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Theories of lean management: An empirical evaluation

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ABSTRACT

Debates within organization theory traditionally argued the relative merits of bureaucracy but today there is broad agreement across different perspectives that bureaucratic organization is inefficient and outmoded. Despite their differences, post-bureaucratic and neo-liberal theories argue that organizations with relatively flat hierarchies and low management overhead are better adapted to current market requirements. Post-bureaucratic theory also argues that employees, as well as firms, benefit from leaner management structures. This paper investigates trends in managerial leanness, proposed explanations for such trends, and the consequences of leanness for firms and employees. Although there is a trend toward flatter management hierarchies, there is only weak support for current claims regarding both the causes and consequences of lean management.

0. Introduction

Views regarding optimal organizational structure have changed dramatically in the past thirty years. Previously, researchers debated the relative merits of bureaucracy, but today bureaucracy has few defenders. Researchers from quite diverse perspectives agree that management downsizing and delayering is increasingly reversing the growth of administration that characterized the managerial revolution. Current theories of organizational structure fall into two broad camps, post-bureaucratic and neo-liberal. Together, they have displaced previous views, but their claims regarding the prevalence, causes, and consequences of lean management structures remain relatively under-studied empirically.

This paper uses two national probability samples of organizations to examine some of the claims made about trends toward lean management, the environmental and ownership conditions that favor leanness, and the ostensible advantages of lean management for both organizational performance and employee outcomes. The first section describes theories of managerial leanness and derives hypotheses. The second section describes the data. The third section presents results, and the final section concludes. In general, support for various theories of lean management is mixed at best.

1. Theory and hypotheses

1.1. Theory

Bureaucratic organizations, whatever their recognized shortcomings, were the embodiment of the modern organization for academics, managers, and the public for most of the postwar period.

Peter Blau and Alfred Chandler exemplified this generally Weberian and managerialist view within sociology and business history, respectively (e.g., Blau, 1968, 1972; Blau and Meyer, 1987; Chandler, 1977, 1990a). The organizational structures managers built reflected the technical requirements of industrial society for predictability and control over environmental uncertainties. Large-scale operations, intra-organizational differentiation, high capital requirements, and

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technological economies of scale required a large administrative component to manage complexity, minimize costs, and maintain routine. Both Blau and Chandler viewed top executives and ordinary managers through a technocratic lens as a corps of administrative professionals pursuing the larger organization's goals in disinterested fashion. The Aston Group, conducting parallel research, reached similar conclusions (Pugh, 1973; Donaldson, 2001).

Within economics, Williamson (1975, 1985) proposed a similar view in treating bureaucracy as an efficient response to market failure. When asset specificity locks buyers and sellers into bilateral monopolies firms on each side of the transaction are subject to opportunistic treatment from the other, as neither can exit the relationship. A firm that internalizes different functions within a single chain of command eliminates this source of transactions costs. This assumes, following Weber and Chandler, that managers behave in neutral, professional fashion within the firm, even though they are presumed to act opportunistically in dealings with those outside the firm.

Events in the real world soon rendered problematic these views of bureaucracy as professional and efficient. In the 1970s and 1980s output and productivity growth fell, inflation and unemployment rose, and the early 1980s witnessed the most wrenching recession since the Great Depression. A wave of manufacturing imports from Japan and other countries rapidly displaced American firms in many key industries. Plant closures in steel, autos, machine tools, consumer electronics, and other industries swept the Midwest and Northeast United States, as the new competition overwhelmed American corporations that had dominated their industries and seemed unshakable pillars of the economic order (Bluestone and Harrison, 1982). Stock prices fell low enough to reawaken the financial markets that managerial theories considered permanently dormant, setting off a wave of shareholder activism, mergers, hostile takeovers, leveraged buyouts (LBOs), and defensive restructuring (Useem, 1993). Workers' real median wages stagnated, earnings inequality grew, and unions experienced steep declines in membership and leverage. Among the few bright spots in this landscape were small, innovative computer and biotechnology startups; established big business began to seem like a relic of the fading industrial era.

Post-bureaucratic and neo-liberal theories of organizations arose in response to these developments.

Post-bureaucratic theories argued that leaner management and greater workplace participation were superior to traditional bureaucracy and represented the way forward. According to this view, hierarchies were suited to environments with stable markets and technologies, such as the first half of the post-war period. Products and processes changed in predictable fashion. Production work was deskilled and organized according to principles of Scientific Management. Consumers were relatively undemanding and accepted mass produced, standardized goods. Industries were often oligopolistic, profits steady, and firms were buffered from disruptions by their size and administrative planning capacities. A large and growing cadre of managers made this system work. However, firms' traditional coping mechanisms were overwhelmed by the new level of environmental instability resulting from macroeconomic turbulence, foreign competition, technological change, and changing consumer tastes. In the new environment competitive advantage lay in faster decisions times, innovation, and flexibility, rather than economies of scale and the accumulation of deep reserves of internal resources.

In this view, the crises of the 1970s and 1980s caused a paradigm shift toward more decentralized organizations, which have flatter hierarchies, less management control, less Taylorized jobs, and more front-line worker participation in decision-making, quality control, and problem solving. Firms share the gains from greater labor–management collaboration with employees through innovative pay practices, such as team bonuses and profit sharing. This view is attractive because post-bureaucratic organizations offer the possibility of both improved organizational performance and higher-paid, more fulfilling jobs in an era of labor market distress. Specific examples cited by this literature include large Japanese firms, German craft production, Italian small-firm industrial districts, Silicon Valley startups, biotechnology, steel mini-mills, and the Hollywood film industry, among others (Piore and Sabel, 1984; Hirschhorn, 1984; Zuboff, 1988; Powell, 1990; Kanter, 1991; Womack et al., 1991; Appelbaum and Batt, 1994; Heckscher and Donnellon, 1994; Saxenian, 1994; Whittington et al., 1999; Appelbaum et al., 2000; Child and McGrath, 2001; see also Guadalupe and Wulf, 2010). Many, though not all, of these studies focused on particular firms and industries, some of which may have attracted attention because they exemplified the proposed model, raising questions of the representativeness of the findings.

In contrast to the communitarian vision of post-bureaucratic theory, neo-liberal theory posits a return to capitalism's individualistic roots after an interlude of bureaucratic distortion. According to Michael Jensen's principal–agency theory, the economic crises of the 1970s and 1980s stimulated a healthy wave of shareholder revolts and a rollback of the managerial revolution, as firms lost their prior, and abused, independence from shareholder-owners. In this view, unlike Chandler, Blau, and Williamson, managers are opportunistic in the manner in which they run their own firms, rather than neutral technocrats. Because they use investors' capital not their own, salaried managers are tempted to spend money in ways that enhance their own power, prestige, and comfort to the detriment of investors. Unchecked, a management-dominated firm exhibits uneconomic organizational growth (empire building), excess management staff, and overly generous salaries and perks (see also Schumpeter, 1934, pp. 93f.). Before the full extent of the economic crisis was evident, Jensen was confident that various countervailing mechanisms, such as independent boards, pay for performance, and the market for corporate control, ensured that the modern corporation was optimally efficient.

> The publicly held business corporation is an awesome social invention. . .The growth in the use of the corporate form as well as the growth in market value of established corporations suggests that at least, up to the present, creditors and investors have by and large not been disappointed with the results, despite the agency costs inherent in the corporate form. Whatever its shortcomings, the corporation has thus far survived the market test against potential alternatives (Jensen and Meckling, 1976).

By the end of the 1980s, the depth of the crises led Jensen to reverse himself and join the critics of corporate bureaucracy. He argued that many firms had grown uneconomically large because they linked executive pay to organizational size rather than the creation of shareholder value and rewarded middle managers with promotions rather than performance-contingent bonuses, both of which led to the proliferation of unnecessary levels of management. Corporations were rife with "empire building. . .bloated staffs, indulgent perquisites, and organizational inefficiencies" (Jensen, 1989, p. 67). Consequently, the public corporation "has outlived its usefulness in many sectors of the economy and is being eclipsed" by privately held firms, such as those resulting from leveraged buyouts and private equity investments (Jensen, 1989, p. 61). Private companies solved the agency problem by reuniting ownership and control, resulting in "a leaner, more efficient and competitive organization" (Jensen, 1989, p. 67).

In the 1980s and 1990s, lean management became a pillar of business discourse and practice, and the subject of academic research. The most admired corporate leaders (Welch, 2001), as well as those whose initially favorable reputations proved misplaced (Dunlap, 1996), cited the need to cut excess managerial overhead and delayer hierarchies for faster decision making as they downsized and restructured their firms. Academic research confirmed that concepts of leanness, delayering, and restructuring were significant influences on management practice and, to a lesser extent, offered evidence that they improved organizational performance (Newman, 1988; Smith, 1990; Carillo and Koppelman, 1991; Doeringer et al., 1991; Cappelli, 1992; Caves and Kreps, 1993; Hirsch, 1993; Prechel, 1994; Heckscher, 1995; Batt, 1996; Osterman, 1996; Appelbaum and Berg, 1997; Cappelli et al., 1997; Baron et al., 1999; Budros, 1999; Caroli and van Reenen, 2001; Meyer, 2001; Schilling and Steensma, 2001; Palmer and Dunford, 2002; Littler et al., 2003; Littler and Innes, 2004; Love and Nohria, 2005; Rajan and Wulf, 2006; Mendenhall et al., 2008; see also Dalton et al., 1980).

In response to the new twin orthodoxies, Chandler (1990b) reiterated his argument that the large, managerial firm remains the most efficient and productive (see also Lazonick, 2010). A member of the Aston Group, Lex Donaldson (2001), argued that bureaucratic structures reflected task requirements, not agency problems, and questioned the presumed superiority of the post-bureaucratic and shareholder-dominated alternatives (Donaldson, 1995; Donaldson and Hilmer, 1998). Some empirical research also finds no growth over time in environmental instability, calling into question the causal foundation of current theories (Castrogiovanni, 2002).

A number of researchers also wondered whether downsizing and delayering initiatives represented genuine structural shifts. In recent years, managers were cut due to general downsizings, reallocations of resources from declining to growing sub-units, and short-term cost cutting. However, these reductions were often followed by rehiring and relayering when firms discovered they were short-handed. The first phase of these processes could be mistaken for fundamental changes in organizational design. Indeed, managers' share of the workforce has grown over time (Reich, 1993; Budros, 1999, p. 71; Cappelli, 2000; Baumol et al., 2003; Littler et al., 2003, pp. 245ff.; Littler and Innes, 2004, p. 1164). Likewise, the discussion of startups in the post-bureaucratic literature generally overlooked the possibility that cohort effects were confounded with age effects in the cross-section; lower levels of bureaucratization among young firms relative to more established firms may prove transitory as the newer firms age and acquire more crystallized structure (cf. Pugh, 1973). Thus, apparent trends toward debureaucratization might be temporary business cycle or life cycle phenomenon, rather than a genuine paradigm shift.

David Gordon (1996), taking a much more critical position, argued that managers' rising share of the workforce indicates managerial overhead actually increased over time, as firms sought to wrest more effort and output from workers through greater monitoring in the wake of the competitiveness crises described earlier (see also Rose et al., 1987). Goldstein (2012) finds support for Gordon's argument that greater exposure to financial market discipline is positively associated with managerial intensity. Leicht and Brady (2011) find evidence that managerial intensity is associated with increased inequality.

A somewhat different criticism is that leanness is genuine, but achieves cost savings by imposing excessive workloads on employees ("management by stress"), rather than through true efficiencies, such as shorter decision times (Parker and Slaughter, 1988; Graham, 1993; Harrison, 1994). A number of recent studies in industrial relations and industrial/organizational psychology find some support for this claim (Landsbergis et al., 1999; Jackson and Mullarkey, 2000; Littler et al., 2003; Parker, 2003; Sprigg and Jackson, 2006), but other research does not support it (Appelbaum et al., 2000).

Thus, there are questions as to whether there is a significant trend toward lean organizations, its causal basis, and its consequences for organizations and employees. Nevertheless, the discursive opposition between bloated corporate bureaucracy and agile, lean management is powerful, whether the latter is interpreted to mean post-bureaucratic organizations or entrepreneurial firms and investor-friendly corporations. The superiority of lean management is now the dominant, taken for granted philosophy of organizational design (for additional descriptions of this paradigm shift, see, e.g., Meyer, 2001; Goldstein, 2012).

Yet, for all the belief in the virtues of debureaucratization, theories of lean organizations remain under-researched and there is a slim empirical basis for many of its truisms. This paper uses nationally representative data and two measures of leanness, percentage of managers and number of vertical levels, to investigate trends in management leanness and evaluate post–bureaucratic and neo-liberal explanations of its basis and consequences.

1.2. Hypotheses

The preceding discussion implies a number of predictions regarding observed trends in managerial structure and intensity, the forces that drive organization structure, and their consequences for organizational performance and employee well-being.

1.2.1. Trend

On the most basic level, all theories of lean management agree on the basic description of trends:

H1. Organizations are becoming flatter and less management-intensive over time.

1.2.2. Proximate causes: cohort replacement and form of ownership

The underlying drivers of change vary somewhat between the different theories of lean organizations. Post-bureaucratic theory points to new breeds of organizations, like steel mini-mills and Silicon Valley startups, as drivers of change. This focus on younger organizations is consistent with the organizational theory of imprinting, which argues that organizations continue to reflect the dominant paradigms of their founding era for a long time afterwards, while young organizations tend to reflect current models of organizing (Stinchcombe, 1965; Hannan and Freeman, 1977). Thus, organizations founded during the heyday of managerial capitalism, weighed down by the inertia of institutional inheritance, are likely to have a more bureaucratic structure than organizational cohorts founded during and after the crisis of postwar American capitalism.

H2. Organizations founded in the 1980s and 1990s are flatter and less management intensive than older organizations, and cohort replacement partly explains the time trend toward flatter and less management intensive organizations.

By contrast, neo-liberal theory argues that the different incentive structures of various forms of ownership are the cause of efficient or inefficient organizational design. Compared to other forms, public corporations have serious agency problems increasingly penalized by the market.

H3. Owner-managed firms and private corporations are flatter and less management intensive than public corporations, and employment shifts away from public corporations partly explains the overall time trend.

1.2.3. Fundamental causes: environmental turbulence and competition

Both post-bureaucratic and neo-liberal theories agree that the ultimate reason for the trend toward lean management, and an influence on the proximate causes described above, is the environmental instability caused by more turbulent markets. This turbulence includes more competition from domestic and foreign sources, and rapidly changing technology and consumer tastes.

H4. The time trend and proximate causes, such as founding period and ownership, are partly explained by various forms of environmental instability, such as rapidly changing and more competitive markets, which favor lean management.

1.2.4. Consequences: Firm performance and employee well-being

All theories of lean management predict benefits for organizational performance, in contrast to managerialist theory, which is generally skeptical.

H5. Flatter and less management intensive organizations are associated with superior firm performance.

Post-bureaucratic theory also predicts positive outcomes for employees, in terms of material benefits, greater opportunities for employee involvement, labor–management cooperation, and higher levels of job satisfaction (see e.g., Handel and Levine, 2004; Böckerman et al., 2012).

H6. Flatter and less management intensive organizations are associated with higher levels of material benefits, employee involvement, labor–management cooperation, and job satisfaction.

By contrast, both neo-liberal theory and critics of "lean and mean" organizations (Harrison, 1994) argue that such organizations take a tougher line with employees and impose greater effort demands on the workforce. For neo-liberal theory this is seen as an improvement in efficiency, while critics emphasize that it diminishes employee well-being in terms of both material and non-material rewards.

H7. Flatter and less management intensive organizations are associated with less generous material rewards, higher workloads, and lower levels of job satisfaction.

2. Data and methods

2.1. Data

The data are from the first and third National Organizations Surveys (NOS) conducted in 1991 and 2002, respectively. In both years, a sample of organizations was generated by asking respondents to the General Social Survey (GSS) and their spouses to

identify their employers.[1] Because GSS respondents are a random sample of employees, the organizations surveyed for the NOS1 and NOS3 are nationally representative samples of business establishments (see Kalleberg et al., 1996 for further details). In this respect the NOS differs not only from case studies but also from almost all other employer surveys, which are usually either convenience samples, industry-specific, or otherwise limited, such as Fortune 500 or publicly traded corporations. The NOS permits the various implications of different theories of lean management to be tested with representative data for the first time. This paper restricts analyses to all private, for-profit organizations in the NOS samples (N = 454 for 1991, N = 323 for 2002).

The data have a number of advantages. The NOS1, conducted in 1991, is a snapshot of U.S. organizations at a time when the wrenching economic shocks of the time were relatively fresh, organizational responses were variable and evolving, and cohort differences most likely to be pronounced. A substantial period of blue-collar labor shedding in the 1980s was followed by much-noticed white-collar layoffs during the early to mid-1990s, earning the label "white-collar recession" (Levy, 1998, p. 54) and stimulating the early research cited above. Post-bureaucratic and neo-liberal theories rose to prominence around this period, so their critiques of bureaucracy would be expected to apply with particular force in this period. The NOS3 permits replication of many models with more recent data to assess their applicability following another decade of economic evolution. For example, if older organizations or public corporations were able to adapt to unstable environmental conditions, or if such instability proved temporary, relationships observed in 1991 may no longer hold and theories of lean management would need to be modified accordingly.

The structure of the data enable cohort comparisons for organizations founded before, during, and after the crisis (pre-1980s, 1980s, 1990s), and investigation of possible age effects on the development of management structure for the cohort founded in the 1980s and observed across both surveys. This allows a partial test of concerns that lean management might be a transitory or life-cycle phenomenon characteristic of startups and other young firms, rather than a permanent structural shift of organizations founded after the crisis. If organizations founded in the 1980s are less lean in the NOS3 than in the NOS1, then the cohort differences that attracted attention from post-bureaucratic theory would be revealed to be a temporary effect of organizational youth that fades over time. Likewise, the cohorts founded in the 1980s and 1990s can be compared at a similar stage in the lifecycle using the NOS1 for the 1980s cohort and the NOS3 for the 1990s cohort. If the cohort founded in the 1990s is less lean than the cohort founded in the 1980s, this would also indicate that early predictions of a secular trend toward lean management were premature.

An additional advantage of the data is that employer and employee responses to the NOS and GSS can be linked. This expands the kinds of models that can be tested and avoids issues of common method variance that cloud the validity of conclusions when information on the dependent and independent variables come from the same source (Podsakoff and Organ, 1986).

One disadvantage of the NOS is that while both waves contain a wide array of measures, only some variables are replicated across surveys. When the same variables are available in both surveys, models generally use the pooled sample and interactions by year. Other models are year-specific because they use information unique to either the NOS1 or NOS3. Sample size limitations also affect the level of detail of the controls for industry membership. Nevertheless, the multi-wave, merged NOS-GSS data are unique in the range of subjects covered and inclusion of both organizational and employee perspectives for more than a single point in time.

2.2. Measures

2.2.1. Lean management

Lean management is measured by the number of vertical levels in both waves of the NOS and the percentage of managers in the establishment in the NOS1. Both variables are logged in regressions to reduce their significant skew (see Appendix Table A1 for descriptive statistics).

2.2.2. Independent variables

An indicator for the survey year is used to test for trends in managerial leanness (1 = 2002).

Organizational cohort is coded with two dummies for establishments founded in the 1980s, depending on survey year (*1980s-NOS1* and *1980s-NOS3*), and an additional indicator for establishments founded in the 1990s (*1990s*). Organizations founded prior to 1980 are the reference group.

Ownership type is represented by two dummy variables for whether the establishment is part of a public corporation, private corporation, or owner-run firm (reference category).[2]

Two Likert-scale items measure the levels of *competition* and *foreign competition* in the organization's product or service market (0 = none, 4 = a great deal). Foreign competition is particularly relevant for post-bureaucratic theory, which was influenced heavily by the surge of Japanese imports during the 1980s. The NOS1 also asked whether competition had increased in the previous three years (*competition trend*).

Two general measures of environmental instability from the NOS1 are whether the techniques, skills, and information needed by the firm are changing very rapidly (1 = yes) (*rapid change*) and whether the organization has difficulty making long-range plans because the future is unpredictable (1 = yes) (*future unpredictable*). Similar measures of environmental

[1] The second NOS used a commercial database to sample organizations, which rendered it non-comparable to the first and third surveys.

[2] Firms identified in the NOS as proprietorships, partnerships, or franchise establishments are coded as owner-run firms.

instability have been found to be related to an index of new practices, such as delayering, outsourcing, and the use of networks and alliances, in one other study (Palmer and Dunford, 2002).

To complement these perceptual measures of competition and environmental instability, four-firm concentration ratios from the Economic Censuses of 1992 and 2002 are also used. Concentration ratios for 1987 and 1997 were also used to calculate changes in concentration for 1987–1992 and 1997–2002 as alternate measures of environmental instability.[3]

2.2.3. Dependent variables

2.2.3.1. Organizational performance. The NOS1 and NOS3 have several measures of organizational performance that are modeled as functions of managerial leanness and other covariates.

The NOS1 has two measures of organizational dynamism, whether the organization "mostly reacts to outside pressures" (1 = yes) (*reactive*) and whether it "concentrates on doing what it does well and takes few risks" (1 = yes) (*risk averse*). These dichotomous variables are modeled using binary logistic regression.

Four items in the NOS1 asked how large a problem it would be for the organization to *increase productivity*, *develop new products*, *improve quality*, and *improve compensation* over the next three years (1 = no problem, 2 = minor problem, 3 = major problem). These variables are modeled using ordinal logistic regression.

Three items on labor productivity, employee work effort, and financial performance from the NOS3 were combined with two items on organizational effectiveness from the GSS 2002 to construct a scale of overall *organizational performance* and modeled using OLS regression (see Appendix Table A2 for details).

These and similar performance measures from the NOS have been used in other studies examining the effects on performance of decentralized decision making and internal labor markets (Delaney and Huselid, 1996), work-family policies (Perry-Smith and Blum, 2000), and racial and gender diversity within organizations (Herring, 2009).

The NOS1 also has the percentage change in sales over the previous 12 months, which is an objective, quantitative complement to the judgmental measures used in prior research. Research on a wide variety of performance measures shows they are often only moderately correlated and there is benefit to using a broad variety of measures (Meyer and O'Shaughnessy, 1993).

2.2.3.2. Employee outcomes: extrinsic rewards. Both NOS surveys ask whether the organization offers eight fringe benefits: health insurance, paid sick leave, pension or retirement benefits, life insurance, long-term disability instance, flextime, day care, and elder care. A count variable measures the number of *fringe benefits* available to employees and is modeled using OLS regression.

The percentage of employees eligible for bonuses based on workgroup or department performance (*group bonus*) and on company profits or overall organizational performance (*profit sharing*) are available in the NOS3. Following Osterman (1994), both variables were recoded into dichotomies indicating whether at least fifty percent of employees were eligible for these bonuses and modeled using logistic regression.

2.2.3.3. Employee outcomes: intrinsic rewards. Standardized scales for employee *autonomy* were constructed from four items on workplace decision making in the GSS 1991 ($\alpha = 0.85$) and three similar items in the GSS 2002 ($\alpha = 0.74$) (see Appendix Table A2 for details).

A *task participation* scale was constructed from five items in the GSS 1991 asking whether respondents perform various activities with coworkers they do not officially supervise, such as organizing tasks, devising new ways of doing tasks, and checking other workers' performance (see Appendix Table A2 for details) ($\alpha = 0.81$).

Two employee involvement measures were constructed from the NOS3 for whether at least fifty percent of non-managerial and non-supervisory employees belonged to quality circles or employee involvement groups (*QC*) and self-managed teams (*teams*) (1 = yes). Self-managed teams were defined as having "some degree of responsibility and discretion over such decisions as methods of work, task schedules, assignment of members to different tasks, and feedback about group performance."

Because leanness is often criticized as management by stress, five items on effort levels and overwork from the GSS 2002 were used to construct a standardized scale of effort intensity (*effort*) ($\alpha = 0.66$) (see Appendix Table A2 for details). Higher values for this scale indicate higher levels of overwork.

[3] Industry concentration ratios for 1987 were derived from the CD-ROM issued by the U.S. Census Bureau for the 1987 Censuses of Manufactures, Wholesale, Retail, and Services (1987 Economic Censuses, Washington, DC: U.S. Dept. of Commerce, Bureau of the Census, Data User Services Division, 1993). Ratios for 1992 were derived from http://www.census.gov/econ/concentration.html and ftp://ftp2.census.gov/econ1992/MC92/mc92cr.txt (accessed 8/29/12) for manufacturing and the following printed sources for other industries: 1992 Census of Transportation, Communications, and Utilities: Establishment and Firm Size. 1995. Washington, DC: Bureau of the Census. 1992 Census of Wholesale Trade: Establishment and Firm Size. 1995. Washington, DC: Bureau of the Census. 1992 Census of Retail Trade: Establishment and Firm Size. 1995. Washington, DC: Bureau of the Census. 1992 Census of Financial, Insurance, and Real Estate Industries: Establishment and Firm Size. 1995. Washington, DC: Bureau of the Census. 1992 Census of Service Industries: Establishment and Firm Size. 1995. Washington, DC: Bureau of the Census. Spreadsheet files with concentration ratios for industries in 14 sectors of the Economic Census of 1997 were downloaded from the Census ftp site: http://www2.census.gov/econ1997/EC/. Concentration ratios for industries in 15 sectors of the Economic Census of 2002 were downloaded from the Census Bureau's American Fact Finder web site (http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml). Detailed crosswalks were used to convert ratios for detailed industries into 1980 Census codes used in both NOS surveys from Standard Industrial Classification codes used in the 1987 and 1992 Economic Censuses and the North American Industry Classification System codes used in the 1997 and 2002 Economic Censuses.

In both the GSS 1991 and 2002 employees described relations between managers and employees at their workplace (1 = very bad, 4 = very good) (*climate*) and reported their personal job satisfaction on a standard four-point Likert scale (*job satisfaction*).[4] Self-reports of overall job satisfaction are meaningful summary measures of the overall intrinsic and extrinsic rewards that individuals derive from their jobs (Handel, 2005).

2.2.4. Control variables

The (log) establishment size and its square are controlled because of its well-known association with structural variables like height of hierarchies and managerial intensity, which have been argued to represent technical requirements in the managerialist literature (Blau, 1968, 1972; Pugh, 1973). Controlling for size also avoids bias in the estimated coefficients for covariates like organizational youth and ownership type, which are expected to have strong correlations with establishment size.

In addition to organizational size, 35 two-digit industry dummies are used to control for managerial task requirements. Within-industry comparisons are appropriate because theories of lean management argue that new structural forms are superior to managerialist organizations in head-to-head comparisons. The theories do not argue mostly that leanness is becoming more common because between-industry shifts favor sectors that have always been leaner, although the theories are not sufficiently explicit to exclude this as a secondary argument.[5]

Models also control for whether the organization is part of a multi-establishment firm (*multi*) because research finds that establishments that are sub-units nested within a larger organization face greater managerial requirements associated with policies and procedures set at higher levels (Pugh, 1973; Mintzberg, 1979).

The establishment's core occupation is also controlled in models using the NOS1, though in practice its omission does not alter results for study predictors.[6] Following previous research, organizational size, multi-establishment firm, industry, and occupation are expected to provide effective controls for managers' technical task requirements.

Models with dependent variables from GSS respondents also control for respondents' background characteristics: education, experience and its square, tenure and its square, race, gender, occupation, part-time, marital status and its interaction with gender, and metropolitan area.

3. Results

3.1. Basic trends and determinants of organizational structure

The models in Table 1 test whether there is a trend toward lean management and whether ownership and firm birth cohort help account for it. A regression of (ln) vertical levels on year alone (Model 1) shows a strong negative trend, consistent with delayering hypothesis (H1), though the model explains only a small percentage of the total variance. Adding controls for size and industry reduces the time trend coefficient by more than half (Model 2). Thus, much of the apparent trend toward delayering reflects changes in composition across the samples. However, the fact that the time trend remains negative and significant in the presence of controls also supports theories of leanness. Indeed, the interaction model in Column 3 indicates that the positive effect of size on the number of layers declined slightly across the two NOS surveys, which also supports theories of leanness.

However, ownership type is unrelated to the number of management layers after controlling for size (Model 3), contrary to principal–agent theory (H3). Greater distance between principals and agents does not seem to result in a profusion of managerial levels.

The effects of the period of organizational founding are complex. Contrary to post-bureaucratic theory (H2), organizations founded in the 1980s and 1990s are no flatter than otherwise comparable organizations founded before 1980 when the later cohorts are still young. However, it appears by 2002 organizations founded in the 1980s are flatter than otherwise similar organizations, though the negative interaction between 1980s founding and the later survey year is only marginally significant ($p = 0.097$) (Model 3). This is a bit unexpected given that age is conventionally associated with increasing bureaucratization. A test for the equality of coefficients indicates no difference between the cohorts founded in the 1980s and 1990s at a comparable point in their lifecycles, so there seems to be no progressive tendency toward delayering since 1980 for relatively young organizations. Only further research can confirm whether organizations founded in the 1990s will also restrain the growth of managerial levels as they age, as is the case apparently for organizations founded in the 1980s.

Managerial intensity is available for the NOS1 sample only (Model 4). There is no evidence that ownership type (H3) or founding period (H2) is associated with the size of managerial overhead after controlling for the effects of size and industry, contradicting both principal–agent and post-bureaucratic theories of lean organizations. Principal–agency relationships and founding cohort are unrelated to managerial intensity. Organizational size has a strong negative curvilinear relationship to

[4] While the items' wording and response options differed slightly across years, the response distributions were remarkably similar, consistent with time trends for identically worded items. The question wording for 1991 was "On the whole, how satisfied are you with the work you do?" (SATJOB) and for 2002 was "All in all, how satisfied would you say you are with your job?" (SATJOB1). Both items use four-point Likert response scales with slightly different wording.

[5] Supplementary analyses show that results are generally unaffected by using two-digit over three-digit industry, while using the latter reduces sample size and statistical power. Therefore, two-digit industry is used for all analyses.

[6] The occupations are managers, professionals, clerical/sales, craft, semi- and unskilled blue collar workers, and service workers.

Table 1
Predictors of lean management.

	1	2	3	4
	(ln) Number of vertical levels			(ln) Pct. mgrs.
Year = 2002	−0.396***	−0.190***	−0.148*	
	(0.065)	(0.045)	(0.077)	
Public corporation			0.032	−0.048
			(0.077)	(0.127)
Private corporation			0.043	−0.038
			(0.058)	(0.096)
1980s (NOS1)			0.065	−0.037
			(0.064)	(0.078)
1980s (NOS3)			−0.180*	
			(0.108)	
1990s			−0.031	
			(0.083)	
Size				
(ln) Size		0.302***	0.318***	−0.403***
		(0.012)	(0.018)	(0.025)
(ln) Size × 2002			−0.054**	
			(0.023)	
(ln) Size^2		−0.031***	−0.033***	0.072***
		(0.004)	(0.005)	(0.007)
(ln) Size^2 × 2002			0.004	
			(0.009)	
Multi (1 = yes)			0.081	0.080
			(0.056)	(0.086)
Industry dummies		Yes	Yes	Yes
N	690	690	690	416
Adj. R^2	0.05	0.58	0.58	0.63

Note: Standard errors in parentheses. Omitted ownership type is proprietorship, partnership, and franchise. Founding refers to whether the establishment was founded in the 1980s or 1990s and whether establishments founded in the 1980s were observed in 1991 (NOS1) or 2002 (NOS3). Models with squared size terms use centered values for both size variables. "Multi" refers to multi-establishment firms. Industry controls are 35 two-digit Census categories. Managerial intensity available only for 1991 (column 4). Model 4 includes core occupation of establishment (available for 1991 only).
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

the level of managerial intensity, consistent with Blau (1968, 1972). Although one cannot test for whether this effect diminishes over time, interaction models indicate that the effect of size on managerial intensity does not differ between organizations founded before and after 1980 (not shown).

3.2. Effects of environmental conditions on organizational structure

Both post-bureaucratic and neo-liberal theories argue that greater competition undermines managerialism (H4). Post-bureaucratic theory, in particular, emphasizes that environmental instability requires leaner organizational structures to shorten decision times. Models in Table 2 estimate the raw effects of competition and environmental turbulence on the number of levels (column 1) and percentage of managers (column 3), and the effects after controlling for size, industry, multi-establishment firm, ownership type, and founding period, as well as core occupation for models using only NOS1data (columns 2 and 4).

3.2.1. Vertical hierarchy

The results for the height of vertical hierarchies provide limited support for existing theories of lean management. Organizations reporting higher levels of overall competition and foreign competition tend to have taller, not shorter, hierarchies (column 1, panels A and B), though most of the effects disappear once controls are added (column 2, panels A and B). Interaction models do not indicate that the effects of competition or foreign competition on the number of levels vary across survey years (not shown). The NOS1 also includes an item on whether competition changed over the previous three years. In models with controls, establishments in static competitive environments have taller hierarchies, consistent with lean theory predictions (columns 1 and 2, panel C).

The NOS1 also contains two general measures of environmental turbulence, whether the techniques, skills, and information needed by the organization are changing very rapidly (1 = yes) and whether the organization has difficulty making long-range plans because the future is unpredictable (1 = yes). Reinforcing the results for competition, the first measure of turbulence is associated with taller hierarchies (column 1, panel D), contrary to predictions, but the effect are not signif-

Table 2
Effects of environmental conditions on organizational structure.

	(ln) Vertical levels		(ln) Percent managers	
	1 No controls	2 Controls	3 No controls	4 Controls
A. Competition level				
None	−0.031	0.087	0.035	0.232
	(0.247)	(0.169)	(0.630)	(0.428)
Very little	−0.449***	−0.064	0.483**	−0.023
	(0.113)	(0.078)	(0.194)	(0.129)
Moderate	−0.172**	0.007	0.248**	0.035
	(0.073)	(0.051)	(0.121)	(0.079)
Great deal (omitted)				
N	679	679	404	404
Adj. R^2	0.02	0.58	0.01	0.63
B. Foreign competition				
None (omitted)				
Very little	0.239***	0.077	0.050	0.130
	(0.081)	(0.056)	(0.136)	(0.087)
Moderate	0.475***	0.182***	−0.250	0.206*
	(0.097)	(0.070)	(0.165)	(0.117)
Great deal	0.329***	0.057	−0.409**	−0.128
	(0.108)	(0.082)	(0.189)	(0.147)
N	666	666	392	392
Adj. R^2	0.04	0.59	0.01	0.65
C. Competition trend in last 3 years				
Decreased	−0.208	−0.132	−0.049	−0.095
	(0.141)	(0.093)	(0.185)	(0.116)
Stayed same	−0.010	0.132*	0.075	−0.043
	(0.102)	(0.070)	(0.131)	(0.085)
Increased (omitted)				
N	388	388	389	389
Adj. R^2	0.00	0.60	−0.00	0.63
D. Rapid change	0.337***	0.022	−0.380***	−0.051
	(0.089)	(0.063)	(0.113)	(0.076)
Future unpredictable	0.028	0.042	0.137	0.050
	(0.086)	(0.060)	(0.110)	(0.073)
N	405	405	412	412
Adj. R^2	0.03	0.59	0.02	0.63
E. Concentration				
1992 (main effect)	0.016***	0.005*	−0.295***	0.174***
	(0.002)	(0.003)	(0.078)	(0.082)
2002 (interaction)	−0.011***	−0.001		
	(0.004)	(0.003)		
N	580	580	358	358
Adj. R^2	0.14	0.58	0.04	0.74
F. Δ Concentration				
1987–1992 period	−0.009	0.013	0.231	−0.061
	(0.014)	(0.010)	(0.435)	(0.265)
1997–2002 interaction	0.001	−0.016		
	(0.017)	(0.013)		
N	519	519	299	299
Adj. R^2	0.06	0.57	−0.00	0.74

Note: Standard errors in parentheses. Models 1 and 2 in panels A and B use the pooled sample; all other models use the NOS1 (1991). Models 1 and 3 include only predictors shown. Models 2 and 4 include controls for multiple establishments, ownership, establishment founding period, two-digit industry, (ln) establishment size and its square, survey year (pooled models), and core occupation (non-pooled models). Concentration is four-firm concentration ratio in the survey year and Δ Concentration is the change in industry concentration in the survey year compared to five years earlier.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

icant after the introduction of controls. The second measure of environmental turbulence has no significant effects in either model.

Four-firm concentration ratios derived from the U.S. Economic Censuses are used as alternative, objective measures of competition and environmental instability in panel E. A significant, though much reduced, effect of competition level remains after the addition of controls, indicating somewhat higher hierarchies in less competitive industries. The absence

of an interaction between product market concentration and survey year indicates no strengthening of this effect between 1991 and 2002 (Model 2).

Changes in the level of concentration over the periods 1987–1992 and 1997–2002 have no effects on the height of hierarchies, contrary to expectations regarding the implications of environmental instability on organizational structure (panel F).

3.2.2. Managerial intensity

The models for management intensity without controls indicate that organizations facing a great deal of competition overall and a great deal of foreign competition in particular, have lower management overhead (column 3, panels A and B), but most of these effects disappear after controls are added (column 4, panels A and B). Changes in the level of competition do not affect managerial intensity with or without controls (columns 3 and 4, panel C). Rapid change is associated with a smaller corps of managers in the uncontrolled model, but the effect disappears after controls are added (columns 3 and 4, panel D). By contrast, four-firm concentration ratios are strongly and positively related to managerial intensity; firms in more concentrated markets have a higher share of managers (panel E). Whether this relationship holds for the later survey is unknown. Changes in concentration are unrelated to managerial intensity (panel F).

The preceding indicates that organization-level measures of the intensity of competition and environmental uncertainty have few robust effects on either the height of hierarchies or managerial intensity. It should also be noted on a descriptive level that managers do not report significantly higher levels of competition in 2002 than in 1991 (Appendix Table A1), contrary to common impressions of an upward trend but consistent with some research (e.g., Castrogiovanni, 2002). Industry concentration ratios are also stable between 1992 and 2002. Industry-level measures of competition and environmental uncertainty do provide some evidence in the NOS1 cross-section that more concentrated markets are associated with taller hierarchies and a higher managerial share, but there is no strengthening of the former over time.

3.3. Effects of organizational structure on organizational performance

Arguments regarding the causes of managerial leanness rest ultimately on claims regarding its implications for organizational performance. In this view, management is becoming leaner because it makes organizations more nimble, proactive, and efficient than otherwise (H5). Tests of these claims provide some modest support for theories of leanness (Table 3).

The number of levels is associated with a more reactive organizational style (column 1), consistent with theories of lean organizations, but negatively associated with anticipated future productivity problems in 1991, contrary to expectations (column 3). Somewhat undercutting the latter, there is a negative association between number of levels and actual performance in 2002 (column 8). It is not obvious how to explain these contradictory results. The number of levels is not associated with risk aversion, anticipated problems with product innovation, quality improvement, and compensation, or with below average growth in sales in the past year. The percentage of managers is not associated with any organizational performance measure, contradicting the premise of bureaucratic bloat common to all theories of lean management.

Likewise, the direct effects of ownership type show no strong pattern, net of any indirect effects through organizational structure. Organizations founded in the 1980s were consistently stronger than older cohorts when surveyed in 1991, but no cohort effect is observed in 2002 for organizations founded in either the 1980s or 1990s.

The results indicate that while it was a truism in the late 1980s and early 1990s that bureaucracies were bloated and inefficient, there is a rather weak relationship between organization structure and various measures of performance. There is little evidence that principal–agency problems or level of entrepreneurialism, as measured by type of ownership, affects performance. There is somewhat more evidence that organizations founded after the crisis in managerial capitalism perform better than organizations founded during its heyday, at least in 1991.

3.4. Effects of organizational structure on employee outcomes

Organizational researchers also believe that lean management has implications for employee outcomes. Post-bureaucratic theory views lean organizations as more employee-friendly than managerialist organizations because employee involvement and gain sharing are central aspects of their competitive strategy (H6). By contrast, both advocates of neo-liberal theory and its critics, such as Harrison (1994), believe lean organizations take a tougher line with employees than managerialist firms (H7).

3.4.1. Material rewards

Table 4 presents results of OLS models estimating the effects of organizational structure on the levels of different material rewards. Contrary to post-bureaucratic theory, organizations with fewer hierarchical levels do not offer more fringe benefits than otherwise similar organizations in either 1991 or 2002. In 2002, the height of hierarchies is positively related to generosity of fringe benefits, consistent with managerialism's defenders and its neo-liberal opponents. However, the presence of broad-based profit-sharing is negatively related to the height of hierarchies, consistent with post-bureaucratic and neo-liberal predictions. Managerial intensity is unrelated to the number of fringe benefits offered.

Table 3
Effects of organizational structure on organizational performance.

	1	2	3	4	5	6	7	8
			Over the next 3 years, how big a problem to improve				Sales change	
	Org. is reactive	Org. is risk averse	Productivity	New products	Quality	Compensation	past 12 mos.	Performance scale (2002)
(ln) Levels	0.478*	−0.014	−0.435**	−0.107	−0.241	0.087	0.026	−0.284***
	(0.255)	(0.265)	(0.214)	(0.220)	(0.213)	(0.202)	(1.885)	(0.109)
Pct.	managers	0.009	−0.006	−0.005	−0.007	−0.012	−0.005	−0.119
	(0.008)	(0.009)	(0.008)	(−0.107)	(0.008)	(0.008)	(0.083)	
Ownership								
Public corp.	−0.348	0.699	0.729*	0.442	−0.199	0.151	−1.679	−0.208
	(0.517)	(0.540)	(0.416)	(0.424)	(0.424)	(0.424)	(3.659)	(0.211)
Private corp.	−1.282***	0.754*	0.456	0.291	0.097	0.665**	−4.072	−0.067
	(0.414)	(0.419)	(0.327)	(0.328)	(0.328)	(0.338)	(3.007)	(0.150)
Founding								
1980s (NOS1)	−0.591*	−0.651*	−0.270	−0.477*	−0.644**	−0.500*	9.596***	
	(0.333)	(0.352)	(0.275)	(0.282)	(0.282)	(0.274)	(2.971)	
1980s (NOS3)								−0.112
								(0.165)
1990s								−0.257
								(0.157)
(ln) Size	−0.175	−0.218	0.214**	0.090	0.119	0.045	−0.772	0.118**
	(0.132)	(0.133)	(0.102)	(0.106)	(0.107)	(0.101)	(1.088)	(0.047)
N	331	324	360	339	359	350	330	251
LL/adj. R^2	−168.42	−155.34	−295.03	−282.15	−272.92	−303.56	0.05	0.06

Note: Standard errors in parentheses. Models in columns 1 and 2 are binary logits using the NOS1 sample. Dependent variables in columns 3–6 are coded as 0 = no problem, 1 = minor problem, 2 = major problem and models are ordinal logits. Dependent variable in model 7 is the percentage change in sales in last 12 months using the NOS1 and the model is OLS with robust standard errors. Dependent variable in column 8 is a five-item standardized scale using items from both the NOS3 and GSS 2002 and the model is OLS. Number of managers measured in percentage points (0–100). All models control for multiple establishment status, scope of market area, and two-digit industry. Models 1–7 also control for occupation of core employees. Model 8 also controls for personal characteristics of GSS respondents (education, experience and its square, tenure and its square, race, gender, occupation, part-time, marital status and its interaction with gender, and metropolitan area).

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

Both public and private corporations tend to offer more benefits than owner-run organizations net of covariates. Public corporations offer more benefits than private corporations, and tests of the equality of coefficients indicate the difference is significant in 2002 (not shown). In no case do organizations founded after 1980 provide more fringe benefits than those founded earlier. However, larger organizations consistently offer more fringe benefits than smaller organizations. In terms of fringe benefits, then, the classic large, bureaucratic, public corporation of managerialist theory is the most generous and employee-friendly.

The number of vertical levels is unrelated to the presence of profit sharing or group bonuses. Public corporations do not differ from owner-managed firms in the use of either kind of bonus, though private corporations are less likely than proprietorships to make extensive use of group bonus plans (column 4). Likewise, organizations founded more recently are no more likely to use either form of non-traditional compensation than organizations founded prior to 1980. Contrary to theories of leanness, innovative pay practices do not seem to be associated with leaner, younger, or non-publicly traded organizations.

3.4.2. Employee involvement and intrinsic rewards

The models in Table 5 examine the effects of hierarchies and managerial intensity on various measures of employee involvement and intrinsic rewards. Most models use organizational variables reported by managers in the NOS to predict employee-level variables from GSS respondents, providing a relatively rare instance in which information on organizational conditions and employee outcomes are available from independent sources. These models include controls for the background characteristics of the GSS respondents. (Models for teams and quality circles use data from the NOS3 exclusively.)

In no case is the height of hierarchies negatively associated with measures of general autonomy or specific employee involvement practices, contrary to post-bureaucratic theory (models 1–5). Notably, the NOS3 is one of the few representative

Table 4
Effects of organizational structure on employee outcomes—fringe benefits, profit-sharing, and bonuses.

	1 1991 Fringe benefits	2 2002 Fringe benefits	3 2002 Profit sharing	4 2002 Group bonus
(ln) Levels	0.149	0.465**	−0.547*	0.164
	(0.131)	(0.187)	(0.288)	(0.311)
Managers (pct.)	0.002			
	(0.005)			
Ownership				
Public corp.	0.561**	1.426***	0.638	−0.307
	(0.271)	(0.359)	(0.505)	(0.551)
Private corp.	0.352	0.426*	−0.190	−0.773*
	(0.216)	(0.253)	(0.365)	(0.416)
Founding				
1980s (NOS1)	−0.178			
	(0.178)			
1980s (NOS3)		−0.222	−0.361	−0.242
		(0.271)	(0.406)	(0.435)
1990s		−0.386	0.447	−0.039
		(0.269)	(0.381)	(0.431)
(ln) Size	0.290***	0.257***	0.286**	0.027
	(0.069)	(0.082)	(0.132)	(0.138)
N	309	212	229	218
Adj. R^2	0.49	0.47		
LL			−133.97	−111.63

Note: Standard errors in parentheses. All models control for multiple establishment status, scope of market area, and two-digit industry; model 1 also controls for core occupation. Dependent variables are a count of eight possible fringe benefits offered to employees (columns 1 and 2), and availability of profit sharing and group bonuses for at least 50% of employees (columns 3 and 4).
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 5
Effects of organizational structure on employee outcomes—employee involvement, work intensity, management–employee relations, and job satisfaction.

	1 1991 Autonomy	2 2002 Autonomy	3 1991 Tasks	4 2002 Teams	5 2002 QC	6 1991 Climate	7 2002 Climate	8 Pooled Job sat.	9 2002 Effort
(ln) Levels	−0.030	0.090	−0.341	0.380	0.407	−0.445*	0.595**	0.209	−0.020
	(0.096)	(0.123)	(0.252)	(0.335)	(0.339)	(0.245)	(0.251)	(0.167)	(0.121)
Managers (pct.)	0.005*		−0.032***			0.024*			
	(0.003)		(0.008)			(0.013)			
Ownership									
Public corp.	−0.083	0.459*	−1.156**	−0.123	−0.066	−0.574	−0.013	−0.235	0.184
	(0.206)	(0.254)	(0.545)	(0.644)	(0.679)	(0.536)	(0.463)	(0.343)	(0.251)
Private corp.	0.031	0.419**	−0.336	−0.218	−0.382	−0.375	0.332	−0.310	0.073
	(0.147)	(0.177)	(0.393)	(0.460)	(0.490)	(0.403)	(0.338)	(0.253)	(0.174)
Founding									
1980s (NOS1)	−0.094		−0.534			−0.240			
	(0.129)		(0.347)			(0.334)			
1980s (NOS3)		0.269		0.054	−0.127		−0.065	0.190	0.143
		(0.189)		(0.512)	(0.532)		(0.352)	(0.247)	(0.186)
1990s		−0.206		0.103	−0.273		0.330	−0.126	0.128
		(0.187)		(0.482)	(0.544)		(0.360)	(0.338)	(0.185)
(ln) Size	−0.088*	−0.128**	−0.130	−0.215	−0.399**	0.022	−0.336***	−0.130*	0.009
	(0.048)	(0.056)	(0.125)	(0.157)	(0.180)	(0.132)	(0.107)	(0.077)	(0.056)
N	269	220	260	190	200	210	223	439	220
Adj. R^2	0.37	0.08							0.08
LL			−333.35	−90.70	−81.61	−236.97	−248.07	−395.76	

Note: Standard errors in parentheses. All models control for multiple establishment status, scope of market area, and two-digit industry. Except for Models 4 and 5, all models also control for education, experience and its square, tenure and its square, race, gender, occupation, part-time, marital status and its interaction with gender, and metropolitan area. Models 1, 2, and 9 estimated with OLS and other models estimated with logistic regression (models 4 and 5) or ordinal logistic regression (models 3, 6, 7, and 8).
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

surveys with information on the use of teams and quality circles, but neither is related to the height of hierarchies (models 4 and 5). The number of vertical levels is also unrelated to job satisfaction (model 8), while its effect on the climate of management–employee relations is negative in 1991 (model 6) and positive in 2002 (model 7).

Likewise, managerial intensity is positively related to employee autonomy and organizational climate, contrary to both post-bureaucratic theory and David Gordon's argument that a large management staff implies greater employee surveillance and discipline (models 1 and 6). However, managerial intensity is negatively related to the downward delegation of specific higher-level job tasks, consistent with post-bureaucratic theory (model 3). In a separate year-specific model not reported in Table 5, managerial intensity is unrelated to job satisfaction in 1991.

The results for ownership type also show no strong pattern and founding cohort consistently shows no relationship to autonomy or employee involvement. By contrast, organizational size is consistently associated with lower levels of autonomy and job satisfaction, and is negatively associated with quality circles and organizational climate in 2002. Given the robust effects of size on intrinsic rewards and the strong relationship between size and height of hierarchies, it is possible that in the absence of multivariate analyses post-bureaucratic theory mistook the effects of organizational size for those of management structure.

Finally, while both advocates of lean management like principal–agency theory and critics like Harrison (1994) argue that its performance advantage is partly the result of heavier workloads it imposes on employees, the results for effort intensity provide little support for this view. Employees who work in flatter organizations do not report higher levels of overwork than employees of more hierarchical organizations, nor do employees of private corporations or owner-run firms report working harder than employees of public corporations (model 9). The incidence of overwork also appears unrelated to founding cohort and organizational size.

4. Conclusion

Current theories of organizational structure, as well as managerial discourse, almost uniformly promote flatter, less management-intensive or debureaucratized organizations as modern, efficient, and, according to some views, employee-friendly. Evidence from the NOS only partly supports these views. There is evidence of a trend toward flatter organizations, and the effect of organizational size on height of hierarchies has moderated over time. However, type of ownership is not associated with management structure and the role of founding period remains open. Neither changes in ownership type nor cohort succession explain the time trend. There is relatively weak and contradictory evidence that organizations in more competitive markets and experiencing greater environmental turbulence are less bureaucratic.

There is some evidence that organizations with taller hierarchies are less proactive and have greater performance problems, but no such effects are evident for managerial intensity. Large public corporations with taller hierarchies offer their employees more fringe benefits than other organizations. Taller hierarchies have few of the negative consequences for intrinsic rewards claimed by post-bureaucratic theory. However, larger organizations are negatively associated with intrinsic rewards, which may have led post-bureaucratic theory to ascribe these outcomes to management structure, which is correlated with size. It is also possible that flat organizations are diverse, some following the participative model and others the neo-liberal model, with opposite consequences that give an appearance of no net effects. Very fine-grained data would be needed to test this possibility.

The general absence of expected effects of ownership type fails to support neo-liberal claims that the managerialist, public corporation is bloated and sluggish compared to private corporations and owner-run firms. Likewise, the paucity of expected effects of founding period suggest that organizations established after the crisis of managerialism are not as different from their predecessors as often believed and that cohort replacement has not been a powerful source of structural change in organizational populations. In short, the weight of the evidence suggests that bureaucratic management structure may reflect enduring technical task requirements more than changing environmental conditions, imprinting, or agency problems, as argued by Blau, Chandler, and, more recently, Donaldson (1995, 2001). Indeed, the most robust predictor of management structure and employee outcomes is organizational size, supporting traditional theories regarding the positive efficiency and equity implications of bureaucracy (Marsden et al., 1994; Meyer, 2001; Lazonick, 2010).

The present study has several limitations. The NOS sample sizes are smaller than desirable, preventing finer controls for industry. The NOS includes perceptual measures of complex constructs such as environmental uncertainty and organizational performance, whose potential problems are well known (Starbuck and Mezias, 1996; Cameron et al., 1987, p. 231; Keats and Hitt, 1988, p. 580). More objective performance measures would be particularly useful, though the data requirements to address this issue are strong given problems with measurement error, uncertain lagged effects, and the modest intercorrelations among "hard" measures themselves (Meyer and O'Shaughnessy, 1993). If future NOS-GSS surveys could be linked to value-added per hour and other productivity measures in United States Census establishment data, this would represent a great advance. Nevertheless, it should be recognized that several studies testing other hypotheses find significant relationships using the same NOS performance measures used here, which argues against interpreting absence of effects as due to the quality of the measures (Delaney and Huselid, 1996; Perry-Smith and Blum, 2000; Reskin and McBrier, 2000; Davis-Blake et al., 2003; Wall et al., 2004; see also Palmer and Dunford, 2002). In the case of intrinsic rewards, the research design is also an improvement on most organization studies, which use a single source for informa-

tion on both predictor and outcome variables and are vulnerable to problems of common method variance (Podsakoff and Organ, 1986).

The most reasonable interpretation of the results is the need for caution in accepting uncritically the new conventional wisdom. Theories of lean management may have drawn overly general inferences from exemplary case studies and particular sectors or organizations that were notably over-bureaucratic. They may have mistaken temporary restructurings by large, troubled organizations and the prominence of some young, successful startups for evidence of general secular trends, failing to note subsequent relayering by large organizations once growth resumed and the addition of management layers in the startups as they aged and grew. Large, managerialist organizations may have strengths that current views overlook, as Blau and Chandler argued. What is clear is that current theories of lean management have not been the subject of much systematic, empirical research despite their growing acceptance over the past twenty years. This is one of the few such studies but larger samples with improved measures are needed to understand better the trends in management structure, their causes, and their consequences for both firms and workers.

Appendix A

See Tables A1 and A2.

Table A1
Descriptive statistics for NOS 1991 and NOS 2002.

	Mean	SD
Number of vertical levels	6.5	8.9
Percent manager	16.8	16.4
Year (1 = 2002)	0.41	0.49
Size	389.82	1157.4
Cohort and ownership form		
1980s cohort (NOS1)[a]	0.31	0.46
1980s cohort (NOS3)[a]	0.27	0.44
1990s cohort[a]	0.12	0.32
Public corporation[a]	0.30	0.46
Private corporation[a]	0.45	0.50
Turbulence and competition		
Competition level (1991)	3.54	0.68
Competition level (2002)	3.43	0.82
Foreign competition (1991)	1.92	1.04
Foreign competition (2002)	1.91	1.07
Competition trend[b]	2.59	0.67
Rapid change[a]	0.69	0.47
Future unpredictable [a]	0.55	0.50
Organizational performance		
Reactive organization[a]	0.25	0.43
Risk averse[a]	0.76	0.43
Productivity problems[b]	1.69	0.70
New product problems[b]	1.62	0.69
Quality problems[b]	1.59	0.63
Compensation problems[b]	1.81	0.72
Sales change past 12 mos. (percentage)	7.28	20.23
Performance scale	0.00	1.00
Employee well-being		
Fringe benefits (max = 8)	4.35	1.87
Profit sharing (>50% = 1)	0.50	0.50
Group bonus (>50% = 1)	0.26	0.44
Autonomy (NOS1)	0.00	1.00
Autonomy (NOS3)	0.00	1.00
Tasks scale (max = 5)	1.30	1.48
Teams (>50% = 1)	0.18	0.38
Quality circles (>50% = 1)	0.17	0.37
Organizational climate 1991	3.95	1.00
Organizational climate 2002	4.02	0.96
Job satisfaction (max = 4)	3.34	0.72
Effort intensity	0.00	1.00

[a] Yes = 1.
[b] Max = 3.

Table A2
Scales and constituent items.

Scales and constituent items	Response options
Organizational performance scale (2002)	
NOS variables	
Compared with similar establishments	
how hard do people work	1 = a lot below avg., 5 = a lot better than avg.
establishment's labor productivity	1 = a lot below avg., 5 = a lot better than avg.
establishment's financial performance	1 = a lot below avg., 5 = a lot better than avg.
GSS variables	
Conditions allow R to be as productive as possible	1 = strongly disagree, 4 = strongly agree
Workplace run in smooth and effective manner	1 = strongly disagree, 4 = strongly agree
Employee autonomy scales	
GSS 1991 variables	
Who makes decisions on R's job	1 = others decide, 4 = I am my own boss
I can work independently	1 = not true at all, 4 = very true
I have a lot to say over what happens on my job	1 = not true at all, 4 = very true
Job allows me to take part in decisions that affect my work	1 = not true at all, 4 = very true
GSS 2002 variables	
I have a lot of say about what happens on my job	1 = strongly disagree, 4 = strongly agree
How often take part with others in decision making	1 = never, 4 = often
How often does R participate with others in helping set ways things are done on job	1 = never, 4 = often
Employee involvement task scale (GSS 1991)	
R's tasks with employees R does not supervise	
organize schedules or tasks	1 = yes
devise new ways of doing tasks	1 = yes
check workers' progress or attendance	1 = yes
evaluate job performance	1 = yes
recommend promotions or discipline	1 = yes
Effort intensity scale (NOS 2002)	
Job requires that R works very fast	1 = strongly disagree, 4 = strongly agree
R has enough time to get job done	1 = not true at all, 4 = very true
R has too much work to do everything well	1 = strongly disagree, 4 = strongly agree
How often not enough people to get all work done	1 = never, 4 = often
How often R feels used up at end of the day	1 = never, 4 = often

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