Title

Capital markets valuation and accounting performance of Most Admired Knowledge Enterprise (MAKE) award winners

Journal

Decision Support Systems, 56(1)

ISSN

0167-9236

Authors

DeFond, Mark L
Konchitchki, Yaniv
McMullin, Jeff L
et al.

Publication Date

2013-12-01

DOI

10.1016/j.dss.2013.07.001

Peer reviewed

Decision Support Systems 56 (2013) 348–360

Contents lists available at ScienceDirect

Decision Support Systems

journal homepage: www.elsevier.com/locate/dss

Capital markets valuation and accounting performance of Most Admired Knowledge Enterprise (MAKE) award winners

Mark L. DeFond [a], Yaniv Konchitchki [b], Jeff L. McMullin [c], Daniel E. O'Leary [a,*]

[a] University of Southern California, United States
[b] University of California at Berkeley, United States
[c] Indiana University, United States

ARTICLE INFO

Article history:
Received 5 February 2013
Received in revised form 30 May 2013
Accepted 1 July 2013
Available online 16 July 2013

Keywords:
Knowledge management
MAKE award winners
Market study
Delphi method
Asset pricing
Capital markets
Stock valuation

ABSTRACT

Researchers have used the stock price reaction to firms' disclosures of investment in information technology to investigate the value of those investments. This paper extends that research to include knowledge management (KM). In particular, we test whether and how KM is valued by market participants by examining the stock market reaction and future performance of companies receiving the "Most Admired Knowledge Enterprise" (MAKE) award, which recognizes companies that excel at KM. MAKE awards are generated based on opinions gathered from experts using the Delphi method, a well-known group decision support tool. We find that MAKE winners: (1) experience positive abnormal returns around the award announcement, (2) report superior operating performance relative to their peers subsequent to the receipt of the award, (3) receive upward analyst forecast revisions following the award, (4) experience a positive upward stock price drift following the award, and (5) that the market has taken time to learn how to process and interpret information useful in valuing KM. Thus, our findings contribute to the literature by finding that market participants value KM and KM apparently positively influences accounting performance indicators. In addition, a unique feature of our study is that we investigate the market's response to information gathered using the Delphi method, an information source not previously investigated in stock price reaction literature.

1. Introduction

While there is no single accepted definition for knowledge management (KM), a typical definition is processes and systems that allow the creation, storage, transfer and application of knowledge, typically to facilitate and support decision making (e.g., Alavi and Leidner [1]). KM activities commonly include the sharing of information and best practices within the firm, identifying internal experts, and facilitating the exchange of information among employees. Both academics Nicolas [30] and practitioners Quast [34] have argued that knowledge management positively impacts the quality of decision making. Thus, it is not surprising that expenditures on knowledge management grew from $400 million in 1994 to $34 billion in 2007, and were expected to exceed $150 billion in 2012 GIA [18]. However, skeptics label KM a potential management fad (e.g., [32,38,17]). Further, most analyses of impact of KM on decision making typically have focused on internal assessment of impact on decision making and are qualitative Nicolas [30].

As a result, we are interested in assessing value through an external and quantitative metric, the stock market. Previous researchers in information systems have used the stock market price reactions to determine the ultimate decision making value of information systems. For example Dos Santos et al. [15] explored the relationship between stock market prices and a firm's information technology investment announcements. Im et al. [22] used an expanded sample and integrated a number of control variables into the analysis, such as firm size, and found a relationship between stock market prices and firm announcements of information technology investments. Accordingly, the purpose of this paper is to determine if stock prices respond to information about firms that excel at knowledge management.

Rather than using firm-initiated information disclosures, we examine the effect of an alternative source of information. In particular, this study examines the stock market reaction to, and future performance of, companies receiving the "Most Admired Knowledge Enterprise" (MAKE) award. MAKE awards are generated based on using the Delphi method, a well-established group decision support tool (Gray [19]). MAKE awards are granted annually to acknowledge companies that excel in using KM to enhance organizational wealth APO [2]. The winners include public, non-public, and not-for-profit organizations. Examples of public companies winning a MAKE award include: Apple, Caterpillar, Google, Toyota, Siemens, and 3M. Examples of non-public and not-for-profit firms winning a MAKE award include: the BBC, the Hong Kong Police Department, the Korean Water Resources Agency, KPMG, and the U.S. Navy.

* Corresponding author at: Marshall School of Business, 3660 Trousdale Parkway, University of Southern California, Los Angeles, CA 90089-0441, United States. Tel.: +1 213 740 4856.
E-mail address: oleary@usc.edu (D.E. O'Leary).

0167-9236/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.dss.2013.07.001

We hypothesize that if the issuance of a Delphi-based MAKE award provides new information to market participants, and does not simply duplicate existing available information, stock prices will react positively to news of receiving a MAKE award. Thus, the MAKE award provides decision making information about the impact of KM using a key decision support tool, Delphi.

Our first test examines the abnormal stock returns of the winners during the five-day window surrounding the MAKE award announcement. Investigating changes in firm value during a short event window provides strong evidence on whether KM superiority is causally related to increased firm value. We perform our tests using all U.S. publicly traded MAKE winners from 2001 through 2008 with available data, consisting of 247 MAKE awards. Our event study test finds significant mean abnormal returns of 1.23%, consistent with the award providing new information to the market about the value of KM intangibles, and with the market not fully impounding the value of KM prior to the issuance of the MAKE award.

Our second set of tests compares the MAKE winners' future operating performance with their peers. We find that the MAKE winners outperform their peers during the year following the receipt of the award (after controlling for past performance), which corroborates our stock price tests and is consistent with KM improving shareholder value through superior future operating performance. Our third set of tests finds that analysts make upward revisions to their earnings-per-share forecasts following the MAKE award announcements, consistent with the awards conveying new information about future performance that was not previously impounded in analysts' forecasts. Our fourth set of tests finds that abnormal returns continue to be positive for the MAKE winners over the year following the announcement of the award. This upward post-announcement stock price drift is consistent with the award announcement not fully resolving all of the informational difficulties that investors have in trying to interpret the value implications of KM.

Finally, our last set of tests repeats our stock market reaction and future operating and stock price performance tests after partitioning our sample on whether the MAKE was awarded in the first half (2001–2004) or in the second half (2005–2008) of our sample period. We perform these tests because the MAKE award is relatively new, suggesting that market participants may be learning how to interpret the information communicated by the MAKE. We find that, while the MAKE winners' future operating performance is superior to that of their peers in both halves of our sample period, the positive short window reaction to the MAKE awards occurs only during the second half, and the upward post-announcement drift occurs only during the first half. This means that during the first half of our sample period market participants do not react immediately to the announcement of the MAKE award, but that stock prices drift upwards over this period as the winners exhibit superior operating performance. In contrast, during the second half of our sample period market participants react fully to the announcement of the MAKE award during the short window, with no future upward stock price drift. Taken together, these results are consistent with the MAKE identifying superior performing firms during the entire sample period, but with market participants still learning this during the first half of the sample period.

Our study makes three important contributions to the literature. One is that we are the first to find evidence that KM leads to higher stock prices. This is an important finding because KM intangibles have not been previously studied, and while management investments in KM have grown rapidly in recent years, the benefits from KM are controversial (e.g., Fotache [17]). Second, we find that those same firms with better knowledge management generate superior future accounting performance (e.g., return on assets) when compared to their peers, establishing a relationship between firm performance and KM. Finally, the MAKE process chooses the winning firms using the "Delphi" method. As a result, our final contribution is we show that information generated by the Delphi method results in a positive stock market reaction, which suggests that the Delphi method provides a decision making tool that is useful as a means of creating information for markets.

The remainder of the study proceeds in the following manner. Section 2 discusses the sample selection of MAKE winners investigated in this paper. Section 3 presents our analysis and results, Section 4 presents sensitivity analysis, and Section 5 summarizes our conclusions.

2. The MAKE Awards: sample selection, data and information conveyed

MAKE awards are issued periodically by Teleos, an independent international research organization of knowledge management professionals, to recognize companies that are global leaders in transforming enterprise knowledge into wealth creating ideas, products and solutions. The MAKE winners are chosen by expert panels using the Delphi method, a technique used to obtain consensus decisions from groups of experts. Prior research indicates that the Delphi method results in group decisions that are superior to the decisions of the individual members (Dalkey [14]). The panels comprise leading KM experts, Fortune 500 executives and organizational learning experts, from a balanced mix of publicly held, privately held, and not-for-profit organizations (APO [2]; Chase [13]). There are no more than four panelists from any one organization and the panels range from 750 to 3000 members. The objective of the Delphi method is to aggregate the divergent beliefs of the individual experts and converge on a collective decision.

The Delphi selection process consists of three or four rounds of the experts anonymously sharing views among themselves, where the experts' identities are not revealed to one another. In the first round, each panelist nominates one or more organizations (public, non-public, or not-for-profit) based on KM-related criteria that indicate superior KM, along with information to support their nominations. In the second round, the first round choices and supporting explanations are anonymously shared among the panelists and another set of nominations is made. Firms that are short-listed by 10% or more of the panelists are included in the third round and the panelists are asked to formally score each of the third round finalists on a Likert scale from one to ten based on eight criteria related to KM: success in establishing an enterprise knowledge culture; top management support for managing knowledge; ability to develop and deliver knowledge-based goods/services; success in maximizing the value of the enterprise's intellectual capital; effectiveness in creating an environment of knowledge sharing; success in establishing a culture of continuous learning; and effectiveness of managing customer knowledge to increase loyalty/value; and ability to manage knowledge to generate organizational wealth. The scores are equally weighted across eight criteria, and the firms with the highest scores are selected as the winners. The criteria upon which the MAKE winners are chosen include the judges' assessment of management's ability to use KM to generate organizational wealth. This is important for the purpose of our study because we test whether superior KM indeed leads to improved shareholder value. If superior KM does not lead to improved firm performance, we are unlikely to find a positive reaction to the MAKE winner announcements. For the remainder of the paper we will focus on the outcome of the Delphi process in the form of the MAKE awards, rather than the process.

MAKE winners are announced through emails to the members of The KNOW Network, followed by the issuance of a public press release. The winners are announced by geographical region periodically throughout the year, with no pre-determined announcement dates.[1] Winners include

[1] MAKE awards are issued by various geographic regions (e.g., North America, Asia, and Europe), as well as an overall global award. Thus, firms may win more than one MAKE award per year if they win an award in their geographic region and a global award.

Table 1
MAKE Award Distribution by Year and Industry.
This table reports the number of MAKE awards awarded between 2001 and 2008 by industry (Panel A) and by year (Panel B) for firms with available CRSP data. Industries are based on the 12 Campbell (1996) industry classifications.

Panel A: MAKE awards by industry		
Industry	N	%
Consumer Durables	75	30
Services	66	27
Capital Goods	52	21
Petroleum	24	10
Basic	16	6
Construction	7	3
Finance/Real estate	5	2
Transportation	1	<1
Utilities	1	<1
Total	247	100
Panel B: MAKE awards by year		
Year	N	%
2001	12	5
2002	9	4
2003	22	9
2004	41	13
2005	41	17
2006	47	19
2007	38	15
2008	37	15
Total	247	100

a variety of organizations, including public corporations, government entities, non-public business enterprises, and not-for-profit organizations.

2.1. Sample selection and data

We begin our data collection by searching the Factiva and LexisNexis databases for news announcements of the MAKE winners. This search identifies 425 MAKE awards, with the earliest winners announced during 2001.[2] After excluding MAKE winners that do not have data in the CRSP database (primarily non-listed companies such as Ernst & Young and not-for-profit organizations such as NASA), we reduce our sample to 222 observations. We then obtain press release dates directly from Teleos for another 25 publicly traded MAKE winners that we cannot identify in the Factiva and LexisNexis databases.[3] This process results in a final sample of 247 MAKE awards issued to 46 distinct companies from 2001 through 2008.[4]

We obtain stock returns, prices, and shares outstanding data from the Center for Research in Security Prices (CRSP). We obtain analysts' earnings forecasts from the U.S. Institutional Brokers Estimate System (I/B/E/S), Summary History–Summary Statistics (with Actuals) dataset. The data are for all U.S. firms, from the annual and quarterly Compustat North America Merged Fundamentals, XPF Tables, datasets. We use the following data and variable definitions: Stockholders' Equity (Compustat item SEQQ), Net Income (Compustat item NIQ), Total Assets (Compustat item ATQ), Sales (Compustat item SALEQ), Cash Flows from Operations (Compustat item OANCFY), Book-to-Market (Compustat items SEQQ /(PRCCQ × CSHOQ)), Return on Assets (Compustat items NIQ/ATQ), Cash Flows from Operations over Total Assets (Compustat items OANCFY/ATQ), and Return on Equity (Compustat items NIQ/SEQQ). Our industry classification is based on the 12 industries in Campbell [11].

Table 1 provides descriptive statistics of the MAKE awards by industry and year. Panel A presents the number of MAKE awards by industry. The Consumer Durables industry has the largest number of MAKEs, with 30%, followed by Services with 27%. The Capital Goods industry has the third largest number of MAKEs, with 21%, and the Petroleum industry has the fourth largest number of MAKEs with 10%. The remaining industries receive 6% or less of the awards.[5] Panel B of Table 1 lists the number and percentage of MAKE winners in our sample by year, and indicates that the number of MAKE winners increases over time. Table 2 lists descriptive statistics for our MAKE winning firms using data from the Compustat database. We report quarterly statistics on each sample firm based on their average values over the period 2001–2008, equally-weighted by firm and winsorized at the first and ninety-ninth percentile. Table 2 reports that the sample firms tend to be reasonably large, with median assets of over $34 billion and median sales of over $8 billion. Our sample firms are also financially healthy, with median quarterly return on assets (ROA) of 1.9%, median quarterly return on equity (ROE) of 4.7%, and median quarterly cash flow from operations scaled by total assets (CFO) of 8.5%.[6]

2.2. Information conveyed by winning a MAKE award

Under market efficiency, stock prices are expected to already reflect the market's estimate of the value of firms' KM prior to the receipt of a MAKE award. This is because managers have incentives to communicate the value of their KM to market participants, consistent with companies including discussions of their KM activities in presentations made to securities analysts (e.g., Carrig [12]). However, market participants are likely to find it difficult to value KM for several reasons. Because information about KM does not appear on the balance sheet and the information provided by management about their value is not audited, it is difficult for managers to credibly communicate its value to investors. In addition, the benefits from KM activities can vary widely across firms. For example, in a collection of case studies that attempt to learn why some firms do not benefit from their KM activities, Malhotra [27] documents several cases of poorly conceived or designed KM systems that do not improve firm performance. If it is difficult for the market to discern, ex ante, which firms' KM initiatives are likely to succeed and which are likely to fail, we expect the market to assign an expected value to the probability that a firm's KM initiatives will improve shareholder value. If the MAKE awards provide new information about which firms are most likely to successfully implement their KM initiatives, it should update this probability and thereby increase stock prices.

To illustrate how we expect the MAKE awards to impact share value under the semi-strong form of market efficiency, we use the framework proposed in Hendricks and Singhal [21]. Let V equal the value associated with successful KM activities, and let P_b be the market's assessment that the activities will be successful, before the MAKE award is announced.

[2] The KNOW Network website reports that the first MAKE award was announced in 1998, but during our analysis we were able to identify only sporadic news announcements prior to 2001. Thus, we begin our sample with the 2001 awards.

[3] Teleos issues a press release publicly announcing the MAKE winners. To establish the validity of the 25 press release dates obtained directly from Teleos, we compare the dates of the MAKE announcements of a sample of 97 Teleos press releases for which we also have news announcements and find that the Teleos dates match the news announcement dates in all but three cases, and in those cases the press release dates are within one day of the news announcement dates.

[4] Hendricks and Singhal [21] examine the market reaction to 91 quality award announcements issued to 32 firms over the period 1985–1991.

[5] The distribution of distinct firms across industries is Capital Goods (28%), Services (20%), Consumer Durables (13%), Finance/Real Estate (17%), Construction (11%), Basic (4%), Petroleum (2%), Transportation (2%), and Utilities (2%) industries.

[6] Firm-level investments in KM are only sporadically available on a project-by-project basis. The estimates in GIA [18] are industry-wide and include only sales revenues generated from sales of KM software and KM management services. KM impacts a wide variety of activities across many functional areas and total firm level expenditures are unavailable. Thus, we are unable to systematically examine KM dollar investments at the firm-level.

Table 2
Descriptive statistics. Descriptive statistics for distinct MAKE award winning firms with available Compustat data. Statistics are quarterly average values for each of the 46 distinct MAKE firms over the period 2001–2008, equally-weighted by firm in millions of dollars. Variable definitions: Stockholders' Equity (Compustat item SEQQ), Net Income (Compustat item NIQ), Total Assets (Compustat item ATQ), Sales (Compustat item SALEQ), Cash Flows from Operations (Compustat item OANCFY), Book-to-Market (Compustat items SEQQ / (PRCCQ × CSHOQ)), Return on Assets (Compustat items NIQ/ATQ), Cash Flows from Operations over Total Assets (Compustat items OANCFY/ATQ), and Return on Equity (Compustat items NIQ/SEQQ).

	Mean	Median	Standard deviation	25th percentile	75th percentile
Stockholders' Equity ($mm)	24,032	16,620	25,769	5,650	33,066
Net Income ($mm)	1,080	706	1,117	229	1,361
Total Assets ($mm)	121,925	34,396	271,851	14,367	95,482
Sales ($mm)	15,613	8,574	17,553	3,890	22,958
Cash Flows from Operations ($mm)	4,830	2,706	7,207	882	5,995
Market Value of Equity ($mm)	72,066	50,191	71,853	21,214	85,663
Book-to-Market	0.379	0.291	0.245	0.215	0.494
Return on Assets	0.024	0.019	0.020	0.009	0.038
Cash Flows from Operations/Assets	0.092	0.085	0.054	0.050	0.130
Return on Equity	0.065	0.047	0.084	0.028	0.075

This means that stock prices will have impounded P_bV as the expected value of the firm's KM activities before the award is announced. If the firm then wins a MAKE award, we expect the market to reassess the probability that the firm's KM activities will be successful. If the new probability after the award is P_a, then P_aV is the portion of the total value of the firm's KM activities impounded in price after the MAKE award is announced. Thus, winning the award will increase firm value by $(P_a - P_b)V$. This theoretical framework suggests that the MAKE award will revise the market's assessment of the probability that the winning firms' KM activities will successfully result in superior future performance.[7]

3. Analyses and results

3.1. Stock market reaction to winning a MAKE award

Our first test examines the abnormal stock returns of the MAKE winners during the five-day window surrounding the award announcement date. Because winning a MAKE is expected to update the market's expectations about which firms' KM activities are likely to be most valuable, we expect a positive stock market reaction to the announcement. We test our prediction using a standard event-study methodology with cumulative abnormal returns (CAR) computed over a five-day event window, beginning two days before the announcement through two days after the announcement (e.g., Binder [6]). We employ a five-day window because the MAKE awards are announced to members of the KNOW Network via email one or two days prior to the official press release date, which suggests news of the awards may be leaked prior to the official announcement date. In addition, the MAKE awards are relatively new and the benefits of KM may be relatively unclear to market participants, suggesting that market participants may be slow to react to the announcements. Specifically, we compute CAR as:

$$CAR_{[-2,+2]} = \sum_{t=-2}^{t=+2} \overline{AR}_t. \quad (1)$$

where: $\overline{AR}_t = \frac{1}{N_t}\sum_{i=1}^{i=N_t} AR_{it}$; $AR_{it} = R_{it} - E(R_{it})$; and $t = (-2, -1, 0, +1, +2)$; R_{it} is the return of the sample firm i on day t; $E(R_{it})$ is the corresponding market return from CRSP on day t.

[7] We also note that the market reaction to the MAKE award announcement is an example of market efficiency with costly information (Grossman and Stiglitz [20]; Beaver [5]; Ball [4]). Specifically, the information aggregation process in the MAKE award selection procedure and the expertise extracted through this selection is costly for market participants. Obtaining this information requires acquisition costs that do not necessarily outweigh their benefits. These factors suggest that short-window event returns can exist under market efficiency with costly information.

We report two z-statistics and two t-statistics that test the statistical significance of the CAR, using the Pattell [31] Z-test and the Generalized Sign Z-test, as well as using the time-series mean abnormal returns as in Brown and Warner [8,9] and the calendar-time abnormal returns as in Jaffe [24] and Mandelker [28].[8] The Z-tests are conventional, and the t-statistics using the time-series approach are computed as follows:

$$t = \sum_{t=-2}^{t=+2} \overline{AR}_t \Big/ \left(\sum_{t=-2}^{t=+2} S^2\left[\overline{AR}_t\right] \right)^{1/2} \quad (2)$$

where: $S^2\left[\overline{AR}_t\right] = \left(\sum_{t=-244}^{t=-6} \left[\overline{AR}_t - \overline{AAR}\right]^2 \right)/238$; $\overline{AAR} = \sum_{t=-244}^{t=-6} \left[\overline{AR}_t/239\right]$.

We use 239 days (−244 through −6) in the estimation period to derive the standard deviation and restrict the analysis to firms with at least 120 daily returns in the estimation period.

To implement the calendar-time test we first sort all firms into portfolios by event calendar date. Next we estimate a portfolio standard deviation from the time series of portfolio abnormal returns in the estimation period, and use it to standardize the portfolio return. Our calendar-time p-value from this test is based on a cross-sectional t-test of the standardized portfolio abnormal return. We calculate the calendar-time t-statistic as follows:

$$t = CAAR_{[-2,+2]} \Big/ \left(S_{CAAR_{[-2,+2]}} / \sqrt{N} \right) \quad (3)$$

where: $S^2_{CAAR_{[-2,+2]}} = \frac{1}{N-1}\sum_{i=1}^{N}\left[\left(\sum_{t=-2}^{t=+2}\overline{AR}_t\right)_i - \frac{1}{N}\sum_{j=1}^{N}\left(\sum_{t=-2}^{t=+2}\overline{AR}_t\right)_j\right]^2$;

$CAAR_{[-2,+2]} = \frac{1}{N}\sum_{j=1}^{N}\left(\sum_{t=-2}^{t=+2}\overline{AR}_t\right)$; and i, j are firm indices.

Table 3 reports the results of the stock market reaction analysis. Consistent with our prediction, we find a positive portfolio mean abnormal return for the MAKE winners of 1.23%, which is significant at p = 0.019 using the Patell Z-test, at p = 0.011 using the Generalized Sign Z-test, at p = 0.059 using the time-series abnormal return t-statistic from Brown and Warner [9.10] and at p = 0.035 using the calendar-time abnormal return t-statistic from Jaffe [24] and Mandelker [28]. The economic significance is captured through the impact of the market reaction on firms' equity value. Evaluated at the mean and median market value of equity for our sample firms of $72,066 and $50,191 million (see Table 2), our findings are consistent with an increase in market value of $900.8 and $627.4 million per sample firm, respectively. Overall, our findings are consistent with the MAKE awards

[8] The nonparametric generalized sign Z-test adjusts for the fraction of positive versus negative abnormal returns in the estimation period, instead of assuming a probability of half for a positive abnormal return.

Table 3
Market Reaction to Announcement for 247 MAKE Award Winners. This table reports abnormal return around the announcement of news for firms that excel at KM. Portfolio abnormal returns are the five-day cumulative abnormal returns surrounding the announcement day for 247 MAKE award winners using standard event study methodology (Binder, 1998). The CARs are computed as follows: $CAR_{[-2,+2]} = \sum_{t=-2}^{t=+2} \overline{AR_t}$, where: $\overline{AR_t} = \frac{1}{N_t} \sum_{i=1}^{i=N_t} AR_{it}$; $AR_{it} = R_{it}\text{-}E(R_{it})$; and $t = (-2, -1, 0, +1, +2)$; R_{it} is the return of the sample firm i on day t; and $E(R_{it})$ is the corresponding market return from CRSP on day t.
P-values are based on statistics computed using two z-tests, and two t-tests following the time-series mean abnormal returns as in Brown and Warner (1980, 1985) and the calendar-time abnormal returns as in Jaffe (1974) and Mandelker (1974). We calculate the time-series t-statistic as follows: $t = \sum_{t=-2}^{t=+2} \overline{AR_t} / \left(\sum_{t=-2}^{t=+2} S^2\left[\overline{AR_t}\right] \right)^{1/2}$, where: $S^2\left[\overline{AR_t}\right] = \left(\sum_{t=-244}^{t=-6} \left[\overline{AR_t} - \overline{AAR}\right]^2 \right) / 238$; $\overline{AAR} = \sum_{t=-244}^{t=-6} \overline{AR_t} / 239$.
We calculate the calendar-time t-statistic as follows: $t = CAAR_{[-2,+2]} / \left(S_{CAAR_{[-2,+2]}} / \sqrt{N} \right)$, where: $S^2_{CAAR_{[-2,+2]}} = \frac{1}{N-1} \sum_{i=1}^{N} \left[\left(\sum_{t=-2}^{t=+2} \overline{AR_t} \right)_i - \frac{1}{N} \sum_{j=1}^{N} \left(\sum_{t=-2}^{t=+2} \overline{AR_t} \right) \right]^2$; $CAAR_{[-2,+2]} = \frac{1}{N} \sum_{j=1}^{N} \left(\sum_{t=-2}^{t=+2} \overline{AR_t} \right)$; and i, j are firm indices.

Portfolio-level abnormal returns	1.23%
p-value (Patell Z)	(0.019)
p-value (Generalized sign Z)	(0.011)
p-value (time-series)	(0.059)
p-value (calendar-time)	(0.035)

providing new information to market participants about which firms' KM activities are likely to benefit future performance.

Our findings in Table 3 are unlikely to result from the market's naïve mechanical reaction to firms that receive major awards. Prior research finds that the stock market does not always react positively to award recipients, and firms that receive awards do not always outperform their peers. Several prior studies examine the stock market reaction and future performance of companies that receive awards such as the Malcolm Baldrige Award and the J. D. Power and Associates Award (e.g., Hendricks and Singhal [21]; Przasnyski and Tai [33]; Balasubramanian, Mathur, and Thakur [3]). The results from this prior literature are mixed, with several studies finding no significant reaction to the awards. Not finding a stock market reaction to published news of awards examined in other studies suggests that our results are not likely to be explained simply by the award focusing the market's attention on the winners.

3.2. Future performance of award winners compared to their peers

If KM impacts firm value through enhanced future performance, we expect the MAKE winners (who are firms with superior KM abilities) to outperform their peers, on average, subsequent to the receipt of the award. We investigate this by comparing the MAKE winners' performance with the performance of their peers using two tests. The first test uses an ordinary least squares regression analysis to compare the MAKE winners with a set of industry-peer firms during the quarters in which the MAKEs are awarded. The second test uses a "propensity score matching" technique to compare the MAKE winners' performance with their peers. Both tests compare three performance measures: ROA, ROE, and CFO, averaged over the four quarters following the quarter in which the MAKE award is received, with data obtained from the Compustat Quarterly database. We use the average of all available quarters for firms with less than four quarters of available data following the receipt of the award. In addition, both of our future performance tests include a measure of past performance in order to control for the so-called "halo" effect (Brown and Perry [7]), which refers to the possibility that the MAKE winners are chosen simply because of their past superior performance. If the MAKE is chosen simply because the MAKE winners performed well in the past, the past performance variable, rather than the MAKE indicator variable will explain future performance.[9]

3.2.1. Performance comparison with peer firms matched on industry

Because the first peer group is matched only on industry, we compare the MAKE winners with this group by estimating the following regression model that adds control variables capturing past performance, total assets, and the book-to-market ratio:

$$FuturePerformance_{it} = \alpha + \beta_1 Winner_{it} + \beta_2 PastPerformance_{it} + \beta_3 Assets_{it} + \beta_4 BTM_{it} + \varepsilon_{it}. \quad (4)$$

Where:

$FuturePerformance_{it}$ ROA, ROE, and CFO, for firm i over period t, which equals the average of the four quarters following the quarter in which the MAKE award is received.

$Winner_{it}$ An indicator variable indicating the observation is a MAKE winner.

$PastPerformance_{it}$ ROA, ROE, and CFO, for firm i over period t, averaged over the four quarters prior to the quarter in which the MAKE is awarded.

$Assets_{it}$ Total Assets of firm i over period t, measured during the quarter in which the MAKE is awarded. When quarterly Compustat data is missing, we use the most recent quarterly or annual data prior to the quarter in which the MAKE is awarded.

BTM_{it} Book-to-Market ratio of firm i over period t, measured during the quarter in which the MAKE is awarded. When quarterly Compustat data is missing, we use the most recent quarterly or annual data prior to the quarter in which the MAKE is awarded.

We cluster the regression residuals by firm and year to control for potential correlations among the error terms. We include control variables for past performance, size, and the book-to-market ratio because these variables are potentially related to future operating performance. For the regression model in Eq. (4), and the related univariate analysis described below, we winsorize the continuous variables at the first and ninety-ninth percentile. A significantly positive coefficient on the indicator variable capturing MAKE winners is consistent with the winning firms outperforming the matched peer firms over the four quarters following the announcement of the MAKE award.

Table 4, Panels A through C, present the results of our first analysis. Panel A presents descriptive statistics for the 202 MAKE winning observations and Panel B presents descriptive statistics for the 51,665 peer firms matched on industry, and all descriptive statistics are based on quarterly data. Panel A indicates that mean future ROA, ROE, and CFO is 2.9%, 6.2%, and 10.1%, respectively, for the 202 MAKE winning observations. Panel B indicates that the industry-matched peers are smaller and perform more poorly compared to the MAKE winners in Panel A. In addition, the book-to-market ratios of the peer firms tend to be larger than for the MAKE winners. Table 4, Panel C, presents the results of the regression analysis and reports a positive coefficient on the indicator variable capturing MAKE winners in all three regressions, with a significance of $p < 0.001$. Thus, we find that when compared to the peers in their industry, the MAKE winners report significantly higher future

[9] Brown and Perry [7] propose a method for extracting the halo effect from Fortune Magazine's ratings of the Most Admired Companies. However, unlike the Fortune Magazine ratings, which are ordinal rankings, the MAKE award is a binary variable. Therefore, we extract the effect in our analysis by including past performance as a control variable. We also perform sensitivity tests in Section 5 that control for the halo effect by first orthogonalizing our future performance measures to past performance, as suggested by Brown and Perry [7], and then using in our tests the future performance measures that are purged of past performance (i.e., the residuals from the first stage).

Table 4
Future performance tests. This table reports results from four-quarters-ahead performance of MAKE winners compared to three matched samples: one based on industry only, a second based on industry and same percentile of total assets, and a third based on propensity score matching. Panel A presents descriptive statistics of variables included in the analysis for the 202 MAKE winners with available Compustat data during the MAKE winning quarter. Panel B presents descriptive statistics for 51,665 MAKE peer firms matched on industry only. Panel C reports results from comparing future performance of the MAKE winners with that of the MAKE peer firms matched on industry only. This analysis regresses *FuturePerformance* on an indicator variable (*Winner*) which is equal to 1 when the observation is a MAKE winner and zero otherwise, and control variables for past performance (*PastPerformance*), total assets (*Assets*), measured in billions of dollars, and the book-to-market (*BTM*) ratio. Panel D presents descriptive statistics for 202 MAKE peer portfolios matched on industry and same percentile of total assets. Panel E reports results from comparing future performance of the MAKE winners with the MAKE peer firms matched on industry and same percentile of total assets. This analysis performs a univariate comparison of ROA, ROE, and CFO across the two samples. Panels F and G report results from the propensity score matching procedure. *FuturePerformance* is ROA, ROE, and CFO averaged over the four quarters subsequent to the winning quarter, and *PastPerformance* is the related performance measure averaged over the four quarters prior to the quarter in which a MAKE is awarded. When less than four quarters of data are available, we use all available quarters. Regression residuals are clustered by firm and year to control for potential cross-sectional and time-series correlation. p-Values are in parentheses.

Panel A: MAKE winners (N = 202)

	Mean	Median	Std dev	25th percentile	75th percentile
Future return on Assets	0.029	0.025	0.024	0.011	0.044
Future return on Equity	0.062	0.056	0.046	0.034	0.086
Future Cash Flows from Operations over Assets	0.101	0.097	0.057	0.061	0.138
Past return on Assets	0.029	0.022	0.023	0.011	0.043
Past return on Equity	0.059	0.053	0.043	0.036	0.080
Past Cash Flows from Operations over Assets	0.102	0.099	0.056	0.060	0.138
Total Assets	113,707	48,516	239,654	14,746	98,008
Book-to-Market	0.311	0.244	0.199	0.143	0.479

Panel B: MAKE peer firms matched on industry only (N = 51,665 peer firms)

Future return on Assets	−0.025	0.004	0.094	−0.028	0.018
Future Return on Equity	−0.099	0.011	0.424	−0.053	0.035
Future Cash Flows from Operations over Assets	−0.015	0.022	0.163	−0.032	0.065
Past return on Assets	−0.024	0.003	0.091	−0.029	0.018
Past return on Equity	−0.057	0.011	0.253	−0.052	0.035
Past Cash Flows from Operations over Assets	−0.012	0.021	0.149	−0.034	0.064
Total Assets	3,771	145	40,501	31	752
Book-to-Market	0.595	0.454	0.554	0.264	0.733

Panel C: Regression of future performance for MAKE winners (N = 202) and MAKE peer firms matched on industry only (N = 51,665 peer firms)

$FuturePerformance_{it} = \alpha + \beta_1 Winner + \beta_2 PastPerformance_{it} + \beta_3 Assets_{it} + \beta_4 BTM + \varepsilon_{it}$

	Dependent variable		
	Future return on assets	Future return on equity	Future cash flows from operations over assets
α	−0.006	−0.059	−0.004
	(<0.001)	(<0.001)	(<0.001)
Winner	0.014	0.066	0.020
	(<0.001)	(<0.001)	(<0.001)
PastPerformance	0.679	0.721	0.816
	(<0.001)	(<0.001)	(<0.001)
Assets	2.040E–05	1.148E–04	1.450E–05
	(<0.001)	(<0.001)	(<0.001)
BTM	−5.216E–03	9.129E–04	−9.430E–04
	(<0.001)	(0.840)	(0.415)
N	51,867	51,867	51,867
Adj. R^2	0.432	0.186	0.562

Panel D: Propensity score matching analysis–covariate balance

	MAKE Firms		Propensity matched control sample		Difference in means	Wilcoxon sign ranked test
Variable	Mean	Median	Mean	Median	(p-Value)	(p-Value)
Performance — Return on Assets (N = 186)						
Assets	94,843	49,289	89,222	3,971	(0.845)	(<0.001)
Book-to-Market	0.322	0.241	0.350	0.306	(0.135)	(0.420)
Past return on Assets	0.028	0.022	0.023	0.016	(0.449)	(0.067)
Performance — Return on Equity (N = 185)						
Assets	93,802	48,516	73,590	3,941	(0.399)	(<0.001)
Book-to-Market	0.321	0.241	0.380	0.325	(0.001)	(0.056)
Past return on Equity	0.056	0.052	0.082	0.040	(0.399)	(0.012)
Performance — Cash Flow from Operations over Assets (N = 180)						
Assets	104,506	48,594	59,670	3,145	(0.077)	(<0.001)
Book-to-Market	0.324	0.241	0.319	0.270	(0.772)	(0.602)
Past Cash Flow from Operations over Assets	0.101	0.097	0.088	0.085	(0.021)	(0.333)

(*continued on next page*)

Table 4 (*continued*)

Panel E: Propensity score matching analysis — comparison of future performance						
	MAKE firms		Propensity matched control sample		Difference in means	Wilcoxon sign ranked test
Performance variable	Mean	Median	Mean	Median	(p-Value)	(p-Value)
Return on Assets	0.029	0.024	0.017	0.013	(<0.001)	(<0.001)
Return on Equity	0.063	0.053	0.038	0.038	(0.001)	(<0.001)
Cash Flow from Operations over Assets	0.099	0.097	0.086	0.075	(0.092)	(0.014)

performance, after controlling for past performance, size, and the book-to-market ratio as control variables.

3.2.2. Performance comparison using propensity score matching

Our propensity score matching analysis follows the approach outlined in Mithas and Krishnan [29] (see also Rosenbaum and Rubin [36]). First, we identify the treatment, the outcome of interest, and the covariates. In our setting, the treatment is receiving the MAKE award, the outcome of interest is the firm's performance (measured as ROA, ROE and CFO), and the covariates are the firm's size, past performance, and book-to-market. Second, we define the parameter being estimated. Since we are interested in the performance of firms receiving a MAKE award relative to their peers that do not receive a MAKE award, the parameter we estimate is the difference in performance after the receipt of a MAKE award. Third, we identify the covariates associated with the parameter we estimate (i.e., winning a MAKE award). While we do not have a theory to help direct us in choosing these covariates, the descriptive information in Panels B and C of Table 4 indicate that the MAKE winners tend to be large, with lower values of book-to-market-to firm and higher past performance when compared with their peers. Thus, we use total assets, book-to-market, and past performance as covariates to make MAKE winners.[10]

Our fourth step is to obtain our propensity scores by estimating the following logit model:

$$MAKE = \alpha + \beta_1 \cdot Assets + \beta_2 \cdot BTM + \beta_3 \cdot PastPerformance + \varepsilon. \quad (5)$$

The dependent variable, *MAKE*, is an indicator variable which equals one if the firm wins a MAKE award, and zero otherwise. *Assets* and *BTM* (book-to-market) are measured during the quarter prior to the quarter in which the MAKE is awarded. *PastPerformance* is measured over the year prior to the quarter in which the MAKE is awarded. We define *PastPerformance* using three measures: past ROA, past ROE, and past CFO. The sample consists of the MAKE winners and all firms within the same industry and asset decile during the quarter prior to the quarter in which the MAKE is awarded. We estimate Eq. (5) for each industry-quarter. The propensity scores are calculated for each observation, for each of the three *PastPerformance* measures, by obtaining the fitted values from Eq. (5).[11]

Our fifth step is to use a caliper matching algorithm, without replacement, to identify one control firm for each MAKE firm. We require the propensity score for the control firm to be within plus-or-minus 0.001 of the MAKE firm, and are able to identify a control firm within this range for all MAKE winning firms. Table 4, Panel D, provides descriptive statistics for the MAKE winners and the control firms we identify, along with the differences between the treated firms and the propensity score matched firms. The panel reveals that the control sample identified by the propensity score matching is quite similar to the MAKE winning firms in terms of assets, book-to-market, and past performance. The sample size decreases from 202 observations in each test because of insufficient observations within some industry-quarters to estimate the logit propensity score model.[12]

Our final step compares the future performance of MAKE winning firms with the future performance of the propensity score matched sample, and is presented in Panel E of Table 4. Panel E indicates that MAKE winning firms experience significantly greater future performance—in terms of ROA, ROE, and CFO—than the propensity score matched sample, ROA and ROE at $p < 0.001$ and CFO at $p = 0.092$. Thus, findings from the propensity score matching procedure provide additional evidence that MAKE firms outperform their peers.

The two analyses of future performance presented in Table 4 provide consistent evidence that the MAKE awards identify firms that outperform their peers subsequent to receiving the award.

3.3. Analyst earnings forecast revisions following award announcements

Equity analysts are information intermediaries that are potentially interested in the valuation implications of the MAKE awards. Thus, in addition to investigating the stock market's reaction to the announcement of the MAKE awards, we also investigate the reaction of equity analysts. If the MAKE awards provide new information about which firms are most likely to succeed at KM, we expect that equity analysts are more likely to make upward revisions to their annual earnings forecasts during the month following the announcements. Finding that analysts make upward revisions to their forecasts in response to the awards is consistent with the awards providing analysts with new information about which firms' KM activities are likely to benefit future performance.

We perform two analyses to test the reactions of analysts. Our first analysis tests whether the average number of upward earnings forecast revisions is larger than the average number of downward earnings forecast revisions for the MAKE winners during the month following the announcement of the award. If the MAKE awards provide new information about improved future performance, we expect to find significantly more upward revisions than downward revisions. Using the I/B/E/S database we compute the total number of upward and downward revisions for all observations with available data, divided by

[10] A limitation of this particular performance analysis is that there exists little theory to guide us in modeling MAKE winners. However, we do not rely solely on the propensity score matching test to draw inferences about MAKE winners' future performance. Rather, we look at the preponderance of evidence across all three of our tests of future performance.

[11] We check the overlap of the propensity score support for MAKE firms and control firms to determine if there are any MAKE winning firms which are outside of the support of the control firms. We find that the support for the MAKE firms is within the support for the control firms, thus we proceed without dropping any treatment cases.

[12] We estimate the propensity score model for subsamples of industry-quarter combinations. A few of these subsamples are small or the model that uses them does not converge, which leads to a propensity score model not yielding reliable estimates (i.e., no propensity score) in such cases. This results in the decrease of the sample size from 202 observations.

Table 5
Analyst forecast revisions following MAKE award. This table reports results from analyses of analyst forecasts. Panel A reports the average of each firm's proportion of revising analysts who revise their annual EPS forecast upward during month $t + 1$. Panel B reports a comparison in the change of the mean consensus annual EPS forecast from month $t - 1$ to month $t + 1$ between MAKE winning firms and a control group of peer firms matched on same industry, year, quarter, and one percentile of total assets.

Panel A: The direction of analyst forecast revisions (N = 190)

$$Measure\ 1 = \frac{Number\ of\ Upward\ Revisions_{t+1}}{Number\ of\ Awards}$$
$$Measure\ 2 = \frac{Number\ of\ Downward\ Revisions_{t+1}}{Number\ of\ Awards}$$

Mean number of analysts per MAKE winner that revise upward (Measure 1)	3.084
Mean number of analysts per MAKE winner that revise downward (Measure 2)	1.663
p-Value for difference in means	(0.004)

Panel B: Comparison of the magnitude of analyst forecast revisions surrounding the award month for MAKE winners versus a control sample of matched peer firms (N = 160)

	Mean	p-Value from a two-sample *t*-test for comparison of means	Median	p-Value from a two-sample Wilcoxon Z-test for comparison of medians
Test sample: MAKE winners	0.035	(0.034)	0.004	(<0.001)
Control sample: matched peers	<0.001	(0.8925)	<0.001	(0.840)
Difference (test – control)	0.034	(0.028)	0.015	(0.005)

the number of MAKEs with available data. Specifically, we calculate the following two ratios, where time t is the award month:

$$Measure\ 1 = \frac{Number\ of\ Upward\ Revisions_{t+1}}{Number\ of\ Awards}$$
$$Measure\ 2 = \frac{Number\ of\ Downward\ Revisions_{t+1}}{Number\ of\ Awards}. \quad (6)$$

Table 5, Panel A, reports the results of this test. This analysis restricts our sample to observations with consensus forecasts in the I/B/E/S database during the month after the award month, which reduces our sample to 190 observations. Panel A indicates that an average of 3.084 analysts per MAKE winner revise upwards (Measure 1), and an average of 1.663 analysts per MAKE winner revise downwards (Measure 2), and that the average number of upward revisions is significantly greater than the average number of downward revisions at p = 0.004. Thus, we find that the average number of upward forecast revisions is larger than the average number of downward forecast revisions for the MAKE award winners during the month following the announcement of the award.[13]

Our second test investigates analyst EPS forecast revisions of MAKE firms relative to a control sample. We first match each MAKE award observation with a matched portfolio of firms in the same industry, year, quarter, and percentile of total assets, where each portfolio contains an average of 6.4 matched peer firms. Next we calculate the revisions in analyst consensus EPS forecasts over the period month +1 relative to month −1 (−1, +1), where the award month is defined as month 0. We scale the analyst EPS forecast revisions by the analyst consensus EPS forecast from the first month of each period and winsorize at the first and ninety-ninth percentile for both the MAKE firms and the peer portfolios. We then compute the mean and median of the scaled revisions, and conduct a two-sample *t*-test and a two-sample Wilcoxon Z-test to compare the means and medians, respectively, between the MAKE firms and the matched control portfolios.

Table 5, Panel B, reports the results of this test. The sample size for the test period is constrained by the availability of I/B/E/S data for both the treatment firm and the matched portfolios, and requires forecasts for both the month before and the month following the announcement. Thus, the sample size is reduced to 160 award observations.[14] The first row reports the mean and median revision for the award firm observations and indicates that both the mean and the median are significantly positive, with values of 0.035 (p = 0.034) and 0.004 (p < 0.001), respectively. The next row reports the mean and median revision for the control matched portfolios and indicates that they are both insignificant at conventional levels. The last row in Panel B reports the differences in the mean and median revisions between the award firm observations and the matched portfolios. This analysis finds that the mean and median MAKE firms' revisions are significantly higher than the matched portfolios' revisions, with values of 0.034 (p = 0.028) and 0.015 (p = 0.005), respectively. Thus, Panel B indicates that equity analysts make significantly larger upward revisions to MAKE winners than to their peers during the months immediately following the award announcement month.

Thus, for MAKE winners during the month following the award announcement the average number of upward analyst forecast revisions is larger than the average number of downward revisions and analyst EPS forecast revisions for MAKE winners are significantly higher than for their peers. Together, these findings corroborate our short window market reaction results and provide evidence that the MAKE awards communicate information about which firms' KM activities are likely to benefit future performance.

3.4. Subsequent abnormal stock returns of award winners

It is only recently that companies have begun to make large investments in KM, and the MAKE awards are relatively new. Therefore, the market may still be learning about the benefits of KM and the credibility of the MAKE awards. If so, the market may not impound all of the value relevant information about the award winners around the announcement date. If so, and if the MAKE winners outperform their peers, we expect abnormally high stock returns for the MAKE winners to persist subsequent to the announcement of the awards, as the market learns of their superior performance. Thus, we examine the risk-adjusted one-year-ahead returns of the MAKE winners.

We examine the subsequent stock market performance of the MAKE winners using an asset pricing test that examines the Fama–French intercepts (alphas) from a monthly time-series model of MAKE portfolios (e.g., Fama and French, 1993 [16]). Specifically, we form portfolios on July 1st of each year, where each portfolio consists of all MAKE winners during the preceding twelve months. Fig. 1 presents a timeline for the construction of our portfolios relative to the announcement of the MAKE winners. We then calculate the portfolio average return in excess of the risk-free rate for each month during the subsequent twelve months, and regress these monthly portfolio returns on the Fama–French factors, excess return on the market (MKT), small-

[13] We note that prior literature finds that analysts "walk down" their forecasts, whereby forecasts at the beginning of the period tend to be optimistically biased and forecasts at the end of the period tend to be pessimistically biased (e.g., Richardson et al. [35]; Ke and Yu [26]). This means that most forecast revisions are downward. Thus, our test, which assumes 50% of analysts' revisions are upward, is conservatively biased against finding our result.

[14] Note that the forecasted annual earnings during the month prior to the award announcement month must also be for the same year as the forecast during the month subsequent to the award announcement month. This restriction results in dropping seven observations.

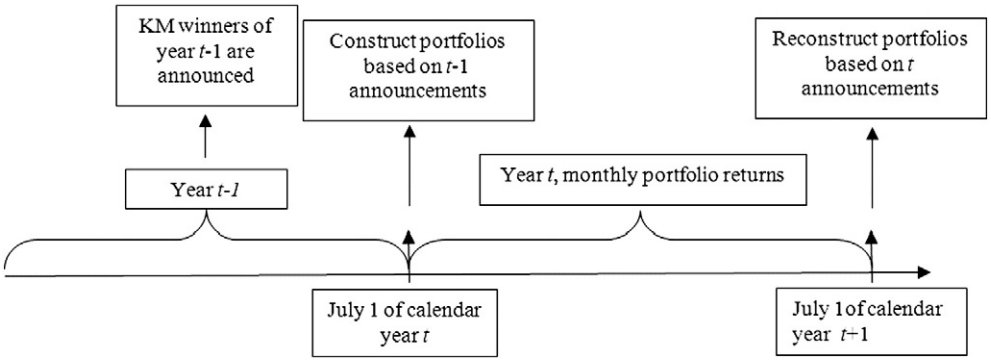

Fig. 1. Timeline for test of future risk-adjusted returns for portfolios constructed on MAKE winners. The figure plots the timeline for the analysis of one-year ahead abnormal returns for portfolios constructed on MAKE winners. The first portfolio, constructed on July 1, 2001, includes all firms that received a MAKE award during the prior 6 months. Portfolios are reconstructed on July 1 of each year *t* based on KM award winners during the prior 12 months. Our sample includes the monthly observations from July 2001 through December 2008 (N = 90). Each firm's monthly returns are obtained from the CRSP Monthly Stock File, and the monthly portfolio returns are obtained by averaging all firms' returns in each month during the test period. The monthly portfolio returns are regressed on the four Fama–French and momentum factors: excess return on the market (MKT), small-minus-big return (SMB), high-minus-low return (HML), and momentum factor (MOM).

minus-big (SMB), high-minus-low (HML), and a momentum factor (MOM). Specifically, we estimate the following model:

$$\left(Ret\text{–}R_f\right)_{pm} = \alpha_p + \beta_1 MKT + \beta_2 SMB + \beta_3 HML + \beta_4 MOM + \varepsilon_{pm} \qquad (7)$$

where:

$(Ret - R_f)_{pm}$
Month *m* equally-weighted return in excess of the one month Treasury Bill, R_f, to portfolio *p* formed each July 1st and includes all MAKE winners in our sample during the preceding 12 months.

MKT the monthly return on the stock market minus the return on the one month Treasury Bill.

SMB and *HML* the respective monthly return to the size (small-minus-big) and book-to-market (high-minus-low) factor mimicking portfolios as described in Fama and French [16]

MOM the monthly return to the momentum factor mimicking portfolio (Jegadeesh and Titman [25]; Carhart [10])

A significantly positive intercept in this regression indicates the MAKE winners report abnormal stock returns over the year following the MAKE awards portfolio formation date. Table 6 presents the results of this analysis. The sample size is 90 observations, corresponding to the number of months in the analysis (6 months of returns for 2001, and 12 months of returns for 2002–2008). We find that the coefficient on the intercept is significantly positive, with a value of 0.9% (p = 0.005). This finding indicates that MAKE winners continue to experience abnormal stock returns, on average, during the year following the MAKE awards portfolio formation date. This finding is consistent with market participants finding it difficult to value KM, and with the winning of a MAKE not fully updating market participant's expectations of the value of KM to the winners.

3.5. Investor processing of KM information

Market participants may take time to learn how to process the information about knowledge management provided by the MAKE award. As a result, we conduct additional analysis to examine whether there is a learning effect. We begin by first partitioning our sample on whether the MAKE is won during the first half of our analysis (2001–2004) or the second half (2005–2008). We then repeat our tests of the short window market reaction (Table 3), future operating performance (Table 4), and future abnormal returns (Table 6), for each of the two sub-periods.[15] If the market is learning over time, we expect a stronger and more complete short window market reaction during the second half of our sample period. Specifically, during the first half of our sample we expect a relatively weaker short window reaction, and relatively greater post-MAKE-announcement upward drift. However, a stronger market reaction to the MAKE award during the second half of our sample period is also consistent with the MAKE award becoming better at identifying superior performing firms. Thus, we also track whether the MAKE award consistently identifies superior performing firms across both subsample periods.

Table 7, Panels A, B, and C report results from the short window stock market reaction, future operating performance, and future abnormal returns tests for the two subperiods, which correspond to the tests reported in Tables 3, 4, and 6, respectively. Panel A indicates that while the stock market reaction is insignificant during the early subperiod (abnormal return = 0.76%; p-values: Patell Z = 0.237, Generalized Sign Z = 0.263, time-series = 0.420, and calendar-time = 0.341), it is significant and positive during the late subperiod (abnormal return = 1.46%; p-values: Patell Z = 0.001, Generalized Sign Z < 0.001, time-series = 0.010, and calendar-time = 0.035). The insignificant market reaction during the early subperiod contrasts with the significantly positive reaction during the late subperiod, and is consistent with market participants learning over time that the MAKE award provides information about firms with superior performance. This is consistent with the award announcement not fully resolving all of the informational difficulties that investors have in trying to interpret the value implications of KM.

Panel B indicates that MAKE winners experience superior future operating performance in both subperiods, and this finding is consistent across the three tests of future performance. Finding superior future performance in both subperiods indicates that the MAKE consistently identifies superior performing firms across the entire sample period. Table 7, Panel B, repeats the future performance tests conducted in Table 4, but for each subperiod. Our goal here is to investigate whether the effect of KM on superior future performance pertains to both subperiods. Panel B indicates that MAKE winners experience superior future operating performance in both subperiods. Also, the results of superior future performance for award firms are strong and consistent when using future ROA and ROE, and slightly weaker, although generally consistent, when using future CFO (using future CFO, superior

[15] Since we have no prediction for the effects on analysts' forecasts, we do not repeat the tests in Table 5.

Table 6
Future abnormal returns for portfolios constructed on MAKE winners. This table reports results from estimating future abnormal returns for portfolios constructed on MAKE winners during 2001–2008. Portfolios are constructed on July 1st of each year, and include all MAKE winners during the preceding 12 months. Monthly return data are obtained from CRSP, and portfolio monthly returns are calculated each month as the equally-weighted monthly returns for all firms in the portfolio. Portfolios are rebalanced every year, and portfolio monthly returns in excess of the monthly risk-free rate $(Ret - R_f)_{pm}$, are regressed on the four Fama–French and momentum factors: excess return on the market (MKT), small-minus-big return (SMB), high-minus-low return (HML), and momentum (MOM). The monthly risk-free rate is the return on the one month Treasury Bill.

$(Ret - R_f)_{pm} = \alpha_p + \beta_1 MKT + \beta_2 SMB + \beta_3 HML + \beta_4 MOM + \varepsilon_{pm}$

Variable	Coefficient	t-statistic	p-Value
α	0.009	2.87	(0.005)
MKT	1.292	14.88	(<0.001)
SMB	0.010	0.08	(0.937)
HML	−0.667	−4.85	(<0.001)
MOM	0.007	0.09	(0.929)
N	90		
Adj. R^2	0.813		

performance is apparent in the second subperiod, both subperiods, and second subperiod as shown in Panel B, parts B.1, B.2, and B.3, respectively). Finding superior future performance in both subperiods indicates that the MAKE consistently identifies superior performing firms across the entire sample period. Panel C reports that while there is significantly positive future abnormal returns for an investment trading strategy that uses KM information during the early subperiod (Fama–French–Carhart alpha = 2.16; p = 0.0372), the future abnormal return is insignificant during the late subperiod (Fama–French–Carhart alpha = 0.75; p = 0.4569). The significant subsequent returns during the early subperiod of our analysis, contrasted with insignificant returns during the late subperiod, is consistent with the market learning, during the 2001–2004 period that KM improves subsequent operating performance.

In summary, during the first half of our sample we find a statistically insignificant short window reaction and a statistically significant post-MAKE-announcement upward drift. Conversely, during the second half of our sample we find a significant short window reaction and an insignificant post-MAKE-announcement upward drift. In addition, we find that the MAKE identifies firms with superior operating performance during both halves of our sample period. Thus, the findings in Table 7 are consistent with market participants learning to interpret the information conveyed by the MAKE award over our sample period.

4. Sensitivity tests

4.1. Alternative analysis of abnormal short window returns

We repeat the analysis in Table 3 using firm-level instead of portfolio-level returns. In untabulated tests we continue to find significantly positive abnormal returns during the short window centered on the MAKE announcement day. Thus, our interpretation from our analysis in Table 3 remains unchanged using this alternative measure of returns.

4.2. Alternative analysis of future performance

Table 4, Panel E, reports an analysis using a univariate test. We test the robustness of this analysis by using a regression specification as in Table 4, Panel C, and using the 202 peer portfolios we use in Table 4, Panel E. Specifically, we regress future performance for our sample of MAKE winners and peer firm portfolios (matched on industry and same percentile of total assets), on an indicator variable for MAKE winners, past performance, total assets, and the book-to-market ratio. In untabulated analysis we find a significantly positive coefficient on the MAKE winner indicator variable. Thus, our inferences in Table 4, Panel E, remain unchanged using a multivariate analysis.

We also test the sensitivity of our results in Table 4, Panel C, and the alternative regression specification of Table 4, Panel E (described above), to the inclusion of past performance by repeating the regression analyses after omitting the past performance variable. In untabulated results we find that the coefficient on the indicator variable for MAKE winners remains significantly positive in both specifications. Thus, our inferences regarding the multivariate analysis of Table 4, Panels C and E, are unchanged when we drop past performance from the analysis.

In addition, to rule out the potential concern that our results are influenced by companies with large R&D expenditures, we rerun our analysis of future performance in Panel C of Table 4 after including R&D expense as a control variable, and in untabulated analysis find that our results are unchanged.[16] Further, because Sales, General, and Administrative (SG&A) expenses are sometimes used to surrogate for "organization capital", we also rerun our analysis of future performance in Panel C of Table 4 after including SG&A expense as a control variable, and also find in untabulated analysis that our results are unchanged.

4.3. Alternative specification for future returns

We repeat our future return tests in Table 5 using the Fama–French three-factor model (i.e. after dropping the momentum factor). In untabulated analysis we find that the coefficient on the intercept remains significantly positive. Thus, our interpretation from our analysis in Table 5 remains unchanged using this alternative specification.

4.4. Analysis of winners with more than one award

Because it is possible to win a MAKE award more than once, we investigate whether the market continues to react positively to firms that have previously won an award. We partition our sample into first-time winners (46) and non-first-time winners (201), and calculate portfolio-level CARs over the five-day window surrounding the award announcement. We find that the market reaction for the 201 non-first-time winners is significantly positive (0.87%), but significantly smaller (at p = 0.01) than the market reaction for the first-time winners (1.56%). This indicates that the market reacts positively to non-first-time winners, although not as strongly as to first-time winners. There are several reasons why the market reacts positively to firms that have previously won an award. Winning multiple MAKE awards may indicate that the winning firm is continuing to make new investments in KM initiatives and that management is excelling at implementing these new initiatives. If the benefits from the new KM initiatives are incremental to the benefits from the prior KM initiatives, the market is expected to react favorably to multiple winners. In addition, over the period of our analysis the market is likely to still be learning that KM improves performance, and that the MAKE selection process reliably identifies firms that excel at KM. This is consistent with our analysis that finds that the winners continue to experience positive abnormal returns during the year following the award. This suggests that the market may not fully impound the benefits of superior KM performance during the initial winning of the award, but that subsequent wins reinforce the market's confidence that management

[16] R&D is coded as zero for firms with missing values.

Table 7
Investor processing of knowledge management information: capital market tests for early and late subperiods. This table reports results from repeating the tests provided in previous tables, but after splitting the entire sample period into early (2001–2004) and late (2005–2008) subperiods. Panels A, B, and C respectively report results from stock market reaction, future operating performance, and future abnormal returns tests for the two subperiods, and these tests are equivalent to the tests reported in Tables 3, 4, and 6, respectively. See the related table for more information about the tests.

Panel A: Stock market reaction to award announcement

Early period (2001–2004). N = 84		Late period (2005–2008). N = 163	
Portfolio-level abnormal returns	0.76%	Portfolio-level abnormal returns	1.46%
p-Value (Patell)	0.237	p-Value (Patell)	0.001
p-Value (Generalized Sign)	0.263	p-Value (Generalized Sign)	<.0001
p-Value (time-series)	0.420	p-Value (time-series)	0.010
p-Value (calendar-time)	0.341	p-Value (calendar-time)	0.035

Panel B: Future operating performance tests

B.1. Regression of future performance for MAKE winners and MAKE peer firms matched on industry only

	Early period (2001–2004)			Late period (2005–2008)		
	N = 77 MAKEs; 24,269 peers			N = 125 MAKEs; 27,396 peers		
	Future ROA	Future ROE	Future CFO	Future ROA	Future ROE	Future CFO
α	−0.031	−0.283	0.036	−0.023	−0.244	−0.014
	(<0.001)	(<0.001)	(0.496)	(<0.001)	(<0.001)	(0.007)
Winner	0.041	0.224	−0.029	0.042	0.259	0.112
	(<0.001)	(<0.001)	(0.721)	(<0.001)	(<0.001)	(<0.001)
PastPerformance	0.012	0.066	1.087	0.247	0.022	−0.003
	(0.25)	(<0.001)	(0.059)	(<0.001)	(0.070)	(0.003)
Assets	1.14E−04	9.56E−04	−1.22E−04	4.5E−05	4.6E−04	6.02E−05
	(<0.001)	(<0.001)	(0.571)	(<0.001)	(<0.001)	(<0.001)
BTM	1E−07	−2.8E−06	−5E−07	4.2E−06	2.59E−05	4.9E−06
	(0.437)	(0.334)	(0.628)	(0.160)	(0.020)	(0.106)
Adj. R2	0.004	0.002	0.001	0.097	0.000	0.001

B.2. Univariate analysis of future performance of MAKE winners compared with MAKE peer portfolios matched on industry and percentile of total assets

	Early period (2001–2004). N = 77						Late period (2005–2008). N = 125					
	MAKEs		KM peer portfolios		Difference in means	Wilcoxon signed rank	MAKEs		KM peer portfolios		Difference in means	Wilcoxon signed rank
	Mean	Median	Mean	Median	p-Value	p-Value	Mean	Median	Mean	Median	p-Value	p-Value
Future ROA	0.023	0.015	0.012	0.011	(<0.001)	(<0.001)	0.033	0.027	0.016	0.015	(<0.001)	(<0.001)
Future ROE	0.052	0.044	0.025	0.029	(<0.001)	(<0.001)	0.069	0.060	0.019	0.040	(0.003)	(<0.001)
Future CFO	0.096	0.086	0.065	0.060	(<0.001)	(<0.001)	0.104	0.100	0.067	0.068	(<0.001)	(<0.001)

B.3. Propensity score matching

	Early period (2001–2004)						Late period (2005–2008)					
	N = 68 to 73 observations depending on the performance measure						N = 112 to 114 observations depending on the performance measure					
	MAKEs		Propensity matched control sample		Difference in means	Wilcoxon signed rank	MAKEs		Propensity matched control sample		Difference in means	Wilcoxon signed rank
	Mean	Median	Mean	Median	p-Value	p-Value	Mean	Median	Mean	Median	p-Value	p-Value
ROA	0.024	0.018	0.013	0.009	(<0.001)	(<0.001)	0.032	0.027	0.020	0.017	(<0.001)	(<0.001)
ROE	0.052	0.044	0.038	0.032	(0.145)	(<0.001)	0.069	0.059	0.037	0.042	(0.004)	(<0.001)
CFO	0.097	0.090	0.068	0.068	(<0.001)	(0.021)	0.101	0.098	0.096	0.077	(0.696)	(0.219)

Panel C: Future abnormal return analysis

	Early period (2001–2004). N = 42			Late period (2005–2008). N = 48		
	Coefficient	t-Statistic	p-Value	Coefficient	t-Statistic	p-Value
α	0.012	2.16	(0.037)	0.003	0.75	(0.457)
MKT	1.359	8.13	(<0.001)	1.222	14.23	(<0.001)
SMB	−0.008	−0.05	(0.964)	0.002	0.01	(0.991)
HML	−0.732	−3.24	(0.002)	−0.190	−1.05	(0.300)
MOM	−0.062	−0.44	(0.660)	0.351	3.43	(0.001)
Adj. R^2	0.833			0.832		

indeed excels at KM. Finally, because KM is relatively new, it is likely to be improving over the period of our analysis, such that the benefits from KM, and the competition to win a MAKE award, are increasing over time. If so, the benefits from KM activities are likely to be relatively greater for the firms that win the award a subsequent time.

4.5. Potentially confounding events

To further investigate whether confounding events can explain our event analysis results, we drop potentially confounding events identified in EDGAR or LexisNexis Academic databases. Specifically, we hand collect material events data from the Securities and Exchange

Commission EDGAR filing system for each company in our sample for two days before and two days after each MAKE award announcement date. This procedure identifies 22 observations, out of our 247 sample observations, with an earnings announcement, annual financial statement filing, or quarterly financial statement filing events during the five-day window centered on the award date. Using the LexisNexis Academic database, we identify all newswires and press releases announced during the five-day event window for each of our 247 sample observations. We classify a MAKE award as confounded if during the five-day window there is any newswire or a press release, such as announcement that the firm repurchased shares, issued a dividend, won an award (other than the MAKE), received a rating upgrade, or received a favorable change in stock recommendation. This procedure identifies 25 MAKE award observations with at least one confounding event (2 of which overlap with the 22 companies identified in our EDGAR search). We then repeat the event study after excluding these 45 observations ($22 + 25 - 2$) that are confounded by all the events in any one of the two sources we use to identify confounding events, i.e., EDGAR and LexisNexis Academic. Using that sample of 202 MAKE awards, we find a positive Mean Portfolio Cumulative Abnormal Return of 1.40% and significant using all the statistical event tests (Patell Z, Generalized Sign Z, Portfolio Time-Series t, and Calendar Time t).[17]

Next, we identify another group of potentially confounding events by examining issuances of important press releases. In particular, we search newswires for major press releases mentioning our MAKE firms but that are not related to the announcement of MAKE winners during the expanded event window. We identify 29 observations with this type of potentially confounding event, and after removing these observations the estimated abnormal return is 1.37% (significantly different than zero, with the Patell Z, Calendar Time t, Portfolio Time-Series (CDA) t, and Generalized Sign Z statistics all have p-values < 0.05). We also identify as potentially confounding events having a newspaper publish an article that refers to any of our award sample firms. Accordingly, we search ten major newspapers for articles that mention the MAKE winning companies in our sample.[18] We collect these articles from Lexis.com by searching for the companies' names in quotes.[19] We then remove from our sample any observations with a newspaper article, and repeat the abnormal return analyses. After removing observations with at least one newspaper article, the abnormal return becomes much stronger, with a mean value of 2.67% (significantly different than zero, with the Patell Z, Calendar Time t, Portfolio Time-Series (CDA) t, and Generalized Sign Z statistics all have p-values < 0.05), more than double the abnormal return we estimate using the full sample. Accordingly, it does not appear that confounding events during the award event window explain our results.

4.5.1. Potential selection based on past performance

Although the award selection process requires the judges to evaluate and select winners based on KM-related criteria, it may be possible that the judges simply select firms based on past earnings or stock price performance. First, our tests of future performance in Table 4, Panel C include a control variable for past earnings performance. Second, we repeat the future performance test in Table 4, Panel C after matching our MAKE sample by (1) industry and percentile of past ROA, (2) industry and percentile of past ROE, and (3) industry and percentile of past CFO. Untabulated results find that our inferences are unchanged relative to those currently reported in Table 4, Panel C, with MAKE firms significantly outperforming their matched peers (after matching on past performance) when investigating future ROA, ROE, and CFO.

4.5.2. Alternative controls for halo effects from past performance

In our future performance tests, we control for a halo effect by including a control variable for past performance. As an alternative control, we also repeat those three tests after orthogonalizing future performance to past performance. Specifically, we first regress future performance on past performance, and then use the residual from that regression as the dependent variable for future performance in the tests reported in Panels C and E, and G of Table 5 (after dropping past performance as an independent variable). Untabulated results find that our inferences are unchanged relative to those currently reported in Table 4, with MAKE firms significantly outperforming their peers based on future ROA, ROE, and CFO.

4.6. Outlier tests

To alleviate concerns that a small number of observations could be driving the significantly positive abnormal returns, we examine the impact of outliers. To do this, we trim abnormal returns at different percentiles: at 0.5% and 99.5%, at 1% and 99%, and at 2% and 98%. The abnormal returns after applying these trimming levels are 1.34%, 1.33% and 1.22% respectively. The Patell Z, Calendar Time t, Portfolio Time-Series (CDA) t, and Generalized Sign Z all have p-values of <0.05 for all levels of trimming. In summary, we find that the average abnormal return continues to be significantly positive for all three levels of trimming.

5. Summary and extensions

We investigate the stock price and performance implications of KM by examining the short window stock market reaction and future performance of companies receiving the "Most Admired Knowledge Enterprise" (MAKE) award, which recognizes companies with superior KM abilities. We find that during the five days surrounding the award announcement, MAKE winners experience 1.23% abnormal stock returns. We also find that MAKE winners surpass their peers in terms of operating performance during the year subsequent to winning the award, that equity analysts are relatively more likely to make significant upward revisions to MAKE winners' earnings forecasts during the month following the award, and that abnormal returns are positive for the MAKE winners over the year following the announcement of the award. In addition, we find evidence consistent with market participants learning about the valuation implications of a MAKE award over the period of our analysis.

Taken together, our study contributes to the literature in two ways. First, prior market-based research has not examined whether KM is valued by the market, and while KM investments are growing rapidly, there is controversy surrounding their ability to increase share value. However, we find evidence that excellence in KM leads to higher stock prices. Second, we examine the market reaction to the issuance of an award, based on the Delphi Method, to draw inferences about whether and how the market values KM. Specifically, our analysis suggests that the Delphi method can be used as a group decision support system to gather information and opinion from experts to provide value to the markets. Thus, our research provides evidence on how information generated outside of the firm can be used in the

[17] The 202 observations include the original 247 observations minus 45 observations that are potentially confounded (where 45 observations comprise the 22 from EDGAR plus 29 from LexisNexis Academic minus one observation that is identified from both sources).

[18] The newspapers we searched include two national newspapers (USA Today and The Wall Street Journal) and newspapers from eight major U.S. cities. The following newspapers are the most highly circulated newspapers for each of these major cities: The Dallas Morning News for Dallas, Texas; The Houston Chronicle for Houston, Texas; The Philadelphia Inquirer for Philadelphia, Pennsylvania; The New York Times for New York, New York; The Washington Post for Washington, D.C.; Los Angeles Times for Los Angeles, California; Chicago Tribune for Chicago, Illinois; and San Jose Mercury News for San Jose, California.

[19] We use quotes to avoid retrieving irrelevant articles. For example, we used "Caterpillar Inc." to avoid retrieving articles about caterpillars. Also, when appropriate, we used an OR connector to search for different versions of the company's name. For example, for HP we used the following search string with the appropriate date range: ("HEWLETT PACKARD CO" OR "HP CO" OR "H.P. CO").

price discovery process regarding the value of information systems. Professional organizations (such as those issuing the MAKE award) can provide investors and information intermediaries such as analysts with value relevant information about technology (and other) investments that are inherently difficult for market participants to value. This is consistent with these institutions playing an economically valuable role in firm valuation.

This last finding also suggests that the Delphi method could be used to capture information about the adoption of other technologies, processes or organizational forms adopted by firms. Finally, the Delphi approach used by MAKE could be extended to other similar approaches, such as fuzzy Delphi (e.g., Ishikawa et al. [23]) or analytic hierarchy process (e. g., Saaty [37]), which also may result in the ability to generate information that creates abnormal returns.

References

[1] M. Alavi, D.E. Leidner, Review: knowledge management and knowledge management systems: conceptual foundations and research issues, Management Information Systems Quarterly 25 (2001) 107–136.
[2] Asian Productivity Organization (APO), Knowledge Management: From Brain to Business, 2007 (Hiakawacho, Chiyoda-ku, Japan).
[3] S. Balasubramanian, I. Mathur, R. Thakur, The impact of high-quality firm achievements on shareholder value: focus on Malcolm Baldrige and J. D. Power and Associates awards, Journal of the Academy of Marketing Science 33 (2005) 413–422.
[4] R. Ball, The development, accomplishments and limitations of the theory of stock market efficiency, Managerial Finance 20 (1994) 3–48.
[5] W.H. Beaver, Market efficiency, The Accounting Review 56 (1981) 23–37.
[6] J.J. Binder, The event study methodology since 1969, Review of Quantitative Finance and Accounting 11 (1998) 111–137.
[7] B. Brown, S. Perry, Removing the financial performance halo from Fortune's "most admired" companies, Academy of Management Journal 37 (1994) 1347–1359.
[8] S.J. Brown, J.B. Warner, Measuring security price performance, Journal of Financial Economics 8 (1980) 205–258.
[9] S.J. Brown, J.B. Warner, Using daily stock returns: the case of event study, Journal of Financial Economics 14 (1985) 3–31.
[10] M.M. Carhart, On persistence in mutual fund performance, Journal of Finance 52 (1997) 57–82.
[11] J. Campbell, Understanding risk and return, Journal of Political Economy 104 (1996) 298–345.
[12] K. Carrig, Sysco Corporation 2005 analyst field trip, Presentation by Sysco Corporation Executive Vice President and Chief Administrative Officer to Securities Analysts, 2005.
[13] R. Chase, Speech by Rory Chase, Executive Director of Teleos and The KNOW Network, 2007.
[14] N. Dalkey, The Delphi Method: An Experimental Study of Group Opinion, Rand Corporation, Santa Monica, CA, 1969.
[15] B. Dos Santos, K. Peffers, D. Mauer, The impact of information technology investment announcements on the market value of the firm, Information Systems Research 4 (1993) 1–23.
[16] E.F. Fama, K.R. French, Common risk factors in the returns of stocks and bonds, Journal of Financial Economics 33 (1993) 3–56.
[17] M. Fotache, Knowledge management between fad and relevance, Information 8 (2005) 255–268.
[18] Global Industry Analysts, Inc. (GIA), Knowledge Management: A Global Strategic Business Report, 2008.
[19] P. Gray, Group decision support systems, Decision Support Systems 3 (1987) 233–242.
[20] S.J. Grossman, J.E. Stiglitz, On the impossibility of informationally efficient markets, American Economic Review 70 (1980) 393–408.
[21] K.B. Hendricks, V.R. Singhal, Does implementing an effective TQM program actually improve operating performance? Empirical evidence from firms that have won quality awards, Management Science 43 (1997) 1258–1274.
[22] K. Im, K. Dow, V. Grover, Research report: a reexamination of IT investment and the market value of the firm — an event study methodology, Information Systems Research 12 (2001) 103–117.
[23] A. Ishikawa, T. Amagasa, G. Tamizawa, R. Totsuta, H. Mieno, The Max–Min Delphi Method and Fuzzy Delphi Method via Fuzzy Integration, Fuzzy Sets and Systems 55 (1993) 241–253.
[24] J.F. Jaffe, Special information and insider trading, Journal of Business 47 (1974) 410–428.
[25] N. Jegadeesh, S. Titman, Returns to buying winners and selling losers: implications for stock market efficiency, Journal of Finance 48 (1993) 65–91.
[26] B. Ke, Y. Yu, The effect of issuing biased earnings forecasts on analysts' access to management and survival, Journal of Accounting Research 44 (2006) 965–1000.
[27] Y. Malhotra, Why knowledge management systems fail? in: E. Knoenig, T. Srikantiah (Eds.), Knowledge Management Lessons Learned: What Works and What Doesn't, Society for Information Science and Technology Monograph Series, 2004, pp. 87–112.
[28] G. Mandelker, Risk and return: the case of merging firms, Journal of Financial Economics 1 (1974) 303–336.
[29] S. Mithas, M.S. Krishnan, From association to causation via a potential outcomes approach, Information Systems Research 20 (2009) 295–313.
[30] R. Nicolas, Knowledge management impacts on decision making process, Journal of Knowledge Management 8 (2004) 20–31.
[31] J.M. Patell, Corporate forecasts of earnings per share and stock price behavior: empirical tests, Journal of Accounting Research 14 (1976) 246–274.
[32] L. Ponzi, M. Koenig, Knowledge management: another management fad? Information Research 8 (2002), (http://informationr.net/ir/8-1/paper145.html).
[33] Z.H. Przasnyski, L.S. Tai, Stock performance of Malcolm Baldrige National Quality Award winning companies, Total Quality Management and Business Excellence 13 (2002) 475–488.
[34] L. Quast, Why knowledge management is important to the success of your company, Forbes, 8/20/12, http://www.forbes.com/sites/lisaquast/2012/08/20/why-knowledge-management-is-important-to-the-success-of-your-company/.
[35] S. Richardson, S. Teoh, P. Wysocki, The walkdown to beatable analysts' forecasts: the role of equity issuance and inside trading incentives, Contemporary Accounting Research 21 (2004) 885–924.
[36] P.R. Rosenbaum, D.B. Rubin, The central role of the propensity score in observational studies for causal effects, Biometrika 70 (1983) 41–55.
[37] T.L. Saaty, The Analytic Hierarchy Process, McGraw-Hill, Inc., 1980
[38] T. Wilson, The Nonsense of Knowledge Management 8 (1), http://informationr.net/ir/8-1/paper144.html?referer=www.clickfind.com.au.

Mark L. DeFond is the A. N. Mosich Chair of Accounting at Leventhal School of Accounting, University of Southern California. His research is primarily studies on auditing, international accounting, and general issues in financial accounting. His research is widely published in the academic accounting literature. He received his PhD at the University of Washington and prior to that he worked for several years as an auditor with Deloitte (formerly Touche Ross) and is a California CPA (inactive).

Yaniv Konchitchki is an Assistant Professor at the University of California at Berkeley, Haas School of Business. He specializes in interdisciplinary capital markets research, particularly examining the usefulness of accounting information through its links to macroeconomics (e.g., inflation; GDP) and valuation (e.g., cost of capital; asset pricing). He has published in top journals and won prestigious awards for excellence in research and teaching. Before receiving a Ph.D. from Stanford University, he was a CPA and Senior Financial Consultant at PricewaterhouseCoopers, as well as a Senior Expert at the Securities Authority.

Jeff L. McMullin is an Assistant Professor at Indiana University Bloomington, Kelley School of Business. His research interests are in the intersection between accounting and capital markets research, with a focus on how disclosure practices impact the usefulness of accounting information. Jeff is also interested in research design for causal inference, specifically approaching causal inference from the perspective of the potential outcomes approach or Rubin Causal Model. Jeff received his Ph.D. from the University of Southern California in 2013. While pursuing his Ph.D., Jeff was presented with the Mary Pickford Foundation Doctoral Teaching Award in 2012.

Daniel O'Leary is a Professor in the Marshall School of Business at the University of Southern California, focusing on information systems, artificial intelligence, enterprise resource planning systems and knowledge management systems. Dan received his Ph. D. from Case Western Reserve University. He is the former editor of *IEEE Intelligent Systems* and current editor of John Wiley's *Intelligent Systems in Accounting, Finance and Management*. His book, *Enterprise Resource Planning Systems*, published by Cambridge University Press, has been translated into both Chinese and Russian. Much of Professor O'Leary's research has studied emerging technologies and their use in business settings.