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Management practices and M&A success

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ABSTRACT

We study whether management practices determine merger and acquisition (M&A) success. We model management as an unobserved (latent) variable in a standard microeconomic model of the firm and derive firm-year management estimates. We validate these estimates against benchmark survey data on management practices and by using Monte Carlo simulation. We show that our measure is among the most important determinants of value creation in M&A deals, substantially increasing the predictive power of models that explain cumulative abnormal returns. Thus, we offer a measure of management practices that identifies the best-performing M&As. Our results are robust to the inclusion of acquirer fixed effects and many control variables, and to several other sensitivity tests. We identify the Q-theory as the key mechanism driving our results.

1. Introduction

Despite a voluminous literature on merger and acquisition (M&A) success, the main source of that success remains an issue of debate. Most of the variables that researchers propose as determinants of acquirers' performance add little explanatory power to models of value creation. A main reason is that M&A success relies on firm characteristics that, by their own nature, relate to the acquirer's qualitative management practices (Golubov et al., 2015). This is an element difficult to observe or measure. In this study, we first broadly measure management practices following its theoretical modeling as an input of production (Lucas, 1978; Bloom et al., 2017). Subsequently, we examine their effect of management practices on M&A value creation. We show that our measure is among the most important determinants (the *sine qua non*) of cumulated abnormal returns (CARs). We show that our key finding is consistent with the Q-theory of M&As, which predicts that acquirers with superior management create value in M&As by transferring this management to target firms.

The broad definition of "management practices" includes all business decisions and leadership elements. According to mainstream management theory (Katz, 1974), there are three components of management: human resource management (the ability to interact, communicate, motivate, and negotiate), technical abilities (human capital, knowledge, and proficiency), and conceptual skills (understanding concepts, develop ideas, and implement strategies). We use the term "management practices," as it is the most general term encompassing the three components.

To measure management practices, we use the implications of recent literature. Specifically, Bloom et al. (2017) build on early models of management by Lucas (1978) and Melitz (2003) and show that in addition to capital (physical capital, financial capital, R&D expenses, and land) and labor, firms use management practices to achieve their objectives. This assumption perfectly aligns with the idea that there are three (instead of two) inputs of production and that management complements capital and labor (e.g., Samuelson and Nordhaus, 2009).

Following this set of theoretical models, we measure management practices as a latent (unobserved) input of firms' production function (Delis and Tsionas, 2018; Delis et al., 2020). The merit of this approach is threefold. First, it incorporates all firms (acquirers) to yield a firm-year index. Second, it is consistent with both the

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theoretical economic models of management and the broad definition in the management literature. Third, it includes a stochastic term to avoid attributing the estimates to other unobserved inputs or to operations efficiency (which in the stochastic frontier literature is part of the error term).

Subsequently, our key contribution is to examine the effect of management practices on the M&A deals' CARs. We posit that management is among the most important CAR determinants, given good management's ability to identify lucrative M&A deals and realize them in the most efficient way possible. Thus, our baseline specification follows from the extant literature on CAR modeling around M&As (e.g., Bao and Edmans, 2011; Golubov et al., 2015), with the exception that we add our management index.

The results of our study indicate that management practices are economically one of the most significant explanatory variables of CARs. Specifically, a one-standard-deviation increase in our measure increases the CAR of the average M&A deal by more than 50% in all our baseline specifications. Importantly, our results are still potent when including acquirer fixed effects. Therefore, our findings suggest that management practices are not merely a firm fixed effect. They are time-variant, implying that the dynamics of employment (entry and exit of employees), the learning process, and the evolution of human capital are important in defining M&A success.

Our baseline results survive a large battery of sensitivity tests. Specifically, we first use a long list of explanatory variables that the accounting and finance literatures identify as significant determinants of CARs. Second, we control for industry characteristics for the acquirer, the target, or both, and also conduct our analysis by industry. Third, we use alternative time windows to construct CARs, remove outliers by winsorizing our data, include withdrawn deals, and examine standard errors from different clustering. Fourth, we look at the role of managerial practices in synergistic gains (measured through synergy CARs). Fifth, we examine management's longer-term effects on M&A success using accounting measures of firm performance. In most cases, we identify positive correlations between management practices and firm performance post-acquisition, especially concerning return on equity and Tobin's q.

We contend that the key mechanism explaining the strong effect of management practices on M&A value creation is the Q-theory of M&As (Jovanovic and Rousseau, 2002). Specifically, we show that firms with better management practices are more likely to pursue M&As, more firm value is created with a larger management practices gap between the acquirer and the target, and firms with good management tend to acquire firms with bad management. Moreover, the cross-sectional dispersion in firm management practices positively affects the likelihood of M&As. These findings are economically significant, especially considering the ability of acquirers with good management practices to target firms with weaker ones and create value from advancing the target's management practices.

Our paper makes three interrelated contributions. First and foremost, we show that management, when broadly measured, is among the most important determinants of M&A success, essentially doubling the power of CAR models. Recent literature, especially Golubov et al. (2015), alludes to the idea (as in standard M&A event studies) that including acquirer fixed effects markedly increases CAR models' explanatory power. With our management index we explain part of this fixed effect, but we also show the importance of within-firm variations in management practices, as the effect on M&A success comes over and above acquirer fixed effects.

Second, we introduce to the relevant literature (e.g., McDonald et al., 2008; Custódio et al., 2013, 2018) a thorough management measure that originates in standard microeconomic theory. We eclectically view this measure as a complement of (not a substitute for) governance characteristics such as executive compensation and CEO and director experience (especially investment banking experience as in Huang et al., 2014), which are more precise in what they aim to measure.

Third, and related, we bring together three well-established but distinct strands of literature in production economics, corporate finance, and management science. The relevant production economics literature highlights important aspects of empirically estimating production functions (e.g., Greene, 2008; Ackerberg et al., 2006) and management (e.g., Bloom and Van Reenen, 2007; 2010). The relevant corporate finance literature examines the driving forces behind M&A success and explains a limited part of the variability in abnormal returns (e.g., Moeller et al., 2004; Masulis et al., 2007; Aktas et al., 2007; Harford et al., 2012; Born et al., 2014; Huang et al., 2014; Golubov et al., 2015). Finally, the relevant management science literature introduces the theoretical ideas of dynamic manager capabilities and overall effects on performance. The merger of these three strands of literature allows us to explain a significant part of M&A success and opens up new pathways for exploring important aspects of financial management, both within the borders of a country, but also in the international arena.

The rest of the paper proceeds as follows. Section 2 defines management practices, briefly discusses existing measures, and provides the model and estimation for our measure. Section 3 discusses the sample of M&As and CAR estimation. Section 4 provides the main results of the empirical analysis. Section 5 discusses potential economic mechanisms. Section 6 concludes and provides directions for future research.

2. Management practices: definition, theory, and measurement

2.1. A broad definition of management practices

Management's role as a determinant of firm performance is a vivid avenue for academic research in economics, finance, and management sciences (e.g., Harris and Holmstrom, 1982; Hermalin and Weisbach, 1998; Huang et al., 2014; Silva, 2010). Here we define management practices in the broadest way possible, closely following micro-founded economic models. Specifically, Manne (1965), Lucas (1978), and Bloom et al. (2017) suggest that management should be viewed as a separate production factor that has important implications for firm productivity and performance.

Manne (1965) notes that the allocation of production factors to managers with different ability explains productivity differences especially in acquisitions. Lucas (1978) is the first to explicitly model the management technology as a function of a skill endowment and diminishing returns due to their span of control (the manager does not control everything in the firm). Bloom et al. (2017) consider management as a technology that enters the production function along with other forms of technology, labor, and capital, to contribute to total factor productivity. A distinguishing element of the latter model is that management is endogenously determined to improve firm performance by, for example, hiring management consultants, spending time developing or reinforcing improved organizational processes, investing in continuing education, learning-by-doing (experience), or paying for a better CEO. Thus, management practices are not fixed and evolve over time.

This general definition of management also relates to the definition in the management science literature (Katz, 1974), which encompasses three key dimensions. The first relates to human resource management, which encapsulates the abilities to lead, interact, communicate, motivate, and negotiate. Second are technical abilities, which relate to human capital, depth of knowledge,

and proficiency among CEOs, top executives, and managers. Technical skill implies, inter alia, proficiency in all aspects of firm value creation, including M&A deals or choices regarding those aiding in completing these deals. Third, conceptual skills include understanding concepts, developing new ideas, and implementing strategies. This involves seeing the enterprise as a whole, improving efficiency (the optimal use of inputs), and understanding a firm's relationship with industry, political, social, and economic forces.

2.2. Previous measures of management and recent theory

A number of past studies measure managerial quality based on a firm's economic outcomes after a CEO departs. For example, Hayes and Schaefer (1999) argue that good managers are those whose former firms experience negative shocks after their departures. The way a CEO manages a company might have long-lasting effects, even after her departure, but one can argue that there are also managerial skill differentials and styles among individuals below the CEO level, such as among CFOs.

Another important aspect of studying managerial skill is its multidimensional profile. For example, Kaplan et al. (2012) identify two components of managerial practices—general ability and execution skills (e.g., communication and interpersonal skills)—and find that CEOs with higher general ability and execution skills are better at increasing firm value.

In M&As, where the allocation of resources is considerable and the risk of heavy losses is high (Harford and Li, 2007; Moeller et al., 2005), we expect management practices to play a crucial role in creating value for acquirers. However, the literature considers only how distinct elements of management affect M&A success.

Most closely related to our research objectives, for example, is the work on CEO experience in M&A deals. Jaffe et al. (2013) document that CEOs who were successful in their last deals tend to have higher-performing subsequent acquisitions. Custódio and Metzger (2013) and McDonald et al. (2008) find that CEOs who have experience in M&As for specific industries are more likely to increase corporate value. Custódio et al. (2018) document the means through which management skill spurs innovation. This expertise could provide management teams with better information and superior bargaining power, all of which have positive effects for acquiring firms. Hayward (2002) provides similar results from the whole firm (as opposed to CEO). However, CEO experience and other corporate governance characteristics do not capture all aspects of management practices.[1]

Additional literature attempts to proxy for management practices via firm size, performance indicators, and firm fixed effects. However, performance indicators tend to assume everything is the result of managerial skill; clearly this is not the case, because numerous firm characteristics and operational processes are outside the managers' reach. Similarly, fixed effects tend to assume all time-invariant firm characteristics are management-related, which again is not the case because, *inter alia*, management practices are not stable over time (Bloom et al., 2017).

Recent techniques also include frontier-efficiency methods (e.g., data envelopment analysis, or DEA) and assume that skill is defined as efficiency if one subtracts variables outside the reach of executives and managers, such as firm size and age, market share, ownership status, etc. (e.g., Demerjian et al., 2012).[2]

Bloom and Van Reenen (2007, 2010) and later studies by the same team use survey data (the World Management Survey, or WMS) for a limited number of firms worldwide to quantify best management practices. These practices focus mostly on plant-level operations and the authors create firm-year management scores across a few thousand firms located in several countries.[3]

Delis and Tsionas (2018) estimate management practices using the theoretical implications of Lucas (1978) and Bloom et al. (2017). Specifically, their model assumes a cost function in which management is an unobserved (latent) input of production. Subsequently, they approximate latent management from its latent dynamics and observed firm characteristics, such as firm size and input prices (as proxies of investment in management).[4] Importantly, they validate their model using formal econometric techniques and show that what they measure is indeed management (and not general production efficiency or another unobserved component of production).

2.3. Estimating management practices

We estimate management using the theoretical economic models of management (Lucas, 1978; Bloom et al., 2017), the broad definition in the management literature (Katz, 1974; many others henceforth), and the empirical model of Delis and Tsionas (2018) and Delis et al. (2020). We assume that management practices constitute an unobserved (latent) input of production, along with observed labor and capital. The latter includes physical capital, financial capital, R&D expenses, and land. Our model is stochastic, which allows distinguishing between management as a latent input and operations efficiency. In the stochastic frontier models, operations efficiency is estimated in relative terms via separating the error term into the inefficiency component and the remainder disturbance (e.g., Greene, 2008).

From a theoretical viewpoint, all modern textbooks list human capital, entrepreneurship, or a similar concept as that third factor (e.g., Samuelson and Nordhaus, 2009), and this completes the list. Bloom et al. (2017) explicitly model management as that third factor of production (again, this completes the list) and show that their model consistently explains productivity and performance differences among firms. Corporate governance and management science largely revolve around the idea that coordinating inputs requires human resource management, technical skills, and concep-

[1] Advisors could also affect M&A outcomes. For example, Bao and Edmans (2011) find a positive relationship between M&A outcomes and using advisors from U.S. banks. However, this is not the case for cross-border acquisitions, as Rajamani et al. (2016) document. They find that employing internationally diversified advisors decreases M&A returns. One reason could be that international advisors have less to lose compared to domestic ones.

[2] There might be two problems with this approach. The first is that, especially when using DEA, regressing efficiency scores on covariates results in econometric bias and inconsistency (Simar and Wilson, 2007). The second problem is that the variables in the second stage never completely capture all firm elements that are beyond managerial control (much like performance indicators). This naturally creates omitted-variable bias in the residuals, which then include other elements of efficiency besides those that managers control.

[3] Bloom and Van Reenen (2007) use an evaluation tool designed by a consultancy firm (McKinsey) that is composed of 18 management practices (e.g., performance tracking, or managing human capital, *inter alia*). In addition, using an econometric model of productivity, they validate their managerial practices data following a two-step approach, where they estimate the production function in the first stage and calculate total factor productivity (TFP) in the second stage. The free version of WMS is available from the following link: http://worldmanagementsurvey.org/survey-data/download-data/

[4] The broad definition of management practices that we adopt here is not without shortcomings. Good managers produce optimal firm outcomes by managing both tangible and intangible inputs, and our broad definition naturally encompasses both. However, if the research objective is to measure the role of intangible inputs (such as corporate culture, brand reputation and recognition, strong relationships and business ties, etc.) on firm outcomes, then our broad definition and associated measure needs more detailed data. Specifically, any empirical model needs to further distinguish between these components of management practices, and this is impossible without detailed survey data on specific firms.

tual skills in order to gather, allocate, and distribute economic resources or consumer products to individuals and other businesses. However, and in stark contrast, "best management practices" are missing from the list of inputs needed to estimate production relations.

From an empirical viewpoint, this assumption is in fact testable as in Delis and Tsionas (2018), who validate their approach based on a Monte Carlo method. Note that by its very nature our model is stochastic, allowing for an unobserved error term (besides the unobserved latent variable). This is not just semantics: it shows that a stochastic model is preferable to deterministic approaches precisely because the stochastic component also reflects unobserved elements other than management.

Instead of using a cost function as in Delis and Tsionas (2018), we prefer to model a production function for three reasons related to simplicity and replicability. First, management directly enters the production function as a latent input. In contrast, cost and profit equations are functions of input prices (and not input quantities). This implies that an estimation of management (as a variable) needs involved transformations with the cost share equations (the cost share of inputs). Second, estimating the production function implies that we do not need data on management compensation (i.e., the price of management quality), which in principle is another latent variable in the model. This increases the estimation complexity, potentially introducing bias in our estimates. Third, the production model perfectly aligns with the theoretical model of Bloom et al. (2017).

The production function takes the form:

$$\begin{aligned}\ln q_{it} &= \beta_0 + \beta_k \ln k_{it} + \beta_l \ln l_{it} + \beta_m \ln m_{it} \\ &+ \frac{1}{2}\beta_{kk}(\ln k_{it})^2 + \frac{1}{2}\beta_{ll}(\ln l_{it})^2 \\ &+ \frac{1}{2}\beta_{mm}(\ln m_{it})^2 + \beta_{kl} \ln k_{it} \ln l_{it} + \beta_{km} \ln k_{it} \ln m_{it} \\ &+ \beta_{lm} \ln l_{it} \ln m_{it} + u_{it}. \end{aligned} \quad (1)$$

In Eq. (1), q is the output of firm i in year t; k, l, and m are capital, labor, and management (inputs); and u is the stochastic disturbance. This is a translog specification including all the squared terms and interaction terms, which is preferred because of the appealing properties of flexibility and linearity in the parameters (e.g., Greene, 2008).

To estimate Eq. (1) we use firm-year data from Compustat for 1980–2016. We proxy firm output using the log of sales (Compustat item SALE), which reflects how well managers maximize revenue. We estimate management twice, differentiating between models with four inputs (*Capital, Cost of inventory, Employees*, and *Net operating leases*) and seven inputs (adding *Net R&D, Purchased goodwill*, and *Other intangible assets*).[5] To measure capital, we use the log of the sum of the dollar amount of net property, plant, and equipment (Compustat item PPENT); net operating leases (Demerjian et al., 2012); net R&D (Demerjian et al., 2012; Lev and Sougiannis, 1996); purchased goodwill (Compustat item GDWL); other intangible assets (the difference in the Compustat items INTAN-GDWL); and the cost of inventory (Compustat item INVT).[6,7] To measure labor, we use the log of the number of employees (Compustat item EMP). The choice of these inputs is justified based on their contributions to sales revenue and managers' role in determining their level.

For latent management practices, we assume:

$$m_{it} = \sum_{g=1}^{G} \gamma_g \varphi\left(\alpha_g + x'_{it}\beta_g\right) + v_{it,2},\ i = 1, ..., n,\ t = 1, ..., T. \quad (2)$$

where $\varphi(z) = \frac{1}{1+e^{-z}}$, $z \in \mathbb{R}$, is a sigmoid activation function and the process is an artificial neural network (ANN) with G nodes. For identification, we order the intercepts as: $\alpha_1 < ... < \alpha_G$. Using the marginal likelihood criterion, the best choice is $G = 5$.

Economics and management theory guide the assumption on the determinants of m in Eq. (2). We assume that latent management practices in Eq. (2) are a function of lagged values of inputs, and current and lagged values of the price of labor p in logs (estimated from the ratio of total operating expenses to total number of employees).[8] In other words, we assume that the use of inputs in optimal quantities and their allocation determines the quality of management. Also, including the price of labor follows the corporate governance literature identifying compensation as a positive correlate of ability and human capital (e.g., Custódio et al., 2013); it also serves as an external instrument. Identification through input prices has a long tradition in the production economics literature (e.g., Nevo, 2001). In our case, where we assume the labor market is fairly competitive, the price of labor can be a valid instrument (Ackerberg et al., 2006).[9]

The system of Eqs. (1) and (2) essentially constitutes a structural equation model (SEM) with a latent variable. We estimate this model using Bayesian techniques. Contemporary econometrics literature prefers Bayesian methods to standard techniques in the presence of latent variables (e.g., Kaplan and Depaoli, 2012; van de Schoot et al., 2014). The key theoretical reason for this is that the

[5] The reason is that the additional three inputs might bias management estimation in favor of CAR performance. Specifically, R&D depreciation rates might differ across firms in ways that might be correlated with future M&A value creation. Further, the inclusion of purchased goodwill and other intangible assets as inputs reflecting intangible capital might yield measurement error in intangible capital, and this error might be correlated with a firm's past acquisition activity.

[6] To construct this variable, we follow Demerjian et al. (2012) and use firms' footnotes in Compustat to calculate the discounted present value of future (five years) operating lease payments. The Compustat items for the five lease obligations are MRC1-MRC5, and we use a discount rate of 10% in accordance with previous studies.

[7] We follow the literature to calculate net R&D (e.g., Lev and Sougiannis, 1996; Demerjian et al., 2012). Specifically, based on the Compustat item XRD, which measures research and development expense, net R&D is: $RD_{cap} = \sum_{t=-4}^{0}(1 + 0.2t) \times RD_{exp}$.

[8] To construct the price of labor, we optimally need information on staff expenses in order to determine the ratio of staff expenses to total employees. Unfortunately, the data for staff expenses are missing for many firms in our sample. We remedy this problem in two ways. The first is to regress the existing staff-expense observations on total operating expenses and predict the missing staff expenses from the fitted values of that regression. For precision, we use a model with firm and year fixed effects. The adjusted R-squared is as high as 91%. A simple alternative is to construct the price of labor from the ratio of total operating expenses to total number of employees. Irrespective of the method, the production function yields highly correlated estimates of management practices (about 96% and with perfect rank correlation). In addition, the change in the effect of management practices on M&A value creation is minimal. To use the actual data and avoid criticism related to estimation bias, we use the ratio of total operating expenses to total number of employees.

[9] For the price of labor to be a valid instrument in Eq. (2), the identification condition is that it is uncorrelated with the production function residuals u. For this to hold, we must exclude a number of possibilities. First and foremost, the price of labor needs to have a strong effect on m. Theoretically, this must hold, as higher labor prices should reflect better management practices in a competitive labor market. Empirically, we find that this is indeed the case. Second, these prices should not directly affect (enter) the production of firm output. By construction, the production function has this property. Third, and related to the first, the labor market needs to be perfectly competitive so that each firm separately has no effect on market prices. The size and depth of the markets considered should mean that, at least in our data set, this property is satisfied. Fourth, input prices should vary sufficiently to allow for good econometric identification. Our labor prices vary by firm-year so that this condition is also met.

Bayesian analysis incorporates uncertainty in measurements because of the infusion of prior knowledge (if priors are informative) or lack thereof (if priors are uninformative) into the prior distributions (e.g., van de Schoot et al., 2014). Given that we need one or more variables to approximate management practices, the informative priors help us towards a better approximation compared to a standard approach to SEM estimation. From a purely practical perspective, estimating our model with standard maximum likelihood encounters convergence problems in some of our applications.

We use a prior $\alpha_g, \beta_g, \gamma_g \sim iidN(0,1)$, $\frac{\bar{q}}{\sigma_2^2} \sim \chi^2_{\bar{n}}$. where $\bar{n} = 50$, $\bar{q} = 10$ which means that in a fictitious sample of size 50, σ_2^2 is, on average, 1/5. Our results on the effect of management practices on M&A value creation are not particularly sensitive to these choices. This prior ensures that our management estimates take similar values and have similar distributions with the corresponding estimates in the WMS database.

As is standard practice in the Bayesian literature, we resort to Markov chain Monte Carlo (MCMC) methods for inference (StataCorp, 2017). We implement MCMC using a Gibbs sampling for increased efficiency (Gelfand et al., 1990; Andrieu et al., 2010). We run the Gibbs sampler for 150,000 iterations and burn the first 50,000 to mitigate possible start-up effects. We successfully test convergence using Geweke's (1992) diagnostic; autocorrelation in MCMC never exceeds approximately 0.40 for any parameter. We discuss the technical details in the Appendix.

Using the model described by Eqs. (1) and (2), we obtain a mean value of management practices equal to 0.539 and standard deviation equal to 0.126. Also, our measure takes values between 0 and 0.968. In table A1 of the online appendix, we report average estimates of management practices by industry and year. We observe a similar level of skill across industries, which is intuitive as there is *a priori* no reason that more skillful individuals are employed in specific industries.

Importantly, we conduct many robustness tests on our management estimates when examining the effect of management on CARs in the next section. Further, in addition to the validation procedures in Delis and Tsionas (2018) and Delis et al. (2020), we validate our measure within our M&A sample.

3. M&A sample, CAR estimation, and summary statistics

Having estimated management practices, we subsequently examine whether and how they affect M&A value creation. Our key hypothesis is that management practices are one of the most important determinants of M&A value creation, due to the superior ability of firms with good management to identify value-enhancing M&A deals and execute them effectively. Thus, we expect that the inclusion of management practices in CAR models substantially increases their power (in terms of the adjusted R-squared).

We draw M&A data from the Thomson One Banker database from January 1, 1980, to December 31, 2016. The data-selection process follows the five restrictions imposed by Fuller et al. (2002), Masulis et al. (2007), and Golubov et al. (2015). Specifically, (i) the bidder is a U.S. publicly listed company, and the target is either a public, private, or subsidiary U.S. company; (ii) the acquisition is complete; (iii) the acquirer owns less than 50% of the target prior to the acquisition and 100% after; (iv) the transaction is at least 1% of the bidder's market capitalization 11 days prior to the announcement and it exceeds $1 million in value; and (v) multiple deals within the same day for the same acquirer are excluded.

We end up with 15,261 events. From this sample, we drop observations lacking information on the variables needed to estimate management practices and on some of our important controls used in the baseline specifications. Our final sample has 7721 events.[10] We provide variable definitions and data sources in Table 1 and summary statistics in Table 2. Following Fuller et al. (2002) and Golubov et al. (2015), we carry out our analysis using three samples. The first includes all deals (full sample), the second includes acquirers that completed at least five deals within a three-year time window (frequent acquirers), and the third includes acquirers who completed at least two deals within a three-year window (occasional acquirers). This practice allows us to study persistence in acquirers' returns and use acquirer fixed effects. The sample of frequent acquirers includes 1294 deals, and the sample of occasional acquirers includes 5136 deals. Nonetheless, because the number of observations drops considerably when we study synergistic gains, we use the whole sample without distinguishing between frequent and occasional acquirers.

As in previous studies, we find anemic gains for acquirers. Based on the summary statistics of Table 2, the mean CAR is about 1.4% and the median is 0.8%. This is not the case for target firms, where the mean (median) CARs are 26.5% (23%). For synergies, we have a mean of 2.4% and a median of 1.5%.[11]

Using firm fixed effects is very important because it disentangles the time-invariant firm characteristics from our time-variant (firm-year) measure of management practices. In our view, management practices, as defined in our context, are dynamic through a learning-by-doing process and the addition of new managers and executives. In that sense, and unlike previous studies, we examine the role of time-varying, firm-specific management practices in M&A success.[12] Although our focus is on acquirers, in a subsequent section we study how acquirer management practices affect combined firm CARs.

Table A2 in the online appendix reports average acquirer CAR $(-2, +2)$ values for 1980–2016 for 12 different industries. The highest values are in the telephone/TV and consumer (durables and nondurables) industries. However, some of these industries perform either superbly or very poorly around the events, indicating high volatility.

Table 3 reports distributional information on the management practices index and three different acquirer CARs (three-, five-, and 11-day windows around an M&A). The statistics show that the management quality of the lowest 1% is slightly less than 0.245, but for the top 1% this value surpasses 0.8. This indicates that management practices among top performers are about 3.42 (0.838/0.245) times better than those among low performers. The range between the 75 and 25th quartile is about 0.17 points, which accounts for about one-third of the mean value of the management practices index.

As expected, there are considerable differences in abnormal returns. For the bottom 1% of performers, the returns are negative and span from −29% for CAR $(-5, +5)$ to −18.7% for CAR $(-1, +1)$. In contrast, the top 1% performers have returns spanning from 26.2% to 35.6%. Hence, the average difference in cumulative returns between the top and bottom performers is about 54.7%. With an average of 8.2%, the interquartile difference ranges from 6.3% (for the three-day window) to 10.5% (for the 11-day window). This in-

[10] When we study synergistic gains, the number of observations drops to around 1,011. We expect this because we deal with unlisted targets that therefore do not have information in CRSP.

[11] Past studies also find positive combined returns (e.g., Andrade et al., 2001; Moeller et al., 2004; Bhagat et al., 2005; Wang and Xie, 2008).

[12] This comes at the cost of being unable to conduct any meaningful analysis of target firms and their management practices. We limit our sample to firms with repeated acquisitions and, thus, a reduced sample of M&As. The sample of targets then becomes quite small because target firm information in Compustat and CRSP is quite limited (e.g., if the firm is not public, there is no information in CRSP). Subsequently, when the number of targets decreases, the same happens for synergy calculations, as target information from CRSP is needed to measure synergy CARs.

Table 1
Variable definitions and data sources.

Variable	Description
Return variables and antitakeover indexes	
CAR (−2, +2) – acquirer	Five-day cumulative abnormal return (CAR) of acquirer firm's stock, i.e. in the (−2, +2) days surrounding the announcement date. CAR is calculated using the market model and the benchmark is the CRSP value weighted index. Model parameters are estimated over (−300, −91) days before the announcement.
CAR (−2, +2) – target	Five-day cumulative abnormal return (CAR) of target firm's stock, i.e. in the (−2, +2) days surrounding the announcement date. CAR is calculated using the market model and the benchmark is the CRSP value weighted index. Model parameters are estimated over (−300, −91) days before the announcement
Synergy CAR (−2, +2)	Five-day cumulative abnormal return for both the acquirer and the target for a value-weighted portfolio. CAR is calculated using the market model and model parameters are estimated over (−300, −91) days before the announcement. Acquirer' and target's weights are based on their market capitalization six trading days before the announcement (see Bradley et al., 1988).
GIM index	The Governance Index of Gompers et al. (2003) that accounts for 24 anti-takeover provisions.
E-Index	The entrenchment index based on Bebchuk et al. (2009).
Bidder characteristics	
Management practices	Estimates of good management practices obtained from a production function and the method of Delis and Tsionas (2018).
Ln(acquirer size)	The natural logarithm of the market value of a firm's equity 11 days prior to the M&A announcement date. The data are in million dollars and are obtained from CRSP.
Run-up	Bidder's market-adjusted buy-and-hold return for the window (−210, −11) days. Data are from CRSP.
Sigma	Standard deviation of a bidder's market-adjusted daily returns for the time window (−210, −11). Data are from CRSP.
Free cash flow	[(Operating income before depreciation - total interest and related expenses - total income taxes - capital expenditures)/(close price x common shares outstanding)]. In Compustat coding: [(oibdp - xint - txt -capx)/(prcc_c (x) csho)].
Tobin's q	The calculation of Tobin's q in Compustat is: [at + csho (x) prcc_f – ceq]/at. The values are taken for the fiscal year prior to the acquisition.
Leverage	(Total debt in current liabilities + long-term debt)/total assets [Compustat: (dlc + dltt)/at].
Tech	= 1 if both the bidder and the target belong to high tech industries. Based on Faccio and Masulis (2005), Masulis et al. (2007), and Harford et al. (2012) tech firms have the following four digit SIC codes: 3572, 3575, 3577, 3578, 3661, 3663, 3669, 3671, 3672, 3674, 3675, 3677, 3678, 3679, 3812, 3823, 3825, 3826, 3827, 3829, 4812, 4813, 4899, 7371, 7372, 7373, 7374, 7375, 7378, 7379.
Tech target	= 1 if the target belongs to a high tech industry (as defined above) and = 0 otherwise.
Conglomerate	= 1 if the acquirer and the target are in different Fama-French industries and = 0 otherwise.
R&D intensity	R&D expenses divided by total assets (Compustat: xrd/at).
R&D high	= 1 if R&D intensity for a specific firm is above the industry median and = 0 otherwise.
ROA	Earnings before interest and taxes over total assets (Compustat: ebit/at). The values are computed in the fiscal year prior to the acquisition.
Low_ROA	= 1 if the ROA of a firm is lower than the average of the sector and = 0 otherwise. The values are computed for the fiscal year prior to the acquisition.
ROE	Net income over total assets (Compustat: ni/at). The values are computed for the fiscal year prior to the acquisition.
Annual stock return	A firm's stock return on a yearly basis. It is calculated using Compustat data in the following manner: [(prcc_f(t)/ajex(t) + dvpsx_f(t)/ ajex(t))/(prcc_f(t-1)/ajex_f(t-1))]. See also Custódio et al. (2013).
CAPX	Capital expenditures over total assets (Compustat: capx/at).
Net profit margin	Net income over sales (Compustat: ni/sale).
Industry sales Herfindahl	As in Custódio et al. (2013), this Herfindahl index is based on a firm's sales. The computation utilizes Compustat's SALE variable. Computations are based on the two-digit SIC industry codes.
Deal characteristics	
Relative size	The deal value (from Thomson One Banker) divided by the market value (CRSP) 11 days prior to the deal announcement.
Relatedness	= 1 if bidder and target are in the same two-digit SIC code and = 0 otherwise. Data are from Thomson One Banker.
Friendly merger	= 1 if the merger is characterized as such in Thomson One Banker and = 0 otherwise.
Hostile merger	Same as above.
Neutral merger	Same as above.
Public (cash)	= 1 for acquisition of public targets that have been financed with cash and = 0 otherwise. Data are from Thomson One Banker.
Public (stock)	= 1 for acquisition of public targets that have been financed with stock and = 0 otherwise. Data are from Thomson One Banker.
Private (cash)	= 1 for acquisition of private targets that have been financed with cash and = 0 otherwise. Data are from Thomson One Banker.
Private (stock)	= 1 for acquisition of private targets that have been financed with stock and = 0 otherwise. Data are from Thomson One Banker.
Subsidiary (cash)	= 1 if acquisition of a subsidiary target that have been finance with cash and = 0 otherwise. Data are from Thomson One Banker.
CEO and management team characteristics	
Above vice-president	The number of people who are in a position above that of a vice-president in the fiscal year prior to the M&A announcement (calculation based on Execucomp data).
Age1	The average age of the individuals who are above the position of the vice-president in the fiscal year prior to the announcement date (data from Execucomp).
Age2	Executive age in the year prior to the announcement date (data from Compustat).
Cash pay	Total current compensation (Execucomp: total_curr).
Total pay	Total pay for the CEO in thousands of dollars (Execucomp: tdc1).
Equity pay	Restricted stock granted + options granted (in thousands of dollars). In Execucomp: rstkgrnt + option_awards_blk_value.
Variables used for the creation of managerial practices index	
Log sales	The natural logarithm of sales (Compustat item: sale).
Capital	The natural logarithm of the sum of the dollar amount of net property, plant, and equipment (Compustat item: ppent).
Net operating leases	We use firm's footnotes in Compustat, to calculate the discounted present value of future (five years) operating lease payments. The Compustat items for the five lease obligations are MRC1-MRC5 and the discount rate we use is 10%, in accordance with previous studies.
Net R&D	Based on Compustat item "xrd", which measures research and development expense, net R&D is defined as: $RD_{cap} = \sum_{t=-4}^{0} (1 + 0.2t) \times RD_{exp}$.
Purchased goodwill	This is Compustat item "gdwl".
Other intangible assets	The difference between Compustat items "intal" and "gdwl".
Cost of inventory	Compustat item "invt".
Employees	Number of employees in a firm (Compustat item: emp).

Table 2
Summary statistics.

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
CAR (−2, +2) – acquirer	0.014	0.008	0.091	−0.663	1.486	7721
CAR (−1, +1) – acquirer	0.013	0.006	0.081	−0.675	1.456	7721
CAR (−5, +5) – acquirer	0.014	0.008	0.116	−0.972	1.603	7721
CAR (−2, +2) – target	0.265	0.230	0.250	−1.124	2.910	1011
CAR (−1, +1) – target	0.256	0.219	0.255	−0.988	3.044	1011
CAR (−5, +5) – target	0.286	0.245	0.261	−0.274	2.677	1010
CAR (−2, +2) – synergy	0.024	0.015	0.082	−0.035	0.458	1011
CAR (−1, +1) – synergy	0.023	0.014	0.077	−0.333	0.450	1011
CAR (−5, +5) – synergy	0.027	0.020	0.097	−0.423	0.459	1010
GIM index	9.533	10	2.805	2	17	563
E-index	2.382	2	1.189	0	5	642
Management practices	0.539	0.539	0.126	0	0.968	7721
Ln(acquirer size)	6.319	6.294	1.862	0.412	12.978	7721
Run-up	0.123	0.100	0.225	−0.994	2.030	7721
Sigma	0.030	0.027	0.016	0.007	0.192	7721
Free cash flow	0.049	0.033	3.792	−6.621	332.817	7721
Tobin's Q	2.194	1.655	2.368	0.258	48.839	7721
Leverage	0.221	0.194	0.200	0	1.406	7721
TECH	0.308	0	0.462	0	1	4105
TECH (target)	0.379	0	0.485	0	1	4105
Conglomerate	0.450	0	0.497	0	1	4105
RD intensity	0.058	0.034	0.071	0	0.861	4105
ROA	0.117	0.119	0.075	−0.057	0.249	7022
ROE	0.277	0.269	0.214	−0.181	0.729	7018
Annual stock return	1.376	1.071	8.904	0.022	730.446	6751
CAPX	0.061	0.040	0.080	0	1.978	6751
Net profit margin	0.004	0.051	0.687	−26.856	6.978	6751
Industry sales Herfindahl	0.282	0.211	0.233	0.025	1	6751
Relative size	0.223	0.088	0.437	0.010	9.817	7721
Relatedness	0.602	1	0.489	0	1	7721
Friendly merger	0.995	1	0.074	0	1	7721
Hostile merger	0.003	0	0.059	0	1	7721
Neutral merger	0.001	0	0.038	0	1	7721
Public (paid with cash)	0.054	0	0.227	0	1	7721
Public (paid with stocks)	0.045	0	0.208	0	1	7721
Private (paid with cash)	0.123	0	0.329	0	1	7721
Private (paid with stocks)	0.068	0	0.252	0	1	7721
Subsidiary (paid with cash)	0.130	0	0.337	0	1	7721
Above vice-president	4.996	5	1.605	1	11	1611
Average age (above vice-president)	67.761	67.5	6.500	32	91	1611
Average age (executives)	53.648	53.667	6.293	35.667	77	1611
Cash pay for CEO (in thousand)	1379.671	992.215	1646.594	0	32,016.67	1611
Total pay for CEO (in thousand)	4860.047	2364.47	9321.433	0.001	134,437.2	1611
Equity pay for CEO (in thousand)	3087.509	989.555	8357.176	0	131,348.9	1611
Variables for accounting profitability models						
$\Delta ROE_{t\rightarrow t+3}$	−0.016	−0.000	0.193	−0.495	0.410	7018
Tobin's Q	2.198	1.642	2.522	0.232	78.565	9499
Management practices	0.538	0.538	0.127	0.093	0.968	7018
Size	6.047	5.980	1.860	−1.470	13.590	7018
Leverage	0.230	0.204	0.210	0	2.137	7018
Cash	2883.722	461.805	16,878.21	0.253	859,671	7018
CAPX	0.063	0.040	0.076	−0.008	1.291	7018
Friendly merger	0.994	1	0.076	0	1	7018
Hostile merger	0.004	0	0.061	0	1	7018
Private target	0.492	0	0.500	0	1	7018
Public target	0.156	0	0.363	0	1	7018
Cash M&A	0.299	0	0.458	0	1	7018
Stock M&A	0.139	0	0.346	0	1	7018
Relatedness	0.604	1	0.489	0	1	7018
TECH (target)	0.286	0	0.452	0	1	7018

dicates that for a market capitalization of $3588 million (the mean in our sample), moving from the lower quartile to the upper quartile results in gains of about $294.2 million. This outcome is in line with Golubov et al. (2015), who argue that acquirers are either very good or very bad at mergers, and because of this there is a considerable gap between the top and bottom bidders.

Solitary events of firms that appear once in our sample can drive this number and thus drive our results in a specific direction. We therefore show statistics for frequent and occasional acquirers. Occasional acquirers tend to have, on average, slightly lower CAR interquartile ranges compared to frequent acquirers (8% versus 8.1%). Hence, the mean interquartile value for frequent acquirers translates into almost $292 million. It is worth noticing that the median value of CARs is very low (0.67%). That is, the average acquirer has an anemic positive outcome from M&A activities, revealing that acquirers are either extremely good or bad performers (similar findings occur in Golubov et al., 2015, and Gompers et al., 2010).

Table 3
Percentile statistics. This table reports distribution characteristics for management practices and acquirer CAR measured over different time windows (2 days, 5 days, and 11 days). CAR is calculated based on the market model. We report characteristics for the whole sample, for frequent acquirers and for occasional acquirers. Definitions of all variables along with their sources are in Table 1.

Statistics	Management practices	CAR (−1, +1)	CAR (−2, +2)	CAR (−5, +5)
Panel A: Whole sample				
1st percentile	0.245	−0.187	−0.206	−0.290
5th percentile	0.334	−0.092	−0.114	−0.158
10th percentile	0.378	−0.060	−0.075	−0.107
25th percentile	0.453	−0.022	−0.029	−0.043
50th percentile (median)	0.539	0.006	0.007	0.007
75th percentile	0.625	0.041	0.049	0.062
90th percentile	0.701	0.093	0.109	0.138
95th percentile	0.746	0.137	0.160	0.198
99th percentile	0.838	0.262	0.290	0.356
p75-p25 (interquartile range)	0.172	0.063	0.078	0.105
Panel B: Frequent acquirers				
1st percentile	0.250	−0.156	−0.193	−0.285
5th percentile	0.343	−0.087	−0.113	−0.158
10th percentile	0.386	−0.061	−0.076	−0.105
25th percentile	0.454	−0.022	−0.030	−0.043
50th percentile (median)	0.548	0.007	0.007	0.006
75th percentile	0.634	0.040	0.049	0.059
90th percentile	0.698	0.086	0.100	0.126
95th percentile	0.746	0.118	0.147	0.194
99th percentile	0.843	0.226	0.266	0.323
p75-p25 (interquartile range)	0.179	0.063	0.079	0.102
Panel C: Occasional acquirers				
1st percentile	0.245	−0.171	−0.200	−0.275
5th percentile	0.333	−0.088	−0.109	−0.154
10th percentile	0.378	−0.058	−0.074	−0.104
25th percentile	0.452	−0.021	−0.028	−0.041
50th percentile (median)	0.539	0.006	0.007	0.008
75th percentile	0.627	0.039	0.048	0.060
90th percentile	0.702	0.090	0.105	0.133
95th percentile	0.745	0.131	0.154	0.192
99th percentile	0.840	0.246	0.279	0.324
p75-p25 (interquartile range)	0.175	0.060	0.076	0.102

Table 4
Benchmark regressions (without management). This table reports OLS results from the estimation of Eq. (3) without management practices. The dependent variable is the bidder's CAR, based on a two-day event window (−2, +2) around the announcement date. The results are for the whole sample, for frequent acquirers (acquirers who have completed at least five acquisitions within a three-year event window), and for occasional acquirers (acquirers who have completed at least two acquisitions within a three-year period). CAR calculation is based on the market model. Standard errors are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Whole sample (1)	Frequent (2)	Occasional (3)
Ln (acquirer size)	−0.0038***	−0.0065***	−0.0046***
	(0.001)	(0.002)	(0.001)
Run-up	−0.0127*	−0.0142	−0.0164**
	(0.007)	(0.015)	(0.008)
Sigma	0.2256	0.1141	0.0146
	(0.165)	(0.309)	(0.136)
Relative size	0.0270***	0.0203**	0.0203***
	(0.005)	(0.008)	(0.005)
Relatedness	0.0031	−0.0049	0.0030
	(0.002)	(0.005)	(0.002)
Friendly merger	0.0245	0.0179	0.0306
	(0.028)	(0.025)	(0.053)
Hostile merger	0.0127		0.0151
	(0.031)		(0.055)
Neutral merger	0.0284	−0.0109	0.0157
	(0.041)	(0.026)	(0.055)
Public (cash)	0.0025	0.0029	0.0033
	(0.004)	(0.010)	(0.005)
Public (stock)	−0.0297***	−0.0344***	−0.0300***
	(0.005)	(0.011)	(0.006)
Private (cash)	0.0013	0.0068	0.0006
	(0.003)	(0.007)	(0.003)
Private (stock)	0.0194***	0.0089	0.0216***
	(0.005)	(0.009)	(0.006)
Subsidiary (cash)	0.0107***	−0.0067	0.0089**
	(0.003)	(0.008)	(0.004)
Free cash flow	−0.0000**	0.0184	−0.0000***
	(0.000)	(0.013)	(0.000)
Tobin's q	−0.0022***	−0.0010	−0.0020***
	(0.001)	(0.001)	(0.001)
Leverage	0.0063	−0.0024	−0.0022
	(0.006)	(0.011)	(0.006)
Observations	7721	1339	5328
R-squared	0.049	0.044	0.042
Adjusted R-squared	0.047	0.033	0.039

4. Empirical results

4.1. Empirical model and results without management

We now turn to explaining the observed valuation effects with our management practices index. The regression for the benchmark model is:

$$CAR_{it} = \beta_0 + \beta_1 \Psi_{it} + \beta_2 \Omega_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (3)$$

where Ψ and Ω are vectors of firm and deal characteristics, respectively, and μ and ν are firm and year fixed effects. Definitions for all variables in this model are in Table 1, and summary statistics are in Table 2.

For comparative purposes with benchmark empirical studies, we first estimate a CAR (−2, +2) model without our management index (e.g., Masulis et al., 2007; Bao and Edmans, 2011; Golubov et al., 2012; Harford et al., 2012). In Table 4 we report our findings for the full sample, as well as for frequent and occasional acquirers. These findings are very similar to those in the benchmark studies. Specifically, acquirer size, buying public targets using stock, and Tobin's *q* enter with a negative and highly significant coefficient. In contrast, relative size, buying private targets using stock, and buying subsidiary targets with cash have a positive and significant effect on CARs.[13] Variables such as *Relatedness* and *Free cash flow* have marginally significant effects in the full sample.

What is crucial to notice here is the very low explanatory power of the models, with the R-squared and adjusted R-squared being 4.9% and 4.7%, respectively, in the full sample. This level of explanatory power is highlighted in

[13] Previous research documents that the payment method for M&As matters. Specifically, Travlos (1987) and Franks et al. (1988) find that cumulative abnormal returns are higher when acquirers pay with cash instead of equity. Using stock to pay for acquisitions may signal firm internal problems that may decrease the acquirer's value. That is, firms could be overvalued and thus sell their stock (see also Myers and Majluf, 1984; Baker and Wurgler, 2002; Golubov et al., 2016). As far as private/subsidiary targets are concerned, Fuller et al. (2002) find higher CARs for firms that acquire targets with stock.

Table 5
Benchmark model with management. This table reports OLS results from the estimation of Eq. (3) with management practices. The dependent variable is the bidder's CAR, based on a two-day event window (−2, +2) around the announcement date. The results are for the whole sample, for frequent acquirers (acquirers who have completed at least five acquisitions within a three-year event window), and for occasional acquirers (acquirers who have completed at least two acquisitions within a three-year period). CAR calculation is based on the market model. Standard errors (in parentheses) are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The last three specifications include firm and year fixed effects. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Whole sample (1)	Frequent (2)	Occasional (3)	Whole sample (4)	Frequent (5)	Occasional (6)
Management practices	0.0876***	0.0366**	0.0650***	0.0592***	0.0178	0.0544***
	(0.009)	(0.017)	(0.010)	(0.010)	(0.021)	(0.011)
Ln (acquirer size)	−0.0039***	−0.0064***	−0.0046***	−0.0108***	−0.0233***	−0.0156***
	(0.001)	(0.002)	(0.001)	(0.003)	(0.006)	(0.003)
Run-up	−0.0130*	−0.0138	−0.0163**	−0.0103	−0.0123	−0.0065
	(0.007)	(0.015)	(0.008)	(0.009)	(0.020)	(0.010)
Sigma	0.2076	0.0995	−0.0002	0.0003	−0.1876	−0.0388
	(0.163)	(0.308)	(0.135)	(0.199)	(0.493)	(0.258)
Relative size	0.0257***	0.0207**	0.0194***	0.0194***	0.0243***	0.0176***
	(0.005)	(0.008)	(0.005)	(0.005)	(0.009)	(0.006)
Relatedness	0.0034	−0.0044	0.0032	0.0031	−0.0120*	0.0016
	(0.002)	(0.005)	(0.002)	(0.003)	(0.007)	(0.003)
Friendly merger	0.0151	0.0180	0.0296	0.0329	0.0425**	0.0461
	(0.032)	(0.026)	(0.057)	(0.042)	(0.019)	(0.051)
Hostile merger	0.0021		0.0129	0.0226	0.0279	0.0385
	(0.034)		(0.059)	(0.045)	(0.031)	(0.054)
Neutral merger	0.0197	−0.0072	0.0149	0.0316		0.0457
	(0.043)	(0.027)	(0.060)	(0.045)		(0.056)
Public (cash)	0.0017	0.0027	0.0024	−0.0015	0.0028	0.0032
	(0.004)	(0.010)	(0.005)	(0.005)	(0.014)	(0.005)
Public (stock)	−0.0293***	−0.0354***	−0.0296***	−0.0248***	−0.0410***	−0.0255***
	(0.005)	(0.011)	(0.006)	(0.007)	(0.013)	(0.008)
Private (cash)	0.0015	0.0070	0.0007	0.0003	0.0032	0.0024
	(0.003)	(0.007)	(0.003)	(0.004)	(0.008)	(0.004)
Private (stock)	0.0196***	0.0084	0.0215***	0.0195***	0.0022	0.0267***
	(0.005)	(0.009)	(0.006)	(0.006)	(0.014)	(0.008)
Subsidiary (cash)	0.0102***	−0.0071	0.0085**	0.0039	−0.0159	0.0020
	(0.003)	(0.008)	(0.004)	(0.003)	(0.010)	(0.004)
Free cash flow	−0.0000	0.0195	−0.0000	−0.0001**	0.0049	−0.0001**
	(0.000)	(0.013)	(0.000)	(0.000)	(0.034)	(0.000)
Tobin's q	−0.0022***	−0.0010	−0.0020***	−0.0016*	−0.0007	−0.0018*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Leverage	0.0040	−0.0044	−0.0041	−0.0121	−0.0501	−0.0243
	(0.006)	(0.011)	(0.006)	(0.012)	(0.030)	(0.015)
Firm FE	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	Yes	Yes	Yes
Observations	7721	1339	5328	6570	1294	5136
R-squared	0.064	0.047	0.051	0.330	0.263	0.327
Adjusted R-squared	0.062	0.035	0.048	0.100	0.055	0.086

Moeller et al. (2004), Masulis et al. (2007), Harford et al. (2012), and Golubov et al. (2015), among others.

4.2. Baseline results with management

We report our baseline results of the effect of management practices on CAR (−2, +2) in Table 5. In the first three columns we report results without acquirer and year fixed effects, which we add in the last three columns. *Management practices* enters with the expected positive sign and is generally statistically significant at the 1% level. The coefficient estimate for the full sample and without (with) fixed effects equals 8.8% (5.9%). The findings in column (1) indicate that a one-standard-deviation increase in *Management practices* (equal to 0.126), increases CAR by 0.011 (obtained from 0.126×0.088). Given that the mean CAR in our sample is 0.014, this increase is about 79%. Similarly, the coefficient on *Management practices* in column (4) shows that a one-standard-deviation increase in *Management practices* increases CAR by 0.0075. We document equivalently large increases for occasional acquirers; for frequent acquirers, the effect of management is less potent, but this is likely due to the significantly smaller sample.[14,15]

To make the importance of our findings more explicit, in online appendix table A4 we report the standardized (beta) coefficients for Table 5. These statistics allow for a direct comparison of the

[14] Prior research by Delis and Tsionas (2018) has validated the management practices score via a Monte Carlo analysis. They show that this index captures management quality and not something else. Here, we perform another validation exercise. We compare the effect of our management practices measure on CARs against the equivalent effect of fitted values of management practices computed from the World Management Survey (WMS). This exercise also yields a positive relation between the fitted values of management practices and CARs. The results are in the online appendix in the detailed discussion of the Bayesian method and in the online appendix table A3.

[15] To be sure that our results are not driven by extreme values, we rerun our models by winsorizing the continues variables. The results are in the online appendix A5 and remain qualitatively and quantitatively unchanged. Further, instead of splitting the sample into frequent and infrequent acquirers, in the online table A6 we include the number of deals in the past five years and the ratio of dollar value of past deals to acquirer market capitalization. Our inferences are very similar to those of the benchmark model.

relative effects of the explanatory variables of CARs, showing that *Management practices* is one of the most important variables in explaining a firm's CAR following M&A in the models without fixed effects. Thus, it comes as no surprise that the adjusted R-squared of the models in Table 5 (0.062) substantially increases compared to the one in Table 4 (0.047). These results highlight the importance of including our management practices index in the CAR model.[16]

One objection that may arise in our analysis is whether our score is able to capture management practices that are specific to M&As only. For example, past papers have shown that firms having directors with investment banking experience are able to identify good M&A deals and have positive announcement returns (see e.g., Huang et al., 2014). We argue that this is not necessary. The management practices index provided here should be viewed as a general and robustly measured firm-year managerial efficiency score resulting from standard economic theory and estimated through Bayesian techniques. As such, this score can capture general management practices of top executives necessary to build the firm environment required to succeed in the M&A market; this includes both finding the right deals and increasing firm value. As such, our work acts as a complement of these prior studies.

The role of fixed effects also deserves special mention. The use of fixed effects increases the adjusted R-squared by about 3.8 points when using the full sample. Comparing the same specifications, the coefficient on *Management practices* decreases from 0.0876 in models without fixed effects to 0.0592 in models with fixed effects. This decrease implies a decline from a 0.011 point increase in CAR to a 0.0075 point increase in CAR when increasing *Management practices* by one standard deviation.[17] The 0.0035 difference is statistically significant at the 1% level (obtained from a Hausman test) and indicates that part of *Management practices* is indeed a firm fixed effect. However, three-quarters of the effect of management practices remains, even in models with fixed effects. This suggests that the role of management practices differs substantially from one acquisition to another. Thus, management practices are dynamic in the sense that good management implies adaptation to the unique environment surrounding each acquisition.

4.3. Sensitivity to additional control variables and CAR windows

In this section, we explore the robustness of the effect of management practices once we control for a series of variables shown to affect CARs in the literature. Essentially, our tests show that our management index affects CARs over and above the effect of these variables.

First, we look into the role of authority within companies, as corporate governance could affect shareholder behavior. Gompers et al. (2003) argue for the importance of balance of power and use a governance index *(G-index)* based on anti-takeover provisions to test their hypothesis. Lower *G-index* indicates relatively democratic firms, and higher values characterize a more despotic corporate environment. They find that firms with a higher *G-index* have lower market values. Similarly, Bebchuk et al. (2009) construct an entrenchment index (*E-index*), which *inter alia* accounts for mergers and charter amendments; they find that increases in this index are associated with decreases in market value and abnormal returns.[18]

Second, management practices might erroneously capture the effect of time-varying corporate governance characteristics, such as compensation and experience of the top-management team.[19] We include the relevant variables to control for the aforesaid.

Third, we control for several firm-performance variables, such as return on assets (*ROA*), return on equity (*ROE*), *Annual stock return, Net profit margin*, capital expenditures as a proportion of assets (*CAPX*), and *Industry sales Herfindahl*. This could be an important addition to our baseline specification because our index should strictly capture management practices and not overall firm performance.

A last set of additional control variables that could affect the relation between effective management and CARs concerns industry characteristics. Several papers allude to the role of industry characteristics in M&A value creation. For example, one strand of literature argues that efficiency problems occur more often in conglomerates (e.g., Rajan et al., 2000; Scharfstein and Stein, 2000). Lang and Stulz (1994) show that multisegment firms have lower Tobin's *q* values. In the same spirit, Berger and Ofek (1995) argue that conglomerates are worth about 15% less than stand-alone firms. On the other hand, conglomerates allocate capital better due to their centralized control (e.g., Stein, 1997). Similar arguments exist in the literature on the role of technology and innovation.

We add three controls to examine whether the acquirer and the target (i) belong to the same Fama-French industry (*Conglomerate*), (ii) belong to high-tech industries (*TECH)*, and (iii) have high R&D intensity (*RD intensity*). Given that our aim is to identify industry characteristics that may bias our estimates on *Management practices* rather than to identify the mere effects of industry characteristics, we also saturate the model using Fama-French industry fixed effects.

We report results in Table 6. Column (1) shows results with governance controls (G-index and the E-index). We observe our *Management practices* score entering with a positive and significant coefficient at the 5% level, despite the large decrease in sample size. The value of the coefficient is somewhat lower compared to the benchmark model, but this is probably due to the large decrease in sample size due to the unavailability of information for newly added indices for a number of firms and years.

Column (2) shows results including boardroom characteristics. Again, our management index enters with a positive and significant coefficient. In this restrictive case, with the many control variables and fixed effects, the statistical significance drops due to the smaller sample and not the inclusion of the corporate governance controls (which are mostly statistically insignificant). According to the results, a one-standard-deviation increase in *Management practices* is associated with a 0.0045 unit increase in CAR.

Column (3) shows results while including firm-performance variables. We find that the effect of *Management practices* changes only slightly from the baseline specifications of Table 5, indicating that our main finding is robust to the inclusion of firm-performance indicators. In terms of economic significance, a one-standard-deviation increase in *Management practices* leads to a 0.0075-point increase in CAR (the same as our baseline specifica-

[16] In the main specifications, *Relatedness* is based on the two-digit SIC codes. Two-digit codes could be quite crude in determining whether two firms are related, so we replicate this exercise using four-digit SIC codes to construct an alternative *Relatedness* indicator. We find no significant change in our main results (see online table A7 in the appendix).

[17] Naturally, the models with fixed effects have fewer observations. If we reestimate the models without fixed effects for the sample of the models with fixed effects, there is no change in our inference. Notably, the year fixed effects do not play any role in the results (they are jointly insignificant) and any change in the results between the first three and the latter three columns of Table 5 come from the firm fixed effects.

[18] An issue further complicating firm governance is directors' incentives. For example, Bushman et al. (2004) document that directors' incentives increase with firm complexity and differ with earnings timeliness.

[19] The top-management team includes individuals above the vice president level who thus are senior executives (Chemmanur and Paeglis, 2005). For relevant empirical studies, see Gabaix and Landier (2008), Terviö (2008), Edmans et al. (2009), and Custódio et al. (2013).

Table 6
Controlling for governance, management characteristics, firm performance, and industry characteristics. This table reports OLS results from the estimation of Eq. (3) with management practices and additional controls for corporate governance, management characteristics, firm performance, and industry characteristics. The dependent variable is the bidder's CAR, based on a two-day event window (−2, +2) around the announcement date. The results are for the whole sample. CAR calculation is based on the market model. Standard errors (in parentheses) are clustered at the firm level (acquirer). Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	(1)	(2)	(3)	(4)
Management practices	0.0672**	0.0359*	0.0598***	0.0645***
	(0.032)	(0.019)	(0.010)	(0.014)
G-index	−0.0016			
	(0.006)			
E-index	0.0027			
	(0.010)			
Average age (above VP)		−0.0010		
		(0.001)		
Average age (executives)		0.0014**		
		(0.001)		
# above vice-president		−0.0047**		
		(0.002)		
Cash pay		0.0000		
		(0.000)		
Total pay		−0.0000		
		(0.000)		
Equity pay		0.0000		
		(0.000)		
ROA			0.0215	
			(0.042)	
Low ROA			0.0021	
			(0.005)	
Annual stock return			−0.0001***	
			(0.000)	
CAPX			−0.0077	
			(0.021)	
Net profit margin			−0.0139***	
			(0.005)	
Industry sales Herfindahl			−0.0119*	
			(0.007)	
Conglomerate				−0.0088
				(0.006)
TECH (target)				−0.0172**
				(0.009)
TECH (both)				0.0079
				(0.010)
RD intensity				−0.0943
				(0.059)
RD high				0.0131*
				(0.007)
Firm controls	Yes	Yes	Yes	Yes
Deal controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	488	1611	6751	4105
R-squared	0.47	0.37	0.349	0.386
Adjusted R-squared	0.145	0.105	0.133	0.141

tion). As for the performance-related variables, we find that *Annual stock return* and *Net profit margin* are the most important (negative) determinants of M&A success, while *ROE* and *Industry sales Herfindahl* have some explanatory power.

The results regarding *Net profit margin* are somewhat puzzling, however. We expect that firms with more cash flow are more capable of creating firm value through M&As. A potential explanation could be that profitability indices do not necessarily capture firm characteristics—including management practices—that are of high importance in value creation through M&As. The negative coefficient on *Industry sales Herfindahl* could signal inefficiencies that are more pronounced in more concentrated sectors, where firms live the quiet life (Hicks, 1935).

In column (4) we report results while including industry characteristics. If anything, our management practices index enters with a slightly larger coefficient compared to the baseline specification. A one-standard-deviation increase in *Management practices* implies a higher CAR (−2, +2) of approximately 0.0081 points. As far as the other controls are concerned, firms with higher R&D tend to have higher CAR values, and *Conglomerate* enters with a negative, yet insignificant coefficient. Further, *TECH (target)* enters with a negative and statistically significant coefficient. We should note here, however, that the large set of fixed effects might oversaturate the model and prevent proper identification of the effect of industry characteristics.

To ensure that event timing does not drive our results, we repeat the previous models with CARs calculated over three- and 11-day windows. The results are in Table 7 and are similar (if not stronger) to those of the baseline models.

4.3. Synergies

Having studied the impact of management practices on acquirers' CARs, we next look at firm synergies. This is important, as previous research finds that M&As positively affect the cumulative abnormal returns of the combined firms (e.g., Andrade et al., 2001) and firm productivity (Maksimovic and Phillips, 2001). More recently, Li (2013) suggests that the increase in a target's productivity comes from decreases in capital expenditures, lower labor expenditures, and associated efficiency gains, all of which market expectations incorporate. These arguments strengthen our insight, whereby the market expects a positive relation between the quality of acquirers' managers and the firm's post-M&A productivity, efficiency, and eventually its value.

We calculate synergies following Bradley et al. (1988). We construct a value-weighted portfolio for the acquirer and the target, with weights based on market capitalizations of the acquirer and the target at the sixth trading day before the announcement (also see Wang and Xie, 2008). As shown in the online appendix Table A8, there is a positive correlation among all cumulative abnormal return measures.

To quantify the effect of management practices on synergistic gains, we re-run our main specifications where the dependent variable is the synergistic gain for different time windows. Because our sample is much smaller now, we do not include firm fixed effects. Comparing Tables 5 and 8, the results look similar: in Table 5 the coefficient on management practices is 0.0592 for the whole sample, and in Table 8 it is 0.0683. The estimates on the controls are also very similar.[20]

4.4. Additional robustness tests

Having established the strong explanatory power of management practices in the CAR models, we turn to additional measures of M&A success proposed by the extant literature. We first study long-run changes in profitability. In general, we find that our baseline management measures have less explanatory power in models of long-term post-acquisition performance. An important wrinkle to these findings are the significant effects of management prac-

[20] Because governance and industry characteristics might affect the gains made in synergistic gains, we report results including the relevant controls. These can be found in the online appendix tables A9 & A10. By and large, our results remain strong even in the inclusion of these controls.

Table 7
Alternative CARs. This table reports OLS results from the estimation of Eq. (3) with management practices. Instead of acquirer's CAR (−2, +2), we now use CAR (−1, +1) and CAR (−5, +5). Each numbered line corresponds to a column in the previous tables. Specifically, lines [1] to [6] of *Panel A* correspond to columns (1) to (6) of Table 5. Lines [7] to [10] correspond to the columns of Table 6. Similarly, for *Panel B*. Standard errors are clustered at the acquirer level. Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Definitions of all variables along with their sources are in Table 1.

		Coefficient	Standard error	R^2	R^2-adjusted	Observations
	Panel A: CAR (−1, +1)					
[1]	Full sample, FE = No	0.0931***	0.009	0.069	0.067	7721
[2]	Frequent, FE = No	0.0427***	0.015	0.059	0.048	1339
[3]	Occasional, FE = No	0.0683***	0.009	0.059	0.056	5328
[4]	Full sample, FE = Yes	0.0664***	0.009	0.347	0.124	6570
[5]	Frequent, FE = Yes	0.0307*	0.018	0.284	0.081	1294
[6]	Occasional, FE = Yes	0.0613***	0.010	0.349	0.115	5136
[7]	Governance	0.0589**	0.027	0.463	0.134	488
[8]	Management	0.0601***	0.016	0.404	0.152	1611
[9]	Firm performance	0.0653***	0.009	0.368	0.159	6751
[10]	Industry characteristics	0.0605***	0.012	0.405	0.167	4105
	Panel B: CAR (−5, +5)					
[1]	Full sample, FE = No	0.0957***	0.012	0.058	0.056	7721
[2]	Frequent, FE = No	0.0610**	0.028	0.047	0.036	1339
[3]	Occasional, FE = No	0.0743***	0.013	0.049	0.046	5328
[4]	Full sample, FE = Yes	0.0781***	0.013	0.345	0.122	6570
[5]	Frequent, FE = Yes	0.0260	0.032	0.328	0.138	1294
[6]	Occasional, FE = Yes	0.0670***	0.014	0.359	0.129	5136
[7]	Governance	0.0658*	0.039	0.449	0.111	488
[8]	Management	0.0329	0.022	0.366	0.099	1611
[9]	Firm performance	0.0719***	0.013	0.355	0.141	6751
[10]	Industry characteristics	0.0878***	0.017	0.396	0.155	4105

Table 8
Benchmark model with management and synergies. This table reports OLS results from the estimation of Eq. (3) for the whole sample. The dependent variable is synergistic CARs for acquirer and target. These are computed based on the market model with their respective weights based on their market capitalizations six days prior to the day of announcement. Standard errors (in parentheses) are clustered at the acquirer level. Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels. All regressions include a constant term. Definitions of all variables along with their sources are in Table 1.

	Synergy CAR(−1, +1)		Synergy CAR(−2, +2)		Synergy CAR(−5, +5)	
Management practices	0.0630***	0.0612***	0.0726***	0.0683***	0.0686***	0.0685***
	(0.018)	(0.018)	(0.019)	(0.019)	(0.023)	(0.024)
Ln (acquirer size)	−0.0058***	−0.0085***	−0.0057***	−0.0085***	−0.0070***	−0.0095***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Run-up	−0.0415**	−0.0373**	−0.0504***	−0.0490***	−0.0551**	−0.0539**
	(0.016)	(0.017)	(0.016)	(0.016)	(0.023)	(0.024)
Sigma	−0.2805	−0.4075	−0.1165	−0.1647	0.1633	0.0536
	(0.288)	(0.376)	(0.308)	(0.396)	(0.345)	(0.445)
Relative size	0.0240***	0.0212***	0.0241***	0.0211***	0.0256***	0.0231***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Relatedness	0.0097**	0.0077*	0.0092**	0.0066	0.0146***	0.0117**
	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)
Friendly merger	−0.0354	−0.0288	−0.0044	0.0079	0.0590	0.0671
	(0.062)	(0.041)	(0.084)	(0.066)	(0.117)	(0.101)
Hostile merger	−0.0143	0.0054	0.0157	0.0393	0.0683	0.0878
	(0.063)	(0.043)	(0.085)	(0.068)	(0.118)	(0.103)
Public (cash)	0.0179***	0.0114*	0.0174***	0.0102	0.0196***	0.0124*
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
Public (stock)	−0.0125*	−0.0156**	−0.0094	−0.0128*	−0.0119	−0.0171*
	(0.006)	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)
Private (cash)	0.0421	0.0387	0.0526*	0.0509*	0.1163***	0.1116***
	(0.039)	(0.035)	(0.029)	(0.026)	(0.018)	(0.017)
Private (stock)	0.1024***	0.0903***	0.0119	0.0005	−0.0667***	−0.0715***
	(0.008)	(0.015)	(0.008)	(0.015)	(0.011)	(0.019)
Subsidiary (cash)	0.0644***	0.0704***	0.0505***	0.0596***	0.0663***	0.0839***
	(0.007)	(0.022)	(0.007)	(0.022)	(0.008)	(0.022)
Free cash flow	0.0196	0.0101	0.0225	0.0126	0.0147	0.0036
	(0.018)	(0.018)	(0.017)	(0.018)	(0.024)	(0.027)
Tobin's q	−0.0057***	−0.0054***	−0.0059***	−0.0058***	−0.0069***	−0.0072***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Leverage	0.0124	0.0078	0.0265*	0.0198	0.0196	0.0096
	(0.015)	(0.015)	(0.016)	(0.016)	(0.018)	(0.018)
Year FE	No	Yes	No	Yes	No	Yes
Observations	1011	1011	1011	1011	1010	1010
R^2-adjusted	0.193	0.212	0.178	0.191	0.159	0.169

Table 9
The effect of management practices on accounting profitability. This table shows the effect of management practices measure on acquirers' accounting profitability. The dependent variables in columns (1) to (4) are ROE differences three- and five-years in the future compared to current ROE. The dependent variable in columns (5) and (6) is the current value of Tobin's Q. Standard errors, clustered at the firm level, in parentheses. . Stars ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Definitions of all variables along with their sources are in Table 1.

	$\Delta ROE_{t\to t+3}$ (1)	$\Delta ROE_{t\to t+3}$ (2)	$\Delta ROE_{t\to t+5}$ (3)	$\Delta ROE_{t\to t+5}$ (4)	Tobin's Q (5)	Tobin's Q (6)
Management practices at t	0.0501**	0.0515**	0.0222	0.0202	0.5876*	0.6802**
	(0.021)	(0.021)	(0.029)	(0.029)	(0.314)	(0.324)
Size		−0.0141***		−0.0116*		−0.7753***
		(0.005)		(0.007)		(0.115)
Leverage		−0.1210***		−0.1674***		−0.0053
		(0.030)		(0.036)		(0.182)
Cash		−0.0000		0.0000		−0.0000
		(0.000)		(0.000)		(0.000)
CAPX		0.1063		0.2045*		0.6529
		(0.087)		(0.113)		(0.532)
Friendly merger		0.0066		−0.0202		1.5343
		(0.069)		(0.069)		(1.334)
Hostile merger		0.0060		0.0269		1.4057
		(0.078)		(0.082)		(1.315)
Private target		−0.0126**		−0.0020		−0.0612
		(0.006)		(0.007)		(0.051)
Public target		−0.0081		0.0061		−0.1159
		(0.008)		(0.010)		(0.072)
Cash M&A		0.0043		−0.0090		−0.0453
		(0.006)		(0.008)		(0.040)
Stock M&A		0.0043		−0.0027		0.9538***
		(0.010)		(0.011)		(0.180)
Relatedness		0.0048		0.0067		0.0210
		(0.006)		(0.007)		(0.048)
TECH (target)		−0.0156*		−0.0028		0.1475**
		(0.009)		(0.011)		(0.073)
Observations	7179	7018	5724	5599	9698	9499
R-squared	0.376	0.378	0.419	0.428	0.468	0.516
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm	Firm

tices on accounting measures (forward-looking return on equity and Tobin's q).[21]

Specifically, we use the change in *ROE* over three to five years post-acquisition (ΔROE) and Tobin's q (see Table 1 for definitions). Using such performance measures adds depth to our analysis (e.g., Fu et al., 2013), which does not suffer from reduced samples. Nonetheless, we are also cautious, as the use of accounting data to appraise the economic performance of firms that participate in M&A activities might suffer from noise due to internal (firm-specific) and external developments, which make isolating the pure effect of M&As very difficult (e.g., Renneboog and Vansteenkiste, 2018).

We report our results in Table 9. In columns (1) and (2) our results show that better management practices positively affect ΔROE up to a period of three years post-acquisition. Specifically, a one standard deviation increase in management practices, increases ΔROE by about 0.03 units (equivalent to 0.007 percentage points). Similarly, in columns (5) and (6) we find a positive effect of management practices on Tobin's q. Specifically, a one standard deviation increase in management practices increases Tobin's q by about 0.086 percentage points.

Overall, we find positive correlations between management practices and long-term firm performance, even though we should be cautious about interpreting these effects as causal. In the years following management practices, these practices change, other corporate events occur, firms manage their accounting measures, and the general business and economic environment evolves. Still, the identified positive correlations indicate how well-managed firms effectively choose their M&A deals.

We have furnished several additional tests to check the robustness of the baseline findings. These results can be found in the online appendix that accompanies this work. In most of these tests, our results hold. Some of this additional analysis and results include validation exercises utilizing the World Management Survey, analysis while accounting for extreme values, (double-)clustering at different dimensions, models incorporating goodwill and firm innovativeness, and the past acquisitiveness of the acquiring corporation. We also provide results with additional governance characteristics (such as board characteristics and the presence of institutional blockholders). Finally, we show results utilizing seven instead of four inputs in generating management practices scores using Bayesian techniques, as well as Bayesian inferences for the benchmark model.

5. Relation with the Q-theory of M&As

In this section, we explore a theoretical mechanism that explains our findings—the Q-theory of mergers (e.g., Jovanovic and Rousseau, 2002). According to this theory, a key motivation for acquiring firms is to relocate their assets to the best use possible. That is, mergers are a channel that helps capital reallocate to better projects and management. As a result, efficient acquirers create value and synergistic gains during takeovers because they transfer their superior management practices to target firms. Based on these insights, we introduce the following testable hypotheses:

[21] All our results in this section become highly significant when we model Eq. (2) as a function of latent lagged management. This is intuitive from an econometric perspective, as long-term performance indicators should encompass information about the underlying dynamics (e.g., Arellano, 2003; Baltagi, 2013).

Table 10
Management practices and M&A frequency. The dependent variable is the number of M&A events for each firm in each year. Standard errors (in parentheses) are clustered at the acquirer's level. Stars, ***, **, and *, indicate significance levels at the 1%, 5%, and 10%, respectively.

Dependent variable	Number of annual events	
Estimation method	Negative binomial	
	(1)	(2)
Management practices	0.276**	0.422***
	(0.131)	(0.148)
Log assets	0.104***	0.125***
	(0.013)	(0.013)
Leverage	−0.382***	−0.472***
	(0.095)	(0.134)
PPE	0.604***	0.688***
	(0.171)	(0.155)
Taxes	0.058	0.028
	(0.087)	(0.10)
ROA	0.766***	0.745***
	(0.159)	(0.14)
Intangibles	1.683***	1.977***
	(0.143)	(0.155)
Cash	1.051***	0.877***
	(0.12)	(0.145)
Tobin's q		0.031***
		(0.011)
Stock return		0.221***
		(0.026)
Net profit margin		0.039***
		(0.010)
MB		−0.005
		(0.004)
Observations	69,637	59,781
Pseudo R^2	0.06	0.041
Log-likelihood	−36,909.4	−31,266.8

H1: Firms with better management practices should pursue more M&As.
H2: More value will be created as the gap of managerial quality between the acquirer and target increases.
H3: Firms with good management acquire firms with bad management.
H4: The cross-sectional dispersion in firm management practices should be positively correlated with the likelihood of M&As.

We form a fifth testable hypothesis based on the insights of Dong et al. (2006), who suggest that the evidence on the Q-theory is more prominent in the pre-1990 market. The reason for this is that takeovers during the 1980s suffered more from agency issues, while those in the 1990s suffered from inefficiency issues. Thus, the evidence is more supportive of the Q-theory during the 1980s, while during the 1990s the mis-valuation hypothesis appears to explain better the data. Based on this premise, we formulate our fifth hypothesis as follows:

H5: The effect of management practices should be stronger in the pre-1990 market.

An important implication of our baseline results is that if better management practices create more value, then the involved firms should pursue more M&As. To test this hypothesis, we regress the number of M&A events on management practices. We conduct these tests using time series data for the acquiring firms; thus, our sample is considerably larger than the respective including M&A events only. Because there are many occurrences of zeros (firms do not conduct M&As in all years), we use a negative binomial model, which is suitable for over-dispersed count data.

We report the results in Table 10. We find that management practices carry a positive and statistically significant coefficient. The results in column (2) indicate that a one unit increase of management practices, increases the difference in the logs of expected counts of M&A events by 0.422, *ceteris paribus,* which corresponds to an increase of about 55% (= exp(0.442)). This finding is consistent with the Q-theory, which predicts that firms with better management will find opportunities to increase their value through synergies with other firms.

We test the hypotheses H2-H5 in Table 11. Panel A of Table 11 presents results for H2 and H3. Columns (1)-(3) in this panel, examine whether more value can be created when the gap in the management practices between the acquirer and the target is large (Lang et al., 1989). Using differences in our index between acquirers and targets, as well as the same controls and fixed effects (we cannot use acquirer fixed effects because our sample only has 344 observations), we end up with a coefficient that is positive and statistically significant, again consistent with Q-theory. In economic terms, an increase of Δ*(Management practices)* by one standard deviation, increases CAR by about 1.7 percentage points (= 0.0935×0.179).

Columns (4)-(6) test the Q-theory prediction that firms with good management will acquire firms with bad management. To this end, we construct an indicator variable taking the value one for all M&A cases where the target's management practices are lower than the acquirer's. We then examine whether the management practices of the acquirer have explanatory power on that indicator. We find a positive and statistically significant coefficient, indicating that a one percent increase in the *Management practices* score increases by about 3.2% the probability that a target company has a lower management score than the acquirer. However small the sample, our specification has good explanatory power for a dichotomous choice model, as the pseudo R^2 is around 0.30. This again shows that our management practices score has strong explanatory power when testing Q-theory predictions.

Panel B of Table 11 tests hypothesis H4. Specifically, we calculate the average management practices values in different Fama-French industries for each year. Then, for each Fama-French group and year, we count the number of M&A events. Next, we regress the number of events on the average values of management practices. We find a positive and statistically significant coefficient and our model has good explanatory power. In economic terms, a one standard deviation increase in *Management practices* for the average Fama-French industry is accompanied by an 0.8 (= 44.15×0.018) percentage point increase in M&A events in that industry. This indicates that for a sector to be M&A active, interfirm differences in managerial quality should exist. This follows the model of Jovanovic and Rousseau (2002) who suggest that, without interfirm dispersion, M&A events do not occur.

Panel C of Table 11 tests hypothesis H5. We create an indicator variable taking the value one for all events that took place before 1990 and interact this variable with our management practices score. According to H5, Q-theory is better suited at explaining M&A waves in the 1980s because during that period agency issues were more pronounced. This might not be the case for the waves that followed that period, whereby the misvaluation hypothesis appears to be more potent in explaining statistical patterns. If this conjecture is true, we should observe a positive coefficient on the interaction term. Indeed, we find that the interaction term enters with a positive coefficient, and that it is more potent for the case of frequent acquirers. This could indicate that frequent acquirers in the 1980s were more efficient at choosing the right target companies to create synergies; especially target companies that might have had agency issues and thus not functioning at their fullest capacity. The results of the interaction term for frequent acquirers indicate that those acquirers with management practices higher by one unit in the period before the 1990s would enjoy higher CARs by about 0.29, compared to acquirers after that period.

Table 11
Additional tests for Q-theory. For panel A, Δ*(Management practices)* is equal to the difference of management practices scores of the acquiring and target firms. The dependent variable in columns (1)-(3) is CAR(−2, 2), while the dependent variable in columns (4)-(6) is an indicator taking value one when the management practices (MP) score of the target company is lower than that of the acquiring firm. Fama-French fixed effects include 48 industries. For panel B, the dependent variable is the number of acquisition events in each Fama-French (12) industry for each year. The management practices score is the average value for each industry and year. For panel C, the dependent variable is CAR(−2, 2).The results are for the whole sample, for frequent acquirers (acquirers who have completed at least five acquisitions within a three-year event window), and for occasional acquirers (acquirers who have completed at least two acquisitions within a three-year period). CAR calculation is based on the market model. *Pre-1990* takes value one for all events that occurred before 1990. Standard errors are reported in parentheses. Stars, ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Definitions of all variables along with their sources are in Table 1.

Panel A: Management practices differentials between acquirers and targets on value creation, and the tendency of acquirers to acquire firms with lower management practices

Dependent variable	CAR(−2, 2)			$\mathbb{I}\{MP^{target} < MP^{acquirer}\}$		
Estimation method	OLS			Logit		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ(Management practices)	0.0538**	0.0811***	0.0935***			
	(0.027)	(0.027)	(0.029)			
Management practices				2.8055***	3.1192***	3.2118***
				(0.264)	(0.254)	(0.411)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Fama-French industry FE	No	No	Yes	No	No	Yes
Observations	344	344	339	344	328	314
R-squared	0.144	0.231	0.319			
Adjusted R-squared	0.113	0.106	0.115			
Log pseudolikelihood				−152.988	−130.331	−113.4
Pseudo R-squared				0.308	0.39	0.446

Panel B: Cross-sectional dispersion of management

Dependent variable	Number of acquisitions by FF12/year
Management practices (industry averages by year)	44.510**
	(22.128)
Constant	−0.532
	(10.712)
Year FE	Yes
Fama-French industry FE	Yes
Observations	455
R-squared	0.703
Adjusted R-squared	0.66

Panel C: Testing the potency of management practices on M&A value creation before 1990

Dependent variable	CAR(−2, 2)		
	Full sample	Frequent acquirers	Occasional acquirers
	(1)	(2)	(3)
Management practices (*) Pre-1990	0.0782**	0.2942**	0.0773*
	(0.032)	(0.115)	(0.041)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	6570	1294	5136
R-squared	0.33	0.264	0.327
Adjusted R-squared	0.10	0.054	0.085

6. Conclusions

This paper contributes to the M&A literature in three interrelated ways. First and most important, we measure management practices using standard microeconomic and management theory. We show that our measure is one of the most significant explanatory variables in empirical models of short-term M&A success. Including management practices substantially increases the explanatory power of these models, with a one-standard-deviation upsurge in our index increasing CARs by more than 50% around M&A deals. By also looking at longer-term measures of M&A success, we identify positive correlations, which are statistically and economically significant in models of forward-looking return on equity and Tobin's q.

Second, we show that the effect of management practices on M&A success comes over and above previously used firm characteristics and governance, as well as time-invariant acquirer characteristics. Thus, we contend that the effect of management practices is indeed time-variant and not solely attributable to experience, previous success, or other unobserved time-invariant firm characteristics.

Third, we show that our results are explained by the Q-theory of M&As. Specifically, we find that acquirers with good management practices pursue more M&As and, importantly, they target firms with poor management practices to create value from improving these practices. Indeed, we provide evidence that the cross-sectional dimension in firm management practices is a

positive and economically significant determinant of the likelihood of M&As.

Overall, we view management as an important component of short-term M&A performance that significantly increases the power of relevant empirical models. Future research can use this measure as a control in predicting M&As, but also in reexamining the relation between management practices and corporate characteristics such as CEO turnover, board independence, and female board participation. Further, our analysis provides incentives to re-examine the relation between the quality of managerial practices and executive or employee compensation. Finally, our approach to estimating management practices via a latent variable model might provide new ideas for modeling notions that, by their own nature, are unobserved or related to the management of intangible capital. These include but are not limited to corporate social responsibility, corporate culture, and accounting practices such as earnings management and profit-shifting. In doing so, future studies will be able to also define and estimate management practices less broadly and mitigate part of the relevant limitations that our measure inevitably faces. We leave these ideas as a desideratum for future research.

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Supplementary materials

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