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How Should we Estimate the Performance Effect of Management? Comparing Impacts of Public Managers' and Front-Line Employees' Perceptions of Management

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Abstract

Many areas of public management research are dominated by a top-focused perspective in which emphasis is placed on the notion that managers themselves are usually the best sources of information about managerial behavior. Outside of the leadership literature, managers are also the typical survey respondents in public management studies. An alternative perspective on management can be provided by subordinates' perceptions of what management is doing. Surveys of subordinates and of managers each pose potential advantages and potential disadvantages when it comes to measuring management, and each approach is likely to prove more fruitful for measuring certain management functions. Using a unique data set of parallel surveys on management with managers and their subordinates as respondents, we examine the differences and relationships between Danish school managers' and teachers' perceptions of management functions and the implications of such relationships for organizational performance. We find a surprisingly low correlation between manager and teacher responses regarding the same management functions. Teacher responses are better predictors of student performance for management aspects that are visible to and mediated by teachers. However, manager responses better predict performance for manager expectations that are less visible to

employees.

INTRODUCTION

How management affects organizational performance is one of the central questions of public administration (Lynn, Heinrich, and Hill 2001; O'Toole and Meier 1999; Rainey 2014). Whether management is viewed as adopting a specific strategy (Boyne and Walker 2004), networking with key nodes in the environment (Schalk, Torenvlied, and Allen 2010), developing human resources (O'Toole and Meier 2009), or dealing with environmental shocks (Andrews et al. 2013), measures of management (other than leadership measures) are typically operationalized by asking managers what they themselves do—especially in studies examining the effect of management on organizational performance. Unwittingly, scholars of public management have adopted a research strategy that is implicitly based on a top-focused view of how to understand management, one that could potentially introduce a source of significant measurement error as a result. Such an approach runs the risk of isolating the analysis on a manager's perception of his or her decisions. On the other hand, tapping what management is doing by gathering data elsewhere in and around the organizational system might reveal otherwise-obscured aspects of management, but might also introduce different kinds of measurement error. A salient question, therefore, is how to measure public management, especially if one is interested in the performance aspects of that management.

In many instances, a decision by a top manager is only an initial step in a lengthier process of influencing what actions an organization takes and how it performs. Any

managerial communication in an organization follows a simple pattern whereby the sender (i.e., top management) crafts messages to the recipients (i.e., subordinates); the recipients receive the message, interpret it, and often take action. Communication across hierarchical layers is potentially subject to distortion. Perhaps the sender does not craft an unambiguous message, or circumstances change so that the original message is no longer relevant to the situation. Beginning with the work of Chester Barnard (1938) and developing through the contributions of Herbert Simon (1947) and the human relations and organizational behavior schools of management (Argyris 1957; Katz and Kahn 1966), some scholars have viewed authority as emanating from the lower echelons of the organization rather than the top. Organization members can accept the commands of management and apply them in their day-to-day operations. This perspective suggests that simply recording management's version of what management does might be problematic for research. Treating management self-reports as the most valid accounting of managerial behavior incorporates only a single perspective, which is subject to a number of potential biases.

Within public administration research, leadership studies frequently employ a more bottom-up approach to studying managers by collecting data through surveys of a leader's subordinates. In his review of the vast general literature on leadership research, Yukl (2013, 402) claims that "most of the studies use questionnaires that ask subordinates to retrospectively rate how often or how much a leader has been using a designated type of behavior." This also applies to studies of leadership in public administration, including those that examine the effect of leadership on a range of outcomes (see, e.g., Hassan 205;

Hassan and Hatmaker 2014; Moynihan, Pandey, and Wright 2012; Ritz et al. 2012; Trottier, Van Wart, and Wang 2008; Tummers and Knies 2013). It is interesting that studies of public leadership and those of other areas of public management tend to use such different methods. One reason may be that many studies of public management focus on some aspects of management with which subordinates may not be familiar—e.g., budgeting, planning, and managerial networking—whereas most leadership studies examine leader-follower relations that are relatively visible to both parties. Another reason may be that testing some of the dominant leadership theories based on manager reports would pose a particularly high risk of social desirability bias, e.g., when accounting for leaders' charisma or visionary leadership in testing charismatic and transformational leadership theories. This bias is likely smaller when surveying followers. A recent leadership study finds that employee-perceived transformational and transactional leadership in high schools is more strongly related to performance than manager-reported leadership (Jacobsen and Andersen 2015). But surveying subordinates about management might also be fruitful in other areas of public management research. A recent public management study takes that position and shows that subordinate perceptions of management are valid measures of management in an organization and that these measures strongly predict organizational outcomes (Favero, Meier, and O'Toole 2016).

The current study uses an unusual dataset on Danish education that enables us to measure multiple managerial functions from responses of both the managers themselves and also the organization's subordinates. After a discussion of differing perspectives of

management as well as the measurement issues concerning the optimal way to measure management, we explain how we will estimate managerial production functions using both measures of management. We find there is a striking lack of correlation between manager and teacher responses regarding the same management functions. The study finds that for highly visible aspects of management, such as resource allocation and delegation of authority, subordinates' perceptions of management are better predictors of organizational performance than are managerial self-reports, but under other circumstances managerial self-reports can be more robust predictors. We then conclude with a discussion of the implications of these findings for the study of public management and their contribution to overall management theory.

TWO APPROACHES TO CONCEPTUALIZING MANAGEMENT

Research approaches to public management come in a variety of forms; some focus on creating or adjusting formal structures (Gulick 1937), while others focus on the motivation of the individuals in the organization (Argyris 1957; McGregor 1960), and still others focus on the economic (Downs 1967) or noneconomic incentives that structure the organization (Barnard 1938). One fundamental distinction regarding management is whether the focus of research and management is on the manager from a manager-centric perspective, a tradition dating to the early scientific management period (Taylor 1911), or the focus is on the individual workers' willingness to accept signals and direction from a manager (Barnard 1938; Simon 1947).

The manager-focused approaches to management are clearly the dominant

perspective in both the generic management and the public management literatures. New Public Management, for example, concentrates on how top managers can transform the organization by adopting private sector techniques such as incentives and privatization (Christensen and Lægreid 2007). To some extent, leadership staples such as transformational leadership or transactional leadership even center on what top managers decide to do to revitalize an organization to improve performance (Bass 1991; Rainey 2014). The popular literature in management is replete with case studies that provide the details about how organizational success can be attributed to the insight, skills, and leadership of a single individual – typically as seen from the perspective and agenda of the manager.

Although empirical challenges to this approach appeared as early as the Hawthorne experiments (Roethlisberger and Dixon 1939), the first direct rebuttal was launched by Chester Barnard (1938) in *The Functions of the Executive*. Barnard viewed organizations as attracting members through a balance of inducements and contributions. Individual subordinates had to be persuaded to dedicate themselves to the objectives and processes of the organization. Authority in his view appeared when workers gave up their own autonomy and accepted the authority of the manager over a range of possible actions. Barnard's approach was extended further by Herbert Simon's *Administrative Behavior*, which replaced the managerial-centric perspective with one that considered a range of purposive, solidary, and monetary incentives in the calculus to accept authority.

The more subordinate-focused approach to understanding organizations has

spawned an equally impressive literature. The organizational behavior literature examines questions of motivation, job satisfaction, and how these factors contribute to effective organizations (Katz and Kahn 1966). An extensive literature on street-level bureaucracy (Brehm and Gates 1997; Lipsky 1980; May and Winter 2009) documents how difficult it is for top-level management to control the actions of front-line personnel.

The difference between management-centered and employee-centered understandings of management also implies fundamentally different ways to measure what managers do. Apart from the general leadership theories, the management-centered approach to management tends to rely on the actions or statements from managers about what they intended to do. The employee-centered perspective would focus on employees' perceptions of management as the more appropriate measurement source. To the extent that there is divergence between the two sources, the choice of which measure to use is an important one for empirical research. The development of theory suggests that, presumably, either might be more accurate under some conditions, but we know relatively little about which source should be preferred under what conditions. This is particularly the case for efforts to estimate performance effects. In this article we examine the pros and cons of each source; and, using our Danish dataset, observe if there is correlation between managers' and subordinates' views of management.

The Basic Choice: How to Measure Management?

Measuring management by using survey questionnaires or observations of managers has two clear advantages. First, such measures have face validity; managers

know what they are trying to do. Use of these measures is highly consistent with the underlying philosophy of much of behavioral research that relies on surveys to measure job satisfaction, motivation, political participation, voting behavior, and many other behaviors of interest in the social sciences. Second, gathering information by surveying managers is an efficient way to study the linkage between management and performance. Scholars frequently have access to data systems that document program or organizational performance. Often these data contain a wealth of information about the characteristics, clientele, or structure of the program. What these official datasets generally do not contain are any measures of management or management activities. Supplementary surveys of managers can transform a program evaluation or performance appraisal dataset into one that can address public management research questions. In some cases only a single survey of top management is used (see O'Toole and Meier 2011; Schalk, Torenvlied, and Allen 2010).

However, measuring management based on managers' survey responses has some disadvantages. These measures might not tap actual managerial efforts. First, managers might not respond accurately to survey questions. Most managers have either extensive training as managers or substantial experience in the role. They are likely to be familiar with popular or classroom ideals regarding what effective management looks like, and academic literature may even inform some of these ideals. The threat of social desirability bias is present because managers could have an incentive to report adopting behaviors consistent with what they believe a manager should do, even if they are actually behaving otherwise. For example, the Comprehensive Area Assessment

management reforms in the United Kingdom under the David Cameron government included local government innovativeness as one part of an overall assessment score. Being subject to such a criterion might encourage managers to rate their own managerial strategy as more innovative and risk-taking than it actually is.

Second, managers might accurately respond to survey questions based on their own thoughtful assessments of their actions, but these assessments might differ from actual management practices. The manager, for example, might not have communicated directives consistently and clearly to his or her subordinates but honestly believes that he or she had in fact done so. Communications that seem clear from the point of view of the sender may often be misinterpreted by the receiver. Even if managerial action is clearly communicated, the literature on street-level bureaucracy shows that street-level personnel exercise substantial discretion in performing their jobs (Lipsky 1980; May and Winter 2009). Task demands at the street level might lead to employees transforming the instructions communicated by management into actions that are completely different. Several studies in psychology cast doubt on the use of self-assessment ratings as reliable measures (see Dunning, Heath, and Suls 2004), although whether or not assessments from others are more accurate than self-assessments appears to depend on the characteristic being measured (Vazire and Mehl 2008).

Third, problems of measurement error might be most severe when only a single respondent is used. This concern has led some management scholars to use multiple managers as respondents to get an overall measure of organizational management

(Andrews, Boyne, and Walker 2006). This strategy permits the scholar to tap management from several vantage points in the organization rather than just the top manager. In theory, using multiple respondents will tend to cancel out the errors of measurement if those errors are random. With multiple respondents, however, one needs to determine how to aggregate the responses to reflect the management of the entire organization. Simply summing the responses appears inconsistent with the notion of a hierarchical organization, and some work using multiple respondents shows that conflict among respondents has managerial implications (Flink 2014). In addition, if response errors are correlated rather than random, averaging multiple respondents may have little impact on eliminating bias.

Using subordinates rather than manager responses to measure management also has advantages and disadvantages. One benefit is that subordinates are probably better judges of the content and clarity of the messages that managers actually communicate to workers. They see management on a day-to-day basis and, therefore, can judge its consistency over a period of time. They can also provide an outside perspective on the differences between announced policies and how management actually makes decisions. Because they are not reporting information about themselves, social desirability will likely have a smaller influence on their responses. Any given manager is likely to have multiple subordinates. Because typically numerous subordinates are all observing the same behavior, aggregating their responses is likely to cancel out any random perceptual errors (Conway and Huffcutt 1997; Smith et al. 1988).¹

Using subordinates to measure management has three significant disadvantages. First, surveying hundreds or thousands of street-level personnel in organizations is more expensive than surveying those organizations' much smaller number of chief executives and top managers. Thus, manager surveys might be more feasible for researchers. Second, employee surveys are also subject to biases. An employee might assign blame for the organization's poor performance to management, and this view might color the subordinate's survey responses about management practices. Such a halo effect was observed by Favero, Meier, and O'Toole (2016) to a substantial degree in teachers' assessments of school management. These effects are difficult to unambiguously remove from a quantitative analysis. Third, for certain aspects of management employees are likely to have less information than managers about the decisions and actions taking place in the organization. Examples where this is likely to be the case are managers' external networking, managers' participation in planning and allocation of some resources, and perhaps also managers' direct communication with users of public services (Winter et al. 2016). Consistent with this line of logic, a recent study in social psychology finds some support for the argument that self-assessments yield better data when measuring non-evaluative traits that are not easily observable, while other-assessments are better when measuring traits that are observable and are evaluative (Vazire 2010).

Direct communication with and influence on target populations may come into effect because many managers in the public sector (e.g., school principals) have daily face-to-face interaction with their target groups (Lipsky 1980). Research shows that members of target groups not only passively receive public services or react to public policies, but are

also active in co-producing these public services (see, e.g., Ostrom 1996; Bovaird 2007; McCulloch 2009). Leaders frequently communicate with target groups in various co-production settings – for example, at meetings or through newsletters and electronic media. Because managers' expectations are less visible to employees and may be communicated directly to co-producers, employee responses about this management aspect may have less impact in predicting organizational performance than for other management aspects that are more exclusively mediated by employees.

In sum, these considerations suggest that it matters to the study of management whether information is gathered from subordinates or from managers themselves since each approach has distinct advantages and disadvantages. Whether the self-report of a single manager or the reports of subordinates provide a more valid measure of actual management behaviors deserves careful consideration.

We are aware of one existing study in public administration that directly compares the utility of self-reported and subordinate-reported measures of management. In their examination of managers' leadership styles, Jacobsen and Andersen (2015) find that employee-perceived transformational and transactional leadership is more strongly related to performance than manager-reported leadership. Given the preceding discussion, we might expect this result to extent to some but not all aspects of management that one might wish to measure. More specifically, we expect that employee responses will generally be better predictors of performance when 1) the managerial behavior or characteristic is more visible to employees, and 2) employee actions have a

larger and more exclusive role in transforming managerial behaviors or characteristics into organizational performance. Conversely, to the extent that managerial practices involve communicating directly with target populations or making decisions not visible to most employees, we expect manager reports of these practices to be better predictors of performance than employee reports.

METHODS AND MEASUREMENT

Examining the difference between relying on managers' self-reports and subordinates' perceptions of management requires a rare combination: data on both managers' and subordinates' reports about the same managerial issues combined with performance data from a third data source (to avoid common source bias; Meier and O'Toole 2013). As mentioned earlier, studies of public managers' effect on performance are dominated by data using managers' self-reports. Apart from leadership studies (Yukl 2013), examples of studies surveying subordinates' perception of management are scarcer. (For a recent example, however, see Favero, Meier, and O'Toole 2016.) Data sets containing both managers' and subordinates' responses to the same management issues are even rarer, let alone data sets that combine these responses with archival performance data. However, recently Jacobsen and Andersen (2015) published a study testing the theories of transformational and transactional leadership based on parallel surveys of managers and subordinates in Danish high-schools in 2012 and archival performance data.

In response to this lacuna, we collected data in 2011 from both managers and subordinates in Danish public primary and lower secondary schools and merged those

data with student test scores, which is a prominent type of outcome measure in public education. The Danish school setting may be less likely to reveal systematic differences between how managers' and teachers' responses are related to performance than would be observed for many other public educational contexts. Danish schools are small compared to other OECD countries (about one third fewer teachers than the OECD average, OECD 2014, Table 2.18), meaning that the span of control for managers is narrower. If managers have fewer subordinates and thus (all else equal) more contact with each of them, the difference in perception between managers and subordinates may be smaller.

Danish principals are responsible for allocating the overall budget within the school; they set goals for the school, decide how work is distributed between teachers, and are responsible for administrative and pedagogical leadership in their school. However, public school principals do so within the confines of a broadly corporatist and dual-layered political system consisting of the national parliament and local governments. National legislation sets up the overall goals of all schools and sets minimum standards in terms of the number of lessons within different subjects and grade levels. Local governments (municipalities) decide on overall school budgets, they hire and fire school principals, and about one half set goals for their school's academic performance among students. Private schools receive their major funding from the national government but also receive contributions from parents. Private schools are not regulated by local governments and also enjoy greater autonomy in relation to the national legislation and government than public ones. All in all, Danish school principals probably operate in a

somewhat constrained environment relative to other public managers; a comparative study of Denmark and Texas shows that the effect of school management on performance overall is weaker in Denmark (Meier et al. 2015). It should be more difficult to detect different effects between subordinate and manager responses on performance in a setting where management is generally less impactful. Consequently, if we observe differences in this context, it is likely that these results will be generalizable to organizations where management is more influential and has less direct contact with subordinates.

We sent a survey to the school manager (the principal) in all Danish public schools covering grades 0-9 (N=2,201).² We also distributed a survey to all teachers of Danish and mathematics in grade 9 for which we were able to obtain their e-mail addresses from their school (N=2,690.) Both surveys were completed in spring 2011.³ The response rate for the teacher survey was 59 percent and for the manager survey 54 percent. The distribution of schools in the dataset does not differ significantly from the population of all schools in terms of average student performance, socio-economic student composition, or school size.⁴ In the analyses we use the average of teacher responses within a school whenever more than one teacher at a school responded to the survey.⁵

Management, of course, consists of many facets. We examine and compare three aspects of internal management to determine whether the type of respondent (that is, managers or front-line employees) affects measures differently for various management functions. We look at three core management functions, all of which are a part of the classic view of management according to a POSDCORB-like framework.⁶ The functions differ,

however, in terms of their concreteness, or tangibility. In other words, different aspects of management, or evidence of managerial activity, can be more or less visible and able to be discerned by others in or even outside of an organization.

The first, resource allocation (budgeting), is highly visible, and the impact of resource allocation on performance is likely to be mediated through the behaviors of teachers. While some research suggests that the overall level of spending is not closely related to performance (e.g., Andersen and Mortensen 2010; but see O'Toole and Meier 2011), the allocation of resources within an organization may be. Resource allocation is a core managerial task in the sense that managers are unlikely to delegate it to front-line employees in the organization, a point that might suggest that managers should have the clearest view of how resources are distributed within the organization. They would therefore also be most aware of whether resource scarcity is limiting the performance of the organization. The perspective of managers in this area also might be more valid than that of front-line employees, if the latter have an interest in overstating the degree to which a lack of resources is hindering optimal performance.

On the other hand, street-level bureaucrats are, naturally, working at the front line, so they may have more direct information about and a better understanding of how different input factors relate to performance. We measure this budgeting aspect of management by asking both managers and teachers about three aspects of resource allocation – amount and adequacy of teaching materials (e.g., textbooks) and teaching equipment (e.g., IT-resources), as well as the condition of school facilities (e.g., classrooms). Responses are

on a Likert scale. These are not direct measures of managers' behavior, but are nevertheless directly related to budgeting and resource allocation, which is a core managerial function. Teachers are likely to gain firsthand knowledge of each of these measures. These input factors are essential to teachers' teaching practices and are likely to affect students' performance as mediated through teachers' teaching practices. Because of the high visibility and high importance of these inputs, we expect teacher responses to be better predictors of management than manager responses.

We use factor analysis to construct a single measure representing the overall adequacy of how resources are allocated.⁷ We list the items and factor loadings in Table 1. We include both manager and teacher responses in the same factor analysis so that we can directly compare the manager and teacher indexes to one another.⁸ The factor loadings meet the usual levels expected for validity.

The second aspect of internal management we examine is delegation of authority. This measure is less readily observable to front-line employees than resource allocation, since it occurs in organizations both formally and informally. A classic dilemma for managers is how much authority should be delegated to subordinates (Weber 1946). On the one hand, subordinates may have more information about individual clients and other factors related to the production of services. Without some level of discretion they will not be able to use that information to increase performance. On the other hand, by withholding some discretion managers may be better able to coordinate the efforts of the employees and ensure they are acting in accordance with desired goals and behaviors. In terms of

measuring the extent to which managers delegate authority, managers may have better knowledge since they – at least formally – decide the level of delegation. Yet subordinates may have a better understanding of the informal, *de facto*, level of delegation, either because they know what tasks managers actually delegate (rather than what managers think or say they delegate), or because subordinates' responses reflect how they themselves *use* whatever discretion they have. Subordinates' *use* of authority may be more important to performance than their formal level of delegated authority.

We measure teacher delegation of authority using two survey items. For each item, manager respondents were presented with two opposing statements and asked to what extent they agreed with one statement versus the other (see Table 2). The first set of opposing statements dealt with whether management involves themselves in teaching methods while the second set of statements describes management's level of involvement in the formation of subject teacher teams. Each of the responses is measured on a five-point scale, and the two items were combined in a summed index (range: 2-10). Higher values indicate greater teach authority.

Teacher respondents were asked to respond to the same statements from the first item about whether management is closely involved in teaching methods (see Table 2). For the second item about manager involvement in the composition of subject teachers, the statements were slightly reformulated to tap teachers' individual experiences. We expect teachers to be more familiar with their own experiences regarding the formation of subject teacher teams around their classes than with the overall formation of subject

teacher teams at the school level. Accordingly, teachers were asked to respond to the following statement: A. “When the teacher team for your current 9th grade was formed, it was the school management that decided, who became subject teachers.” B. “When the teacher team for your current 9th grade was formed, the school management let you and the other teachers decide who became subject teachers.” Because teachers have first-hand knowledge of any manager intervention in the selection of subject teachers, and because the impacts of delegation of authority are likely to affect organizational performance through teachers’ teaching practices, we expect that teacher responses regarding teacher authority will better predict performance than will manager responses.

The third measure of internal management is the least visible management function of the three we compare. It relates to managers’ expectations for the organization. Research on goal setting and managers’ expectations has shown that managers’ expectations – and their communication in forms of clear and ambitious goals – are important for performance (Favero, Meier, and O’Toole 2016; Locke and Latham 1990). Managers should know their own expectations better than anyone else, a point that suggests that self-reported expectations will be more strongly correlated to performance. Conversely, it is possible that managerial expectations can have an impact on performance only if they are actually communicated to and perceived by employees so they can be acted upon. In this respect, employees’ perceptions of managerial expectations may be better predictors of performance than the managers’ expectations themselves. The visibility of the expectations may also vary between managers depending on how they communicate their expectations.

However, relative to decisions of budget allocations and delegation of authority within the organization, expectations for an organization are likely of interest to a wider audience. Managers may also communicate their expectations directly to target populations – here, students and their parents. Managers communicate directly with parents in the form of meetings, newsletters, and other information provided by the school. In the principal survey we use, respondents report that they spend on average 26% of their working hours on the following types of contacts with students and parents: managerial tasks related to individual students (e.g., disciplinary actions, pedagogical and social support, cooperation with the social services, parental contact) (13%), general school-parents relations (including collaboration with school board, parent meetings, etc.) (9%), and teaching (4%). Also, 67 % of managers state that they are involved early when there is a conflict between parents and teachers. Knowledge of the manager's expectations for the organization may affect the students' expectations for themselves as well as their parents' expectations of them. Thus, school managers' expectations may affect students' and parents' roles in co-producing education outputs and outcomes (Winter et al. 2016; Ostrom 1996; Bovaird 2007; McCulloch 2009). Because managers' expectations may both be communicated directly to co-producers and mediated by employees, we expect employee responses about this management function to have less impact in predicting organizational performance. We measure manager expectations using a single item asking managers or teachers to state to what degree (on a Likert scale) they agree the most with either of two statements:

A. "Concerning their grades, I and the other managers [for teachers: the management

team] expect that students at this school perform better at the final exams than similar students at other schools”

B. “Concerning their grades, I and the other managers [for teachers: the management team] have no expectations about the performance of students at this school compared to other similar students at other schools.”

Correlations between management and performance may reflect past performance affecting management rather than management affecting performance (see Meier, Favero, and Zhu 2015). This may be the case for all three aspects of internal management considered here, but perhaps most markedly with respect to managerial expectations. Expectations are very likely to be influenced by the performance in previous years (Jussim and Harper 2005). Therefore, we control for past performance in some of our models. This approach will only allow us to identify how management affects performance over the course of a single year. Many aspects of management may have cumulative effects over multiple years. For that reason, we also run models without the inclusion of past performance and discuss any differences between these two model specifications.

Besides past performance, we control for a number of other variables that may influence management and performance. These include whether the school is private, student composition at the school (gender, immigrants, nuclear families, parental education and income (in hundreds of thousands of Danish kroner)), student/teacher ratio, proportion of teachers with at least a bachelor’s degree, school size (number of students at the school),

and principal's management training. The parental income and school size variables are logged in the analyses. Descriptive statistics on all variables used can be found in the online appendix (Table A-1).

We measure organizational performance using 2011 student grades on mandatory 9th grade final exams in Danish and math. These exams are national standardized academic subject tests. The Danish exam evaluates reading comprehension, spelling, and written presentation, and the math exam tests problem solving and arithmetic. Grades for each exam are given on a 7-point scale. Written examinations are graded by the students' subject teacher and an external examiner appointed by the Ministry of Education. Using each student's mean score for the written tests in the two subject areas, we construct a school-level average performance score. We use the written, open-ended exams because they are graded relatively objectively compared to oral exams (Rangvid 2015). Using the exam results in the subjects of both Danish and math allows us to get a broad measure of school academic performance. Schools are required to publish their average exam grades on their website, so parents, the media, and others are able to view their performance. A right-wing think tank uses these public data on exam scores to create rank tables of all schools in the country.

For each of the three management variables, we conduct six specifications of the model in the following analyses. We run models using manager (specifications 1 and 2) and teacher (specifications 3 and 4) reports separately and together (specifications 5 and 6). Having both measures in the same model provides us with a more direct comparison of

the independent association with performance. We do not include estimations for all three management functions simultaneously, because doing so introduces collinearity.⁹ For each of the three types of models, we have two specifications – one without (specifications 1, 3, and 5) and one with (specifications 2, 4, and 6) the lagged performance variable.

FINDINGS

We start by comparing manager and teacher responses to each of the three managerial variables (see Figure 1). Results show that managers tend to estimate both the lack of resources (cf. sub-figures A and B) and the level of teacher authority (cf. sub-figures C and D) to be lower than teachers do. On the other hand, managers perceive their own expectations to be higher than teachers do (cf. sub-figures E and F). For resources and manager expectations, manager responses appear to favor the socially desirable answer more so than teacher responses. The data for teacher authority do not follow this pattern, but they could reflect a tendency for teachers to experience more leeway to decide things for themselves than their manager intends to allow.

If managers systematically over- or underestimate their own management compared to their subordinates' perceptions, that does not necessarily create bias in the relationship with performance. If manager and subordinate reports were perfectly correlated, both would show the same relationship to performance. From a methodological perspective, high degrees of correlation would make the choice between using manager or subordinate reports less relevant. Therefore, in Table 3 we examine the correlation between manager

and teacher responses to the three sets of management questions. The table clearly shows that manager and teacher responses do not measure the same underlying variation.

Correlations are .36 or lower, which means that they explain at most 13% of the same variance. (The shared variance is the square of the correlation.) For teacher authority it is as low as 2%. Correlations for individual survey items (before the creation of indexes) are similarly unimpressive (see Table A-2 of the online appendix).

The degree to which these measures are uncorrelated between managers and teachers is startling and emphasizes the need to evaluate which measure is more predictive of performance. The two ways of tapping management may relate differently to performance. Indeed, this is also what we find in our regression results. In Table 4 we compare manager and subordinate reports on what we consider the most visible management variable, resource allocation. Higher values on this variable represent a belief from the respondent that the school's ability to instruct students is hindered by inadequate resource allocation, which we would expect to impact performance negatively. Indeed, the subordinates' responses on lack of resources are correlated significantly and negatively with performance (specification 3). The relationship persists even when controlling for past performance and/or manager responses (specifications 4, 5, and 6). Managers' responses, on the other hand, are not significantly related to student performance in any of the models. These findings suggest that subordinates are a better source of information when it comes to the more visible aspects of management that are closely related to service production.

In Table 5 we examine the correlation between delegation of authority in terms of decisions about teaching methods and allocation of subject teachers among classes of students. Here, higher values for the delegation variable represent more delegation of authority to the teacher level. Again, managerial responses have no significant correlation with performance in any of the four specifications where they are included. Teacher reports do have a significant association (specifications 3 and 5), but only when past performance is not controlled for. The relationship vanishes in specifications 4 and 6 when we include the lagged performance variable. Interestingly, the correlation for teachers is negative, which suggests that more management (that is, less teacher discretion) is associated with better performance. When past performance is controlled for, the correlation becomes insignificant. This insignificance may be caused by inadequate statistical power resulting from less unique variation, or it could reflect that schools that are already high performers delegate less autonomy to the teachers. The finding that more managerial involvement in teachers' teaching practices and methods (less delegation) corresponds to better student performance is supported by a meta-analysis of the effect of management practices on student achievement by Robinson and her colleagues (2008; 2009; building on studies by Andrews and Soder 1987; Heck et al. 1990; Bamburg and Andrews 1991; Heck 1992).

Table 6 presents analyses of the least visible aspect of management that we consider – managers' expectations. Higher values represent expectations that the school's students will outperform similar students at other schools. Responses from both teachers and managers are positively correlated with performance. Specification 5 shows that

managers' self-reports are more robustly associated with performance than teacher perceptions are, since they dominate the effect on performance when both are included in the model. Causality is difficult to discern with cross-sectional data, but one interpretation is that managers are the best judges of their own expectations for the school. Another is that managers' expectations are communicated to and influence teachers in addition to students and their parents who aid in co-producing education. This may make the managerial expectations perceived by teachers relatively less important to performance than we saw for resource allocation and delegation of authority. However, when controlling for past performance, these correlations between manager and teacher perception of expectations and performance all become insignificant. Expectations are very likely to reflect the prior performance of the school, and prior performance is also likely to have been affected by prior and similar manager expectations. So it is not surprising that past performance and expectations are highly correlated.

As a further robustness check, we tried including all three managerial functions in the same regression equation for all six specifications (see Table A-4 of the online appendix). Teacher autonomy becomes insignificant across all specifications, but the subordinate reports on resources retain significance in specifications 3 and 4, and the managers' self-reports of expectations retain significance in specifications 1 and 5.

In sum, of the six measures of managerial functions that we examine, four (all three subordinate survey measures and the manager survey measure of expectations) are significantly related to performance in at least one specification. The effect of the

subordinate survey measure of resource allocation is the only one that is robust to the inclusion of past performance in the regression. We discuss the implications of these findings in the final section.

CONCLUSION

At least since the beginning of the 20th century, considerations regarding management have oscillated between a manager-centric perspective (Taylor 1914) and a more subordinate-oriented perspective (Barnard 1938). However, by relying predominantly on managers' self-reports, empirical research on the effect of public management on performance has given priority to the former by analyzing how managers' own perceptions relate to performance.

We find, first, that manager and subordinate reports clearly measure different things. The correlation between responses within the same organization to very similar questions is surprisingly low (at most 13% shared variance). Therefore we conclude from a methodological perspective that the decision whether to measure management from the top or from other perspectives is quite important. In the research design stage, scholars should carefully consider which perspective (managers' or subordinates') is theoretically more relevant to the argument they are making. In some cases, both perspectives may be important, suggesting that both sources should be surveyed. The lack of common variation between manager and employee surveys may also reflect large random measurement error present in our variables. This should serve as a reminder of the importance of following best practices to minimize measurement errors during survey

design, such as carefully crafting item wording to use concrete language and avoid triggering social desirability bias, using multiple sub-items to measure each construct, and adequately pilot testing surveys (see Groves' et al. 2009).

Secondly, we find that teacher reports of management have stronger associations with performance than manager self-reports when considering allocation of resources for teaching as well as delegated authority to teachers. These particular management aspects are relatively visible to teachers and are theoretically expected to affect performance through teachers' production of education. On the other hand, manager self-reports of their performance expectations have a stronger relationship with actual performance than teacher assessments of managerial expectations. This may be due to the fact that manager expectations are the least visible management aspect that we measure and that manager expectations are likely to affect performance not only indirectly through teachers' perceptions and teaching practices but also directly in communications with students and their parents in their co-production of education outputs and outcomes. A tentative guideline for applied researchers might be that surveys of subordinates are preferred when the managerial function being considered is both (1) relatively visible to subordinates and (2) expected to affect production through subordinates. Surveys of managers should be preferred whenever this first condition is not met (and possibly any time the second condition is not met, although this is less clear). Future methodological research should use parallel surveys to examine other managerial functions and other organizational settings to see whether results continue to conform to this general pattern.

Thirdly, our results have implications for causal analyses. When it comes to the less

visible aspects of management that we consider—delegation of authority and particularly manager expectations—results are dependent on the control for past performance. As mentioned above, managers' self-reported expectations are more strongly correlated with performance than teachers' perceptions of those expectations, but neither is significant when a lagged dependent variable is used. It seems to a large extent that past performance influences expectations rather than the other way around. (It is also feasible that the past performance variable had already been affected by earlier managerial expectations and that current expectations were a continuation of prior expectations.) In this situation, teacher expectations may be a more reliable source (for a more comprehensive discussion of this point, see Winter et al. 2016). Fully explaining the pattern would require longitudinal data, and future research will clearly be helpful in this regard.

Regarding teacher authority, teacher responses are more closely related to performance than are managers' perceptions. This relationship also becomes insignificant when controlling for past performance, but here the correlation is opposite: more teacher authority is negatively correlated with performance. We think it is unlikely that higher performance one year should reduce the level of teacher authority the next year. So, we suggest the interpretation that in this case the insignificant relationship between teacher authority and performance when controlling for past performance is the result of too little variation from one year to the next to estimate the effect precisely enough. However, this is but one interpretation, and future research should be designed to test this relationship.

For the most visible aspect of management that we examine, resource allocation,

teachers' responses are much more strongly correlated with performance than manager reports – including when controlling for both past performance and manager self-reports. This suggests that the strength of association between performance and at least some aspects of internal management is underestimated in the bulk of research that uses manager reports to examine how management matters. Ironically, studies incorporating top-down measures of management may inadvertently underestimate the impact of some aspects of management.

Our data do not allow us to draw empirical conclusions about the effect of measuring management at the subordinate level in other settings or for other aspects of management. External management, in particular, which we do not examine in this study, may be better measured by asking managers, since subordinates may have less exposure to these management functions than the management functions performed internal to the organization. Another question that is left for future research is whether the discordance between managers' and employees' responses regarding management is partially a function of the layer(s) at which subordinates are located. If communication channels are key, and if managerial communications are mediated via multiple vertical links, there might be a larger discrepancy between top and bottom than with immediate subordinates. Danish schools are not a good venue to explore this issue, since they are very flat organizations, but many other empirical settings could work quite well. A variant on this issue for exploration in later studies is whether varying communications across different groups of subordinates will result in differing perceptions of management for differing sets of subordinates. Another venue for future research could be to use previously

validated scales for different aspects of management thereby making results more easily comparable to other studies. So there surely are important questions yet to be explored. What we do clearly see in this study is that the choice of data source – manager or subordinate perceptions – has strong effects on how management is measured and how it relates to performance.

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ONLINE APPENDIX

Table A-1. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Performance	6.44	1.02	3.02	8.99
Lagged Performance	6.65	0.93	3.36	9.44
Manager:				
Lack Resources	-0.20	0.93	-1.62	3.07
Autonomy	4.83	1.48	2	10
Expectations	3.74	0.94	1	5
Subordinate:				
Lack Resources	0.00	0.77	-1.62	2.67
Autonomy	6.78	1.62	2	10
Expectations	3.27	1.00	1	5
Private School	0.31	0.46	0	1
Student Characteristics:				
Males	0.51	0.10	0.11	0.94
Immigrants	0.09	0.15	0	1
Nuclear Families	0.80	0.11	0.10	1
Mothers' Education	12.88	0.97	8.80	15.03
Fathers' Education	12.85	0.96	10	15.89
Mothers' Income	11.81	0.11	11.20	12.32
Fathers' Income	12.00	0.17	11.38	12.76
Student-Teacher Ratio	12.54	2.52	2.11	19.42
Teachers w/ Bachelor's	0.71	0.29	0	1

Size	5.94	0.53	3.53	6.79
N=330				

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Table A-2. Correlation between Manager and Subordinate Responses to Individual Items

Variable	Correlation (r)	Explained variance (r ²)
Resource allocation		
Teaching materials	0.34	0.12
Teaching equipment	0.28	0.08
School facilities	0.30	0.09
Teacher authority		
Teaching methods	0.09	0.01
Subject teachers	0.24	0.06

Table A-3. Pairwise Correlations among Variables

	Man. - Lack Resou r.	Man . - Aut on.	Man . - Exp ect.	Sub. - Lack r.	Sub . - Aut on.	Sub. - Exp ect.	P e rf .	Pa Pe rf.	Priv ate Sch ool	% Male Stud ents	% I m m.	% Living w/ 2 Parent s	Mot her' s Edu .	Fat her' s Edu .	Moth er's Inco me	Fath er's Inco me	Stud. -Tea. Rati o	% Tea. w Bach .
Man. - Auton.	0.07																	
Man. - Expect .	-0.15	- 0.17																
Sub. - Lack Resour .	0.36	- 0.03	- 0.17															

Sub. - Auton.	0.17	0.15	- 0.08	0.13														
Sub. - Expect .	-0.20	- 0.08	0.36	-0.08	- 0.17													
Perf.	-0.14	0.00	0.31	-0.18	- 0.10	0.32												
Past Perf.	-0.15	0.04	0.29	-0.15	- 0.10	0.31	0 .77											
Private School	-0.31	- 0.04	0.06	-0.32	- 0.25	0.17	0 .333	0.3 2										

% Male Students	0.20	-0.11	-0.01	0.16	0.00	-0.07	-0.006	-0.006	-0.25									
% Imm.	-0.02	-0.02	0.07	0.04	-0.02	0.10	-0.007	-0.037	-0.08	-0.09								
% Living w/ 2 Parents	0.04	0.10	0.14	-0.05	0.01	0.22	-0.039	0.305	0.01	0.08	-0.26							

Mother's Edu.	-0.05	0.01	0.17	-0.06	0.06	0.21	0.647	0.29	-0.03	-0.50	0.23						
Father's Edu.	-0.10	-0.04	0.24	-0.04	-0.02	0.29	0.658	0.30	-0.02	-0.22	0.20	0.80					
Mother's Income	-0.02	-0.03	0.06	0.00	0.03	0.05	0.460	0.13	0.02	-0.58	0.21	0.61	0.47				
Father's Income	-0.07	-0.01	0.16	0.01	0.00	0.19	0.574	0.11	0.05	-0.48	0.29	0.63	0.62	0.64			

e							9											
Stud.-	-0.08	0.04	0.14	-0.11	-	0.15	0	0.3	0.17	-0.07	-	0.25	0.36	0.3	0.14	0.18		
Tea.					0.02		.	3			0.			2				
Ratio							3				14							
							9											
% Tea.	-0.09	-	-	-0.06	-	-	0	0.1	-	0.02	-	-0.03	0.00	0.0	0.02	-0.03	0.02	
w		0.02	0.02		0.06	0.04	.	1	0.13		0.			3				
Bach.							0				07							
							3											
Size	0.02	0.06	0.16	0.17	0.16	0.13	0	0.0	-	0.04	0.	0.08	0.11	0.1	0.12	0.22	0.27	0.04
							.	9	0.56		08			6				
							1											
							3											

Table A-4. Delegation of Authority Using Factor Score Instead of Summative Index

Model	1	2	3	4	5	6
Manager						
Lack Resources	-0.020	-0.015			0.012	0.010
	(0.043)	(0.038)			(0.045)	(0.040)
Autonomy	0.010	-0.008			0.013	-0.007
	(0.025)	(0.022)			(0.026)	(0.023)
Expectations	0.138**	0.062			0.111*	0.046
	(0.042)	(0.038)			(0.044)	(0.039)
Subordinate						
Lack Resources			-0.121*	-0.093*	-0.100	-0.088
			(0.050)	(0.044)	(0.053)	(0.047)
Autonomy			-0.043	-0.029	-0.043	-0.028
			(0.024)	(0.021)	(0.024)	(0.021)
Expectations			0.068	0.023	0.044	0.013
			(0.041)	(0.036)	(0.042)	(0.037)
Past Performance		0.526**		0.525**		0.515**
		(0.054)		(0.053)		(0.054)
Private School	0.437**	0.204	0.336**	0.135	0.347**	0.148
	(0.128)	(0.115)	(0.127)	(0.113)	(0.130)	(0.117)
Student Population						
% Male Students	-0.091	0.016	-0.061	0.058	-0.087	0.021

	(0.371)	(0.326)	(0.367)	(0.322)	(0.369)	(0.326)
% Immigrants	-0.060	0.284	0.022	0.350	-0.061	0.306
	(0.364)	(0.321)	(0.367)	(0.323)	(0.366)	(0.326)
% Living w/ 2 Parents	1.740**	0.828*	1.699**	0.790*	1.621**	0.793*
	(0.369)	(0.338)	(0.372)	(0.339)	(0.374)	(0.342)
Mother's Education	0.310**	0.241**	0.332**	0.254**	0.325**	0.254**
	(0.079)	(0.070)	(0.079)	(0.070)	(0.079)	(0.070)
Father's Education	0.290**	0.159*	0.297**	0.165*	0.287**	0.162*
	(0.074)	(0.066)	(0.074)	(0.066)	(0.074)	(0.066)
Mother's Income	-0.086	-0.133	-0.053	-0.101	-0.031	-0.107
	(0.506)	(0.444)	(0.504)	(0.441)	(0.502)	(0.443)
Father's Income	0.033	-0.381	0.033	-0.373	0.011	-0.373
	(0.338)	(0.300)	(0.337)	(0.298)	(0.336)	(0.299)
Student-Teacher Ratio	0.024	0.020	0.024	0.019	0.023	0.018
	(0.017)	(0.015)	(0.017)	(0.015)	(0.017)	(0.015)
% Teachers w Bachelor's	0.153	-0.079	0.104	-0.112	0.117	-0.102
	(0.128)	(0.115)	(0.128)	(0.114)	(0.128)	(0.115)
Size	0.221*	0.147	0.240*	0.157	0.221*	0.156
	(0.107)	(0.094)	(0.104)	(0.092)	(0.106)	(0.094)

(Constant)	-4.435	1.923	-4.568	1.530	-4.556	1.621
	(5.695)	(5.045)	(5.668)	(5.003)	(5.652)	(5.031)
R ²	0.60	0.69	0.60	0.70	0.61	0.70
N	330	330	330	330	330	330

Note: *p < .05; **p < .01. Standard errors in parentheses. Dependent variable is the average exam score.

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Table 1. Factor Analysis of Resource Allocation (Lack Resources)

Survey Item	Factor Loadings
Is the school's [for teachers: your] capacity to provide good instruction hindered by the following circumstances?	
Shortage of or insufficient teaching materials (e.g. textbooks)	0.77
Shortage of or inadequate teaching equipment (e.g. computers and internet access, smart boards, AV-equipment)	0.81
Poor condition of school facilities (e.g. classrooms, playground)	0.76
Eigenvalue	1.83
Proportion	0.61
N	1894

Table 2. Measuring Teacher Authority

Low		High
A. "School management is closely involved in teachers' teaching methods"	vs.	B. "In general, school management does not interfere with teachers' teaching methods"
A. "School management is very much involved in the composition of subject teachers in the individual classes"	vs.	B. "School management lets teachers decide among themselves who are to become subject teachers in each class"

Note: Respondents were asked to state how much they agreed with A or B on a 5-point scale.

Table 3. Correlation between Manager and Subordinate Responses

Variable	Correlation (r)	Explained variance (r ²)
Resource allocation	0.36	0.13
Teacher authority	0.15	0.02
Manager expectations	0.36	0.13

Table 4. Resource Allocation as a Predictor of Standardized Exam Scores

Model	1	2	3	4	5	6
Lack Resources						
Manager	-0.038	-0.023			-0.008	-0.001
	(0.043)	(0.038)			(0.045)	(0.039)
Subordinate			-0.128*	-0.096*	-0.125*	-0.096*
			(0.051)	(0.044)	(0.053)	(0.046)
Past Performance		0.543**		0.536**		0.536**
		(0.053)		(0.053)		(0.053)
Private School	0.452**	0.202	0.416**	0.173	0.409**	0.172
	(0.129)	(0.115)	(0.124)	(0.111)	(0.130)	(0.115)
Student Population						
% Male Students	-0.067	0.053	-0.026	0.087	-0.020	0.088
	(0.373)	(0.324)	(0.369)	(0.321)	(0.371)	(0.323)
% Immigrants	0.086	0.363	0.111	0.380	0.113	0.380
	(0.366)	(0.319)	(0.363)	(0.317)	(0.364)	(0.317)
% Living w/ 2 Parents	1.898**	0.848*	1.831**	0.812*	1.834**	0.813*
	(0.369)	(0.336)	(0.366)	(0.334)	(0.367)	(0.335)
Mother's Education	0.322**	0.242**	0.319**	0.241**	0.320**	0.241**
	(0.080)	(0.070)	(0.079)	(0.069)	(0.079)	(0.069)

Father's Education	0.304**	0.163*	0.310**	0.169*	0.310**	0.169*
	(0.075)	(0.066)	(0.074)	(0.066)	(0.074)	(0.066)
Mother's Income	-0.139	-0.143	-0.122	-0.129	-0.119	-0.129
	(0.512)	(0.444)	(0.507)	(0.441)	(0.508)	(0.442)
Father's Income	0.078	-0.373	0.109	-0.346	0.105	-0.347
	(0.342)	(0.300)	(0.339)	(0.298)	(0.340)	(0.299)
Student-Teacher Ratio	0.025	0.020	0.023	0.019	0.023	0.019
	(0.018)	(0.015)	(0.018)	(0.015)	(0.018)	(0.015)
% Teachers w Bachelor's	0.144	-0.091	0.128	-0.102	0.125	-0.102
	(0.130)	(0.115)	(0.128)	(0.114)	(0.129)	(0.115)
Size	0.253*	0.156	0.266*	0.164	0.262*	0.164
	(0.107)	(0.094)	(0.104)	(0.091)	(0.107)	(0.093)
(Constant)	-4.473	1.883	-5.066	1.362	-5.046	1.364
	(5.756)	(5.035)	(5.710)	(5.006)	(5.720)	(5.014)
R ²	0.59	0.69	0.59	0.69	0.59	0.69
N	330	330	330	330	330	330

Note: *p < .05; **p < .01. Standard errors in parentheses. Dependent variable is the average exam score.

Table 5. Delegation of Authority as a Predictor of Standardized Exam Scores

Model	1	2	3	4	5	6
Autonomy						
Manager	-0.007	-0.016			0.000	-0.012
	(0.025)	(0.022)			(0.025)	(0.022)
Subordinate			-0.053*	-0.033	-0.053*	-0.031
			(0.024)	(0.021)	(0.024)	(0.021)
Past Performance		0.546**		0.536**		0.538**
		(0.053)		(0.053)		(0.053)
Private School	0.489**	0.222*	0.428**	0.190	0.428**	0.190
	(0.122)	(0.109)	(0.124)	(0.111)	(0.125)	(0.111)
Student Population						
% Male Students	-0.115	0.004	-0.156	-0.004	-0.156	-0.022
	(0.374)	(0.324)	(0.369)	(0.322)	(0.372)	(0.324)
% Immigrants	0.076	0.354	0.105	0.371	0.105	0.367
	(0.366)	(0.319)	(0.364)	(0.318)	(0.364)	(0.318)
% Living w/ 2 Parents	1.899**	0.861*	1.888**	0.855*	1.887**	0.870*
	(0.371)	(0.337)	(0.366)	(0.335)	(0.369)	(0.337)
Mother's Education	0.319**	0.241**	0.345**	0.256**	0.345**	0.257**
	(0.080)	(0.069)	(0.080)	(0.070)	(0.080)	(0.070)

Father's Education	0.302**	0.159*	0.294**	0.159*	0.294**	0.156*
	(0.075)	(0.067)	(0.075)	(0.066)	(0.075)	(0.066)
Mother's Income	-0.162	-0.169	-0.139	-0.144	-0.139	-0.156
	(0.512)	(0.444)	(0.508)	(0.442)	(0.509)	(0.443)
Father's Income	0.093	-0.369	0.056	-0.381	0.056	-0.384
	(0.342)	(0.300)	(0.340)	(0.299)	(0.341)	(0.300)
Student-Teacher Ratio	0.025	0.020	0.024	0.020	0.024	0.020
	(0.018)	(0.015)	(0.018)	(0.015)	(0.018)	(0.015)
% Teachers w Bachelor's	0.161	-0.082	0.133	-0.095	0.133	-0.095
	(0.129)	(0.114)	(0.128)	(0.114)	(0.128)	(0.114)
Size	0.273*	0.170	0.269*	0.167	0.269*	0.169
	(0.105)	(0.092)	(0.104)	(0.092)	(0.105)	(0.092)
(Constant)	-4.382	2.182	-4.010	2.090	-4.014	2.301
	(5.780)	(5.051)	(5.723)	(5.020)	(5.748)	(5.042)
R ²	0.58	0.69	0.59	0.69	0.59	0.69
N	330	330	330	330	330	330

Note: *p < .05; **p < .01. Standard errors in parentheses. Dependent variable is the average exam score.

Table 6. Manager Expectations as a Predictor of Standardized Exam Scores

Model	1	2	3	4	5	6
Expectations						
Manager	0.138**	0.066			0.124**	0.062
	(0.041)	(0.037)			(0.042)	(0.038)
Subordinate			0.084*	0.033	0.053	0.019
			(0.041)	(0.036)	(0.042)	(0.037)
Past Performance		0.525**		0.537**		0.522**
		(0.054)		(0.054)		(0.054)
Private School	0.457**	0.218*	0.448**	0.211	0.435**	0.211
	(0.120)	(0.109)	(0.123)	(0.110)	(0.122)	(0.109)
Student Population						
% Male Students	-0.127	0.015	-0.087	0.036	-0.114	0.019
	(0.365)	(0.321)	(0.369)	(0.322)	(0.365)	(0.321)
% Immigrants	-0.068	0.279	-0.058	0.302	-0.138	0.252
	(0.363)	(0.320)	(0.370)	(0.325)	(0.366)	(0.325)
% Living w/ 2 Parents	1.749**	0.810*	1.722**	0.788*	1.659**	0.783*
	(0.365)	(0.335)	(0.375)	(0.340)	(0.372)	(0.339)
Mother's Education	0.309**	0.237**	0.306**	0.235**	0.303**	0.235**

	(0.078)	(0.069)	(0.079)	(0.069)	(0.078)	(0.069)
Father's Education	0.288**	0.160*	0.297**	0.161*	0.286**	0.160*
	(0.074)	(0.066)	(0.075)	(0.066)	(0.074)	(0.066)
Mother's Income	-0.104	-0.129	-0.082	-0.125	-0.064	-0.115
	(0.503)	(0.442)	(0.510)	(0.444)	(0.504)	(0.443)
Father's Income	0.041	-0.374	0.041	-0.379	0.012	-0.382
	(0.337)	(0.299)	(0.341)	(0.300)	(0.337)	(0.299)
Student-Teacher Ratio	0.024	0.020	0.026	0.020	0.025	0.020
	(0.017)	(0.015)	(0.018)	(0.015)	(0.017)	(0.015)
% Teachers w Bachelor's	0.162	-0.071	0.158	-0.078	0.160	-0.071
	(0.126)	(0.114)	(0.128)	(0.114)	(0.126)	(0.114)
Size	0.233*	0.152	0.242*	0.157	0.218*	0.147
	(0.104)	(0.092)	(0.106)	(0.092)	(0.105)	(0.092)
(Constant)	-4.285	1.754	-4.444	1.818	-4.265	1.731
	(5.663)	(5.012)	(5.725)	(5.031)	(5.658)	(5.018)
R ²	0.60	0.69	0.59	0.69	0.60	0.69
N	330	330	330	330	330	330

Note: *p < .05; **p < .01. Standard errors in parentheses. Dependent variable is the average exam score.

Figure 1. Distribution of Manager and Teacher Responses Compared

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¹ Differences among subordinates in terms of what a manager is doing can sometimes be a useful measure of the quality of management, since it means that management is not communicating consistently to all members of the organization. Of course, there are circumstances under which different subordinates observe different managerial behaviors, and sometimes managers might have reason to communicate inconsistently with various members of the organization. Still, and especially given the informal organizations, communication among subordinates is likely to attenuate such variation in subordinate reports.

² Most managers in our sample (66%) report having between two and four middle-managers below them. 10% have none. 3% have seven or more. The manager and the middle managers make up a management team. We survey the top manager at the school, the principal.

³ The performance data, student test scores, were gathered later that year.

⁴ As mentioned, variability among the responses of subordinates within an organization can in itself provide information about how effective managers are in terms of managing the school. For our data the intra-class correlation, which measures how much of the variance in teacher responses is due to differences between schools, varies between 11 % and 33 %. This suggests that there is substantial variation within schools.

⁵ In our final sample, 276 out of 330 schools (84%) had two or more teachers respond to the survey, and the mean number of teacher survey respondents per school is 2.63.

⁶ Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting (Gulick 1937).

⁷ We note that managers are not always able to reduce resource scarcity. Besides their internal budgeting, scarcity also depends on the overall budget of the organization. However, we compare whether measuring resource allocation at the front-line or management level is more closely associated with performance. For this purpose the causes of scarcity are less important.

⁸ Individual teacher responses (rather than school-level means) were used in the factor analysis, and after the index for the first factor had been created, school-level means of teacher responses were computed. We also tried conducting separate factor analyses for managers and teachers; the two factor analyses produced

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fairly similar factor loadings, and the substantive results of the regression models did not change when these factor indexes were substituted for the ones used in the paper.

⁹ We acknowledge that by leaving the other management functions out of the regression equations, we risk introducing omitted variable bias to the extent that one management function may proxy another management function. In this case, we elect to accept this risk of bias since the main substantive question we wish to answer is whether the self-reported or subordinate measures better predict performance. If we were interested primarily in determining which of our three managerial functions (resource allocation, teacher authority, or manager expectations) play a role in predicting performance, it would be more important to ensure that none of the managerial functions were acting as a proxy for another function.