



Equity market valuation of human capital and stock returns

Christos Pantzalis^a, Jung Chul Park^{b,*}

^a Department of Finance, College of Business, BSN 3403, University of South Florida, Tampa, FL 33620, United States

^b Department of Economics and Finance, College of Business, P.O. Box 10318, Louisiana Tech University, Ruston, LA 71272, United States

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ABSTRACT

We investigate whether and how well firms' stock market valuations reflect their employees' collective skills and effectiveness relative to that of their industry peers and competitors. We devise a relative stock market valuation measure of human capital intangibles (EVHC) and find that portfolios of low EVHC firms systematically outperform portfolios of high EVHC firms by an average 1.34% per month. However, this is primarily a small firms effect, because for large firms the excess returns of the arbitrage portfolio that is long on the low EVHC stocks and short on the high EVHC stocks is zero. Our results suggest that reliance on human capital intangibles may proxy for risk not fully accounted for by conventional asset pricing models, or alternatively, that the market cannot correctly price human capital intangibles for small size firms.

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1. Introduction

Human capital comprises the physical and intellectual skills and capabilities acquired through education and training that enable an individual to perform tasks effectively and to be productive. As such, human capital is at the core of several economic theories that provide explanations for the link between individuals' skills and earnings. Companies compete in the labor market to attract the services of individuals. Thus, the labor market value of human capital is reflected in the compensation amounts received by human capital investors. What remains to be determined is how human capital is reflected in stock valuation.

Human capital is an important parameter of firm performance. Theory and empirical evidence suggest that maximizing firm value involves optimally mixing people, technology, and physical assets in order to produce strategic goals (see, among others, Myers (1999), Becker and Huselid (1998), Boudreau and Ramstad (1997), DiFrancesco and Berman (2000), Huselid (1995), Lev (2001), Provo (2000)).¹ Even though the importance of human capital and its valuation in the labor market have been studied extensively, human capital intangibles are either difficult to incorporate in financial val-

uation or simply missing in traditional accounting valuation methods. This is because the input of human capital cannot be measured clearly and the product of human capital is often masked by other factors. Thus, it is difficult to gauge the stock market's ability to recognize the quality of human capital, i.e., whether firms' equity valuation is commensurate with their employees' collective skills and effectiveness relative to that of their industry peers and competitors.

In theory, the link between firm valuation and human capital can be understood in the context of a simple model wherein the firm's total market value, $MV(F)$, is decomposed into the present values of profits attributable to tangible assets ($MV(T)$) and intangible assets ($MV(I)$), respectively. If human capital-related intangibles contribute a sizeable component of $MV(I)$, then they should also have an impact on $MV(F)$. However, since under current US accounting standards intangible assets are not reported in financial statements, there is considerable doubt about the market's ability to correctly assess $MV(I)$ (see Lev and Zarowin (1999)). Past studies examining the impact of intangibles on valuation have concentrated on R&D (and advertising) expenditures as a proxy of a firm's intangibles (see for example, Chan et al. (2001)). However, these measures suffer from two limitations: first, they are available only for a small subset of public firms, and second, they do not account for a possibly sizable portion of the firm's intangible assets that is attributed to the firm's employees.²

* Corresponding author. Tel.: +1 318 257 3571; fax: +1 318 257 4253.

E-mail addresses: cpantzal@coba.usf.edu (C. Pantzalis), jcpark@latech.edu (J.C. Park).

¹ Myers (1999) noted that firms' ownership, form of organization, incentive financing and allocation of risk adapt to support the co-investment of human and financial capital. In addition two recent studies by human capital consulting firms Watson Wyatt and O.C. Tanner (see <http://www.octanner.com>) found that superior recruiting practices and rewards programs can have a direct, positive impact on shareholder returns. Watson Wyatt's survey of human resource practices at 147 large North American companies conducted in 2005 produced the Human Capital Index (HCI, see http://www.valuebasedmanagement.net/methods_hci.html).

² R&D and advertising expenditures information is missing for the vast majority of public firms. For example, R&D expenditures are reported by less than 40% of the firms in COMPUSTAT, while advertising expenditures are reported for less than 20% of firms in COMPUSTAT. Thus, it is very hard to make general statements about the impact of intangibles on valuation based on information that is only available for a subset of the population.

In this paper we use a more general and representative measure of the market's valuation of firm intangibles than those based on R&D and advertising expenses. Ideally we would like to have employed a measure that is based on employee wages. Unfortunately, this information is mostly absent in data extracted from COMPUSTAT,³ and, in addition, it is not clear whether salaries correctly reflect investors' assessments of how much human capital intangibles contribute to firm performance.⁴ We therefore devise a relative stock market valuation measure of human capital intangibles (EVHC) based on the ratio of the market value of equity per employee to the industry's median market value of equity per employee and examine whether it is related to future return performance. In an efficient market EVHC would correctly impound all relevant information about the value of the firm's intangibles and therefore there should be no systematic relationship between EVHC and future returns. Conversely, if reliance on human capital intangibles constitutes a risk not accounted for in conventional asset pricing models, then EVHC will be related to future returns. Moreover, EVHC will be related to future returns if extreme values of EVHC reflect the market's inability to correctly assess the value impact of intangibles due to either limits to arbitrage, noise trading, or behavioral biases. For example, Hirshleifer (2001) points out that people are more prone to biases, and thus misvaluation is more likely, when they try to value securities for which information is sparse. Alternatively, if the value of human capital is hard to pin down, then stock prices may be noisy, making mispricing more likely. Thus, since information about the quality of human capital and the intangibles' advantages derived from it is not readily available, it is reasonable to expect that investors may misinterpret the value impact of human capital for intangibles-intensive firms.

We find that portfolios of low EVHC firms systematically outperform portfolios of high EVHC firms by an average 1.34% per month. This is primarily a small firm effect. Our asset pricing tests show that in the case of small firms the difference in the return performance of the low- and high EVHC portfolios cannot be explained away by conventional risk factors, whereas in the case of large firms the excess returns of the arbitrage portfolio the is long low EVHC firms and short high EVHC firms is zero. Our results also indicate that EVHC is highly correlated with several mispricing measures. We conduct a number of additional tests aimed at clarifying the nature of the link of between EVHC and future returns. Overall, our results are consistent with two alternative views of EVHC: as a proxy for risk associated with firm's reliance on human capital intangibles, or as a mispricing proxy that reflects the market's inability to correctly assess the true value of human capital, especially for small firms.

The rest of the paper is organized as follows: Section 2 describes the data selection process and provides detailed definitions of the variables used in the study with special focus on EVHC. Section 3 presents and describes the empirical results. Section 4 provides a summary and some concluding remarks.

2. Data and variable definitions

2.1. Data sources and sample selection

We extract stock returns from the Center for Research in Securities Prices (CRSP), which includes NYSE, AMEX, and Nasdaq

stocks. The number of employees and financial data are drawn from COMPUSTAT. In addition to the number of employees, we require that firms have information on the number common equity shares and the share price as of the end of June of each calendar year t in order to be able to compute the relative market valuation of human capital (EVHC). The industry classification we use is based on the Fama and French (1997) definition of 48 industry codes.^{5,6} These requirements generate the initial sample which includes 48,964 firm-year observations. We also require that firm's monthly returns from July of year $t - 1$ to June of year $t + 1$ be available in CRSP. Our final sample includes 5653 firms and 44,191 firm-year observations over the period, 1978–2002.

2.2. Excess value of human capital (EVHC) and other firm characteristics

We measure excess value of human capital (EVHC) as follows. first, we compute the industry-median value for the ratio of market value of common equity to total number of employees (EV). Then, we multiply the industry median EV by the firm's number of employees to obtain an imputed market value of human capital. The assumption underlying the use of the number of employees as a multiplier is that the returns to human capital are similar across firms that belong in the same industry, i.e., on average firms in the same industry competing for services of individuals invest in similar (i.e., average quality) human capital. Excess value of human capital of firm i at time t is then defined as the natural logarithm of the ratio of i 's market value of common equity to its imputed equity value:

$$EVHC_{i,t} = \ln[V_{i,t}/\text{Imputed}(V_{i,t})], \quad (1)$$

where $V_{i,t}$ is the market value of common equity, and $\text{Imputed}(V_{i,t})$ is computed as the product of the firm's number of employees ($EM_{i,t}$) and the industry's median equity value per employee ratio ($(\frac{V}{EMP})_{m,t}$). A positive value of EVHC indicates that the market assigns values higher than what the industry benchmark-based return on human capital would indicate.

Alternatively the EVHC expression in (1) can be written as:

$$EVHC_{i,t} = \ln \left[\left(\frac{V}{EMP} \right)_{i,t} / \left(\frac{V}{EMP} \right)_{m,t} \right]. \quad (2)$$

Thus, the excess value of human capital of firm i can also be expressed as the natural log of the ratio of firm's market value of common equity per employee to the industry's median (m) value of market value of common equity per employee.⁷

There are three possible views of the EVHC measure.

- (1) EVHC as an (in)efficiency measure: Assuming that the market is efficient, i.e., that the firm's stock value reflects all relevant information, a low EVHC firm would be a firm that has low returns to human capital, or in simple terms, a firm that utilizes a greater amount of employees than similarly valued firms in its industry. This could indicate that the firm operates less efficiently than the benchmark firm.

³ As stated in Qian (2001), "According to Ballester et al. (2001) only 10% of firms in COMPUSTAT consistently identify labor costs, another 30% report these costs in some but not all years".

⁴ In a perfect world, firm investors (shareholders) can have their agents (managers) set salaries appropriately, i.e. dispense higher (lower) salaries when human capital intangibles contribute more (less) to firm performance. Given the fact that in the presence of informational asymmetries between managers and outside shareholders it is difficult to assess whether salaries have been set based on value maximization criteria, investors do not know exactly what the value impact of human capital intangibles may be.

⁵ Standard Industry Classification (SIC) codes for each of the 48 industries are available in Kenneth R. French's website at http://www.mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

⁶ We also use a 3- or 4-digit SIC classification, and find that the results are qualitatively similar to the ones reported in this paper. These results are left out of the paper for the sake of brevity, but are available upon request.

⁷ We also use the levels for the excess value of human capital (i.e. without the log transformation) and find that our results are similar to those reported in this paper.

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