading, and controlling other factors of production in the pursuit of organizational goals and objectives (Griffin 2013). Lucas (1978) writes that one reason why average firm size has increased in the US is partially due to increases in managerial training and talent which have allowed managerial span of control and coordination to increase. That is, the better trained managers are able to supervise more employees at each hierarchical level within most firms, and in turn, this has helped to boost the average size of most US firms. Keren and Levhari (1983) argue that managerial span of control and coordination are0 part of any firm's efforts to minimize average total costs and find that management intensity or span of control declines as one goes up an organization's hierarchy. In general, many authors note that the number of management levels, or hierarchy, and span of control or management depends upon organizational size and the frequency of contact that a manager or supervisor needs to make with his/her subordinates as well as how complex the subordinates' tasks are, the subordinates' experience, skills and knowledge levels are, and management culture, or "climate" (Janger 1989, Griffin and Moorhead 2007, Griffin 2013 among many others). With climate, a key consideration is whether the organizational culture is hierarchical or "top down" or is it more relaxed and "hands off". Some management experts have tried to devise formulas to calculate appropriate spans of control (Nickols 2011), and others note that for many years an average span of control was deemed to be 4 to 5 subordinates, but

with advances in communications technology, the modern average has become around 10 subordinates (Janger 1989). According to Janger's research (1989), span of control as well as the number of hierarchical layers also seems to vary from industry to industry with firms in some industries having few layers of management and wide spans of control at each layer (for example, the oil industry) whereas others have many layers with wide span of control at the lower levels and narrow at higher levels (for example, auto manufacturing).[1] In general, he finds that larger firms have more layers of management, and the span of control narrows as one goes up the layers of management. A key consideration in the mainstream span of control literature is that the benefits of greater control over employees with a more narrow span of management has to be weighed against greater supervisory and managerial costs. Achieving a balance between these two concepts is often difficult to do and subject to a lot of trial and error (Janger 1989).

Some mainstream economists and many heterodox economists note that productivity is difficult to measure and almost impossible to link to compensation.[2] In general, Marxists and neo-Marxists see managers as means for the capitalist class to exploit workers in a way to extract as much surplus value from them as possible (Baran and Sweezy 1966, Braverman 1974, Marglin 1974a, Marglin 1974b, and Gordon 1996 among others). Baran and Sweezy (1966, pp. 46-48) view managers as basically part of the capitalist class, and because their personal savings and financial interests align with firm owners, they pursue maximum labor exploitation, and by which mostly serve the interests of owners, whose interests are also congruent with their interests as managers. Additionally, according to Baran and Sweezy, many managers occupy

[1] Interestingly, Janger notes that despite all of the news in 1980s about the streamlining of managerial ranks in corporate America, the number of managers per employee actually increased rather than decreased. This was one of the theme of Gordon's book published in 1996.

[2] There are many sources to cite here and beyond the scope of this paper. See Felipe and Crombie (2014) on a summary of the debate on capital and its productivity and see Brown (2005) on labor and measuring its productivity. Meanwhile, Simon (1957) notes that many management terms, such as "span of management", come closer to being vague "proverbs" rather than being concepts that yield solid guidelines on how to actually organize or manage a firm.

positions in many fields that the two authors would consider "wasteful", that is, in the fields of public relations, advertising, etc. These areas of pursuit by modern organizations are attempts by a monopoly capital system to absorb "excess surplus" that is not productively re-invested.[3] Braverman (1974) and Marglin (1974a) question whether specialization, assembly lines, and managers actually raise productivity in modern times as opposed to when a lot of work was done by smaller shops and craftsmen. To them, mass production, specialization and the rise of a managerial class originate more under capitalism's need for exploitation and control of labor rather than productivity concerns, although the greater productivity is also important if attainable. Braverman particularly points out that the main goal of scientific management is actually to cheapen labor by employing low skilled workers to produce items, and the low skilled labor in turn presumably needs a lot of guidance from managers. Gordon (1996) goes so far as to argue that increasing managerial numbers, even during a time of corporate "downsizing" (Caves and Kreps 1993), is a symptom of the fact that capitalist owners basically do not trust employees, and so owners employ more and more managers in order to minimize employee shirking and to monitor employee performance. This is despite the possibility that more managers may entail what he calls a "bureaucratic burden" for organizations, or in other words, higher salary costs and a greater monitoring of employees to the extent that there is a fall in firm productivity or profitability. Gordon's 1996 book builds upon some of earlier works on these topics that he did by himself (1990, 1994) and along with co-authors (Weisskopf, Bowles, and Gordon 1983) which involved some statistical analysis wherein he discussed what he called the intensity of

[3] Baran (1957, page 37) writes that maximizing efficiency nor minimizing costs is necessary or not desired in large corporations. Large corporations have "skyrocketing expense accounts, exorbitant salaries paid to executives making no contributions to the firms' output but drawing revenues on the strength of their financial connections, personal influence, or character traits making them particularly adapted to corporate politics."

supervision[4] using the independent variables or constructs of the threat/cost of job loss, worker independence (degree of unionization, legal job protection, job stability, etc.), degree of government support for workers' rights and social welfare, etc. These types of variables were successful predictors of the level of supervisory intensity whereas a major mainstream, neoclassical concept such as efficiency wages was not. The mainstream/neoclassical theory of efficiency wages, as used by him as meaning higher wages in a workforce for higher productivity, should in turn mean less economy wide supervisory personnel because, on average and *ceteris paribus*, workers who tend to have higher productivity tend to be more self-motivated, earn more, and are more likely to stay at a job, and therefore do not need so much supervision. Yet efficiency wages were not found to be statistically significant in any of his econometric models, and in a later piece he questioned whether higher wages and greater employee participation really helped to decrease monitoring and supervision costs because in his research it usually appeared that US management style was generally suspicious and untrustworthy of labor compared to the styles that existed in other nations (Gordon 1998). That is, many US organizations would prefer to have higher costs of monitoring and control than necessary. Bowles (1985) and Bowles and Gintis (1993) believe that with agent-principal problems of monitoring employee performance, some firms over invest in monitoring and controlling employees, which reduces employee efficiency, yet still raises employee profitability. The inefficiency of high monitoring costs as well as the overemployment and high salaries of so many managers would, if supported empirically, bolster the argument that many firms in oligopolistic or monopolistically competitive industries operate with higher costs than

[4] This is usually defined in his writings as the ratio of administrative and managerial personnel to clerical, service and production workers. Most of the data used in his analyses either preceded or were from the years of the 1980s. The 1990 work included statistical work on US data whereas the 1994 piece performed analysis on data from 16 different nations including the US.

those costs at the minimum of their average costs curves, which is a mainstream textbook concept. Colander (2010, pages 388-389) cites Joan Robinson in calling such firms "lazy monopolists" because their market dominance allows them to operate with x-inefficiency and somewhat carelessly in managing costs. The costs of the "tension" between greater control and subordinate monitoring versus greater subordinate freedom and less supervision is one of the issues examined in this paper.

In his book, which is probably one of the most recent and thorough explorations of general capitalist management from a neo-Marxist point of view, Gordon mostly relies upon charts, graphs, tables and simple descriptive statistics to make the case that in some nations, especially in the US, the level of managers has grown (despite what other reports contend) while wage inequality and job instability have risen at the same time. He argues that in some economies a "wage squeeze" is in play wherein high unemployment rates, decreasing unionization rates, smaller unemployment and social welfare benefits, and stagnant minimum wage rates have led to overall stagnant wages for most workers. To offset the effect of declining wages, and hence, declining worker desire to be productive, Gordon argues that managerial levels have increased simultaneously so that firms can apply what he calls "the stick", or closer monitoring and watching of employees in order to motivate workers to perform at an acceptable level. This in turn, however, can actually lead to lower productivity rates and lead to greater management-labor strife, and so he notes an upturn in the number of strikes and "lock-outs" that have occurred in those economies which have seen stagnating wages and increasing managerial ranks.[5]

Both Gordon (1996) and Marglin (1974a) argue that managers try to keep as much of the surplus for themselves even though they are supposed to serve the interests of shareholders, and so

[5] Braverman (Chapter 2, 1974) notes that the central function of any management system is control over the workers. This is more important than any other management task according to him.

this has been part of the reason for the rise of a managerial class, something about which institutional economists have written (Veblen 1904, 1923, Galbraith 1973). Berle and Means (1932) are among the first to note that many shareholders have yielded a lot of control over their ownership interests to professional management teams via the dilution of ownership that exists in many large corporations who have issued vast amounts of stock over the years. This view, therefore, generally disagrees with the one of Baran and Sweezy (1966). Even if managers are also investors/shareholders in their firms, the number and diversity of owners are still too great to say that managerial and investors' interests are always parallel especially since managers draw salaries in addition to stock options and any other rewards as shareholders. Marglin (1974b) also writes in another paper that contrary to neoclassical theory most national savings is done through business and managerial hierarchies rather than through households. Nonetheless, whether surplus extraction exists to enrich management, shareholders or both, all of these authors would probably agree that greater intensity of supervision seeks to maximize the extraction of surplus value whether for the bosses or shareholders or both groups. Additionally, in order to increase their status, power and pay within an organization, many managers try to hire as many subordinate managers under them in a quest of "empire building", a situation that is even noted by mainstream economists and management scholars. This could be another factor explaining administrative "bloat". Whether this bloat exists and why are other issues examined in this paper.

A paper by Leicht and Brady (2011) uses the number of jobs classified as managerial as a portion of a nation's labor force as a successful predictor of various measures of earnings inequality in different multivariate econometric models. Baker (2016) writes that corporate CEOs are earning excessive economic rents due to lax governance by corporate boards. Their findings also somewhat reinforce the contention of Braverman (1974) and Marglin (1974a) that specialization and layers of managers used in coordinating labor are really unnecessary since

productivity is not enhanced by either.[6] A paper by Buchele and Christiansen (1999) supports through econometric analysis the Gordon contention that more harmonious working conditions, greater workers' rights, and lesser intensity of supervision result in greater growth of labor productivity.

Meanwhile, there are volumes of mainstream, non-radical, scholarly management pieces which point to greater worker productivity or productivity enhancement in organizations due to participatory management, human relations techniques, and "Theory Y" principles. Some of these studies involve empirical work. These papers and books are far too numerous to list, but a good compilation and overview of these principles and theories are usually contained in any introduction to management book (e.g., Griffin's *Management*, 11^{th} *edition* (2013)). In the view of many, perhaps even more important to worker participation and greater productivity are the concepts of worker or producer cooperatives or employee stock ownership plans wherein employees are not only workers but owners of the firm in which they work (Horvat 1982, Estrin 1983, Rosen, Klein and Young 1986, Estrin, Jones and Svejnar 1987,Uvalic 1991, Bonin, Jones, and Putterman 1993, Bowles and Gintis 1993, Klinedinst and Sato 1994, Rock 1994, Jones and Kato 1995, Pencavel 2001 and 2012, and Perotin 2015 among many others). Ideally, in worker cooperatives there is no such thing as labor and management because labor and management are one in the same thanks to the workers also being owners and thanks to collective decision making. However, the works cited above mention that worker cooperatives are no panacea since employee-owners can still have disagreements and still operate in market economies subject to volatility (see for example Klinedinst and Kato 1994). In the US, there exist only 200 to 300 of such organizations, and many of them have managers who supervise others, and some have employees who are also not owners

[6] Landes (1986) took issue with many of Marglin's historical interpretations of how and why hierarchies developed and thought Marglin's analysis flawed.

(Lambert 2016).

Although not mentioning Gordon or his works, Mohun (2014) takes a radical economics approach and argues that the biggest driver of "unproductive" labor and wage growth in the US economy over the last five decades has been the growth of supervisory positions and their wages. Dumenil and Levy (2011) argue that the increase in financial management positions is a symptom of neo-liberal policies implemented over the last 35 years or so, and Jo and Henry (2015) also note this and assert that the presence of so many financial "money" managers are contrary to adequate social provisioning. Perelman (2011) writes that capitalism stunts the development of workers, and one way this is done through the use of heavy handed management practices.

Otherwise, no papers involving econometric work on how the bureaucratic burden or bloat (hereafter BB) or how too many managers may affect productivity or efficiency, managerial compensation, and surplus extraction at the industry level in the US have been found in doing a literature review for this paper. This absence is, in the opinion of this paper, a gap in the literature since one of Gordon's main arguments, and especially since he uses terms such as burden and bloat, is that excessive managerial numbers can cause a drain on efficiency and output. Additionally, showing greater extraction of surplus by a higher or lower presence of managers would bolster the contentions of the other radical writers mentioned so far. Gordon contends that much of the decline in real wages by most workers, especially in the US, has been extracted and absorbed by a growing managerial class and that there are no gains to labor and sometimes not much to investors either. These thoughts have also been mentioned more or less in more recent scholarly work such as Piketty (2013) among others. Since Gordon did not do any advanced statistical work in his book, and only did statistical work involving topics other than industry productivity and economic efficiency in the two published papers leading up to his

book, this paper does an empirical analysis of how some type of BB or managerial intensity at the industry level impacts efficiency, productivity, surplus generation, managerial compensation, and organizational performance.

This paper proceeds as follows. The next section is the Methods section in which the techniques used to analyze the data surrounding the main issues of interest are discussed. Next, in the Results section the output of different statistical analyses is highlighted and briefly addressed. Finally, a Discussion and Conclusion section looks at the results of the analysis more closely with a focus on insights, implications and recommendations.

Methods

Productivity and efficiency are concepts that can be defined many different ways and according to the inputs and outputs used. Nonetheless, a commonly agreed upon or accepted standard for a nation's overall productivity level is its real GDP per labor hour or worker. This is commonly used in most of the works mentioned above, especially those of Gordon. At the firm level, the value of output, shipments or sales per hour or per employee is commonly used. This paper examines productivity at the US industry level as one way to assess overall managerial pay and organizational performance as opposed to using the international units of analysis (OECD nations) measurements as used in the Gordon works and some of the other publications cited. At the national and international levels, the overall percentages of managers in different workforces do not give any indication of inter-industry variation in managerial levels or any possible indication of how industrial composition varies across nations (i.e., some nations have greater concentrations of one industry over others), which in turn may cause some nations to have fewer managers employed as a portion of the labor force only because of its unique industry composition. That is, and for example, if standard and common industry practice at the

international level is to have a span of management of 1 manager per 10 employees in industry A, yet 1 manager for 20 in industry B, and if country X has a much larger concentration of industry in industry A, then its intensity of supervision could appear greater than that of another nation which has less concentration in industry A and more in industry B, all else held constant. For this reason, this paper attempts an analysis at the sub-national level within one nation, the United States (US). It is hoped that cross-industry comparisons can show possible patterns regarding the variables of interest.

To assess industry level productivity, firm performance, and surplus extraction given the management and supervisors (first line supervisors and other types of supervisors) portions of total industry employment (hereafter MgmtSupv Intensity), this paper used data from the US Bureau of Labor Statistics' (BLS) May 2002 to May 2014 National Industry-Specific Occupational Employment and Wage Estimates (BLS 2002-2012) to estimate MgmtSupv Intensity, managers' and supervisors' pay, and total employment data for 4-digit NAICS industries. The years 2002 to 2014 were chosen in order to see if there were difference before and after the Great Recession with regard to intensity levels. In its general grouping of managers, the BLS includes chief officers of an organization, which includes the number of chief executive officers of individual firms.[7] The 4-digit level of NAICS classification was

[7] The BLS website is not clear in its definition of chief executives much less chief executive officers, or CEOs. In the data files, under the broad occupational category of "Management Occupations", "Chief Executives" are given as one specific type of management category along with general and operations managers, financial managers, etc. However, there were sometimes more chief executives listed for an industry than there were number of firms or enterprises listed as being part of an industry suggesting that there could be more than one chief executive per firm. When the author wrote the BLS for a clear definition of the term "Chief Executive", the reply below was received, Since it is not entirely clear whether Chief Executive refers to a CEO, this paper uses the term "chief officers" on the chance that some companies may have more than one CEO, or more likely, a CEO and his/her management team or lieutenants in a firm have been labeled as chief executives by the BLS because they have not been defined as Chief Information Officers, or Chief Operations Officers, etc. (BLS Correspondence February 27, 2017).
ESInfo <oesinfo@BLS.GOV>
Mon 2/27, 4:03 OESInfo <oesinfo@BLS.GOV>

In general, managers whose duties involve planning and directing in a specific functional area would be coded in the management occupation for that functional area, while managers whose duties are too broad to classify in one functional area would generally be coded as either chief executives (11-1011) or general and operations

chosen because there were enough industries with disclosed amounts of data versus the 5 and 6-digit levels, and yet this level is at a more industry specific level than NAICS 3-digit data, and this helps one to explore more microeconomic effects of any type of intensity of supervision. The number of 4- digit industries used which had data common for all variables and common to the databases used averaged around 168 per year because data from the BLS and Census were matched with data from Leo Troy's and Troy and Philip Wilson's *Almanac of Business and Industrial Financial Ratios*, 2005 to 2017, which contained financial and other useful data for the years 2002 to 2014 for roughly 190 to 200 industries. The BLS and Census Bureau data sources have data on over 300 4-digit NAICS industries, but do not have data on 4-digit NAICS level financial performance as well as some industry concentration ratios such as those in agriculture, mining or construction. A number of industries greater than approximately 168 could have been used in each year of the panel data, yet some financial ratios from the almanacs would have had to have been used for industries that may not have been that similar to those listed in the almanacs. For example, one could use an estimate of industry return on assets (ROA) for beer manufacturers if these are grouped under the heading of beverage manufactures (soft drinks, beer, etc.) but probably could not apply a ROA specific to the beer manufacturing

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managers (11-1021). For example, a chief information officer would generally be coded as a computer and information systems manager (11-3021) rather than as a chief executive.

The difference between chief executives and general and operations managers is partly one of work level. The Standard Occupational Classification (SOC) definition for chief executives specifies that they "plan, direct, or coordinate operational activities at the highest level of management with the help of subordinate executives and staff managers." Therefore, a manager who has a broad range of duties but who is not at the "highest level of management" would typically be classified as a general and operations manager. However, not all top managers or all workers with the title "chief executive officer" would necessarily be classified in the chief executives occupation. The SOC definition for chief executives also specifies that they must perform their duties "within guidelines set up by a board of directors or similar governing body." For example, if the head of a small business has broad managerial duties and the title "chief executive officer," but does not meet the requirement of reporting to a board of directors or similar body, then he or she may be better classified as a general and operations manager rather than as a chief executive.

More information about the federal Standard Occupational Classification system is available from our SOC home page at https://www.bls.gov/soc/home.htm.

I hope this information helps.

Regards,

OES Information Desk
Phone: (202) 691-6569
Email: oesinfo@bls.gov
Website: www.bls.gov/oes

industry to all other forms of beverage making. The almanacs by Leo Troy, who was later joined by Phillip Wilson as an author, frequently cluster different 4-digit NAICS industries together and at other times do not. This appears to also vary over the course of several editions. For most industries, the data given are for specific 4-digit NAICS industries, and at other times some 4-digit industries are clustered together in a way similar to the Internal Revenue Service's (IRS) Statistics of Income (SOI) industry coding (https://www.irs.gov/irm/part1/irm_01-013-007.html). The IRS's coding sometimes groups together NAICS 4, 5 and 6-digit industries. Therefore, data used for a clustering or grouping of some industries in the almanac (e.g., beverage manufacturing which took in beer manufacturing, soft drink manufacturing and other forms of beverage manufacturing) was sometimes applied to several 4-digit NAICS industries which corresponded to the almanac's cluster of industries. The Census Bureau provides some financial ratios for 3-digit NAICS industries, mostly manufactures (see the Census Bureaus' Quarterly Financial Reports page, https://www.census.gov/econ/qfr/). Other publications of industry financial ratios exist from other sources, but their data is mostly for 5 and 6-digit industries. Data on property, plant and equipment and other assets are also only published by the Census Bureau every five years for some industries, and only for manufacturing on an annual basis. Therefore, Troy's and Troy and Wilson's almanacs were employed as the best source of trying to pinpoint financial ratios and asset values for the 4-digit NAICS industries. A list below is provided which lists all of the other independent variables considered in the models as well as their sources. An appendix at the end of this paper lists all of the variables and their sources used in this paper, and Table 1 shows the descriptive statistics for all these variables.

Data for 2002 to 2014 for the panel was found for most major industries for which data was available such as utilities, manufacturing, wholesaling, retailing, finance/insurance/real estate, transportation, communications, information, professional services, educational service,

health care services, management of companies and enterprises, administrative and support and waste management and remediation services, amusement, and entertainment, accommodation and food services, and other for profit services.[8] Since the Census Bureau only has the following data or similar data for different industries every 5 years (years ending in 2 or 7), data for 1) net sales per industry and 2) net property, plant and equipment per industry were gathered for each year from 2002-2014 from the almanacs. The variable MgmtSupv Intensity which is derived from BLS data, was used along with several independent variables in double natural log[9], least squares multiple regression to predict for each industry for each year 1) the average net sales per employee, 2) industry average ROA after taxes, 3) average return on equity (ROE) after taxes, 4) net profit margin after tax (percentage) and 5) average profits per employee (a proxy variable for worker exploitation). ROA, ROE, profit margins, and profit estimates were gleaned from the Troy and Troy and Wilson almanacs.[10] Similarly, the total pay of managers and first line supervisors as a portion of industry sales was used as an independent variable along with other independent variables to predict the same five variables. Finally, the total number of chief officers per employee per industry per year as well as the total pay of all chief officers as a percentage of total industry sales is used along with other variables to predict these five variables as well. Whether managerial and supervisory levels and pay are positive or negative influences on these five variables is of primary interest in this paper.

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[8] Data from the Census at the 4-digit industry level were not available for mining and construction. Public administration, although important to a capitalist economy, was not considered because productivity levels are problematic to calculate and evaluate. For example, would taxes collected per government employee or government spending per government employee be considered as outputs or inputs?

[9] The exceptions were the dummy and ordinal based variables, which were not, and could not, be transformed into natural log form. Also, using the double log form also allows each regression coefficient to be interpreted as an elasticity, which is often useful in economic analysis.

[10] For ROA and Return on Equity (ROE) after taxes, the *Almanac* gave two numbers, ROA and ROE after taxes for all firms of all sizes regardless of whether they earned net income and another for firms reporting only net income. The analysis for this paper used ROA and ROEA after taxes for all firms regardless of earning net income or not when available. When this was not provided, ROA and ROE for those reporting only net income was used. Unfortunately, data for all 4 digit industries were not available for all industries, which limited sample size in some models. For ROA and ROE, if data was not available at the 4 digit level, ROA and ROE at the 3 digit level was used when available from the Census Bureaus' Quarterly Financial Report Data

Box-Cox regression results and scatterplots showed the double log models to come closest to yielding the best fits between the non-dummy and non-ordinal independent variables and the dependent variables, although the Box-Cox results were inconclusive on some models. However, the estimates of lambda yielded by the Box-Cox regression results came closest to indicating log-linear specifications of the models with lambda values closest to zero rather than +1.0 or -1.0. The author can provide these test results upon request. Some models exhibited heteroscedasticty according to Breusch-Pagan/Cook-Weisberg tests. Yet, when comparing regular standard errors to robust standard errors, the statistical significance of the independent variables were not altered, and so therefore, the regular standard errors are displayed in the tables below. The other independent variables used to predict these dependent variables were

1. Monopoly Power Index. This is an index created from principal components analysis and is composed of the following three highly correlated variables for each industry for each year: 1) the 4 firm concentration ratio (that is, the share of an industry's sales going to the largest 4 firms) for each of the 4-digit industries for the years 2002, 2007, and 2012 (US Census Bureau's 2007 Economic Census)[11]; the total of the net property, plant and equipment for each industry divided the number of enterprises in the industry (Troy 2005 to 2015, Troy and Wilson 2016, 2017); and the estimated capital to labor ratio (KL ratio) for each industry, which is based upon

[11] Concentration ratios are only published by the Census Bureau every 5 years. Therefore, and because there is not much variation in their numbers every five years (except for slight increases on average), the 2002 concentration ratios were used for that year as well as for 2003 and 2004 data; and the 2007 ratios were used for that year as well as for 2005, 2006, 2008 and 2009; and the 2012 ratios were used for that year as well as 2010, 2011, 2013, and 2014. Admittedly concentration ratios developed by the Census Bureau have limitations. The ratios are based only on US firms (foreign competitors are not considered) and local market concentration (at a city or metro area level) is not considered. Only national level data is considered. The Herfindahl-Hirschmann Index (HHI) is an alternative measure, but the Census only publishes this for manufacturing firms (Census Bureau 2002, 2007 and 2012). Despite its limitations, the ratio is used here as one part of a variable to indicate some type of market power that an industry has.

taking the net property plant and equipment estimates from the almanacs for each year and dividing these by the BLS estimates of employment in each industry for each year. Table 2 shows the results of the principal components analysis. These variables were not only combined because of possible multicollinearity problems in the statistical analysis, but they are also combined for theoretical reasons as well. Monopoly capital theory indicates that not only are some industries dominated by a few firms that have high market shares or most of a market's sales, but these firms are also usually large in size in terms of assets (even if some of their capacity is not used). Traditional economic theory indicates that firms with less competition (high concentration ratios) and larger asset sizes enjoy market power and economies of scale in production which could result in higher levels of productivity, higher returns to shareholders and investors, higher pay rates for all employees, and higher profit margins. That is, if the firms behave efficiently and try to minimize costs, then these outcomes should follow.

2. Ln Real GDP. This comes from the US Bureau of Economic Analysis (2002-2014) for each of the years examined and is used as a measure of general consumer demand for the industries, although it is realized that some industries and their sales are more subject to real GDP fluctuations than others.
3. Unionization. This is a dummy variable where industries are labeled as to whether they are part of an overall industry (agriculture, mining, manufacturing, etc.) that is one of five of the heaviest unionized industries in the US (BLS 2017). A value of 1 indicated that a 4-dgiit industry was part of an overall industry grouping that had heavy unionization whereas a value of 0 indicated that an industry was not part of such a larger industry category. Unfortunately, no data source was found that showed

the extent of unionization for the 4-digit industries for the years covered in this paper. According to the BLS, the top five major non-governmental industries with the heaviest union concentration for these years were utilities, transportation and warehousing, telecommunications, construction, and educational services. However, since the data used for this paper did not include any for construction, manufacturing industries were coded as a 1 since this overall industry included the next highest level of unionization in the US, especially in many regions of the US (BLS 2017).

4. Profit, Growth, and Inelastic Demand. This is a dummy variable where an industry receives a value of 1 if it is an industry or business type deemed to be in any of the following categories: 1) a consistently high return industry such as physicians' services, dental services, legal services and many other professional services (Biery 2013); 2) is in the growth stage of the product life cycle such as, for example, scientific research and development services, computer systems designs and related services, etc.; or 3) an industry which would be deemed to have high and overall inelastic demand such as those in the health services (physicians' offices, hospitals), for example.
5. Ln Debt Ratio. This is the natural log of the total debt to total assets ratio for the average firm in each industry (Troy 2005-2014; Troy and Wilson 2015-2017). This is included as an independent variable since the higher the debt of a firm (or industry), the lower its profit margin, return on assets or return on equity should be, on average, since interest and debt payments decrease profitability and returns than what they would be otherwise.

Other independent variables considered for the analysis included components of the

financial ratios for ROA and ROE. ROA can be defined, using the Dupont analysis method, as the product of two ratios, Sales / Average Total Assets and Net Income / Sales. The first of these two represent the asset turnover ratio, and the second one represents profit margin. For ROE, the Dupont analysis looks at the product of the following ratios: Net Income / Pre-tax Income, Pre-tax income / Earnings Before Interest and Taxes (EBIT), EBIT / Revenue, Revenue / Average Total Assets, and Average Total Assets / Average Total Equity (Block and Hirt 2002). However, some of these ratios were highly correlated with some of the other independent variables causing multicollinearity problems[12], and to use these to predict the dependent variables, especially those of ROA and ROE, would have been introducing models that contained tautologies to one degree or another. Therefore, the independent variables chosen were deemed to be the best among those available to predict the dependent variables of sales per employee, ROA, ROE, profit margin, and profit per employee.

Results

(Insert all Tables and Figures around here)

Table 1 displays the descriptive statistics of the variables used in the analysis. A few extreme values need some clarification. For the dummy variable Profit, Growth and Inelastic demand, only a handful of industries were included in this categorization, and so the mean was only around 5% of the observations The maximum value of 4366.87 for Managers' and Supervisors' Pay as a percentage of Sales and of 253.94 for Chief Officers' Salaries as a percentage of Sales is for the NAICS Industry 4251, Wholesale Electronic Markets & Agents & Brokers, for 2003 where sales and profit margins were extremely low and yet salaries high

[12] For example, the assets turnover ratio (Sales / Average Total Assets) was highly correlated with the Monopoly Power Index.

for that year. The large maximum value for MgmtSupv Intensity of 61.60 percent is for the year 2007 for the NAICS 5191 industry, Other Information Services. That year that industry had around 34,000 managers and supervisors to a total employment number of 55,000. Why the number was so high for that year could not be pinpointed. The very large profit margin percentage of 65.50 is for the year 2002 for the NAICS 5259 industry, Open-Ended Investment Funds. The large maximum value of 748 percent for the Debt to Assets Ratio percentage comes from the year 2008 for NAICS 7221, Food Services & Drinking Places, and large ROE after taxes percent of 1468 is from the year 2012 for NAICS 5414, Specialized Design Services. The author cannot find or speculate as to why these last two values are so high but has checked the data to confirm their accuracy. Finally, the large Sales per Employee value of over $30 million is for NAICS 5211, Monetary Authorities, Central Bank for the year 2008, which probably reflects the large amount of credit intermediation the US Federal Reserve and its branches had to do in the wake of the Great Recession. For other years after 2008, this industry also recorded sales per employee of at least $23 million.

As some background information, Figures 1 to 5 are provided to show the relationship between one of the key independent variables of interest, Management and Supervisory Intensity (MgmtSupv Intensity) and its relationship with the five dependent variables of Sales per Employee, ROA, ROE, Profit Margin, and Profit Margin per Employee. Figure 1 indicates that there does not exist much of a relationship between MgmtSupv Intensity and Sales per Employee (a productivity) measure, and the regression results discussed further on in the paper support this. This is true even when outliers are removed. Figures 2 and 3 show some type of logarithmic, inverse relationships between ROA and ROE after taxes on the one hand and MgmtSupv Intensity on the other. Finally, figures 4 and 5 indicate a weak but positive relationship between profit margins after taxes and profit margins after taxes per

employee versus MgmtSupv Intensity. As mentioned earlier, a double log specification is used for some of the independent variables and the dependent variables because Box-Cox regression analysis either indicated a double log specification or a specification with values closest to those for a double log specification versus a linear or inverse specification. When a double log specification was not recommended by the Box-Cox analysis, the values for lambda were somewhere around 0.25 or -0.25, but it would be hard to justify, for example, a model which used the fourth root of the variables based on economic theory. At least using a quasi, double log model puts several of the coefficients of the independent variables in the form of an elasticity measurement, which can be useful for interpreting results of the models.

Table 3 looks at how MgmtSupv Intensity and the other independent variables listed above are associated with the different measurements of industry performance of Sales per Employee (S/E), ROA after taxes (ROA), ROE after taxes (ROE), Profit Margin after Taxes (PM) and Profit per Employee (Pr/E).[13] Standard errors are given in parenthesis below each coefficient. Data for all variables were grouped according to year, 2002 to 2014 (13 groups), to see if there were any changes over time in how the variables correlated. Because of missing values, the average number of industries used per year was around 168, and the panel was not balanced for each and every year, and most of the data available were for manufacturing with finance, insurance and real estate (F/I/RE) industries coming in second.[14] In doing Hausman tests for determining whether to use fixed or random effects models, the

[13] The notation Pr/E is used and not P/E so as to avoid confusion with the short hand notation for Price/Earnings ratio, or P/E.

[14] The almanacs of financial ratios sometimes dropped some industry categories and added news ones over the years as did the Census Bureau. The almanacs usually had data on anywhere from 190 to 200 industries or industry groupings, although some values were not given every year for every industry. Roughly and on average for each year, 2% of the industries examined in this study were utilities; around 44% from manufacturing (which typically had the greatest amount of data available); around 11% for retailing; around 5% for transportation and warehousing; around 5% for information services; around 19% for F/I/RE; around 11% for professional services; around 1% for arts, entertainment, and recreational services, and around 2% for other services.

results varied from model to model. Therefore, each column in each of the Tables 3 to 6 indicates whether random effects (RE) or fixed effects (FE) regression results are displayed. Although there were no indications of multicollinearity among the independent variables with no variance inflation factors greater than 2.0, a fixed effects specification of the models resulted in the natural log of real GDP being omitted from these models, probably because the values for it within each year were a constant. Tables 4, 5, and 6 are organized similarly to Table 3.

In going from left to right and across the columns in Table 3, MgmtSupv Intensity is not associated with S/E, negatively associated with ROA and ROE, and is positively associated with PM and Pr/E. Four of the five models show this variable to be statistically significant. The number of managers and supervisors do not appear to be linked to productivity (S/E), but as their numbers increase, they bring down returns to investors. A one percent increase in managers and supervisors as a portion of total employment causes ROA and ROE to go down around a half of a percent and around three-quarters of a percent, respectively. Yet, a greater MgmtSupv Intensity is associated with greater profit margins and profit per employee. An increase of 1 percent in intensity is associated with increases of 0.31 and 0.42 percent, respectively. It appears that a greater number of managers and supervisors, on average, is associated with less return to investors but greater profitability and exploitation of employees. In looking at the other variables that were statistically significant and employed in the Table 3 models, the index Monopoly Power is statistically significant and is positively correlated with all 5 dependent variables. Typical firm size, its KL ratios, and the market shares for each industry make a difference in boosting productivity, returns to investors, and profitability. Being part of an oligopoly or monopolistically competitive market and having large investments in property plant and equipment appear to matter. At

the same time, the Profit, Growth and Inelastic Demand index was statistically significant with 4 of the 5 dependent variables, and although negatively associated with S/E, it was positively associated with ROA, ROE, and PM It was not, however, associated with Pr/E. These results make sense in that those industries with highly inelastic demand or still in the growth stage of the product life cycle do not need or have high sales per employee. With inelastic demand there is usually the implication of high profit margins on sales due to few substitutes (medical services, utilities, etc.), and often a high volume of sales is not needed to attain significant levels of returns or profitability (Colander 2010 and Mankiw 2015). With those firms in the growth stage of the product life cycle, as an industry grows, it adds more employees as sales climb, and so productivity may not be as great as when the industry matures and sheds employees as sales reach a peak. At the same time, industry profits and returns can be growing dramatically in the growth stage (Vernon 1966, among many others). Although only statistically significant at the 10% alpha level, greater levels of real GDP, as one would expect, does boost S/E and ROE, although this variable is omitted from the FE models. The greater the debt ratio of a typical firm in an industry, the worse its performance with regard to these performance measurements with the exception of ROE. The fact that greater debt is associated with greater ROE makes sense in that often firms trade off equity financing for debt financing, so that greater debt levels means fewer investors. Fewer investors can mean higher ROE results since stock holdings may be lower than what they would normally be due to greater levels of debt financing, and so when net income is reported, ROE looks higher than it would be otherwise if there was greater equity financing. Heavily unionized industries appear to be those that have higher levels of productivity, higher ROE, and greater Pr/E. This is probably so because the most heavily unionized industries mentioned above usually have high KL ratios, and so one would expect their productivity

levels and profit levels to be high on a per employee basis. Some of these industries also rely upon high levels of debt financing as well. Finally, the within and overall r-square results indicate that the models only explain small portions of the variation in the dependent variables. This could be because many of the independent variables displayed a certain degree of consistency in values over the time period examined. For example, over the 13 year time period, the overall average across industries for MgmtSupv Intensity only varied from a low of 10.262 (2006) to a high of 11.97 (2002). From 2002 to 2014, the level of MgmtSupv Intensity only changed from 11.97 to 11.08 percent. However, there was greater variation in the values of the independent variables in going from industry to industry, which probably explains by the between r-square values are higher for each model than their within and overall counterparts. Again, using MgmtSupv Intensity as an example, the minimum value for it was 2.19% (Health and Personal Care Stores, NAICS 4461) for 2010, this industry had low values for other years along with the NAICS industry of Offices of Dentists, whereas as mentioned earlier, Other Information Services had a maximum value of around 61%. Other industries which had consistently high levels of MgmtSupv Intensity were usually in the F/I/RE industries. Since this paper is mostly interested in how variation across industries while controlling for time elements affect performance, perhaps it is better to look at the between r-square results as more indicative of how well the models do. In that case, the models predicting S/E, ROA and ROE explain more than 50% of the variation in these dependent variables, yet do not do as well in explaining PM and Pr/E.

One additional item is added to Table 3, and this is a consideration of whether MgmtSupv Intensity or level is driving industry PM, or is industry PM allowing there to be a certain level of MgmtSupv Intensity. That is, does there exist simultaneity bias between MgmtSupv Intensity and PM? In other words, do higher profit levels allow industries to hire

more managers and supervisors, and do more managers and supervisors lead to higher profit margins? These questions are raised because profitability and profit margins are already embodied in three of the other four variables to one degree or another with which MgmtSupv Intensity is hypothesized to have relationships. Therefore, does MgmtSupv Intensity drive ROA, ROE, PM, and Pr/E, or do the two co-exist simultaneously? To answer these questions, two-stage least squares FE regression was performed, and the results are shown in the bottom half of Table 3. The choice of FE regression was made based upon a Hausmann test, and the instrumental variable used for the natural log of MgmtSupr Intensity was the natural log of the total salaries of managers and supervisors as a percentage of net sales. The salaries as a percentage of net sales is positively correlated with PM and MgmtSupv Intensity.[15] As the bottom of Table 3 indicates, the MgmtSupv Intensity variable is still positive and statistically significant, and the model has an overall between r-square value of 0.359. Therefore, it appears that there is the possibility that higher PM and higher MgmtSupv Intensity go together and occur simultaneously.

Table 4 displays models that focus on how the intensity or level of chief officers per employee (Chief Intensity) may affect industry performance. Since Chief Officers make the most important strategic decision within organizations, it was felt important to assess the impact of their numbers per employee among different industries. Recall that the BLS claims that there may be more than one CEO (chief executive officer) per firm, and that any manager classified as a chief but not specifically identified as a chief information officer or chief operations manager will be simply identified as a chief executive or member of a CEO's top management team. The results of the models in Table 4 parallel those in Table 3

[15] The correlation coefficient between MgmtSupv Intensity and salaries as a percent of sales is around +0.21, and between salaries as a percent of sales and PM, it is around +0.15. Both coefficients have p-values < 0.001.

with pretty much the same level of significance and same coefficient signs (positive or negative) for each independent variable shown in Table 3. Monopoly Power is positively associated with and attains statistical significance as an independent variable for each of the measures of performance except for ROA. The similar results for Chief Intensity and MgmtSupv Intensity are not surprising given that the Pearson correlation coefficient between the two variables is +0.45.[16] It appears that the more chief officers there are in an industry, the greater the number of managers and supervisors there are. In general, similar to MgmtSupv, the greater Chief Intensity is, the greater S/E, PM, and Pr/E are, and the lower ROA and ROE are. The r-square between values for the models predicting S/E, ROA, and ROE are lower than what they were in Table 3, yet higher for PM and P/E. Still, the models in Table 4 explain much less on average of the variation in the industry performance measurements than those in Table 3.

Similar to the two-stage least squares model shown in Table 3, the model in the bottom half of Table 4 considers whether there is simultaneity bias between profit margin and Chief Intensity. Using the total salaries of chief officers as a percentage of net sales as an instrumental variable,[17] the 2SLS, FE model shows that there probably is simultaneity between the level of chief officers in an industry and the industry's level of profitability. Therefore, one cannot really claim that the greater the number of chief officers (and perhaps the greater their leadership, some would claim), the greater the level of profitability. Greater profitability could also mean more chiefs being hired regardless of their capabilities.

[16] Within the general occupational category of Managers, the BLS includes Chief Executives. Another reason why the latter are separated and their impacts analyzed in Table 4 is to test if their intensity levels differ from those of managers in general.

[17] The correlation coefficient between the chiefs' salaries as a percentage of sales and profit margin after taxes is +0.18, and it is +0.43 between Chief Intensity and chiefs' salaries as a percentage of sales. The p-values are both below 0.001.

Table 5 shows models which consider the impact of managers' and supervisors' salaries as a percent of industry net sales (MgmtSupv Pay / Net Sales Pct) on the performance measurements used as dependent variables while controlling for effects of the other independent variables. Not only can a bureaucratic burden (BB) occur from having too many managers and supervisors, but over paying them can also be a burden. The pay variable attains statistical significance with S/E, PM, and Pr/E, and is negatively associated with S/E and Pr/E. Higher pay for managers and supervisors is associated with higher PM, however. Monopoly Power is statistically significant with all measurements but ROA, and is positively correlated with them. The other independent variables show the same patterns exhibited in Tables 3 and 4. Finally, the r-square between measures indicate anywhere from a moderate to a strong explanation of the variation in 4 of the 5 independent variables. The strongest result is found with Pr/E where greater pay is associated with less employee exploitation in terms of profits per employee, and this is perhaps because too much pay for managers and supervisors leaves too little profit to go around on a per employee basis after payroll expenses are deducted. Nevertheless, higher managerial and supervisory pay is associated with higher overall profit margins (PM), and so the bottom half of Table 5, similar to previous analyses in Tables 3 and 4, presents a 2SLS, RE model[18] where Ln PM is predicted using the same independent variables used in all other models along with the instrumental variable natural log of the managers' and supervisors' average annual salaries for each industry.[19] Again, this model is developed to check for simultaneity, and the results in Table 5 indicate as such with MgmtSupv Pay / Net Sales still showing a positive coefficient and statistical significance. One can infer that the mainstream argument that higher managerial

[18] Hausman tests sometimes indicated FE and other times RE models for these 2SLS models in Tables 3 to 5.
[19] The correlation coefficient between average pay and total pay as a percent of sales for managers and supervisors is +0.13, and it is +0.304 between PM and average pay of managers and supervisors.

salaries (which are supposed to indicate higher quality management teams) lead to higher profit margins and are efficient; or that higher profit margins allow firms to pay their managers more regardless of their capabilities, which is a heterodox argument.

Table 6 displays models which highlight how chief officers' total salaries as a percentage of net sales in each industry for each year impact the five performance measurements. The results are similar to those obtained in Table 5 for managers' and supervisors' salaries as a portion of sales. The higher the share of chief officers' pay, the lower S/E and Pr/E, and yet the higher PM is. The results for the other independent variables are the same as in other models in other tables. The models for ROA and ROE yield weak explanations of the variation in these variables whereas the r-square between measures for S/E, PM, and Pr/E are either moderate or strong. Just as with managers' and supervisors' pay share, the portion of chief officers' pay of net sales is positively associated with PM but negatively associated with Pr/E. A 2SLS, RE model is used to check for simultaneity between PM and chief officers' pay share of net sales using the natural log of the annual average salary for chief officers for each industry. The BLS does not indicate whether the annual salaries for chief officers include bonuses and stock options. Salary estimates come from survey responses (BLS 2016). In the course of doing research for this paper, it was also difficult to find data which would show the level of stock buy backs over the years per industry. Stock buy backs are often mentioned as a tool to enhance CEO pay. Unfortunately, only data at the firm level for the largest firms could be found. The 2SLS model indicates that there exists simultaneity. Again, a mainstream view could argue that talented chief officers or corporate leaders should generate high profit margins, and that their pay reflects this. On the other hand, a contrary point of view would be that these officers happen to work in profitable industries that allow them to pay themselves more. In looking at Table 6, the

Monopoly Power index is also positively correlated with PM. Industries which have high concentration ratios, little competition among firms, and high barriers to entry thanks to large levels of property, plant and equipment should have a certain degree of profitability and therefore be able to pay their chief officers well.

Finally, in evaluating the argument that it is management (chief officer or otherwise) and supervisory performance that leads to success, Table 7 compares a proxy of managerial and supervisory capability, their average annual salary, to Monopoly Power, an index of industry dominance. Since greater leadership should be associated with greater levels of productivity, and since most mainstream economics textbooks indicate that greater productivity leads to other manifestations of industry success (profitability, ROA, ROE, etc.), Table 7 uses S/E as the dependent variable in two RE models which use chief officers' annual average salaries and Monopoly Power as predictors in one model, and managers' and supervisors' average annual salaries and Monopoly Power as predictors in the second one. In each model, given the t-scores, Monopoly Power has a greater influence than do the proxies for management capabilities. Also, it would be difficult to argue that management "talent" and knowledge produces Monopoly Power since the average salary of chief officers and Monopoly Power are only mildly correlated ($r = +0.12$). It is roughly the same for the average salary of all managers and supervisors and Monopoly Power with a correlation coefficient of +0.09. Interestingly, the higher the average salaries of chief officers, the higher the pay of all managers and supervisors ($r = +0.77$).

Discussion and Conclusion

In reflecting upon the results of the regression models, one has to consider the vast amount of literature regarding managers and management and leadership techniques, much of

which was discussed in the beginning of this paper. On the surface, it appears that greater managerial and supervisory numbers, as well as chief officer numbers, are negatively correlated with ROA and ROE measurements, which are two benchmarks that are often used by investors and analysts to determine whether a company or industry is performing well enough to warrant further investment. However, greater management and supervisory numbers do seem to somewhat positively impact productivity measurements (S/E is positively associated with a greater number of chief officers but not management and supervisors) and definitely profitability measurements (PM and Pr/E). On average, a greater number of managers and supervisors appear to be able to extract greater profitability per dollar but not returns to investors or owners of asserts. This would indicate possibly that many industries have invested heavily in assets and have a great deal of equity financing since even high profit margins and high profit margins per employee cannot raise ROA and ROE. The other possibility is that these industries have low sales volumes and few employees, and therefore high profit margins and high profits per employee are not enough to raise ROA and ROE. The industries with the greatest number of managers, chief officers and supervisors tended to be those in the F/I/RE industries, and their returns tended to be lower than those of most of other industries. At the same time, their after-tax profit margins were larger on average than other industries. This appears to be the case before and after the Great Recession, although slightly higher profit margins existed before the Great Recession. When one looks at the impact of the salaries of managers and supervisors and chief officers on the performance measurements, there is no impact on ROA and ROE, a negative impact on productivity, yet their pay levels as a portion of overall sales are positively correlated with profit margins and profits per employee. Management level and its compensation seem to be consistently associated with high profit margins yet poor performance on most other measurements.

One can only speculate as to why this is the case. It is possible that investors and asset owners are more preoccupied with profit margins than returns on assets and equity because high profit margins should translate into future cash dividends, and so they do not pressure managers that much over poor ROA and ROE results. But many other investors are focused on long term asset and shareholder value growth, so this is not a totally satisfactory answer. If higher profit margins translate into more cash holdings, then other assets can be bought and existing shares can be purchased back by companies in an industry, which in turn would dilute ROA, but at the same time this could raise ROE. Debt levels also negatively affect all performance measurements except for ROE, so management has an incentive to keep debt levels as low as possible in order to have high profit margins, although this in turn should raise ROE, all else constant. A better explanation, and this is along the lines of thought that there exists bureaucratic bloat and elements of monopoly capital in most industries and firms, is that many managers work in high-barriers-to-entry and highly concentrated industries in which the chief officers have over-invested in assets and over-invested in other managers (in their numbers and their pay), and at the same time have been successful in minimizing other costs (such as the payroll of first tier workers/labor) so as to raise profit margins to higher levels than what would otherwise be the case. As noted by some of the writers mentioned in the literature review for this paper, there has been a redistribution of earnings and profits within most US firms from labor to management over the last 40 years or so. Gordon's observations of so many managers existing and causing bureaucratic bloat is probably correct, but perhaps not so much because they distrust workers and want to control them closely, and so more managers are needed, but perhaps the main reason for bureaucratic bloat is that managers have seen an opportunity to pay themselves well. Although wasteful, the ability to pay themselves handsomely and to hire like-minded compatriots into their ranks can continue indefinitely as long as ownership is diluted and there

exist principal-agent problems between owners and management.[20] Perhaps most owners are satisfied as long as adequate returns are attained, even though some suspect wastefulness on the part of management teams running their corporations.

Unfortunately, Gordon's notion of so many managers existing because of management-labor antagonism could not be explored in this paper because not enough data on strikes and lockouts at the industry level in the US could be found. In fact, the last twenty years or so have seen probably less strikes and lockouts as union membership has been on the decline in the US. In fact, for the data used in this study, there is only a correlation of r = -0.06 between the dummy variable union and MgmtSupv Intensity, which indicates very little relationship between intensity and potential adversarial labor climates in the industries examined. At the same time, the models generally show that a greater number of managers and supervisors and chief officers is connected with greater exploitation rates (Pr/E), and this somewhat supports the Braverman and Marglin arguments that bosses facilitate a certain degree of labor exploitation.

From a mainstream human resources point of view, many large firms try to retain their better employees by offering them "career paths" toward advancement within the organization. Therefore, an implicit goal of many firms is to add to their management ranks those employees who are loyal, have already performed well and fitted well into their organization as time has passed.[21] Whether more managers are needed within the firm may be a question never raised

[20] Admittedly, more of what front-line workers used to do in many organizations is now being done by people who have the title of manager or supervisor. The latter group may have some managerial duties but could mostly be doing a lot of work similar to what his/her subordinates do. There is also a desire of many firms to avoid overtime costs for many front or first-line workers, and so some of them have been "promoted" to the management ranks, given some supervisory duties and been given salaries although they do a lot of the same work their subordinates perform. This phenomena could also be contributing to BB and at the same helping to reduce costs outside of management and supervisory salaries.

[21] Also, there is the claim, along the lines of the quote from Baran (1957), that many new people hired in by firms tend to be friends, relatives and former classmates of current employees who are performing well. This applies to those who work within the managerial ranks as well. Therefore, employers are making safe bets when they hire such

because retaining good employees may be more important to company goals. Additionally, a recent article in the *Wall Street Journal* finds that more and more job generation and creation is now being done by larger firms rather than smaller firms, albeit at a slower rate than how smaller businesses used to create jobs (Francis 2017). Now more people find themselves working for a larger employer rather than a smaller one, a reversal of how things were for many years until recent decades. It is thought that these firms are going to continue to increase in size, and so larger and larger firms probably will require more managers to be trained and employed thanks to more management layers and more employees to supervise. The article also notes how more and more younger people prefer to work for a larger firm rather than a smaller one or to start a business of their own.

Since the Monopoly Power index was usually such a good predictor of industry performance, one could argue that so many managers are tolerated since firms with monopoly power usually operate sales and production levels that are at greater than average total costs, which is inefficient. As long as total profits are maximized for the lazy monopolist or oligopolist, then inefficiency is tolerated. This applies even when there has been too much investment in plant and equipment. As long as performance measurements such as productivity levels, ROA, ROE and profit margins are relatively high compared to more competitive industries thanks to monopoly power, then an excessive number of managers and/or their pay levels can be tolerated.[22] The results of Table 7 somewhat support this notion. From the Baran and Sweezy (1966) perspective, too many managers could also be a symptom of more and more

new people since these people are more likely to support the current corporate culture because they are already the friends, relatives, etc. of people who work at the company. As some of my friends who have done well in getting jobs and promotions in the corporate world have often said, "It is not what you know, but who you know."

[22] Regarding CEO compensation, some recent studies have shown that the best paid CEOs have often had the worst performance by their companies. Despite this, average CEO pay and bonuses continue to go up (Adams 2014)

people being employed in the non-productive sectors (advertising, public relations, promotions, etc.) of many industries. In the monopoly capital point of view, as the economic surplus in an economy grows, investors have no choice but to invest it in some business pursuits which Baran and Sweezy (1966) and Shaikh and Tonak (1994) deem unproductive and "wasteful", or do not really give any value added to economic production and standards of living. As the number of sales and advertising departments in firms in different industries has grown, one would expect the number of advertising and promotions managers to grow as well, even though such managers may be managing a small staff, most of whom may not need that much supervision given their possible educational and professional status. Yet, a department has to have a manager, or otherwise if it did not, that would violate principles on management span of control.

However, adding more and managers is not without limits. As the results in Tables 3 to 6 indicate, there are inelastic relationships between MgmtSupv Intensity, Chief Intensity and management and supervisory and chief officer salary levels on the one hand and the performance measurements on the other. When it comes to profit margins (PM), the coefficients for MgmtSupv Intensity, Chief Intensity, MgmtSupv Pay / Net Sales Pct, and Chief Officers Total Pay / Net Sales Pct are all less than an absolute value of 1.0, which indicates inelastic relationships. Adding more managers and supervisors boosts profit margins somehow, but the proportional effect is less than one to one. These results show some inefficiency with regard to trying to boost profit margins beyond a certain level by adding more managers.

Some of the limitations of this study include the fact that some of the models did not have large explanations of variance. There may be important omitted variables, but there were limitations to the data sets. To have data for all 4-digit industries for all 13 years would have made the results more useful. As it stands now, there is a disproportionate number of manufacturing industries included in the analysis. There are more 4-digit NAICS industries than

the 168 on average analyzed per year in the data set used in this paper, but because of no data on many of them, only around 168 per year could be examined. Finally, and ideally, it would be best if possible to do some type of experiment or quasi-experiment in which the same type and same size of firms making the same type of product or offering the same type services could be staffed with the same number of production workers, staff, etc. but with one important difference—an experimental group having fewer managers than a control group. However, these conditions were not uncovered while doing research for this paper.

Nevertheless, this paper adds to the literature some additional evidence supporting heterodox views of managerial performance at the industry level. Most research and writings over the years have revolved around whether corporate Chief Executive Officer (CEO) pay is fair and adequate, especially given that some estimates put CEO pay at 300 to 400 times that of the typical US worker (AFL-CIO, n.d.) Some, however, argue that US CEO pay is fair if one compares executive compensation to other professionals and not to typical workers (Sumo 2013) whereas others see no connection between CEO pay and corporate performance (Collins 2001). Piketty (2013) cites studies showing little connection between pay and corporate performance as well. At a broader level, this paper raises questions about managerial and supervisory performance at the industry level. The analysis indicates to some degree and with caveats that industries with large shares of managers and supervisors have higher average managerial salaries, somewhat higher productivity rates and higher margins per dollar than other industries yet also show higher levels of exploitation and lower returns to investors. At the same time, monopoly power within industries is usually positively associated with these outcomes. One implication is that the Marglin-Veblen-Gailbraith-Gordon view of management self-interest may be slightly more appropriate than the one by Baran-Sweezy-Braverman which holds that managerial and investor/owner interests coincide. However, it is probably monopoly capital

power which allows the inefficient existence of so managers and their excessive pay levels. Additionally, the findings of greater industry concentration and high asset levels per employee and per firm being associated with higher exploitation rates and higher managerial and supervisory salaries support monopoly capital contentions of greater corporate concentration leading to greater surplus extraction, higher productivity, and the rise of a managerial class. There seems to be some logical reasons behind bureaucratic bloat, even though it is economically inefficient. The dominance of monopoly capital in US industries permits this, more likely than not, and will probably continue to do so as long as average firm sizes tends to increase. With the foregoing analysis in mind, it is no wonder why so many college students study business management and pursue degrees such as the MBA in order to join the ranks of corporate mangers. A monopoly capital society and its large corporations give the incentives to do so.

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Table 1: Descriptive Statistics

Variable	n	Mean	Std. Dev.	Min	Max
Avg Sales Per Enterprise	2191	$84,600,000.00	$509,000,000.00	$103,603.10	$11,500,000,000.00
ProfitGrowthInelastic (Yes=1, No=0)	2193	0.05	0.22	0.00	1.00
Real GDP, Millions $	2193	14616.89	829.46	12908.80	15982.30
Mgrs&Supv Pay / Sales Pct	2189	9.14	95.24	0.02	4366.87
Mgmt Intensity	2193	11.01	3.17	2.19	61.60
Avg Salary Mgrs and Supvs	2191	$81,905.08	$21,913.36	$31,603.14	$157,506.60
Concentration Ratio	2193	26.45	16.76	1.40	90.20
Profit Per Emp	2192	$43.88	$239.97	$-	$4,099.16
Unionization (Yes=1, No=0)	2193	0.43	0.50	0.00	1.00
Profit Margin Per $ Pct	2192	4.76	5.31	0.01	65.50
Chief Officers' Intensity	2054	0.30	0.19	0.00	2.21
Chief Officers' Sal as Pct of Sales	2047	0.52	5.71	0.00	253.94
Chief Officers Avg Salary	2125	$171,557.90	$26,852.58	$88,030.00	$238,740.00
Monopoly Power Index	2190	0.00	1.38	-0.67	22.59
Debt to Assets Ratio Pct	2191	68.41	19.46	3.80	748.00
Return on Assets Pct	2191	7.24	5.91	0.01	79.00
Return on Equity After Taxes Pct	2189	17.47	47.27	0.01	1468.00
Sales Per Employee	2190	$780,710.10	$2,509,390.00	$214.63	$30,500,000.00

Table 2

Principal Components Analysis: KL (Capital to Labor Ratio), Concentration Ratio and Net Property, Plant and Equipment Per Enterprise

Eigen analysis of the Correlation Matrix

Eigenvalue	1.9168	0.8994	0.1837
Proportion	0.639	0.3	0.061
Cumulative	0.639	0.939	1

2190 cases used, 3 cases contain missing values

Eigenvectors

Variable	PC1
Concentration Ratio	0.314
KL	0.672
Net Prop., Plant, Eqpt. per Enterprise	0.671

Table 3: Analysis of Panel Data---Management and Supervisory Intensity

Dep. Variables:	*Ln S/E (RE)*	*Ln ROA (FE)*	*Ln ROE (RE.)*	*Ln PM (FE)*	*Ln Pr/E (FE)*
Ind. Variables	**b**	**b**	**b**	**b**	**b**
ProfitGrowthInelastic	-0.69**	0.71**	0.86**	0.58**	-0.098
	(0.12)	(0.062)	(0.096)	(0.089)	(0.142)
Ln RGDP	2.64*	Omitted	2.18*	Omitted	Omitted
	(0.42)		(0.52)		
Ln Debt Ratio	-0.58**	-0.26**	0.79**	-0.64**	-1.27**
	(0.11)	(0.105)	(0.086)	(0.08)	(0.128)
Ln MgmtSupv Intensity	0.12	-0.52**	-0.74**	0.31**	0.42**
	(0.08)	(0.038	(0.066)	(0.061)	(0.098)
Unionization	0.59**	-0.016	-0.224**	-0.061	0.52**
	(0.05)	(0.02)	(0.042)	(0.039)	(0.062)
Monopoly Pwr Index	0.21**	0.027**	0.049**	0.074**	0.29**
	(0.018)	(0.006)	(0.015)	(0.0135)	(0.022)
Constant	-10.760	4.031	-20.24	3.15	6.35
**p < 0.05, *p < 0.10					
Grouping by Year, 2002-2014					
n	2190	2189	2187	2183	2190
r-square within	0.1875	0.1284	0.1854	0.068	0.1848
r-square between	0.783	0.5905	0.6148	0.1312	0.138
r-square overall	0.1972	0.1314	0.2034	0.0612	0.1715

***Two stage least squares, Fixed Effects: Predicting Ln Profit Margin using Ln Total Salaries of Mgrs and Supervisors as a Percentage of Net Sales as an instrumental variable for Ln MgmtSupv Intensity.*

Ind. Variables	**b**
Ln MgmtSupv Intensity	2.1**
	(0.25)
Ln Real GDP	Omitted
ProfitGrowthInelastic	1.39**
	(0.152)
Ln Debt Ratio	-0.38**
	(0.101)
Unionization	0.054**
	(0.048)
Monopoly Power Index	0.032*
	(0.017)
Constant	-2.265

**p < 0.05, *p < 0.10

n	2182
r-square within	-
r-square between	0.3592
r-square overall	0.0235

Table 4: Analysis of Panel Data---Chief Officers Intensity

Dep. Variables:	*Ln S/E (FE)*	*Ln ROA (RE)*	*Ln ROE (RE.)*	*Ln PM (FE)*	*Ln Pr/E (FE)*
Ind. Variables	**b**	**b**	**b**	**b**	**B**
ProfitGrowthInelastic	-0.702**	0.922**	1.154**	0.503**	-0.184
	(0.113)	(0.072)	(0.096)	(0.086)	(0.134)
Ln RGDP	Omitted	0.704*	1.612**	Omitted	Omitted
		(0.371)	(0.451)		
Ln Debt Ratio	-0.54**	-0.257**	0.802**	-0.548**	-1.1**
	(0.107)	(0.068)	(0.091)	(0.081)	(0.127)
Ln Chief Intensity	0.202**	-0.129**	-0.191**	0.248**	0.452**
	(0.036)	(0.023)	(0.031)	(0.027)	(0.043)
Unionization	0.498**	0.019	-0.181**	-0.073*	0.417**
	(0.052)	(0.033)	(0.044)	(0.04)	(0.062)
Monopoly Pwr Index	0.216**	0.013	0.035**	0.078**	0.297**
	(0.018)	(0.011)	(0.015)	(0.014)	(0.021)
Constant	14.913	-4.172	-16.84	3.86	7.32**
**p < 0.05, *p < 0.10					
Grouping by Year, 2002-2014, 13 Groupings					
n	2052	2051	2049	2046	2052
r-square within	0.191	0.099	0.1593	0.092	0.217
r-square between	0.006	0.1541	0.4913	0.4813	0.3039
r-square overall	0.1827	0.1017	0.1708	0.0723	0.188

***Two stage least squares, Fixed Effects: Predicting Ln Profit Margin using Ln Total Salaries of Chief Officers as a Percentage of Net Sales as an instrumental variable for Ln Chief Intensity.*

Ind. Variables	**b**
Ln Chief Intensity	0.68**
	(0.063)
Ln Real GDP	Omitted
ProfitGrowthInelastic	0.62**
	(0.092)
Ln Debt Ratio	-0.331**
	(0.091)
Unionization	-0.07*
	(0.042)
Monopoly Power Index	0.078**
	(0.014)
Constant	3.54

**p < 0.05, *p < 0.10	
n	2040
r-square within	-
r-square between	0.5604
r-square overall	0.0511

Table 5: Analysis of Panel Data---Management and Supervisory Pay

Dep. Variables:	*Ln S/E (FE)*	*Ln ROA (RE)*	*Ln ROE (RE.)*	*Ln PM (RE)*	*Ln Pr/E (RE)*
Ind. Variables	**b**	**b**	**b**	**b**	**b**
ProfitGrowthInelastic	-0.42**	0.952**	1.21**	0.38**	-0.02
	(0.042)	(0.07)	(0.094)	(0.083)	(0.105)
Ln RGDP	Omitted	1.099**	2.452**	2.69**	4.1**
		(0.312)	(0.429)	(0.464)	(0.458)
Ln Debt Ratio	-0.29**	-0.189**	0.92**	-0.75**	-1.05**
	(0.04)	(0.066)	(0.089)	(0.078)	(0.098)
Ln MgmtSupv Pay / Net Sales Pct	-0.89**	-0.0184	-0.022	0.15**	-0.74**
	(0.008)	(0.013)	(0.017)	(0.015)	(0.019)
Unionization	-0.001	0.008	-0.19**	0.02	0.006
	(0.02)	(0.033)	(0.044)	(0.039)	(0.049)
Monopoly Pwr Index	0.058**	0.008	0.027*	0.106**	0.17**
	(0.007)	(0.011)	(0.015)	(0.013)	(0.017)
Constant	14.74	-8.04	-25.08	-21.63	-31.91

**p < 0.05, *p < 0.10

Grouping by Year, 2002-2014, 13 Groupings

n	2189	2188	2186	2182	2189
r-square within	0.8847	0.0821	0.1395	0.098	0.5125
r-square between	0.7234	0.174	0.5488	0.6033	0.9049
r-square overall	0.8809	0.0883	0.1563	0.1187	0.5299

***Two stage least squares, Random Effects: Predicting Ln Profit Margin using Ln Managers' and Supervisors' Average Annual Salaries as an instrumental variable for Ln Managers and Supervisors Total Pay over Net Sales Percent.*

Ind. Variables	**b**
Ln MgmtSupv Pay / Net Sales Pct	0.95**
	(0.112)
Ln Real GDP	3.88**
	(0.5)
ProfitGrowthInelastic	0.092
	(0.133)
Ln Debt Ratio	-1.04**
	(0.125)
Unionization	0.55**
	(0.098)
Monopoly Power Index	0.242**
	(0.029)
Constant	-32.87094

**p < 0.05, *p < 0.10

n	2182
r-square within	0.0586
r-square between	0.3986
r-square overall	0.0642

Table 6: Analysis of Panel Data---Chief Officers Pay

Dep. Variables:	*Ln S/E (FE)*	*Ln ROA (RE)*	*Ln ROE (FE.)*	*Ln PM (RE)*	*Ln Pr/E (FE)*
Ind. Variables	**b**	**b**	**b**	**b**	**b**
ProfitGrowthInelastic	-0.39**	0.96**	1.21**	0.35**	-0.022
	(0.066)	(0.072)	(0.096)	(0.084)	(0.118)
Ln RGDP	Omitted	1.06**	Omitted	2.94**	Omitted
		(0.379)		(0.484)	
Ln Debt Ratio	-0.57**	-0.19**	0.9**	-0.695**	-1.28**
	(0.062)	(0.068)	(0.09)	(0.08)	(0.111)
Ln Chief Officers Total Pay / Net Sales Pct	-0.73**	-0.003	-0.006	0.17**	-0.56**
	(0.011)	(0.013)	(0.0168)	(0.015)	(0.021)
Unionization	0.14**	0.02	-0.19**	0.018	0.14**
	(0.031)	(0.034)	(0.045)	(0.04)	(0.055)
Monopoly Power Index	0.07**	0.012	0.036**	0.11**	0.18**
	(0.011)	(0.012)	(0.016)	(0.014)	(0.019)
Constant	13.52	-7.68	-1.58	-23.82	6.47

**p < 0.05, *p < 0.10

Grouping by Year, 2002-2014, 13 Groupings

n	2046	2045	2043	2040	2046
r-square within	0.7237	0.0857	0.1435	0.1143	0.3941
r-square between	0.8349	0.1427	0.2125	0.523	0.8052
r-square overall	0.7246	0.088	0.1418	0.1315	0.4007

***Two stage least squares, Random Effects: Predicting Ln Profit Margin using Ln Average Chief Officers Salaries as an instrumental variable for Ln Chief Officers Pay over Net Sales Percent.*

Ind. Variables	**b**
Ln Chief Officers Total Pay / Net Sales Pct	0.65**
	(0.086)
Ln Real GDP	4.5**
	(0.544)
ProfitGrowthInelastic	0.113
	(0.113)
Ln Debt Ratio	-0.74**
	(0.098)
Unionization	0.26**
	(0.065)
Monopoly Power Index	0.208**
	(0.024)
Constant	-26.32

**p < 0.05, *p < 0.10

n	2040
r-square within	0.0862
r-square between	0.8491
r-square overall	0.0928

Table 7: Analysis of Panel Data--Pay and Productivity

Dep. Variable: Ln Sales per Employee
Random Effects Regression, 13 years (13 groupings)

Ind. Variables	b	SE	t-score
Monopoly Power Index	0.252	0.019	13.530
Ln Chief Officer Avg. Annual Salary	1.109	0.211	5.250
Constant	-0.822	2.543	-0.320
**p < 0.05, *p < 0.10			
n	2122		
r-square within	0.0987		
r-square between	0.7352		
r-square overall	0.1077		

Ind. Variables	B	SE	t-score
Monopoly Power Index	0.256**	0.019	13.840
Ln Mgr and Supv Avg Annual Salary	0.546**	0.094	5.840
Constant	6.405	1.055	6.070
**p < 0.05, *p < 0.10			
n	2189		
r-square within	0.091		
r-square between	0.8045		
r-square overall	0.0994		

Figure 1

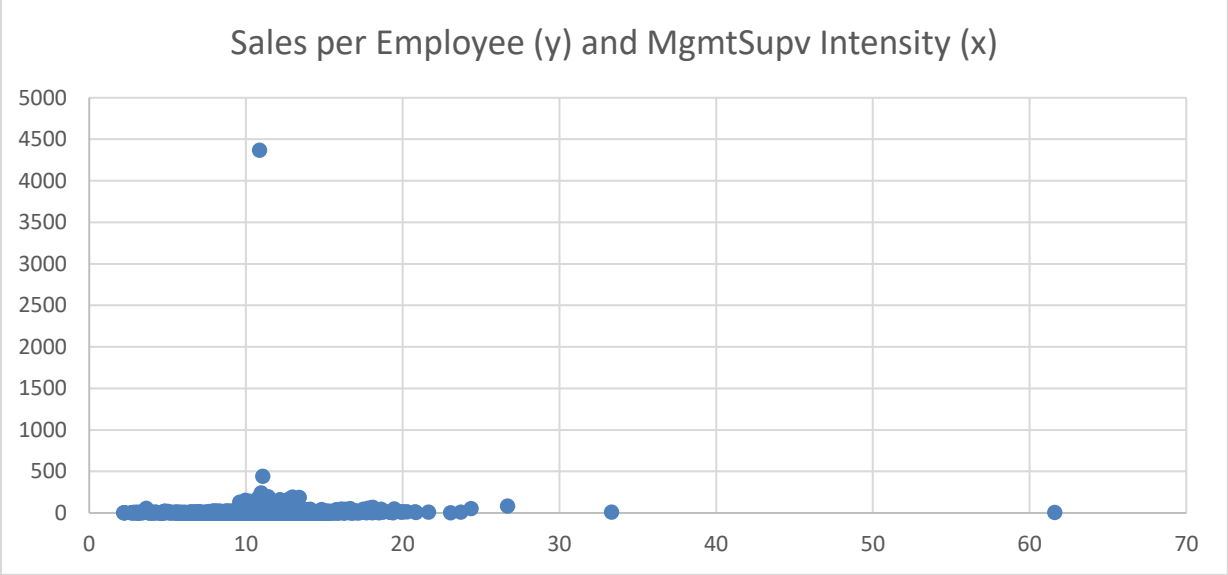


Figure 2

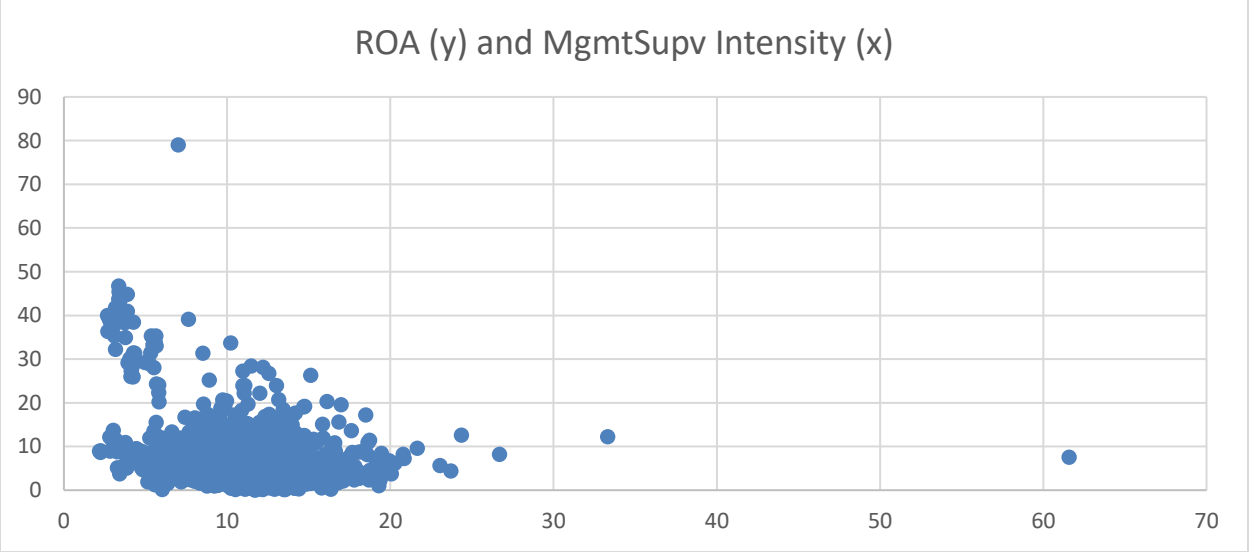


Figure 3

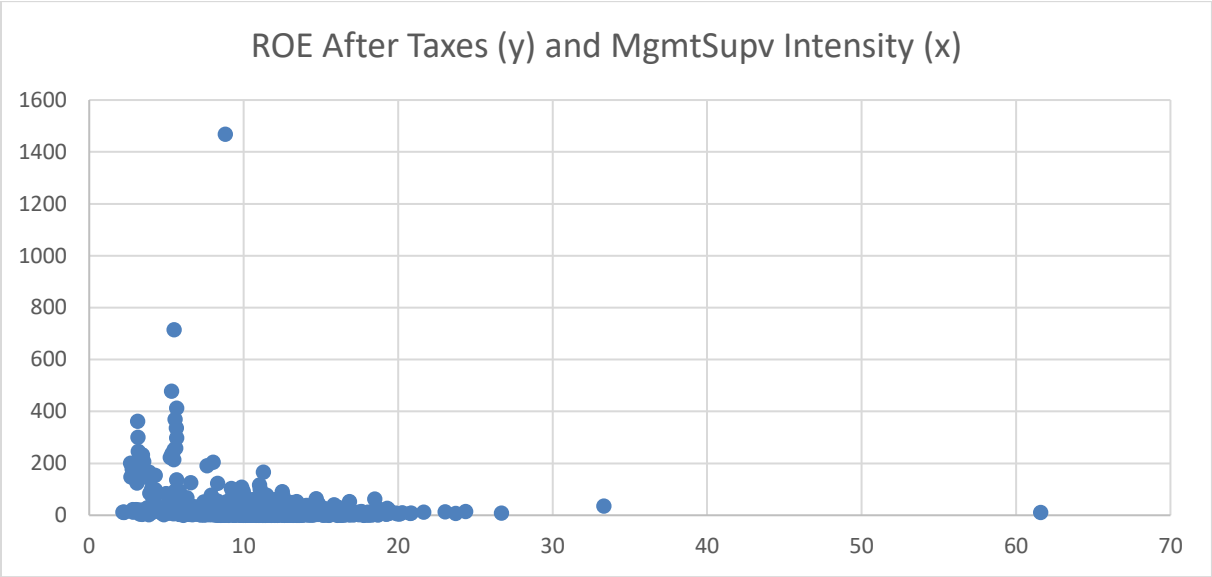


Figure 4

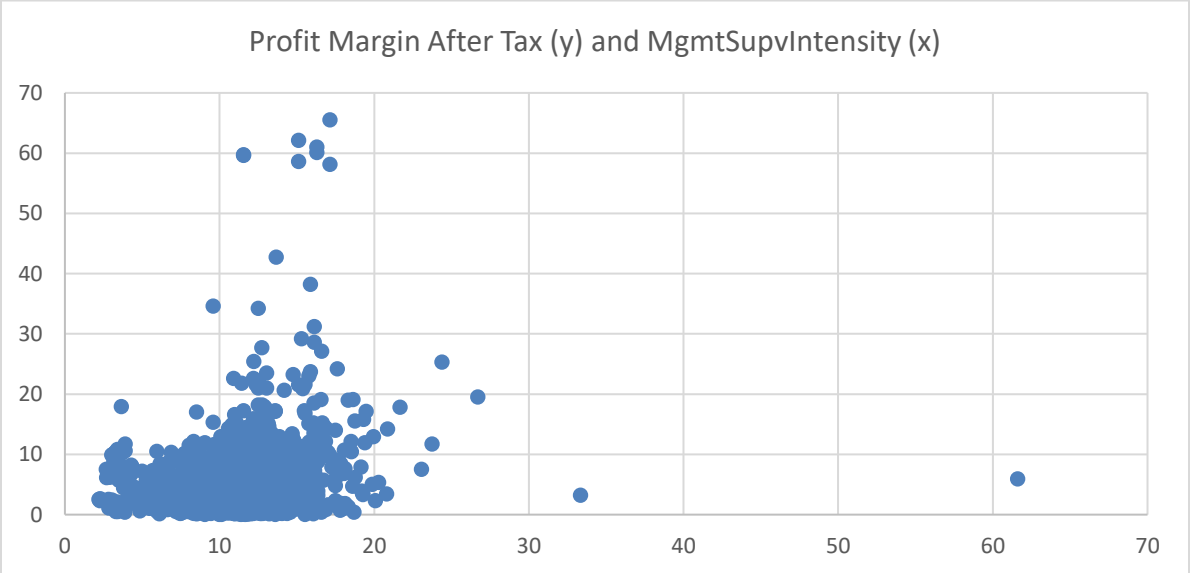
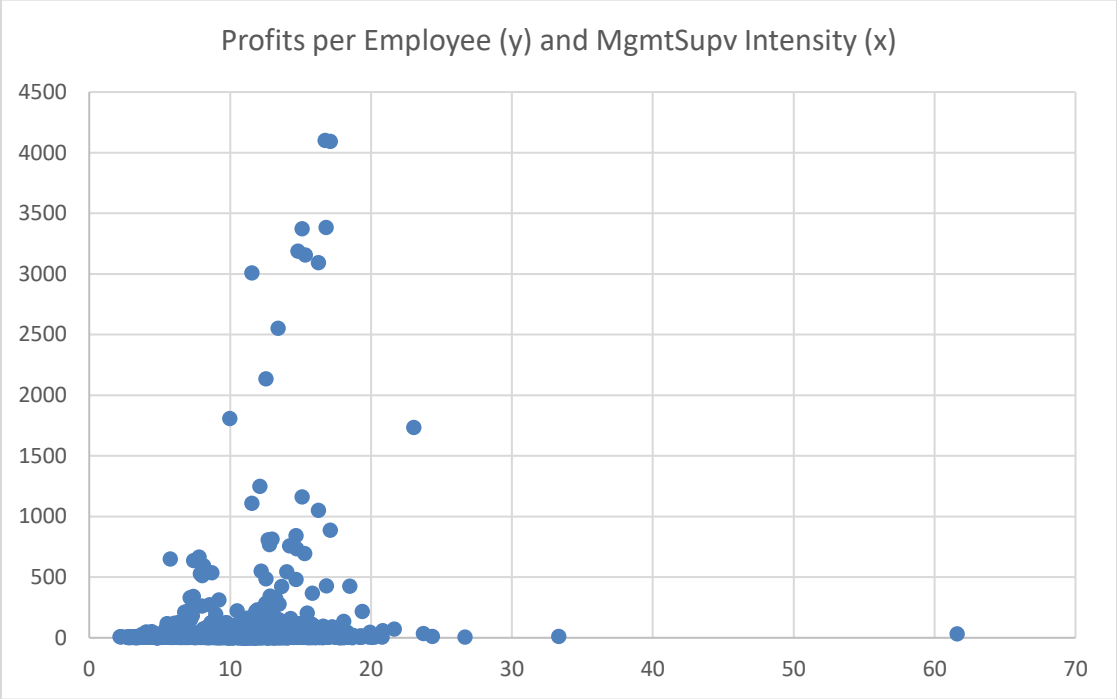


Figure 5


Profits per Employee (y) and MgmtSupv Intensity (x)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70

APPENDIX 1—List of variables, their sources and operationalization

Dependent Variables:

1. Ln S/E (Sales per Employee). This comes from using industry net sales data from the *Almanac of Business and Industrial Financial Ratios* written by Troy (2005 to 2015) and Troy and Wilson (2016, 2017) and then dividing these by the US Bureau of Labor Statistics number of employees within each industry for each year from 2002 to 2014. This variable, like others that are interval or ratio based in this paper, is then put into natural log form. The almanacs publish data for the year that is three years prior to the edition date. That is, for example, for the 2005 edition of the almanac, the data given are for June 2001 to July 2002 corporate year.

2. Ln ROA. This is the natural log of the return on assets after taxes in percent as given by the 2005 to 2017 editions of *Almanac of Business and Industrial Financial Ratios* written by Troy (2005 to 2015) and Troy and Wilson (2016, 2017).

3. Ln ROE. This is the natural log of the return on equity (shareholders' equity) after taxes in percent as given by the 2005 to 2017 editions of *Almanac of Business and Industrial Financial Ratios* written by Troy (2005 to 2015) and Troy and Wilson (2016, 2017).

4. Ln PM (Profit Margin). This is the natural log of the profit margin after taxes in percent as given by the 2005 to 2017 editions of *Almanac of Business and Industrial Financial Ratios* written by Troy (2005 to 2015) and Troy and Wilson (2016, 2017).

5. Ln Pr/E (Profit per Employee). This is the natural log of the profit after taxes per employees and is calculated by first taking the industry profit margin after taxes and multiplying it by industry net sales for each industry for each year (2002 to 2014). The data for these variables are given by the 2005 to 2017 editions of *Almanac of Business and Industrial Financial Ratios* (Troy 2005 to 2015, Troy and Wilson 2016, 2017). Next, this value for profit margin in dollars is then divided by the number of employees for each industry for each year, and these numbers for employees come from

the US Bureaus of Labor Statistics (BLS). The result is profit per employee, which is meant to be some type of exploitation of labor measurement.

Independent Variables:

6. Ln Managers and Supervisors per Employee (MgmtSupv Intensity). This is a variable created from US BLS data from the Occupational Employment Surveys of May 2002 to May 2014. The data are at the 4-digit North American Industrial Classification System (NAICS) industry level. The number of employees in an industry classified as managers and supervisors (first line and other types of supervisors listed) were added together, and then this was divided by the total number of employees in an industry, and then this ratio was multiplied by 100 to put it into percentage terms. This number represents the span of control or management and supervisory intensity within each industry.
7. Ln Chief Intensity. This is a variable created from US BLS data from the Occupational Employment Surveys of May 2002 to May 2014. The data are at the 4-digit North American Industrial Classification System (NAICS) industry level. The number employees in an industry classified as chief officers was divided by the total number of employees in an industry, and then this ratio was multiplied by 100 to put it into percentage terms. This number represents the span of control or chief officer intensity within each industry.
8. Ln Managers' and Supervisors' Total Pay as a Percent of Net Sales (MgmtSupv Total Pay / Net Sales Pct). This is a variable created from US BLS data from the Occupational Employment Surveys of May 2002 to May 2014. The data are at the 4-digit North American Industrial Classification System (NAICS) industry level. The number of employees in an industry classified as managers was multiplied by the estimated average annual salary for managers and added to the number of supervisors multiplied by their estimated annual average salaries. The sum of these was in turn divided by the estimated net sales for each industry for each year 2002

to 2014 as listed in the almanacs written by Troy (2005 to 2015) or Troy and Wilson (2016 and 2017). This ratio was in turn multiplied by 100 to put it into percentage terms.

9. Ln Chief Officers Total Pay as a Percent of Net Sales (Chief Officers Total Pay / Net Sales Pct). This variable uses the same sources and is created using the same methods as the previous one except chief officers' numbers and pay are used.
10. Ln Managers' and Supervisors' Average Annual Salaries. This comes from the US BLS annual Occupational Employment Survey, 2002 to 2014 for different 4-digit NAICS industries. For each year and for each industry, the average annual salary for managers and supervisors is given. For this variable, the number of managers was multiplied by their estimated annual salary for each year and each industry. The same was done for supervisors. These two totals were combined and then divided by the total number of managers and supervisors combined to obtain an average salary for members of both groups.
11. Ln Chief Officers' Average Annual Salary. This comes from the US BLS annual Occupational Employment Survey, 2002 to 2014 for different 4-digit NAICS industries. For each year and for each industry, the average annual salary for chief officers is given.
12. Monopoly Power Index. This is an index created from principal components analysis and is composed of the following three highly correlated variables for each industry for each year: 1) the 4 firm concentration ratio (that is, the share of an industry's sales going to the largest 4 firms) for each of the 4-digit industries for the years 2002, 2007, and 2012 (US Census Bureau's 2007 Economic Census)[23]; the total of the net property, plant and equipment for each industry divided

[23] Concentration ratios are only published by the Census Bureau every 5 years. Therefore, and because there is not much variation in their numbers every five years (except for slight increases on average), the 2002 concentration ratios were used for that year as well as for 2003 and 2004 data; and the 2007 ratios were used for that year as well as for 2005, 2006, 2008 and 2009; and the 2012 ratios were used for that year as well as 2010, 2011, 2013, and 2014. Admittedly concentration ratios developed by the Census Bureau have limitations. The ratios are based only on US firms (foreign competitors are not considered) and local market concentration (at a city or metro area level) is not considered. Only national level data is considered. The Herfindahl-Hirschmann Index (HHI) is an alternative measure, but the Census only publishes this for manufacturing

the number of enterprises in the industry (Troy 2005 to 2015, Troy and Wilson 2016, 2017); and the estimated capital to labor ratio (KL ratio) for each industry, which is based upon taking the net property plant and equipment estimates from the almanacs for each year and dividing these by the BLS estimates of employment in each industry for each year. Table 2 shows the results of the principal components analysis. These variables were not only combined because of possible multicollinearity problems in the statistical analysis, but they are also combined for theoretical reasons as well.

13. Ln Real GDP. This comes from the US Bureau of Economic Analysis (2002-2014) for each of the years examined and is used as a measure of general consumer demand for the industries, although it is realized that some industries and their sales are more subject to real GDP fluctuations than others.

14. Unionization. This is a dummy variable where industries are labeled as to whether they are part of an overall industry (agriculture, mining, manufacturing, etc.) that is one of five of the heaviest unionized industries in the US (BLS 2017). A value of 1 indicated that a 4-dgiit industry was part of an overall industry grouping that had heavy unionization whereas a value of 0 indicated that an industry was not part of such a larger industry. Unfortunately, no data source was found that showed the extent of unionization for the 4-digit industries for the years covered in this paper. According to the BLS, the top five major non-governmental industries with the heaviest union concentration for these years were utilities, transportation and warehousing, telecommunications, construction, and educational services. However, since the data used for this paper did not include any for construction, manufacturing industries were coded as a 1 since

firms (Census Bureau 2002, 2007 and 2012). Despite its limitations, the ratio is used here as one part of a variable to indicate some type of market power that an industry has.

this overall industry included the next highest level of unionization in the US, especially in many regions of the US (BLS 2017).

15. Profit, Growth, and Inelastic Demand. This is dummy variable where an industry receives a value of 1 if it is an industry or business type deemed to be in any of the following categories: 1) a consistently high return industry such as physicians' services, dental services, legal services and many other professional services (Biery 2013); 2) is in the growth stage of the product life cycle such as, for example, scientific research and development services, computer systems designs and related services, etc.; or 3) an industry which would be deemed to have high and overall inelastic demand such as those in health services (physicians' offices, hospitals), for example.
16. Ln Debt Ratio. This is the natural log of the total debt to total assets ratio for the average firm in each industry (Troy 2005-2014; Troy and Wilson 2015-2017). This is included as an independent variable since the higher the debt of a firm (or industry), the lower its profit margin, return on assets or return on equity should be, on average, since interest and debt payments decrease profitability and returns than what they would be otherwise.