

## HUMAN CAPITAL MATTERS: MARKET VALUATION OF FIRM INVESTMENTS IN TRAINING AND THE ROLE OF COMPLEMENTARY ASSETS

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**Research summary:** This article empirically examines the economic value to firms of investing in the training of their employees and firm-level factors that influence how much the firms benefit. Event study methodology is used to obtain a measure of the economic impact of information regarding a firm's human capital management investments and policies. Subsequent regression analyses are then used to test hypotheses regarding possible complementary relationships between firm-level factors and human capital investments. Results provide robust support for the proposition that effective investments in human capital and training matter, and that these human capital investments are more impactful when combined with complementary assets of R&D, physical capital, and advertising investments.

**Managerial summary:** Do firm investments in training and the development of employee human capital matter with regard to financial performance? We find that, yes, these investments do matter. Our results show that managers who view employee human capital as an asset to be invested in and developed can expect to outperform those who view it as a cost to be minimized. In addition, we find that these human capital investments will be of even greater economic value to firms when they have made complementary investments in R&D, physical capital, and advertising. Copyright © 2016 John Wiley & Sons, Ltd.

## INTRODUCTION

In the resource-based approach, a firm's valuable, rare, inimitable, nonsubstitutable, and organizationally embedded resources can result in a firm's superior financial performance (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). Investments in human capital are potential candidates for such resources. The

human capital embodied in employees—whether at the individual, team, or organizational level—is intangible and often tacit in nature (Grant, 1996; Reed & DeFillippi, 1990), which can therefore lead to imitation barriers (Rumelt, 1984) and to a firm's superior economic performance (Amit & Shoemaker, 1993; Chadwick & Dabu, 2009; Makadok, 2001).

Many firms choose to develop human capital through training employees. Existing research suggests that such investments are likely to lead to superior financial performance when the human capital is firm-specific (Coff & Raffiee, 2015; Crook, Todd, Combs, Woehr, & Ketchen, 2011; Mayer, Somaya,

Keywords: complementary assets; general training; human capital; market frictions; resource-based approach

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& Williamson, 2012; Wang, He, & Mahoney, 2009). In contrast to firm-specific human capital, however, general training, defined as building human capital in the employee that has value both to the training firm and to other firms, is not expected to improve the training firm's financial performance because of the firm's inability to capture the value. Specifically, general training would be a financial drain on the training firm while enabling mobility of the employee (Becker, 1964). General training thus fails the test of valuable, rare, inimitable, nonsubstitutable, and organizationally embedded (Barney, 1991; Grant, 1996).

We respectfully dissent from this conventional wisdom. Recent theoretical developments highlight labor market frictions that create the possibility of sustainable competitive advantage through training and other human capital investments (Campbell, Coff, & Kryscynski, 2012; Molloy & Barney, 2015). The extent of such market frictions and their financial effects is an empirical question. The current article examines empirically whether effective investments in general training can benefit firms financially, and if so, what factors influence the variance in their financial returns. Using a novel data set, we examine firms identified by industry experts for excellence in training, and we employ event study methodology to determine the abnormal stock market returns to firms following their placement on the annual "Training Top 125" award list published by *Training* magazine. To address the second question, we analyze those abnormal returns to explain their variance using measures of complementary assets collected from Compustat and other sources. To preview our empirical results, firms that engage in superior training efforts do receive significant financial returns, and the variance in these financial returns is affected by the firms' investments in the complementary assets of R&D, physical capital, and advertising.

This program of research is important to theory and practice. As noted above, historically theory has predicted little or no economic profits (i.e., no positive economic returns above the opportunity cost of capital) to investments in general training and human capital. At a practical level, returns to training drive corporate decision-making, and evidence of positive returns has been lacking. As a leading publication, *Training*, notes:

Training long has been seen as a feel-good profession dealing with warm and fuzzy intangibles such as learning and knowledge. But sales, marketing, operations—those types of bottom-line-oriented departments buoy the company up in the rough seas of competition and economic hard times. At least, that's been the general opinion out there—if not clearly stated, then implied. Training departments have had to fight for their place in the corporate boardroom and budget. Even in economic booms, it has been difficult for trainers to squeeze enough blood from the corporate stone to implement the latest and greatest training technology, continuing education programs, or any other training initiative you could name. That's because there has been little solid data to prove the return on investment (ROI) for those initiatives. Corporate higher-ups want to see hard numbers that outline any expense's ROI, and it's difficult to quantify the value of learning and knowledge (Webb, 2008).

This research offers such "hard numbers."

## LITERATURE REVIEW

Human capital theory (Becker, 1964) posits that human capital investments in the training and education of employees can have positive economic value because they develop and nurture the knowledge and skills of these employees, thereby improving their productivity. Such a definition of human capital includes formal education, work experience, workplace instruction, and on-the-job training (Miller, Xu, & Mehrotra, 2015; Shaw, Park, & Kim, 2013). Consistent with theory, investments in human capital have been shown to positively influence productivity-related measures (Bartel, 1994; Ichniowski, Shaw, & Prennushi, 1997; Lepak & Snell, 1999; Sepulveda, 2010). However, whether these human capital investments have a positive impact on firms' financial performance is unclear (Almeida & Carneiro, 2009; Bartel, 2000; Frank & Obloj, 2014; Jones, Kalmi, & Kauhanen, 2012).

The firm is expected to capture at least some of the economic returns from productivity gains when the human capital is firm-specific (Coff, 1997;

Mahoney & Kor, 2015; Wang & Barney, 2006). Hatch and Dyer (2004) found positive effects of firm-specific human capital investments on organizational learning in semiconductor manufacturing. Selection activities, training, and deployment improved learning performance, measured by rate of defects. Hatch and Dyer emphasized the ability of firm-specific human capital to improve learning performance to *create* value for the firm, and the inimitable nature of firm-specific human capital to enable the firm to *capture* and *sustain* economic value. Kor and Leblebici (2005) examined interdependencies among human capital deployment, development, and diversification strategies of large law firms, and how these interdependencies affect performance. Leveraging firm-specific human capital results in higher financial performance (measured by self-reported profitability per partner) when there is a strategic fit between the business-level strategies of service and geographic diversification, and the human resource strategies of human capital development and leveraging.

What remains to be addressed, however, is whether these nonfinancial measures of performance have a relationship with changes in financial performance, and which variables affect the magnitude of any relationship between human capital and firm financial performance.

## THEORY AND HYPOTHESES

Human capital theory (Becker, 1964) posits that investments in the training and education of employees often will have positive economic value because they benefit the knowledge and skills of these employees, thereby improving their productivity. However, such investments are not expected to improve a firm's financial performance, according to Becker (1964, pp. 11–12):<sup>1</sup>

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<sup>1</sup> It is an assumption of the theory generally that firms do not invest in general training because they are at a comparative disadvantage relative to alternative institutions. Consider the counterargument: Firms are better at general training than training institutions such as trade schools, community colleges, and universities. As a result, workers accept submarket wages in order to pay for their training. One can imagine several specific situations in which this premise might apply: The firm is not distracted by distribution requirements or impractical theory; the firm can better schedule training as part of employment rather than in addition to employment during work times rather than after hours (as with much U.S. contemporary schooling); the firm can attract better teachers due to conditions of work, salary, or licensure

Most on-the-job training presumably increases the future marginal productivity of workers in the firms providing it; general training, however, also increases their marginal product in many other firms as well. Since in a competitive labor market the wage rates paid by any firm are determined by marginal productivities in other firms, future wage rates as well as marginal products would increase in firms providing general training. These firms could capture some of the returns from training only if their marginal product rose by more than their wages. "Perfectly general" training would be equally useful in many firms and marginal products would rise by the same extent in all of them. Consequently, wage rates would rise by exactly the same amount as the marginal product and the firms providing such training could not capture any of the return.

But what if labor markets are not perfectly competitive? In a recent and important series of articles, Coff and colleagues carefully unpacked Becker's (1964) assumption of "competitive" labor markets (Campbell et al., 2012; Coff & Kryscynski, 2011). This research sought to identify market frictions that may enable the firm to improve financial performance and achieve sustainable competitive advantage even from general human capital, and it focused on two distinct sets of causes rooted in supply and demand for labor. Consider first the supply side, and the willingness of a trained employee to move. Everyone who has ever changed a job understands that there are frictions to movement. Individuals rarely choose to engage in a comprehensive job search because such search is costly. Factors of family or familiarity may confine their search to local rather than national or even international labor markets for the services of their skills. These individuals may have established social and other ties at their existing place of work, or routines of life, which may not be duplicated at their new location. They may be unwilling to incur the expense of job hunting, such as lost days for interviewing, and

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requirements than its competitors. Although one can envision firms and situations in which one or more of these conditions might apply, it is difficult to see these conditions applying across the wide range of industries and firms represented by this study, or in the economy generally. Further research focusing on the comparative capability of firms and schools for training is surely warranted.

other transactional expenses. Further, when training is viewed as a signal of a firm's economic commitment to an employee and as a precursor to future training investments or promotion opportunities, an employee may value this signal in lieu of current wages (Baron & Kreps, 1999; Chadwick & Dabu, 2009). For these and other reasons, it is possible that the employer will be able to pay something less than the current market wage, and expect the employee to remain.

The demand side requires consideration of the willingness of the hiring firm to offer a competitive wage to new employees. As Becker (1964) noted, wage rates must rise by exactly the same amount as the marginal product. First, firms must be able to estimate the economic value of the training, which we suggest is more difficult than Becker presented. A training program designed by the employee's current firm is likely to be very difficult to value. The prospective employer must determine the content, the extent to which the employee has learned the content, and the relationship of the content to the productivity of the employee. The firm must also be assured that the productivity of the employee will remain the same in the new firm. And, in the absence of standardized training course titles and syllabi across employers, there will be fewer opportunities to develop comparisons and to learn over time which programs at which competitive firms do well and which poorly. Further, as Becker (1964, p. 18) noted, "Much on-the-job training is neither completely specific nor completely general." Hence, both the employee and the hiring firm face the dilemma of determining which part of training is relevant to the new position, and valuing those accordingly.

Finally, Becker's (1964) analysis posits an instantaneous adjustment in employment by the trained employee. But both demand-side and supply-side frictions create delay to mobility as well as barriers to mobility. If change takes time, the firm has the services of the employee with higher productivity without a compensating higher wage for a limited time, which may be sufficient to justify the investment. Further, if the firm can develop a stream of such individuals, valuing the training and working for a time at less than their full economic value, a sustainable competitive advantage could be created by the firm.

With the cost of moving being potentially large and the benefit of training to the hiring firm uncertain, significant frictions are introduced into

the market. With these market frictions, firms will seek ways to achieve sustainable competitive advantage (Mahoney & Qian, 2013). If the general training is effective, but employees face frictions in trying to leave, due to adjustment costs (Hatch & Dyer, 2004), the firm may be able to retain trained employees while paying them less than their full marginal product and keeping the remainder.

Regarding firm-specific training, the firm is expected to gain at least some of the economic returns from training that increases productivity when the human capital is firm-specific (Coff, 1997; Harris & Helfat, 1997; Hashimoto, 1981). Further, the resource-based approach suggests that firms are willing to make investments in firm-specific human capital because the tacit, complex, and causally ambiguous nature of these intangible investments makes imitability difficult (Lippman & Rumelt, 1982; Rumelt, 1984), and empirical research concerning firm-specific human capital supports these conclusions (Bidwell, 2011; Campbell, Saxton, & Banerjee, 2014; Hatch & Dyer, 2004; Kor & Leblebici, 2005).

Regarding general training, the training literature as well as corporate practice suggests that advantage may be captured by the firm under certain circumstances. Georgiadis and Pitelis (2014) examined the relationship between employees' training and firm-level profitability (i.e., profit margins) using a policy intervention that randomly assigned training support to small- and medium-sized enterprises in the U.K. accommodation and food services sector. Because the number of firms self-selected into training exceeded available places, training was randomly assigned to some firms, resulting in a randomized-natural experiment design that allowed identifying the average effect of training on the treated firms. The empirical results support that an increase in employees' training positively impacted firms' labor productivity. More generally, Arthur, Bennett, Edens, and Bell (2003) provided a meta-analysis (of 26 empirical studies) that corroborates the effectiveness of formal training on organizational performance. Also, Aguinis and Kraiger (2009) provided a literature review of empirical studies that largely support the formal training and organizational performance nexus. And the review of Bartel (2000) showed that sometimes general training realizes positive benefits, but not always. Most studies show operational benefits, but a real difficulty in computing an actual ROI.

Thus, investments in *both* general training and firm-specific human capital training have the potential to yield *sustainable* competitive advantage,<sup>2</sup> assuming this training is efficacious. One measure of that advantage is a positive stock price reaction to new information demonstrating the magnitude and efficacy of those investments. This logic leads to the first hypothesis:<sup>3</sup>

*Hypothesis 1 (H1): A signal of firms' effective investments in human capital leads to a positive stock price reaction.*

<sup>2</sup> While past or *sustained* competitive advantage can be measured by accounting ratios (e.g., ROE, ROA), Barney (2002) connected economic and finance measures with the concept of (forward-looking) *sustainable* competitive advantage. The objective of the firm conceptually is to maximize profitability, driving a wedge between revenues generated and costs incurred, where costs include the opportunity cost of capital. Finance measures the dynamics of sustainable competitive advantage and firm performance by Net Present Value (NPV) or Discounted Cash Flow (DCF) methods for evaluating the economic market value of the firm. The firm's opportunity cost is the firm's weighted average cost of capital (WACC), that is, what the firm pays to the owners of the company's stock and debt. The value of the stock issued by the firm should vary with expectations regarding future firm performance. That is, the total value of a firm should equal the discounted value of the future cash flows, and the value of a firm's equity should equal the discounted value of the future cash flows of the entire firm less expected payments to the owners of debt. The stock price of the firm should reflect the discounted value of these future cash flows. Economic profit is positive if and only if the NPV is positive, which can only occur if there is a sustainable cash flow due to some barrier to imitation and some market friction that leads to a positive NPV, and thus, sustainable competitive advantage. Strategic human resource management scholars as well as strategic human capital scholars have often maintained that a firm's stock of human resources display the characteristics of valuable, rare, inimitable, nonsubstitutable, and organizationally embedded resources that are required for (the forward-looking construct of) *sustainable* competitive advantage, which will be reflected in the stock price. Assuming markets are semi-strong efficient, new positive information about a firm's human resources will be reflected in the firm's stock price in the form of positive cumulative abnormal returns at the time of announcement. This reasoning then leads to our first hypothesis.

<sup>3</sup> To summarize, the research literature on human capital has long argued that firms can capture value from firm-specific human capital, while more recent literature maintains that due to labor market frictions, firms can capture value from general human capital as well. If the firm did not capture any of the economic value from the human capital training of its employees, then the abnormal return would be zero. Our Hypothesis 1 is a *compound hypothesis*, positing that the stock market is efficient, that human capital investment increases employees' productivity and is economically valuable, that the award (signal) removes information asymmetry in the marketplace about firms' (past and potential future) effective human capital training, and that the stock market reaction will be positive because investors expect to capture at least some of that economic value due to labor market frictions.

## Complementarities

The resource-based approach maintains that higher financial performance can be achieved by investing in complementary resources (Helfat, 1997; Teece, 1986). Activities are complementary if doing more of any one activity increases (or at least does not decrease) the marginal profitability of each of the other activities (Milgrom & Roberts, 1990, 1995). Complementarities between human capital and other organizational resources have been shown to have a positive effect on firm performance (Crocker & Eckardt, 2014; Mackey, Molloy, & Morris, 2014; Wright, Coff, & Moliterno, 2014). Amit and Schoemaker (1993) identified strategic assets as those resources and capabilities subject to market frictions that generate organizational rents. These strategic assets are firm-specific, likely to be intangible and tacit, and are complementary with other strategic assets of the firm. It is expected that such resources deployed to complement human capital will increase their economic returns. We operationalize and test this proposition in Hypotheses 2–5, analyzing three important complementarities of R&D, Physical Capital, and Advertising, in turn.

## Research and development

High R&D intensity is often taken as an indication of the importance of knowledge and technology in a firm or industry (Caves, 1996; Cohen, Nelson, & Walsh, 2000; Helfat, 1994). Training and other human capital investments are often significant complements to knowledge gained through R&D, as employees at all levels may need to skillfully interact with advanced technology and conduct advanced operating procedures (Kor, 2006; Kor & Mahoney, 2005). These employees may further need to interact with more sophisticated customers and suppliers. The training and education of employees throughout the firm will be increasingly important in a firm with high R&D intensity (Campbell & Banerjee, 2012; Smith, Collins, & Clark, 2005). Effective use of human capital investments that increases employees' knowledge increases the likelihood of success among multiple R&D investment options, and thus, enables the deployment of resources to higher-margin R&D projects in which the firm is more likely to create and sustain competitive advantage (Kor, 2006). Therefore, the stock price reaction to the signal

of effective investments in human capital is likely to be especially strong when there are complementarities between human capital investments and R&D investments, which leads to the following hypothesis:

*Hypothesis 2 (H2): The higher the firms' R&D intensity, the greater the positive stock price reaction to the signal of effective investments in human capital.*

### Physical capital

Capital and labor are used in the production process to create goods and services, and the substitution of physical capital for labor in production is a well-known fact of empirical economics (Caves & Barton, 1990; Mansfield, 1994). Although the existing empirical work has largely examined the quantity of labor, it is reasonable to expect that physical capital might substitute for the *quality* of labor as well. High physical capital intensity could indicate that a firm has simply substituted away from labor and is now employing more automated equipment and procedures that require fewer and less-skilled employees. Consequently, it is more difficult for firms with high physical capital intensity to create, capture, and sustain a competitive advantage with its human capital investments. Corroborating this logic, Snell and Dean (1994) found that an increase in physical capital investments in manufacturing is associated with less training for its employees. Therefore, the stock price reaction to the signal of effective investments in human capital is likely to be lessened in firms with high physical capital intensity, which leads to the following hypothesis:

*Hypothesis 3 (H3): The higher the firms' physical capital intensity, the lesser the positive stock price reaction to the signal of effective investments in human capital.*

### Interaction of R&D and physical capital

As suggested by Hypothesis 3 above, high physical capital intensity in a firm, especially with low R&D intensity, may indicate a firm emphasizing low-cost production, in which case the firm may be less concerned about product or process innovations, and thus require less human capital training. However,

scholars have noted that we have entered "the age of the smart machine" (Zuboff, 1988), a fundamental change in the manufacturing process (see also Balconi, 2002; Youndt, Snell, Dean, & Lepak, 1996). When previously machinery depended on physical force and human control, today's machinery has embedded microprocessors and other intelligence. Thus, the operator now must set programs, take measurements, and make adjustments, requiring substantive, and significantly different, training. If the firm had a high physical capital intensity that indicated an emphasis on high-tech production technologies, then an R&D department doing at least some process development or information integration would become increasingly important. High physical capital intensity used in a more high-tech environment would be expected to display complementarities. As employees are operating in an environment in which their knowledge and skills are increasingly utilized, we would expect effective human capital investments to be increasingly important (Abowd, Kramarz, & Margolis, 1999; Balconi, 2002; Farjoun, 1994, 1998). Corroborating this logic, Helfat (1997) showed that in response to rising oil prices, firms with larger amounts of complementary technological knowledge and physical assets undertook larger amounts of R&D on coal conversion. Due to the complementarities between R&D intensity and physical capital intensity, the stock price reaction to the signal of effective investments in human capital is likely to be greater in firms with higher R&D intensity and physical capital intensity, which leads to the following hypothesis:

*Hypothesis 4 (H4): The higher the interaction of R&D intensity and physical capital intensity, the greater the positive stock price reaction to the signal of effective investments in human capital.*

### Advertising/differentiation

Successful product differentiation is valuable to the firm because, as the firm successfully communicates its products' attributes and generates a perceived differentiation by the consumer, it can avoid direct price competition (Caves & Williamson, 1985) and create a barrier to entry (Porter, 1980). Successfully differentiating a product or developing a brand requires significant sunk cost expenditures over a period of time (Ghemawat, 1991; Sutton, 1991). The firm's reputation and its brands "signal"

information to the consumer about quality of products and services, which are valuable when consumers are faced with uncertainty and incomplete information concerning a potential purchase (Riley, 2001; Spence, 1973). If consumers face switching costs and if potential entrants face higher marketing costs, then this differentiation barrier to entry is more likely to persist (Lieberman & Montgomery, 1988; Sutton, 1991).

To generate such differentiation, employees throughout the firm need training to develop the skills and knowledge necessary to design, manufacture, sell, and deliver products and services that have unique characteristics (Christensen, Verlinden, & Westerman, 2002; Porter, 1980). Employees striving to differentiate also need training to increase responsiveness to changing tastes and to any service-related issues of customers (Chandler, 1990; Skaggs & Youndt, 2004). Attention to speed of response and quality of service for suppliers and other stakeholders require that employees build skills, nurture relationships, and develop valuable tacit knowledge and know-how over a period of time, both within and between departments (Ernst, Hoyer, & Rübsamen, 2010; Hitt, 1995). Connecting this logic to the resource-based approach, Sirmon and Hitt (2009) found empirically that relatively higher investments in human capital, combined with a deployment focus in markets requiring sophisticated product differentiation, improved performance. Vomberg, Homburg, and Bornemann (2015) discussed extensively and corroborate empirically the simultaneous effect of human capital and differentiation on firm value, maintaining that employees working in organizations with strong differentiation are more motivated to use their human capital training in ways that improve a firm's financial performance. Advertising is an (imperfect) measure of such product differentiation. Therefore, the stock price reaction to the signal of effective investments in human capital is likely to be especially positive when there are complementarities between a firm's human capital investments and its advertising intensity, which leads to the following hypothesis:

*Hypothesis 5 (H5): The higher the firms' advertising intensity, the greater the positive stock price reaction to the signal of effective investments in human capital.*

## RESEARCH METHODOLOGY

### Research design

This study examines a unique data source—firms recognized by industry experts for training excellence—and constructs an event study to capture the performance effects generated by this signal of a firm's effective investments in human capital. Our empirical strategy uses the event study to generate cumulative average abnormal returns (CARs), which provide both a test of Hypothesis 1 and a dependent variable for a regression model of performance to test Hypotheses 2–5.

The events examined are announcements of firms awarded one of *Training* magazine's "Training Top 125"—an annual award recognizing firms for their excellence in training and developing employees and human capital management. The magazine describes the award winners as "the organizations with the most successful learning and development programs in the world." This annual training award list provides an indication of firms recognized through a comprehensive quantitative and qualitative methodology for their efforts to develop human capital. To be considered for this award, firms must pay an application fee of about \$200, and complete a survey of more than 40 questions. The evaluation of completed questionnaires is 75% quantitative, with firms analyzed for: (a) *Training Program/Scope* (including hours of training, number of trainers, training budget, best practices, and outstanding initiatives), which is 25% of the quantitative score; (b) *Tuition Reimbursement*, which is 10% of the quantitative score; (c) *Training Infrastructure and Delivery*, which is 20% of the quantitative score; (d) *Evaluation/Metrics*, which is 25% of the quantitative score; and (e) *Human Resources* (including compensation tied to training, employee satisfaction surveys, length of service and turnover, jobs filled by internal candidates, and percentage of new hires referred by employees), which is 20% of the quantitative score. The remaining 25% of the evaluation is qualitative and is determined by the editors of *Training* magazine. Factors considered include the results and progress of training programs, whether training is strategically linked to business goals, corporate commitment to training, the potential of best practices to be applicable company-wide and to other organizations, and ingenuity of initiatives and their potential to become best practices.

Our hypotheses cover both *general* human capital and *firm-specific* human capital, or the total training of the firm. The award is granted for superior training programs, without distinguishing between the two types of human capital. It is our view that the award primarily recognizes general training, for the following reasons. First, a review of the above categories of the questionnaire does not make any distinction between general and firm-specific training. We carefully examined the 2015 application. Although a few questions were asked about linking training to business goals, the vast majority of content covered general training, e.g., career counseling, first line supervising, and the like. Second, we read the description of the winner of each of the past few years, who typically received a feature article. Little or no mention was made of firm-specific training. Here is the opening for the 2014 winner, Jiffy Lube: "Operating like a well-oiled machine, No. 1 Jiffy Lube International, Inc.'s aligned and focused approach to training—in particular, training on new services, customer service skills, and leadership—resulted in a 900% increase in the number of stores at 100% certification, a reduction in turnover, and a 93% approval rating by franchisees." Third, we examined several issues of *Training* magazine that were contemporaneous to our study. Any magazine's key customers are its advertisers, to whom it sells the attention of an audience of subscribers. In this case, the audience of subscribers is HR officers in large firms, and the vast majority of advertisements (with the exception of the numerous advertisements for *Training* magazine's own conferences, seminars, webinars, and e-newsletters) come from consulting firms and other training professionals (e.g., Dale Carnegie, ROI Institute, Kaplan University, Enspire Learning, The Training Associates, Clarity Consultants, Skillsoft, and Vantage Partners). In short, *Training* magazine appears to be a vehicle by which these consulting firms and training professionals attempt to sell their training services to HR officers in large firms. Such programs are unlikely to be firm specific.

A "signal" will only lead to an abnormal return if it provides new and unanticipated information (Fama, 1970; Riley, 2001). The training award signal examined here has informational value that can lead to significant abnormal returns for multiple reasons. First, generally accepted accounting principles have no explicit requirement that firms report training; if they do, the expenditure is expensed rather than capitalized. Second, managers do not

announce these training "expenses," and there are no public announcements or explicit accounting line items where firms are required to record such investments. Last, this signal reveals information relative to other firms and competitors. Winning companies are likely to have better human capital due to better training than those not on the award list. Hence, the relative value of a hard-to-measure construct of the firm, human capital, is (imperfectly) measured in absolute and competitive terms through stock market abnormal returns on or around the announcement of the award.<sup>4</sup>

## Sample

The current article considers publicly traded firms receiving "Training Top 125" awards during the time period of 2005–2008. By 2005, the award was in its fifth year of publication and had developed a measure of recognition and credibility; in 2009, changes were instituted that disqualified some prior winners from recognition in the subsequent year. As such, the time period of 2005–2008 is chosen because it provides the broadest, most consistent, and most reliable sample. The final sample consists of 219 events involving 99 business units (firms, divisions, or subsidiaries) of 95 parent corporations. These firms are from a variety of manufacturing and service industries.

The sample was constructed in the following way. The awards were actually "Top 100" in 2005–2006, and "Top 125" in 2007–2008, so the total possible firm-award-events was 450. Almost exactly 200 were privately held, and hence, no event study was possible. Of the approximately 250 remaining, a small number (approximately 5–10) were removed due to confounding events such as recent mergers or bankruptcies. Of the 242 events remaining, an additional 20 were lost due to either CUSIPs not being in CRSP database (6 of the 20 events), or missing CRSP data during either the estimation period or event period (14 of the 20 events). So we have event study results for 222 of the 450 events to test Hypothesis 1. For 3 of those 222 events, there

<sup>4</sup> The award presumably represents not only a *stock* of trained individuals who can contribute to firm performance, but in all likelihood a *flow* of present and future individuals that can sustain this performance in the future (Dierickx & Cool, 1989). In the best interpretation, training may reflect a capability of the organization, with positive future impacts on human capital (Chadwick & Dabu, 2009). The event study methodology is well positioned to capture such impacts.

were no Compustat data, leaving us with up to 219 events for regression analysis to test Hypotheses 2–5.

## Variables and measures

### *Dependent variable*

The dependent variables (for H1 and for H2–5) are taken from the measures of abnormal returns generated through event study analysis, described more fully below. These abnormal returns measure the market reaction to the signal of a firm's effective investments in human capital for the purpose of testing Hypothesis 1. These financial performance measures represent unexpected returns on a risk-adjusted basis. A regression model is then specified to explain variance in these abnormal returns to test Hypotheses 2–5.

### *Independent variables*

- *R&D Intensity:* R&D intensity (RDINT) is measured as R&D investment (labeled annual “Research and Development Expense” in Compustat) divided by sales.
- *Physical Capital Intensity:* Physical Capital Intensity (PCINT) is measured as physical capital investment (“Property, Plant, and Equipment –Total (Net)” in Compustat) divided by sales.
- *Advertising Intensity/Marketing-related:* Advertising Intensity (ADINT) is measured as advertising expenditures (labeled “Advertising Expense” in Compustat) divided by sales.

All independent variables are measured in the year before the award. The awards are presented in February. So, to illustrate, if a firm received the award in February 2006, the financial data are taken from 2005.

### *Control variables*

Regression Models 2–5 in Table 3 include control variables. These controls are designed to capture variance in abnormal returns related to factors other than those derived from the theoretical framework. These controls are for: firm size, whether the award was for the entire corporation or a division, whether the firm won an award in the previous year, and industry.

- *Size:* Larger firms are typically more closely scrutinized and have greater coverage by analysts

and others in the financial markets. It is more likely that investors will fully appreciate the training information contained in the awards of large firms. Thus, firm size is included as a control variable and is measured as the natural log of a firm's total assets.

- *Corporation or Subsidiary/Division:* Although in most cases, the annual training awards are awarded to an entire corporation, in some cases, only a division or subsidiary applied for award consideration. In these cases, we expect the effect of training information on stock price to be diluted as only a portion of a parent corporation is providing new training information to financial markets. Therefore, a control variable (*CorpLevel*) is included, which equals 1 if the award was for an entire corporation, and 0 if the award was only for a subsidiary of a corporation.
- *Previous Year Award:* An award in the immediate subsequent year to a firm receiving an award is expected to provide less unanticipated information. Thus, a control variable for whether or not a firm has won an award in the previous year (*RLastYr*) is included, which equals 1 if the firm won an award in the previous year, and is 0 if it did not.
- *Industry:* Analysts or investors might consider training to be more crucial in some industries than others. Therefore, a control variable for industry (*Industry*) is included, which is measured with two-digit SIC codes.

Daily stock market information is collected from the Center for Research in Security Prices (CRSP) at the University of Chicago. Additional variables are collected and constructed from Compustat, Mergent Online, company websites, and additional online sources. Descriptive statistics and correlations for all of these variables are presented in Table 1.

## Methodology for testing Hypothesis 1: event study

The current article follows the customary four steps in conducting an event study: (a) the identification of the event; (b) modeling the normal (expected) returns; (c) estimating the abnormal returns; and (d) analyzing the summary measures of the abnormal returns (Brown & Warner, 1985; Hannon & Milkovich, 1996).

Table 1. Descriptive statistics (Correlations are followed by *p*-values and number of observations)

Variables	Mean	S.D.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
(1) CAR (15 Day Window)	1.67%	0.09	-0.2	0.55	1 222									
(2) RDint	6.87%	0.08	0	0.66	-0.0001 0.9995	1 97	97							
(3) PCint	31.24%	0.33	0.01	1.86	0.0013 0.9847	0.042 0.6896	1 211	211						
(4) ADint	2.94%	0.03	0	0.16	0.0101 0.9179	-0.0783 0.6061	0.0274 0.7802	1 106	106	106				
(5) Firm Size	9.73	1.96	4.94	14.74	-0.0555 0.4138	0.3087 0.0021	0.0244 0.7250	-0.4039 0.0001	1 219	211	106	66		
(6) CorpLevel	84%	0.37	0	1	0.0746 0.2684	0.06 0.5597	-0.0378 0.5855	-0.229 0.0216	0.0204 0.7641	1 222	211	106		
(7) Rlastyr	75%	0.44	0	1	-0.024 0.7219	0.1426 0.1636	-0.187 0.0065	0.0125 0.899	0.0852 0.2091	0.1384 0.0393	1 222	219	222	
(8) PCint × RDint	0.0155	0.0211	0	0.1143	0.0630 0.5484	0.7832 0.0000	0.3263 0.0014	0.1510 0.3163	0.2656 0.0101	-0.0654 0.5335	0.0755 0.4721	1 93	93	93

The event is the announcement that a firm has received a Training Top 125 award for its excellence in training and human capital management. The specific event day each year is the first trading day following the announcement of awards at *Training* magazine's annual award ceremony, which is held in the evening after the U.S. financial markets have completed trading for the day. During the period covered by the study, *Training* magazine's "Training Top 125" edition was released in February or March each year; the four event days were February 27, 2005; March 5, 2006; February 25, 2007; and February 4, 2008. We used a market model, value-weighted index, and the estimation window is a 200 trading day window preceding the event window (Brown & Warner, 1985). The event window of (-15, +1) was considered most appropriate for discussion and further analysis. All results were robust to alternative windows, including (-20, +1), (-15, +1), and (-10, +1).

This event window is larger than customary in research, and requires justification by explaining the timing of the release of the information to the public. The award is formally given to each of the winning firms at an award ceremony during the

training industry's annual "Training Conference & Expo" conference. A few weeks prior to the award ceremony, *Training* magazine contacts winning firms to request they attend the ceremony. The information, including rankings, is officially released at the ceremony itself. Approximately 3 days following the award ceremony, all 45,000 print subscribers are mailed a copy of the publication and an additional 70,000 e-mails are sent out containing award information. Given that winners are notified a few weeks in advance, a longer window seemed warranted. Due to the likely leakage of information, a very short window of (-2, +1) yielded no abnormal returns as the stock price reaction will have already occurred on average.

### Methodology for testing Hypotheses 2–5: regression analysis

After conducting the event study to determine whether or not abnormal returns exist, following McWilliams and Siegel (1997), the current article attempts to explain the variation in these abnormal returns. To do this task, we conduct the following regression analysis.

Table 2. Parametric event study results at various event windows

Event window #	Event window	Mean CAR (%)	Patell Z	p-value	Portfolio time series (CDA)	p-value	StdCsect Z	p-value
1	(-30, +2)	1.13	0.767	.2216	1.483+	.0691	0.674	.2501
2	(-20, +1)	2.01	3.411***	.0003	3.234***	.0006	2.729**	.0032
3	<b>(-15, +1)</b>	<b>1.67</b>	<b>3.010**</b>	.0013	3.064**	.0011	2.244*	.0124
4	(-10, +1)	1.05	1.986*	.0235	2.296**	.0108	1.537+	.0622
5	(-5, +1)	0.30	0.083	.4668	0.856	.1961	0.080	.4682
6	(-2, +1)	0.17	0.216	.4146	0.629	.2648	0.216	.4144

Note. The three parametric tests conducted were the Patell (1976) test, the Portfolio Time Series test (Brown & Warner, 1980), and the Standardized Cross-Sectional test (Boehmer, Musumeci, & Poulsen, 1991). Differences among these tests are that the Patell test (referred to as a standardized abnormal return test) assumes cross-sectional independence of returns. The Portfolio Time Series test (referred to as a crude dependence adjustment (CDA) test) (Brown & Warner, 1980), while avoiding the possible cross-sectional correlation of security returns, has the limitation of not taking account of unequal return variances across securities. The Standardized Cross-Sectional and Patell tests are similar aside from their differing cross-sectional variance adjustments. Bolded event window used for subsequent analysis in Table 3.

N = 222, Significance levels: +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < 0.001$ .

The theory-driven hypotheses, which are based on human capital theory and the logic of complementarities (Becker, 1964; Milgrom & Roberts, 1990; Teece, 1986), suggest the following econometric model specification:

$$\begin{aligned} AR_{it} = & \beta_0 + \beta_1 R\&D_{it} + \beta_2 PC_{it} + \beta_3 R\&D_{it} \\ & \times PC_{it} + \beta_4 ADINT_{it} + \dots \\ & + \beta_5 Size_{it} + \beta_7 CorpLevel_{it} + RlastYr_{it} \\ & + \beta_8 Industry Dummies + \varepsilon \end{aligned}$$

The abnormal returns (AR) for a given firm in a given year are influenced by that firm's R&D intensity (R&D), its physical capital intensity (PC), the interaction of its R&D intensity and PC intensity, its advertising intensity (ADINT), and controls for: firm size (*Size*), (measured by log of total assets), whether the award was for the entire corporation or a division/subsidiary (*CorpLevel*), whether the firm was ranked and received an award in the previous year (*RLastYr*), and *Industry* (controlled for using two-digit SIC codes). These coefficients indicate, for a firm receiving the award, the effect on the Abnormal Returns of increased levels of each variable.

Descriptive statistics for these variables can be found in Table 2. Due to gaps in the reporting of data for the independent variables, testing Hypotheses 2–5 with one comprehensive model was not feasible. We thus tested hypotheses in separate regressions (Models 2–4 in Table 3), using a consistent set of control variables across all models. Given the leakage of information before the award ceremony,

each of Models 2–4 uses returns from the (-15, +1) event window.

## RESEARCH RESULTS

### Results—event study

There is statistically robust support for human capital theory in Hypothesis 1, which predicts that a signal of firms' effective investments in human capital and training leads to a positive stock price reaction. Using multiple parametric tests reported in Table 2, and considering the event windows of (-20, +1), (-15, +1), and (-10, +1), we find consistent support for Hypothesis 1 at the significance levels of 0.1, 1, and 5%, respectively. These results corroborate expectations that information concerning this award leaks out (and is traded on) a few weeks before the award ceremony. Specifically, using the (-15, +1) event window, the mean cumulative abnormal returns (CARs) is 1.67% with a Patell Z statistic of 3.01, which is significant at the 1% level. Nonparametric tests (Generalized Sign test and Rank test) are also robust and significant at the 5% level. In sum, multiple statistical tests support Hypothesis 1 that, on average, firms benefit financially from effective human capital investments and training.<sup>5</sup>

<sup>5</sup> To attempt to rule out confounding events, we took two additional steps. First, we reviewed the *Wall Street Journal* for articles within a 2-week window of the announcement date, looking for "human capital," "training," or "human resource management."

Table 3. Regression results for the (-15, +1) event window

Variables	Model 1	Model 2	Model 3	Model 4
<i>Independent Variables</i>				
R&D Intensity (H2)		-0.00503 (0.981)	-0.472 (0.056)	
Physical Capital Intensity (H3)			-0.394* (0.035)	
R&D Intensity × Physical Capital Intensity (H4)			3.221** (0.007)	
Advertising Intensity (H5)				0.764* (0.033)
<i>Control Variables</i>				
Firm Size	-0.00675 (0.260)	-0.00152 (0.762)	-0.00687 (0.186)	-0.00547 (0.388)
CorpLevel	0.00910 (0.388)	0.00293 (0.897)	0.0167 (0.417)	0.0164 (0.652)
RlastYr	0.00633 (0.681)	0.00462 (0.827)	0.000791 (0.970)	0.0144 (0.412)
Two-digit SIC codes	Included	Included	Included	Included
Constant	0.0680 (0.124)	-0.0232 (0.647)	0.684* (0.041)	-0.00211 (0.968)
Observations	219	97	93	106
R <sup>2</sup>	0.211	0.176	0.240	0.331

Note. Robust *p*-value in parentheses; \**p* < .05, \*\**p* < .01.

Almost all the coefficients of the SIC dummy variables 22 through 99 were statistically insignificant.

In addition to the high statistical significance, we discuss here the economic importance of our findings. To place our result of +1.67% in context, we offer empirical results from other event studies in management of human capital, customer service, and quality awards.<sup>6</sup> Winning awards for quality such as the Malcolm Baldrige Award yields a return of 1.2% (Balasubramanian, Mathur, & Thakur, 2005) to 1.65% (Hendricks & Singhal, 1996). Being recognized for a superior board and superior corporate governance generates 2.9% (Johnson,

Ellstrand, Dalton, & Dalton, 2005). Increasing customer service yields a return between 0.14 and 0.96%, depending on the specific area of improvement (Nayyar, 1995). Layoff announcements of U.S. firms yield -1.78%, while layoff announcements for Japanese firms yield -0.56% (Lee, 1997). Regarding executive transitions, the appointment of a new female CEO gives a return of -2.47%, while a new male CEO gives a return of -0.58% (Lee & James, 2007). If an executive leaves a firm for a Cabinet-level appointment or a Congressional seat, the firm gains 1.6% (Hillman, Zardkoohi, & Bierman, 1999). Stockholder reactions to unexpected executive deaths yields gains of 2.4%, although a finer analysis suggests that the market response differentiates between successful executives and entrenched ones (Combs & Skill, 2003). Our magnitude of the return to a signal of a firm's effective investments in human capital and training in the range of 1.5–2% seems comparable to these significant strategic actions and events.

As an illustration, the largest CAR of 57% came to CompuCredit Holdings in 2008, described as a firm that "provides credit and related financial services and products to an under-served consumer credit market, a market represented by credit risks that regulators classify as 'sub-prime,' in the United

Over the 4 years of the study, 97 articles were found, but none suggested a confounding event, such as a similar award or a change in federal policy regarding training. Second, we examined the daily returns over the window of the study. Abnormal returns of over 2% were identified on event days -29, -25, -15, -10, and -1. This suggests no single confounding event occurred, and appears to be consistent with leakage of information into the market.

<sup>6</sup> Event studies originated in Finance, with more than 500 papers published using the technique. For further perspective from that literature, two primarily methodological papers, MacKinlay (1997), and Kothari and Warner (2007), offered both a good overview of the method and citations to reviews of specific subjects of finance and accounting. We offer two examples from that literature. Corporate control events typically generate high returns, typically around 30%, for firms being acquired but little or nothing for acquiring firms (Jensen, 1986). Positive earnings surprises typically generate a return of 0.97% (MacKinlay, 1997).

States.” It is plausible that a sub-prime lending company that wins an award for effective training in 2008 experiences a highly positive stock price reaction. Effective training yielding a large premium in that industry in that time period of great excitement for sub-prime mortgages seems consistent with our theorizing.<sup>7</sup>

### Results—regression analyses

Now that the empirical evidence from the event study above has corroborated that firms benefit financially from a signal of effective human capital training, we next consider our theory-driven regression model in an effort to better understand factors affecting *the extent* to which firms benefit from investing in the human capital of their employees. We use the abnormal returns associated with the event of firms receiving an award for their “excellence in training and human capital management” and report results using abnormal returns from the (−15, +1) window as the dependent variable in subsequent analyses. These models enable us to test Hypotheses 2–5 concerning the importance of complementary resources in explaining *variance* in firms’ financial performance associated with effective investments in human capital as signaled by the award.

Due to data availability, a single comprehensive regression model was not possible. For example, many firms reporting R&D expenditures did not also report advertising expenditures. Thus, Hypotheses 2–5 are tested separately. Model 1 includes controls; Model 2 tests Hypothesis 2; Model 3 provides a test of Hypotheses 3 and 4; and Model 4 tests Hypothesis 5.

The coefficient for R&D intensity in Model 2 using abnormal returns from event window (−15, +1) is not statistically significant, and thus, does not support Hypothesis 2. The coefficient for physical capital intensity in Model 3 is statistically significant and supports Hypothesis 3. The coefficient for the interaction of R&D intensity and physical capital intensity in Model 3 is significant at the 1% level ( $p$ -value = .007), and supports Hypothesis 4. Thus, the empirical evidence corroborates the complementarity hypothesis (Milgrom & Roberts, 1990; Teece, 1986) that, in the presence of high

human capital investments, the higher the interaction of R&D intensity and physical capital intensity, the greater the positive stock price reaction to the signal of above-average investments in human capital and training. The coefficient for the advertising intensity in Model 4 is significant at the 5% level ( $p$ -value = .033), supporting Hypothesis 5.<sup>8</sup> Finally, the control variables were consistently insignificant.

Overall, empirical evidence from the current study strongly supports the resource-based approach to human capital theory (Campbell et al., 2012; Coff & Kryscynski, 2011), and also supports the theory of complementarities (Milgrom & Roberts, 1990; Teece, 1986).

### CONCLUSION

This study empirically examines the relationship between a firm’s investments in human capital and training and its subsequent financial performance. Making these investments and developing a knowledgeable, capable, and well-trained workforce is often posited to be an increasingly important prerequisite for survival and effectively competing in the modern knowledge-based economy. Yet, despite the economic importance to firms of engaging in these training and related activities aimed at developing the human capital of their employees, little strategic management research has directly examined the relationship between these activities and firm-level measures of financial performance.

Due, at least in part, to the intangible nature of human capital and measurement challenges this creates, secondary data sources providing measures of firm expenditures in this area have generally been unavailable to researchers. Accounting conventions do not permit firms to record these expenditures as “investments,” and in fact, firms are not required to make *any* separate disclosure of these expenditures in public financial statements. The result is that

<sup>8</sup> An alternative explanation for this result is suggested by the mobility constraint theory of Campbell et al. (2012). According to this theory, advertising would serve to increase the reputation of an employer and make an employee more likely to want to stay at this current firm. If employees prefer to work at prominent firms, the firm is less likely to have to pay the full use value for this human capital. We cannot reject this alternative interpretation. We note that a prominent and positive reputation may in turn make the employee *more* mobile due to a reputational spillover from firm to employee, a “halo effect.” Further research should attempt to disentangle these effects.

<sup>7</sup> As a robustness check, we did omit CompuCredit Holdings’ result and re-ran the analysis; our conclusions are robust to the omission of this one data point.

most firms do not disclose this information (Coff & Flamholtz, 1993).

Even where this information is available, measuring the association with firm-level measures of financial performance remains difficult. The relationship within the firm between human capital and training and various financial performance measures is typically complex, and often causally ambiguous. Also, for annual accounting-based measures of financial performance, isolating the effect of training from the large number of other activities performed by the firm throughout the year is quite difficult (Flamholtz, 1985). Thus, management research has often found it necessary to use either self-reported or nonfinancial measures of performance. The interpretation of results related to such nonfinancial measures of performance is a potential concern, however, because there is not necessarily a relationship between the measures of nonfinancial and financial performance (Barney, 1986; Dierickx & Cool, 1989).

The question of whether firms financially benefit from their investments in human capital and training is examined by the use of event study methodology. Several parametric and nonparametric tests corroborate that firms receiving an award for their "excellence in training and human capital management" have significantly positive abnormal stock returns. After completing the event study, we then use the abnormal return measures for each firm in subsequent regression analysis, which focuses on the firm-level factors that affect the extent to which firms benefit. The significantly positive impact of human capital interacting with R&D intensity and physical capital intensity, and human capital interacting with advertising intensity support the logic of complementarities.

### Research limitations

All studies have limitations that constrain their conclusions and suggest future directions. Bettis, Gambardella, Helfat, and Mitchell (2014) noted that there are typically potential specification problems (e.g., with the ever-present possibility of omitted variables); measurement problems due to errors in the values of the variables, which affects both the coefficient estimates and the standard errors; and identification problems of pinpointing causality. Thus, the hallmark of mature scholarship is being forthcoming about omitted variables (e.g., in our case, we simply do not have firms' monetary

expenditures on human capital training), about measurement problems (e.g., using awards as a signal of effective human capital training is the best proxy we can find), and about identification problems (e.g., requiring the acceptance of the efficient market hypothesis). As Bettis et al. (2014, p. 949) noted in general, and as Brown and Warner (1980, 1985) observed for event studies in particular, the key to successful research outcomes has more to do with careful collection of data than with ever increasing econometric sophistication (to deal with poor data).

The current article uses event study methodology where the event is an award that a firm receives for its investments in training and related human capital activities, but this measure has limitations. First, our use of a training award is a measure or "signal" for the human capital itself, which is a difficult-to-observe construct. Thus, the measure of human capital is at least a step removed from measuring changes in an employee's knowledge, know-how, skills, and abilities.<sup>9</sup> Also, we do not claim that financial markets are directly evaluating and reacting to any precise numerical figures regarding training expenditures released at the time of the award. Rather, we posit that in a world of incomplete information regarding training and human capital investments, this award provides new information to financial (and other) markets that increased training has recently occurred, that the award-winning firms are developing the human capital of their employees, and that these firms are making superior investments relative to other firms. Second, it is highly likely that not all training is equal, and thus, more fine-grained measures of types of training would improve the current empirical study. Third, differences in firms' governance might impact the abnormal returns. Specifically, abnormal returns might be greater for firms with less transparent governance (e.g., a less independent board of directors, and corporate charters with staggered boards and other antitakeover provisions that suggest entrenchment tactics).

Another consideration concerns all event studies. The current article's performance measure, the

<sup>9</sup> Triangulation enables further investigation of the impact of human capital on firm-level performance (Jick, 1979), which is a key empirical challenge for studies in the economics and human resource management literature (Huselid, 1995). Some useful ways to progress are by relying on experimental empirical design, where training is assigned exogenously (Becker and Huselid, 2006), and through meta-analyses (Van de Ven, 2007).

abnormal returns obtained from our event study, requires an acceptance of the efficient market hypothesis, which states that all publicly available information regarding firms will be fully and immediately imputed into the firm's valuation and its stock price (Brown & Warner, 1980; Fama, 1970). This hypothesis does not claim that the market reaction based on expected changes in the discounted value of a firm's future cash flows will be perfect in every individual instance, but it does require that the changes in stock price that occur over narrow "event windows" will be unbiased in their valuation of new information.

The need to use multiple samples in our hypotheses testing Hypotheses 2–5 (see Models 2–4 in Table 3) is also a limitation. When collecting independent variables to examine possible complementarity between a firm's human capital and its other strategic assets, it became apparent that gaps existed in the public reporting (in Compustat) of these variables. For example, although the full sample contains 219 observations (of a firm winning an award in a given year), only in 97 of those observations were the firm's R&D expenditures reported that year. In order to preserve the number of observations used to test each hypothesis, it was necessary to create separate subsamples based on (Compustat reporting) availability of each independent variable. This procedure necessitates more caution when directly comparing results across various models, but a comparison of descriptive statistics across samples reveals few obvious differences, aside from the number of observations in each sample. Interpretations of each individual model remain informative and provide valuable insights regarding the overall research questions of this study.

Our study has an important qualitative dimension that creates a quantitative opportunity for future research. Rather than measuring dollars invested, it measures whether a firm is recognized for superior training. This training may or may not be quantitatively larger in duration or in financial or personnel investment—the award simply notes an excellence. Ideally, future research would identify returns to actual dollars invested noting that such returns could be subject to diminishing returns, or even negative returns, depending on the quality of the training.

Finally, an important limitation is that we by no means exhausted the possibilities of examining important complementarities. For example, besides

the complementarities of human capital with those investments considered in the current study (R&D, Physical Capital, and Advertising), human capital investments may be co-specialized with organizational routines (Campbell et al., 2012; Nelson & Winter, 1982).

With these caveats, we identify implications for research and practice.

## Research implications

We used an event study to test whether there is a market reaction to a firm receiving an award for its "excellence in training and human capital management." Due to the specific questions and methodology used by *Training* magazine in determining winning firms, we are able to attribute these awards as being related to those HR activities *specific* to the training of employees. Further, as these awards include information regarding newer training initiatives of firms, we maintain that a substantial portion of any abnormal market reaction to these awards will reflect the market's estimation of the asset value (in excess of training costs) of the human capital developed through this training. In addition, the financial markets consider the expected value that this new information will have in other markets and to various additional internal and external stakeholders. Presumably, these include the labor market, in which an award helps build a reputation and enables a firm to more efficiently attract, hire, and retain qualified workers. Current and potential suppliers are likely to become more confident that any integrated operations will run more efficiently when a potential buyer has well-trained employees, and customers gain additional confidence that they are buying quality products, often allowing the firm to command a price premium for its products. Being a financial measure, these abnormal returns provide a more direct measure of the economic returns to training than many productivity and other nonfinancial measures, and can be leveraged with a systematic examination of complementary investments within the strategy field.

Our research posits that this general training offered by firms adds to general human capital, and we have supported this claim with evidence above, including content analysis of the relevant magazines. As Becker (1964) noted, however, virtually all training contains at least some elements of firm-specific training. As one example, training may involve the use of complementary

assets that are specific to the firm, or at least a deliberate choice of the firm. Not all machine tools or software programs work the same way, and the details of operation may be firm specific, or at least much more limited than general human capital would suggest. If much of these training programs are actually firm-specific, then we would again see a strong return to training. Ideally, further research would help advance strategic management theory and inform managerial practice by distinguishing among the nature of training and its impact on performance, as well as by identifying relative effects of firm-specific and general human capital training on performance and advantage.

### Managerial implications

Human capital matters for (stock price) performance. Human capital investments and training within the firm have economic value, and the financial markets recognize this value—once they are aware of the investments. Top management may want to better insulate mid-level managers making training decisions from the pressures that result from being forced to “expense” these activities that are truly an investment for the firm. As human capital is an intangible asset that financial markets will generally have less than complete information regarding, managers concerned about accurate valuation need to more accurately record and more fully report this information. However, the greater revelation of information should be done with caution because detailed reporting of training activities and the development of intangible assets within the firm will also make this information available to competitors. The current study posits theoretically and corroborates empirically that human capital investments and training can create economic value for the firm, especially in the presence of complementary assets (Chandler, 1990; Helfat, 1997; Tripsas, 1997). Perhaps firms can release the necessary detailed information to a third party such as the awarding organization under a confidentiality agreement, and if they are successful in receiving an award, some portion of a financial under-valuation is likely to be corrected when the financial markets receive this information.

### Future research

Given that the current study has used training awards to provide an indication of a firm's past

investments in human capital and training, future research may use more direct, and fine-grained, measures of these investments. The event study methodology in this article establishes a financial relationship between training (awards) and financial performance, but the coarseness of data used in subsequent regression analysis limits our ability to establish more fully the factors that account for the *variation* in returns to training expenditures. A survey instrument has the limitation of self-reported financial measures, but would enable us to obtain more detailed information on training and other human capital development activities. Also, a survey would enable researchers to obtain measures of the *specificity* of the human capital and physical capital within the firm. Transaction cost economics suggests that this article's complementarity hypotheses regarding human capital with the firm's other strategic investments would have more consistent empirical support if measures of specificity were included in the analyses (Teece, 1986; Williamson, 1985).

In addition to obtaining more fine-grained measures of human capital investments from the firm's perspective, a survey would allow us, at the same time, to also examine these same investments from the employee's perspective. Future research here could also be grounded in transaction cost economics. As Williamson illustrated in a *Simple Contracting Schema* (1985: 33), there is a set of possible contracts between buyers (firms) and suppliers (including employees) determined by the presence or absence of specific investments between these two parties, and also by the presence or absence of safeguards to protect these parties from potential opportunistic behavior of the other party in the contract. At one extreme, there are only general investments, and therefore, no safeguards are necessary to induce either party to contract since neither is vulnerable to potential opportunistic behavior. These investments could easily be redeployed to other uses or sold in the market. At the other extreme, specific investments have been made between these two parties, and safeguards have been provided to protect the parties from the potential opportunistic behavior of their trading partner and induce them to contract. At a third point, the specific investments have been made, but no safeguards against opportunistic behavior have been offered. This situation is “apt to be unstable contractually” (1985: 34). Why would a supplier (a potential new employee, e.g.) enter into a contractual relationship

that would require it to make specific investments when no safeguards are offered? Williamson (1985) stated that, in the absence of safeguards, a significant price premium would need to be offered to induce the supplier to enter contract in a situation where, *ex post*, they would be subject to opportunistic behavior. The projected break-even supply price is high (the wage rate required by workers at the third point exceeds the extreme). The third point is considered an inefficient and out-of-equilibrium situation, which is not expected to persist. However, such a high price premium is not necessarily the only solution that induces the other party to a contract (the employee) to enter into a contractual agreement in the face of specific investments and a lack of sufficient economic safeguards. Other "in kind" benefits, such as human capital investment and training, may induce parties to come to contractual agreement in place of safeguards and price premiums (Galunic & Anderson, 2000; Hansson, 2002). An additional benefit is that human capital investments and training can enhance absorptive capacity that enables the employee to more efficiently learn from new training (Cassiman & Veugelers, 2006; Cohen & Levinthal, 1990; Mowery & Oxley, 1995; Zahra & George, 2002).

In sum, the current article contributes to research on human capital and complementarities. The event study supports the importance of human capital, and empirical tests of the theory-driven model corroborate the predictive power of the logic of complementarities. Effective investments in human capital and training, and in their complementary assets, matter for a firm's performance.

## ACKNOWLEDGEMENTS

We thank Minyoung Kim, Doug Miller, and Paul Vaaler for their comments on earlier drafts of the article. We also thank participants' comments at the annual Academy of Management meeting. Further, we thank Associate Editor Rich Bettis as well as the anonymous reviewers for their guidance in helping to improve the article. The usual disclaimer applies.

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