Human Capital Investment Effects on Firm Returns

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Abstract

This paper demonstrates that two measures of firm investment in specific human capital are significantly and positively correlated with long-term rates of return on investment. The final sample of 260 firms is a subset of the 805 firms included in the June 1984 edition of Forbes' survey of executive compensation. We utilize two proxies for firm return-net income and cash flow. The return measures are scaled by both book value of total assets and market value of common stock yielding four alternative specifications of the rate of return measure. The firm investment in specific human capital measures are generally found to be significant explanatory variables in the regressions that have returns scaled by book value of assets. These measures of investment are insignificant when market value of common stock outstanding is used to scale the return measures. We interpret these findings to imply that a public or regulatory policy needs to be established to require firms to include at least some basic rudimentary information regarding their human capital investment, such as turnover rates and training costs, in their annual reports.

Introduction

Over the last two decades, accounting researchers have studied the problem of unrecorded human assets and whether or not firms should capitalize such assets. Recently, the Department of Labor has been considering the formation of a task force to examine whether accounting rules regarding training costs should be revised.[1] Current Generally Accepted Accounting Principles (GAAP) require that firm investments in human capital be expensed rather than capitalized as an asset. This type of accounting treatment of training cost is presumed to lower a firm's incentive to spend money or otherwise invest in employee training.

Flamholtz (1985) lists the following three conditions as necessary for human capital to be recorded as an asset for external reporting purposes: (1) there must be future service potential,[2] (2) The benefit must be subject to the ownership or control of the firm, and (3) the benefit must be measurable in monetary terms.

The first of these criteria is probably the most easily satisfied. It is hard to envision why firms would invest in training at all, except for the fact that they feel employee productivity, future service potential, will be increased.

The second requirement cannot be strictly met since employees are not legally viewed as property that is subject to the ownership or control of the company. However, it can be argued that long-term attachments between firms and workers suggest that firms may indeed exercise, in essence, a quasi-ownership or control of their human assets. Hall (1982) showed that many employee-employer associations are quite stable with over a quarter of these current attachments expected to last twenty years or more. This suggests that firms may well view their investments in human capital, such as training costs, as a long-term asset from which they receive returns during the employees tenure with the firm.

In reviewing Flamholtz's criteria for reporting human capital assets, clearly the third one presents a great challenge. Though human capital has a conceptual link to physical assets, it is difficult to place a precise value on human assets. However, this problem is not unique to human capital assets. Determination of the value to place on investments in research and development (R&D) activities are highly subjective and prone to miss-estimation. Therefore, it is probably not prudent to try to include such investments as assets on the balance sheet. This suggests that the Financial Accounting Standards Board (FASB) and/or SEC not require that such information be booked, but rather require disclosure of such information in the footnotes to the financial statements. Indeed this is exactly what is currently

required regarding R&D investments and provides a good precedent for requiring similar disclosures for material investments in human capital.

The purpose of this paper is to demonstrate that measures of firm investments in human capital can be shown to be systematically related to observed firm rate of return measures. We propose two measures of firm investments in specific human capital that are based on theoretical models advanced by Becker (1962) and Doeringer and Piore (1971). Our measures are based on information on long-term turnover rates and a hypothesized length of job training ladders in the firm. These measures are validated by demonstrating that they are significantly correlated with long-term rates of returns on investment in a sample of large firms, even when controls are added for market structure and union influence. To our knowledge, this is the first paper to show that measures of human capital investment provide a partial explanation of observed differences in the long-run rates of return on assets across firms. The public policy implication of the findings is that an empirical rationale exists for requiring that firms routinely provide turnover and training cost data in their financial statements. This manuscript suggests that firms should provide information on investments in human capital on a more systematic basis. Additionally, we feel that the Financial Accounting Standards Board and/or SEC should consider requiring that this information be included in financial statements. A potential solution would be to include information in the notes to the financial statements similar to research and development costs. Such information, as a minimum, should include turnover data and training costs.

The next section presents a brief discussion of the human capital theory provided by Becker (1962) and Dittman, Juris and Revsine (1980). The third section presents the methodology and data collection procedures, and the final two sections present the results and summarize the findings.

Human Capital Theory

Becker (1962) developed a theory of human capital that distinguishes between general and specific employee training.[3] General or non-firm specific training increases the employee's value of marginal product (MP) to all potential employers', while firm specific training increases the employee's value of MP to only one employer. The theory is predicated on the assumption that, without either type of training, competitive forces ensure that the wage rate equals the value of MP at all points in time.

Figure 1 illustrates a simple two-period human capital investment model. A discussion and understanding of this model allows us to characterize the type of employee training that a firm is either likely or not likely to engage in and pay for. Let MP_0 represent the value of a worker's general training. If firms compete for workers, they will pay wages up to but not exceeding MP_0. The opportunity wage in other firms is W_0, equal to MP_0.

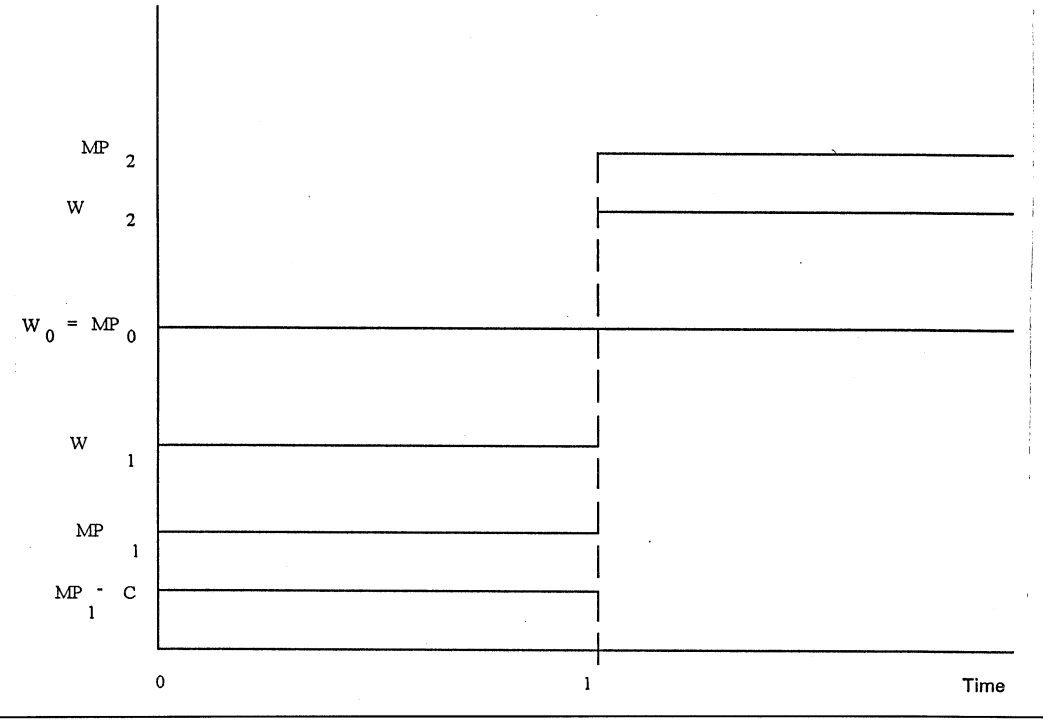
If a worker engages in training, the employee will have to take time away from production activities. Suppose that the worker's productivity while training is MP_1 and that the direct cost of training is C. Then the worker's value to the firm while training is $(MP_1 - C)$. The total cost of training is $[MP_0 - (MP_1 - C)]$. After training, the worker's value rises to MP_2, and the total return from training is $(MP_2 - MP_0)$.

If the training is general in nature, then the worker's value rises to MP_2 in several firms. The firm needs to pay wages below MP_2 if it wants to recapture its training investment. The worker would quit and go elsewhere if the firm offered a wage less than MP_2 since the worker can earn a wage equal to MP_2 in the market place. Thus, in a completely competitive and frictionless labor market the employee will pay all of the costs of general training and the worker's wage will be equal to $(MP_1 - C)$ in the training period and MP_2 in the post-training period.

Firm and employee incentives change when firm specific training is being considered. In this case, the worker's training has value of MP_2 with only the current employer and the employee's value to all other employer's is still MP_0. In this situation, the firm and worker will have an incentive to share the costs and the returns of the training. This is done by setting the wage during training, W_1, between $(MP_1 - C)$ and MP_0 and the post-training wage, W_2, between MP_0 and MP_2. The firm's training costs are $[W_1 - (MP_1 - C)]$ and the firm's return on training is $(MP_2 - W_2)$. The more the firm invests in training in the first period (*i.e.*, the bigger $[W_1 - (MP_1 - C)]$), the greater will be the firm's required return to recapture that investment in the second period (*i.e.*, the bigger $(MP_2 - W_2)$). Additionally, once a firm has invested in firm specific training the firm will have a vested interest in retaining trained workers to recoup its training investment. The incentives to keep the worker are greatest in firms with the largest gap between MP_2 and W_2.

Similarly, the employee's cost of training in period one is $(MP_0 - W_1)$ and the worker's return in period two is $(W_2 - MP_0)$. The greater the cost of training borne by the employee in period one (*i.e.*, the bigger $(MP_0 - W_1)$), the higher will be the wage, W_2, the employee will require in the second period to recoup his/her training investment. Since the employee can only recapture his/her training investment by staying with the current employer in period

Figure 1
Simple Two-Period Human Capital Investment Model



two, the greater the gap between wages in the firm, W_2, and the opportunity wage elsewhere, MP_0, the greater the employee's incentive to maintain employment with the training firm.

The nature of the relationship between observable turnover data and firm investments in specific human capital can now be characterized. First, overall turnover will be tied to the gap between MP_2 and MP_0, which represents the total value of the specific human capital investment embodied in the employee. The overall turnover rate, however, does not reveal how investments in, and returns to, specific training are being allocated between the firm and the employee. Therefore, the amount of employee-elected turnover (quits) relative to firm- elected turnover (layoffs) is driven by how the firm and employee share the costs and benefits of specific training. Specifically, holding (MP_2 - MP_0) fixed, the greater W_2, the smaller the firm's return on the worker's training (MP_2 - W_2) and the more likely the overall turnover rate is being driven by layoffs rather than quits. Similarly, the lower W_2, the higher the firm's return (MP_2 - W_2) and the more likely the overall turnover rate is being driven by quits rather than layoffs. This suggests that the ratio of quits to separations is a better proxy for the firm's share of investment in specific human capital than the overall turnover rate.

It is important to emphasize that low firm turnover rates do not imply high returns to the firm on investments in specific human capital. The low turnover could be due to low quit rates because workers are capturing the return to specific training. Only a high rate of quits relative to separations can be unambiguously interpreted as indicative of high returns to the firms on investments in specific training.[4,5]

Following Dittman, Juris and Revsine (1980, 1976), the simple two-period model can be extended to multiple periods as follows:

$$MP_1 + \sum_{t=1}^{n} [(MP_t)\ (1 + i)^{-1}] = W_1 + C + \sum_{t=1}^{n} [W_t\ (1 + i)^{-t}] \quad (1)$$

where:

MP_1 = the value of marginal product during the training period.
MP_t = the value of marginal product in period t.
C = the firm's expenditure for training.
i = interest or discount rate.
W_1 = Wage in the training period.
W_t = Wage and non-training benefits in period t.

Rearranging these terms, the equilibrium relationship can be expressed as

$$\sum_{t=1}^{n} [(MP_t - W_t)(1 + i)^{-t}] = W_1 + C - MP_1 \quad (2)$$

The right-hand side of (2) represents the costs of training incurred by the firm and the left-hand side of (2) is the discounted firm return from the investment. This is the multi-period extension of the firm's return to training expressed in Figure 1 (eg., $MP_2 - W_2$). When training is offered, the firm will benefit whenever $S (MP_t - W_t) > 0$. Dittman, Juris and Revsine (1976, 1980) further state the cost of specific training would qualify as an asset whenever $S (MP_t - W_t) > 0$. Extending the arguments from the two-period model, higher values of $S (MP_t - W_t)$ will be associated with higher long-term ratios of quits to separations.

In general, firms will differ in their need for firm-specific training. Doeringer and Piore (1971) argue that firms with heavy specific training requirements will generate internal promotion ladders in which only workers with experience in the firm will qualify for upper-level jobs in the firm. The longest promotion ladders will be found in firms that have the greatest specific training requirements. Thus, the length of promotion ladder is another observable indicator of firm investments in, and returns to, specific human capital.

Methodology and Data Collection

The goal of the empirical work presented in this section is to test whether or not measures of firm investment in specific human capital are significantly and positively associated with various long-run rate of return on investment measures. The rationale behind the empirical test is straightforward. If a firm receives a stream of returns from investments in human as well as physical capital, traditionally reported or book value measures of firm assets will understate the true investment base of the firm. This understatement will be greatest in firms with the largest investments in specific human capital. Thus, rate of return measures that use book value of assets as the proxy for the investment base will be systematically biased toward overstated. Therefore, a significant and positive association would be expected to exist between measures of firm investment in specific human capital and such rate of return measures. On the other hand, if a firm does not receive returns on investments in specific human capital, no such association would be expected to exist between such investments and book value based rate of return measures.

Likewise, a rational and efficient stock market will factor such specific human capital investment information into its valuation of the firm as reflected in the stock price. Therefore, firm rate of return measures that utilize the market value of common equity as a proxy for the investment base would not be expected to be systematically correlated with measures of specific human capital investment.

Table 1 provides a summary of the 260 firms included in the sample. The sample consists of firms listed in the June 1984 edition of *Forbes*' survey of executive compensation. This survey contained information useful in measuring the length of the promotion ladder in the firm. These firms were then merged with data from COMPUSTAT. Firms with SIC codes greater than 3999 or less than 2000 were excluded from the sample because labor turnover data were only available for manufacturing firms. Eighteen firms were dropped because they were in the computer industry for which data on turnover were not

Table 1
Development of Sample

Number of firms per the June 4, 1984 edition of *Forbes*		805
Less: Firms not included in COMPUSTAT	89	
Firms with SIC codes under 2000	17	
Firms with SIC codes over 3999	413	
Firms with SIC codes from 3680 to 3689	18	
Firms that were on COMPUSTAT less than ten years	8	
		545
Sample Size		260

collected. Finally, eight firms were eliminated because data on earnings were not available for a period sufficiently long to measure long-run returns.

Annual net income and cash flows were used as proxies for firm return, while the book value of assets and the market value of common stock outstanding were used as proxies for firm investment. Four alternative measures of long-term rate of return on investment were constructed utilizing these return and investment measures. A ten-year average of return on investment for each firm and each of the four alternative measures was used to approximate the long-run rates of return.[6]

Two measures of a firms investment in specific training, one specific to the firm and one specific to the three digit SIC industry in which the firm operates, were used.[7] The industry proxy for firm investment in specific human capital, SPECTR, is measured as the ten-year average of quit rates relative to separation rates in the three-digit industry. The theory suggests that SPECTR should be positively associated with firm returns, conditioned on a given level of total investment in specific human capital. The latter is measured by the ten-year average retention rate, RET, in the firm (or one minus the separation rate). Only SPECTR must have a positive effect on long-term profits since the retention rate can be high because the worker invested in the specific training and is capturing the return in the form of higher wages. Data on industry quit and separation rates are available from the Bureau of Labor Statistics' *Employment and Earnings* until discontinued in March, 1981. The last ten years of data were utilized.

The second measure of firm investment in specific training is CEOTEN, the length of time the Chief Executive Officer was with the firm before becoming CEO which is available from *Forbes*' survey of executive compensation (June 1984). This is taken as a measure of the length of the promotion ladder with the firm. According to Doeringer and Piore (1971), firms in which specific training is most important will be firms that have the longest promotion ladders. Thus, a firm wanting to change leadership will find new management from within its ranks if specific training is necessary to effectively manage the firm.

The traditional explanation for the existence of long-term differences in return rates across firms is that some firms have monopoly power. Firms that earn long-run rates of return above the market rate are presumed to have monopoly power. Therefore, it is important to include controls for potential market power to insure that the measures of firm-specific training are not just proxies for excluded market structure variables. Four measures were taken from the *Census of Manufacturers*. The number of firms in the four-digit industry, N, was used as a measure of industry concentration. This measure performed much better than the usual measures (*e.g.*, Herfindahl indices or four-firm concentration ratios) in explaining variation in long-term profit rates. Since industries with more firms will be subject to greater competitive pressure, the expected sign is negative.

Two measures of entry barriers to the industry were also used. LABINT is a measure of the labor intensity of production, taken as the ratio of total payroll to the value of shipments. The expected sign is negative since entry should be easier in industries with a greater proportion of production expenses associated with variable inputs. SIZE is the average size of firm in the four-digit industry, taken to be the value of shipments per firm. This should be positively correlated with profits as entry should be more difficult in industries with large scale operations. The change in the industries' value of shipments from 1972 to 1982, GROWTH, to measure shifts in the demand for firm production was used. This also should be positively correlated with firm profit.

The last control was a measure of unionization in the industry. Hirsch (1990) and Freeman and Medoff (1984) found that profit rates are lower in more heavily unionized firms. The three-digit industry-level unionization rates developed by Kokkelenberg and Sockell (1985) over the period 1973 to 1981 was used. All variables are defined below.[8]

The models to be tested are:

(3) NITA = f{SPECTR, CEOTEN, control variables}
(4) CFTA = f{SPECTR, CEOTEN, control variables}
(5) NIMV = f{SPECTR, CEOTEN, control variables}
(6) CFMV = f{SPECTR, CEOTEN, control variables}

where:

Dependent Variables (data was obtained from COMPU-STAT data tapes for the years 1973 through 1983):

NITA = The ten-year average of the ratio, net income divided by average total assets.
CFTA = The ten-year average of the ratio, cash flow divided by average total assets. Cash flow is estimated by adding depreciation and amortization expenses to net income.
NIMV = The ten-year average of the ratio, net income divided by the average market value of common stock outstanding.

CFMV = The ten-year average of the ratio, cash flow divided by the average market value of common stock outstanding.

Human Capital Variables:

SPECTR = The ten-year average of quit rates relative to separation rates in the three-digit industry. Data on quits and separations rates are available from the Bureau of Labor Statistic's *Employment and Earnings.*

CEOTEN = The Chief Executive Officer's tenure in years in the firm before becoming CEO. Data are available in *Forbes.*

Market Structure Control Variables:

RET = One minus the separation rate or the industry retention rate (*Employment and Earnings*).

N = Number of firms in the industry (*Census of Manufacturers*).

LABINT = The average labor intensity of production in the industry measured by the ratio of total payroll to the value of shipments in 1982 (*Census of Manufacturers*).

SIZE = The average value of shipments per firm for the 4-digit industry in 1982 (*Census of Manufacturers*).

UNION = The percent of workers in the industry belonging to union. Kokkelenberg and Sockell (1985) provide three-year moving averages of the percentage of firms unionized for a 2-digit industry in 1980.

GROWTH = The ratio of the value of industry shipments in 1982 relative to 1972 (*Census of Manufacturers*).

Acceptance of the model hinges upon the rejection of the null hypotheses that the coefficients of SPECTR and CEOTEN are less than or equal to zero. Rejection of the null hypotheses indicates that the measures of the firm's share of investment in specific human capital are positively associated with long-run return on investment. In addition, the joint influence of SPECTR and CEOTEN is tested in two ways. First, the cumulative effect of our specific training measures is tested by determining if the sum (b_1SPECTR + b_2CEOTEN) is significantly positive when evaluated at the sample means of SPECTR and CEOTEN. Second, an *F*-test of the null hypothesis that the coefficients on SPECTR and CEOTEN, b_1 and b_2 respectively, are jointly equal to zero is performed.

Results

Table 2 presents the means and standard deviations of the dependent, independent and control variables. Sample long-term firm rates of return on assets averaged 7.6 percent when using net income, and 12 percent when using cash flow as the measure of returns. Quits represented 43 percent of separations on average, while CEO's spent a mean of 17 years with their firms before attaining the CEO position.

The correlation coefficients are given in Table 3. CEOTEN is found to be virtually uncorrelated with any of the other independent variables. However, SPECTR is found to be negatively correlated with the UNION and SIZE variables and positively correlated with N and LABINT. This suggests that the specific value of the regression coefficient associated with SPECTR is likely to be sensitive to the values of the other independent variables included in the regression.

As a preliminary investigation of the correspondence between long-term measured firm return on assets and our proposed measures of firm holdings of human capital, we divided our sample of firms into high, medium, and low levels of CEOTEN and SPECTR. Firms in the "High SPECTR" columns are one standard deviation or more above the average level of SPECTR across all firms. Firms in the "Low SPECTR" columns are one standard deviation or more below the average level of SPECTR. Similarly, firms in the "High CEOTEN" rows are at least one standard deviation above the mean and those in the "Low CEOTEN" rows are at least one standard deviation below the mean. Average values of ten-year rates of return on book value of assets were computed for firms falling into each of the resulting nine cells listed in Table 4 for NITA and for CFTA. Firms with both unusually low levels of CEOTEN and SPECTR have significantly lower 10-year average rates of return, using both net income and cash flow measures than the other firms in the sample. This result strongly suggest, or at least is entirely consistent with, our initial assertion that rates of return based on book value of assets for firms with high levels of investment in firm specific training are systematically overstated.

However, the results presented in Table 4 may show only a false relationship between a firm's investment in specific human capital and rates of return based on book value of assets due to the existence of contemporaneous correlations between SPECTR and/or CEOTEN and other omitted variables that are known to influence long-term rates of return. For example, if high levels of CEOTEN

Table 2
Sample Statistics and Definitions of Variables

		Mean	Standard Deviation
	Dependent Variables		
NITA	Net Income to Book Value of Assets	.076	.038
CFTA	Cash Flow to Book Value of Assets	.120	.040
NIMV	Net Income to Market Value of Common Stock	.108	.103
CFMV	Cash Flow to Market Value of Common Stock	.207	.114
	Human Capital Variables		
SPECTR	Ratio of Quits to Separations in the Industry	.434	.124
CEOTEN	The Chief Executive's Tenure in the Firm Before Becoming Chief Executive	17.004	11.652
	Market Structure Control Variables		
RET	One Minus the Separation Rate or the Industry Retention Rate	.969	.018
N	Number of Firms in the Industry (in hundreds)	26.685	56.266
LABINT	Average Labor Intensity in the Industry	.186	.108
SIZE	Average Value of Shipments Per Firm in the Industry	120.175	250.838
UNION	Percent of Workers in the Industry Belonging to Unions	38.242	17.051
GROWTH	Ratio of Industry Shipments in 1982 Relative to 1972	3.268	1.764

and SPECTR are systematically associated with firms that tend to operate in concentrated markets, the observed high rates of return on book value of assets may show variations in firm market power and have nothing at all to do with variations in human capital investments. While the simple correlations may allay these concerns somewhat, it is important to control for such alternative sources of observed differences in the rate of return measures when attempting to assess the impact of variations in human capital investments on a firm's rate of return. Thus, a multiple regression analysis which includes several control variables is utilized.

The multiple regression findings are very consistent with the expectations derived from the theory. The coefficients on the measures of firm investment in specific human capital (SPECTR and CEOTEN) are consistently positive and are jointly significantly different from zero when rate of return is measured using the book value of assets as the dependent variable of the multiple regressions which include the control variables previously specified. As expected, the size of the effect diminishes markedly when return on market value of common equity is utilized as the dependent variable in the multiple regression. These findings are consistent with the presumption that stock prices reflect firm holdings of human capital assets, while the book value of assets only reflects physical assets held by the firm. Taken as a whole, the results reported in Table 5 show that specific human capital offers a strong explanation for the observed long-term differences in rates of return based on book value of assets across firms.[9]

Theory predicts that the coefficients on the measures of firm investment in specific human capital

Table 3
Correlation Coefficients

	CEOTEN	RET	N	LABINT	SIZE	UNION	GROWTH
SPECTR	-0.011	-0.071	0.234	0.325	-0.387	-0.497	-0.026
CEOTEN		0.026	-0.031	-0.129	0.073	-0.025	0.071
RET			-0.326	-0.088	0.340	-0.051	0.374
N				-0.007	-0.195	-0.129	-0.150
LABINT					-0.441	0.013	-0.322
SIZE						0.104	0.573
UNION							-0.079

will be positive when rate of return is based on the book value of assets. The actual regression results presented in Table 5 are found to be entirely consistent with the theory, and all four estimated regression coefficients for SPECTR and CEOTEN are positive when rate of return is based on the book value of assets. The null hypothesis that the coefficient is less than or equal to zero can be rejected at the .05 level of significance in three of four cases when book value of total assets is utilized as the denominator of the rate of return ratio. In addition, the fourth case is significant (CEOTEN in the regression model with NITA as the dependent variable) at the .06 level. In contrast, when the market value of common stock outstanding is utilized in the denominator of the return ratio, only one of the specific training measures is found to have a coefficient which is significant at standard levels. The summed effect of the two variables, evaluated at sample means, is significant in the first two regressions, but not when the denominator is the market value of common stock. In the first three equations, the joint *F*-test of the null hypothesis that the coefficients are equal to zero is rejected at the .05 level of significance.

The control variables generally perform as anticipated, although the results are less consistent across equations than are the impacts of the specific human capital variables. The impact of the number of firms in the industry on firm profit is negative and significant in the first equation, but insignificant in the last three. Consistent with Hirsch (1990) and Freeman and Medoff (1984), firms in more heavily unionized industries have lower profit rates as unions capture return on capital through collective bargaining. The retention rate, industry growth rate, larger firms and labor intensity had no significant impact on profits in any of the equations.

It is interesting to compare the effects of the control variables to the specific human capital variables when assets are measured as the market value of common stock rather than the book value of assets. Both sets of specific training variables easily pass a joint significance test in regressions looking at returns to book value of assets since the measured assets do not incorporate information on market structure or human capital. However, the market can value these unmeasured assets so return on investment ratios need not be systematically related to these measures. Indeed, the R^2 drops about 20 to 43 percent of the previous level in moving from book value of assets to market value of common stock as the denominator in the return measure.

The findings indicate that the stock market impounds market structure information into stock prices. This is shown by the null hypothesis that the market structure variables are jointly equal to zero could not be rejected in the last two equations. Similarly, the null hypothesis that the specific human capital measures are jointly equal to zero can be easily rejected in the models that include total assets in the denominator. However, when market value was included in the denominator (last two models), the null hypothesis is not rejected as easily. It is possible that the market discounts the firm's human capital, though these assets appear to be systematically related to higher rates of return. The greater risk of forfeiture of these human capital assets due to a takeover of the firm or to fluctuations in the firm's economic climate are a likely cause.

Conclusions

Utilizing a model of human capital theory as initially advanced by Becker (1962) and extended by Dittman, Juris and Revsine (1980, 1976), firm investments in specific human capital was expected to increase the firm's future returns. It was further hypothesized that book value measures of return that do not include the value of specific human capital in the investment base (*e.g.*, NITA and CFTA) will systematically overstate the rate of return. On

the other hand, market value measures of return that do include the value of specific human capital in the investment base (*e.g.*, NIMV and CFMV) are hypothesized not to be systematically overstated.

Two proxies for measuring a firm's unobservable investment in specific human capital were developed to assess the validity of the hypothesis. The first proxy for investment in specific human capital, SPECTR, is defined as the ten-year average of quits relative to separation rates. Theory predicts that as firm investment in specific training increases, the ratio of quits relative to separations should also increase. Because the systematic overstatement of book value measures of return are hypothesized to be positively associated with the amount of unrecorded human capital, SPECTR was expected to be positively associated with the book value return measures NITA and CFTA.

The second proxy for investments in specific human capital, CEOTEN, is defined as the Chief Executive Officer's (CEO) tenure with the firm before becoming CEO. Using Doeringer and Piore's (1971) suggestion that the importance of specific capital is positively related to the length of the promotion ladder, CEOTEN was expected to be positively associated with the NITA and CFTA measures of return.

A multiple regression methodology was utilized to test the validity of the hypothesized relationships. Specifically, long-term rates of return on investment were modeled as a function of SPECTR, CEOTEN and several control variables. The regression results are broadly consistent with these hypotheses.

Table 4
Firm Rates of Return by Level of Measured Firm Human Assets

	Ratio of Quits to Layoffs (SPECTR)					
	High		Medium		Low	
CEO Tenure (CEOTEN)	NITA	CFTA	NITA	CFTA	NITA	CFTA
High	0.07	0.11	0.08	0.13	0.05	0.10
Medium	0.08	0.13	0.08	0.12	0.06	0.11
Low	0.07	0.11	0.07	0.11	0.01*	0.05*

High represents firms which are more than one standard deviation above the mean value for SPECTR (CEOTEN).
Low represents firms which are more than one standard deviation below the mean value for SPECTR (CEOTEN).

Tests of null hypotheses:
1) H_1: The average value of NITA is equal across the SPECTR cells. $F(6,251) = 4.78$. Null hypothesis rejected at the .01 significance level.
2) H_2: The average value of NITA is equal across the CEOTEN cells. $F(6,251) = 2.27$. Null hypothesis rejected at the .05 significance level.
3) H_3: The average value of CFTA is equal across the SPECTR cells. $F(6,251) = 3.43$. Null hypothesis rejected at the .01 significance level.
4) H_4: The average value of CFTA is equal across the CEOTEN cells. $F(6,251) = 2.42$. Null hypothesis rejected at the .05 significance level.
5) H_5: The average value of NITA in the low-low cell is equal to that of the other cells. The *t*-statistic = 3.07. Therefore, the null hypothesis is rejected at the .01 significance level.
6) H_6: The average value of CFTA in the low-low cell is equal to that of the other cells. The *t*-statistic = 2.79. Therefore, the null hypothesis is rejected at the .01 significance level.

* Significantly different from the other cell means at the .01 level for NITA and CFTA.

Table 5
Ordinary Least Squares Regressions of Ten-Year Average Return on Investment

	Dependent Variables			
Independent Variables	NITA	CFTA	NIMV	CFMV
CONSTANT	14.182	12.438	-12.528	-3.024
	(1.050)	(.854)	(-.313)	(-.070)
SPECTR	6.039**	4.230*	7.057	-10.688
	(2.562)	(1.664)	(1.009)	(-1.412)
CEOTEN	.030	.047**	.123**	.052
	(1.622)	(2.350)	(2.222)	(.867)
RET	-6.942	-1.083	17.413	22.542
	(-.498)	(-.072)	(.421)	(.503)
N	-.000**	-.000	.000	.000
	(-2.261)	(-1.522)	(.525)	(1.319)
LABINT	-3.220	-2.195	3.009	7.293
	(-1.358)	(-.858)	(.427)	(.958)
SIZE	-.001	-.001	.003	.006
	(-.927)	(-1.065)	(.752)	(1.561)
UNION	-.057**	-.058**	-.009	.077
	(-3.815)	(-3.584)	(-.196)	(1.604)
GROWTH	.045	.275	.174	.041
	(.282)	(1.584)	(.365)	(.079)
N	.260	.260	.260	.260
R^2	.176	.157	.035	.067
	Effects of Specific Training			
Summed Effect	3.138**	2.643**	5.161	-3.757
(in percent)	(2.956)	(2.308)	(1.638)	(1.102)
Proportion of Return Attributable to Specific Training	.415	.221	.478	-.181
F(2,260)	4.743**	4.283**	3.057**	1.333

t-statistics are in parentheses.
** Significantly different from 0 at the .05 level for a two-tailed test.
* Significantly different from 0 at the .1 level for a two-tailed test and at the .05 level for a one-tailed test.
NI is net income; BV is book value of assets; CF is cash flow; and MV is market value of common stock.

Specifically, the coefficients of SPECTR and CEOTEN are significantly positive when return on investment is based on book value measures of the investment base (*i.e.*, NITA and CFTA). However, when return on investment is based on the market value of common stock, (*i.e.*, NIMV and CFMV), SPECTR and CEOTEN are, with one exception, not significant determinants of observed return differences. A partial-F test was performed to test the significance of the incremental value being provided by the two human capital variables. The results of these tests show the incremental explanatory value of the two human capital variables to be significant in the two models that have total assets in the dependent variable.

The measures of firm investments in human capital used herein are admittedly crude. The use of industry-level data or CEO data was required by the lack of better systematically reported information on firm-level human capital investments. Clearly, more refined and sophisticated measures would be preferable. However, those measures will only be available if firms routinely report the type of information necessary to construct them. The results reported above can be taken as supporting more systematic reporting of human capital measures on firm financial statements.

The regression results suggest that firms do indeed receive measurable returns from investments in specific human capital and that return on investment measures that do not include the value of specific human capital in the investment base systematically overstate the rate of return on firm investment. In addition, it appears that the market is expending resources to acquire information of human capital investments in that stock prices do reflect information on firm quasi-holdings of human capital.

The public policy implication of the findings is that mandated financial statement disclosures regarding a firm's investments in human capital would appear to warrant serious consideration from regulators, since a statistically significant empirical relationship exists between investments in human capital and firm return. We interpret the findings of this study to imply that a public or regulatory policy needs to be established to require firms to include at least some basic rudimentary information regarding their human capital investment such as turnover rates and training costs, in their annual reports.

Suggestions For Future Research

Even with the admittedly crude measures of human capital investment utilized in the current study, we are able to empirically demonstrate that the market values a firm's investment in human capital. Thus, we believe that future research directed toward refining and improving the proxies used to measure a firm's investments in human capital would be a worthwhile endeavor. The further identification and enumeration of variables indicative of such investments (e.g., employee training) could prove useful to both investors and regulators who may wish to see such information disclosed in the financial statements.

❄❄❄ Footnotes ❄❄❄

1. Reprinted in the *Wall Street Journal*, October 22, 1991.
2. Ravenscraft and Scherer (1989, 1987) found that merged firms generally had higher return on investment rates for periods before compared to periods after the takeover date. A potential explanation for this phenomenon is that firms are disposing of valuable employees through layoffs after the merger. Further, Flamholtz (1987) indicates that a potential loss in value would occur if personnel of an acquired securities brokerage left after acquisition. Thus, management decided to provide significant incentives for personnel to stay with the firm beyond the transition period to keep from losing a major unreported asset.
3. Brummet, Flamholtz and Pyle (1968) put forth one of the earliest human resource accounting systems. Since then, several academic researchers, e.g. Lev and Schwartz (1971), Morse (1973), Jaggi and Lau (1974), Ogan (1976a, 1976b), and Dittman, Juris and Revsine (1980, 1976), have attempted to develop other such systems.
4. As emphasized by Hashimoto (1981) and Antel (1985), the distinction between quits and separations assumes that firms and workers do not renegotiate the second period wage once business conditions are observed. In fact, in the United States, wages are quite insensitive to business cycle fluctuations (Kniesner and Goldsmith, 1987).
5. Other models have also been advanced to explain the relationship between turnover and wages. Efficiency wage models argue that firms pay higher wages to induce lower worker turnover (Krueger and Summers, (1988). Firms that face unusually high turnover costs would pay higher wages to avoid these costs. These efficiency wage models do not predict any relationship between turnover and profits, however. All firms are assumed to make identical profits with some paying higher wages to avoid turnover costs and others absorbing turnover costs but paying lower wages. Our specific-training model is similar to the job matching model advanced by Jovanovic (1979). Unusually productive matches between firms and workers yield a surplus which will be shared by the firm and the worker. Antel (1985) shows that the matching and specific-training models yield identical predictions

regarding how quits and layoffs are related to firm and worker return shares.

6. Ten-year averages are used because these ratios should be fairly constant over time. Yearly data would be greatly influenced by recessions and inflationary periods. The ten-year period of this study includes two recessions. The selection of time periods for the study was dictated by the availability of data on turnover.
7. These two predictor variables are used because training cost is not readily available. SPECTR and CEOTEN are crude measures of training costs, but, unfortunately, was the best available measures available. The fact that the study finds significant results with the desired sign supports the argument that additional information needs to be provided by firms in their financial statements.
9. The four models were run with only the control variables. A partial *F*-test was performed to test the significance of the value of the incremental information being provided by the two human capital variables. The incremental effects were significant in the first two model, but insignificant in the models where the dependent variable had the market value of common stock in the denominator. These results indicate that the market has used some source, other than the financial statements to measure human capital assets. Again, this provides support that firms should include turnover data and training costs in the financial statements.

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