Can goodwill and restructuring charges tell us about systematic risk?

Preliminary. Section 3 and after are currently under revision. Please do not distribute.

Vivek Raval[1]

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[1]University of Illinois at Chicago, Chicago, IL, 60607, vraval@uic.edu. I acknowledge helpful comments from Robert Bushman's Ph.D. seminar participants at the University of North Carolina.

Abstract

This study's objective is to determine if the timing of firm goodwill and restructuring charges indicate systematic risk related to human capital. Human capital, the combination of talent and a firm's processes and technologies, is an increasingly important asset. However, human capital investment is risky because the payoffs are uncertain. Also, the payoffs may be correlated across firms in a market, making human capital investments subject to systematic risk. While financial statements do not provide human capital valuation, this study hypothesizes that goodwill and restructuring charges indicate when firm human capital assets have diminished in value. If so, then goodwill and restructuring charges' coincidence with lower aggregate labor productivity growth indicates exposure to aggregate trends in the labor market and systematic risk. Tests find that both goodwill and restructuring charges demonstrate significant correlations with industry labor productivity growth. Further, these correlations are indicative of industry systematic risk as measured by CAPM betas. Further tests reveal that firms with a stronger correlation between their restructuring charges and labor productivity growth have higher systematic risk, and that the information in goodwill and restructuring charges is incremental to that provided by other components of income. Overall, this study's findings can inform standard setters about the usefulness of goodwill and restructuring charges for assessing firm systematic risk exposure.

1 Introduction

Human capital is important. As the landscape of the US economy becomes increasingly knowledge-based, the need for talented employees has increased. To stay competitive, firms need to identify projects that keep them on the cutting edge and invest in talent to make these projects successful. If the firm can find great employees that match well with the processes and projects that it chooses, the payoff can be a strong competitive advantage.

However, investment in human capital is risky. Unlike investment in physical capital, it is difficult to ascertain *ex ante* how productive an employee may be when working on an ambitious projects. Further, it is expensive to hire, train, and terminate employees, and employees are not owned by the firm, and will depart if not appropriately compensated. Accordingly, when firms commit to projects that require talented employees, they are committing to take on some risk.

This study attempts to determine if components of earnings can provide investors with information about systematic risk related to human capital. The financial statements do not provide much direct information about the value of human capital, because employees are not capitalized on the balance sheet. However, there are two expenses that have potential to provide information about the change in the value of the firm's human capital. This study investigates whether goodwill impairments and restructuring charges (referred to as goodwill and restructuring charges) provide information about changes in the value of human capital. Further, this study investigates whether the degree to which a firm's goodwill and restructuring charges move in concert with the macroeconomic environment is indicative of the firm's systematic risk.

Goodwill impairments have the potential to provide information about human capital because of the way goodwill is determined. Goodwill is calculated as the excess of the acquisition-date consideration less the the net fair value of the assets and liabilities acquired

(Financial Accounting Standards Board, ASC 805-30-30-1). Acquirers often pay for talent to support future projects (Ranft and Lord, 2000; Uhlenbruck, Hitt, and Semadeni, 2006). Because human capital is not an identifiable intangible asset, its value in acquisition is capitalized as goodwill.[1] When the value of the acquired entity declines, including the value of the human capital, the firm needs to recognize a goodwill impairment to reflect this change in value.

Restructuring charges can also reflect the decline in value of human capital. Restructuring charges are comprised of costs incurred for changing the scope of or manner in which business is conducted, and include termination benefits to employees and the costs to relocate employees (Financial Accounting Standards Board, ASC 420-10-05-1). To the extent that a firm has determined that its investment in human capital no longer is worth maintaining, the firm should attempt to wind-down projects and release or redeploy talent. Severance and relocation costs are part of changing the business, and therefore the decline in the value of human capital can be a large component of restructuring charges.

It is worth acknowledging that goodwill and restructuring charges are not exclusively comprised of changes in the value of human capital. Studies have identified that goodwill can include other elements, including overpayment for the target firm (Z. Li et al., 2011). Also, prior studies have provided evidence that managers may be untimely in recording goodwill impairment to manage earnings (K. K. Li and Sloan, 2017; Z. Li et al., 2011). Similarly, restructuring charges have been identified as subject to substantial discretion by management (Bens and Johnston, 2009).

In light of this, this study conducts analyses in two stages. The first set of analyses determines whether, on average, firms record goodwill impairments and restructuring

[1]The fair values of any identifiable intangible assets excluded from goodwill, even if they were not capitalizable by the acquired entity. This includes trade names, patents, and customer lists (PwC, 2020). However, human capital is not such an asset.

charges at times when aggregate industry labor productivity declines. Because it is unclear, *ex ante* whether these charges reflect the changes in the value of human capital to the firm, this initial set of tests is necessary to determine the human capital information content of these charges. The premise is that, within an industry, firms have correlated demands for human capital. Specifically, because of changing technologies, competitive pressures, and resource availability have an industry component, the need for talent is correlated within the industry. When talent has a productive use, firms are unlikely to realize diminished value of human capital. However, as the talent becomes less productive, either because new technologies are scarce or because there are limited resources for investment into new technologies, firms will realize diminished value of human capital. The first set of tests determine whether firms reflect this diminished value through goodwill and restructuring charges.

The second set of analyses tests whether firms that are more subject to industry shocks in the productivity of human capital demonstrate higher levels of systematic risk. As noted above, human capital investment is risky. The productivity of human capital has an industry component, and therefore, when investing in human capital, firms are not only taking on risk, but risk that is correlated with the aggregate industry and overall market, and therefore is undiversifiable. Shareholders demand compensation for investing in such risks. If goodwill and restructuring charges reflect the changes in labor productivity for a firm, then the degree that these charges correlate with the aggregate change in labor productivity should reflect the degree to which a firm's human capital risk is systematic. The second set of analyses investigates whether this is the case.[2]

This study's results suggest that accounting information can be informative about sys-

[2]Goodwill and restructuring charges are transitory charges, and therefore are not likely to substantially affect the valuation of the firm. However, to the extent that they demonstrate the risk of the firm, they provide important information to investors.

tematic risk related to human capital. Specifically, results show that industry averages of goodwill impairment and restructuring charges correlate with aggregate labor productivity for the industry, as calculated by the Bureau of Labor Statistics (BLS) for the aggregate industry.[3] The correlations are statistically significant at a 0.05 level across industries over the 25 year sample. This suggests that firms provide information about human capital consistent with changes in the macroeconomic environment, and that goodwill and restructuring charges do not appear to be highly idiosyncratic. Further regression analyses suggest that both goodwill impairment and restructuring charges provide distinct information and that the association is not attributable to static industry characteristics or information in income excluding goodwill and restructuring charges.

Further analyses show that the correlation between labor productivity and human capital related charges varies significantly across industries. That is, some industries have more exposure to aggregate changes in labor productivity, and therefore we should expect that investors will price these assign these industries higher levels of systematic risk. To test this, I calculate CAPM beta for each industry and determine whether the average beta by industry is higher when the industry demonstrates a higher correlation between human capital charges and aggregate labor productivity. Tests show that industries that demonstrate the higher correlations also have significantly higher levels of systematic risk. These results are consistent with with goodwill and restructuring charges being informative about a firms exposure to systematic human capital risk. I also repeat this test using a firm-level measure of systematic risk, finding that the timing of restructuring charges is particularly informative about firm systematic risk. The results are robust to controlling for the the growth rate of earnings excluding human capital related charges and controlling for the correlation between restructuring and goodwill impairment charges and capital

[3]The BLS uses survey data to determine labor productivity in an industry, and they do not constrain their data to public firms. Therefore, I refer to the industry-level labor productivity as aggregate.

productivity.

The findings from this study can shed light on the informativeness of goodwill and restructuring charges. In 2014 the Financial Accounting Standards Board (FASB) issued ASU 2014-02, which eliminated the requirement for private firms to perform testing and impairment of goodwill in favor of amortization over a 10 year period. The results from this study demonstrate the potential that timely impairment can have in helping investors assess the systematic risk associated with human capital, and therefore the cost of allowing for similar accounting by public entities. Further, restructuring and goodwill charges are not persistent and are estimates, however, the results in this study suggest that, despite these flaws, the charges are informative because they are relevant to assessing the firm's systematic risk.

Further, this study sheds light on the importance of human capital and its associated risk. The SEC has issued disclosure requirements around human capital as part of amended Item 101 of Regulation S-K. Researchers have highlighted the need for firms to provide better information about human capital investments for investors (Banks et al., 2022). Also, there has been an call for more research evaluating the role of financial statements in firm risk assessment (Barth, 2015). The results from this study provide insights related to these topics by demonstrating how human capital related charges can provide information about firm risk to investors.

The remainder of this paper is organized as follows. Section 2 provides a discussion of the research related to labor productivity, goodwill and restructuring charges, and the hypotheses tested in this study. Section 3 describes the research design. Section 4 describes the data and section 5 provides the results of the tests. Section 6 concludes the study.

2 Related literature and hypotheses

2.1 Human capital-related charges

The firm's human capital value is directly related to its productivity while employed. Firms value their employees because employees produce more value for the firm than the firm surrenders to the employee through compensation. If this difference is large, then the firm puts a high valuation on its human capital. If the productivity of human capital falls, then the firm lowers its valuation of its human capital. Naturally, if the firm provides its human capital valuation to investors, investors would easily be able to value this component of the firm. However, this is not allowed by GAAP. Investors must find other signals of change in the value of the firm's human capital. Two possibilities that appear on the financial statements are charges related to restructuring and goodwill.

Restructuring costs are costs related to exit and disposal activities, and include: a) involuntary termination benefits, b) costs to relocate employees, c) costs to terminate a contract that is not a lease, and d) costs to consolidate or close facilities (Financial Accounting Standards Board, ASC 420-10-05-1). A restructuring liability and related expense are recorded at fair value when the restructuring is probable and when the firm has communicated the termination benefits to affected employees. Restructuring costs are generally not recognized in expense over the period that the restructuring occurs but instead all at once.

When the firm recognizes that the productivity of a group of employees is below expectations, the firm is likely to engage in restructuring to reduce their investment in human capital. In such firms, the cost of terminating the employees and providing severance and support to the former employees is recorded at fair value on the income statement at the time management commits to the restructuring. The timing and magnitude of the restruc-

turing charge would indicate a decrease in the value of the firm's human capital in a timely way, and investors can use this information to assess when and by how much the firm's human capital has decreased in value.

Another expense related to human capital is goodwill impairment. Goodwill is the difference between the acquisition price of a business and the fair value of the identifiable assets acquired. The fair value of any identifiable assets are capitalized individually, such as customer lists or patents. If assets acquired are not specifically identifiable, but still valuable to the acquirer, their fair value is in goodwill. Human capital is not a specifically identifiable intangible asset and therefore not individually capitalizable in an acquisition. However, it is not uncommon that acquirers consider the value of acquired human capital when determining the value of an acquisition (Ranft and Lord, 2000; Uhlenbruck, Hitt, and Semadeni, 2006). To the extent that acquirers pay for human capital, its fair value at the time of acquisition is capitalized as goodwill. For acquisitions that are largely premised on the acquisition of human capital, more of the acquisition is capitalized as goodwill relative to other assets.

SFAS 142 requires that firms assess whether goodwill is impaired, and if so, record an expense on the income statement. Goodwill becomes impaired when the fair value of the acquired business falls below the purchase price. This can occur for various reasons, but goodwill impairment charges are generally an indication that the acquirer is less optimistic about future productivity of the business. For acquisitions where the acquired business is largely comprised of unidentifiable intangible assets, such as human capital, there will be a large write-down of goodwill, as there was a large amount of goodwill tied to the acquisition. For businesses with more identifiable assets, there will be a smaller write-down in goodwill, as there was less goodwill tied to the acquired company. Therefore, large goodwill impairments may indicate reduced human capital valuation.

Accordingly, the first hypotheses are:

Hypothesis 1a *Goodwill impairment charges are associated with lower productivity of human capital.*

Hypothesis 1b *Restructuring charges are associated with lower productivity of human capital.*

Since the introduction of SFAS 142 in 2001, the practice of impairing goodwill instead of amortizing it has been under scrutiny. Studies have highlighted that goodwill impairment is subject to management's discretion and therefore susceptible to earnings management (K. K. Li and Sloan, 2017; Z. Li et al., 2011; Ramanna and Watts, 2012). Further, ASU 2014-02 allows private companies to record goodwill amortization instead of only impairments. This indicates that, for private firms, the FASB does not consider the additional information from timely impairments offsetting the cost to the firm. Similarly, restructuring charges have also been criticized as subject to management discretion and potentially a tool for earnings management (Bens and Johnston, 2009). Also, these expenses are not exclusively related to human capital, and may be more representative of other components such as overpayment for another company or facility reorganization. Therefore, it is and empirical question whether restructuring and goodwill charges reflect changes in the value of human capital to the firm.

2.2 Systematic human capital risk

Systematic risks are risks affecting a large segment of an economy. They are important because they are undiversifiable and therefore affect the prices of a wide cross-section of firms. One of the most important systematic risks is business cycle risk, which is the degree to which a firm is exposed to the aggregate fluctuations of the economy. Firms may vary

in the degree to which they are exposed to their economy's business cycle, but overall, business cycle risk is far-reaching and difficult for investors to avoid.

Researchers continue to debate the causes of business cycles. A collection of models, known as Real Business Cycle theories, suggest that exogenous changes in technology create changes in labor and capital productivity. Positive shocks, such as the introduction of new technologies, can increase the productivity of capital and labor, and alternatively, negative shocks, such as regulation or price increases, can reduce productivity (Kydland and Prescott, 1982). More recent research presents challenges to Real Business Cycle theories with regard to their theoretical and empirical ability to describe the world (for examples, see Eichenbaum et al. (1991) and Shea (1998)). Regardless of their source, researchers generally recognize that economies are subject to periods of growth and contraction, and that labor productivity is a key component in the business cycle which is increasing faster in the growth periods relative to contractions (Huffman, 1994). More recently, studies have explored business cycle effects specific to the human capital assets held by firms (Eisfeldt and Papanikolaou, 2013, 2014).

As component of the business cycle, aggregate, or economy-wide, changes in labor productivity are likely to affect a broad cross-section of firms, but not necessarily all firms equally. Some firms may be more exposed to aggregate changes in labor productivity because they participate in the broader labor market and therefore are exposed to systematic risk related to human capital. Other firms may have idiosyncratic reasons for avoiding the broader labor market, such as needing specialized skills found outside the labor market of the broader economy. Such firms may largely avoid the systematic risk related to human capital.

Firms that are exposed to systematic human capital risk are likely to see the value of their human capital increase (decrease) as aggregate labor productivity increases (de-

creases). If the firm's human capital valuation were observable, it would be transparent as to which firms were subject to the systematic risk. Such valuations are not observable, but firms do record restructuring and goodwill charges, which may provide information about declines in the firm's valuation of its human capital. Assuming so, the timing of these charges can indicate whether the firm is exposed to systematic human capital risk. If a firm is exposed to systematic human capital risk, the firm is likely to see the value of its human capital decline when aggregate human capital productivity declines. This would initiate restructuring and goodwill impairment charges that coincide with the aggregate labor productivity decline. If the firm were not exposed to human capital systematic risk, the firm would not see the value of its human capital decline with aggregate labor productivity, and the firm is less likely to record restructuring or goodwill charges at that time. Accordingly, the timing of goodwill and restructuring charges can indicate which firms are exposed to human capital risk.

The second hypothesis is:

Hypothesis 2 *Firms with a high correlation between goodwill and restructuring charges and human capital productivity have higher systematic risk.*

Prior studies have investigated whether systematic risk measures (betas) constructed based on earnings can provide systematic risk information. Early studies, including Ball and Brown (1969) and Gonedes (1973), demonstrate that earnings can provide information about firm systematic risk by calculating and demonstrating the association between earnings betas and future returns. However, Ismail and Kim (1989) suggests that earnings betas provide a subset of the information that cash flow betas provide, perhaps because earnings is less objective and difficult to understand. More recently, Ellahie (2021) constructs an earnings beta by regressing aggregate earnings on firm earnings using 11 different measures of earnings, finding that earnings can provide a more effective measure of expected return

relative to using firm and market returns. Ball, Sadka, and Tseng (2022) investigates the association between aggregate productivity and firm operating earnings, finding that the association indicates systematic risk. While these studies have developed the foundation for earnings as an indicator of systematic risk, they do not consider how specific expenses, such as restructuring and goodwill charges, can provide information about a component of systematic risk, in this case the component related to human capital.

3 Research Design (*under revision*)

3.1 Goodwill and restructuring charges as human capital-related

To execute the first set of analyses that evaluate whether firms record goodwill impairments and restructuring charges based on changes in aggregate labor productivity, I require a measure of aggregate labor productivity. I obtain annual industry-level labor productivity data from the BLS.[4] The BLS calculates labor productivity as the ratio of an output index divided by the number of hours that employees work. The output index is determined by the Bureau of Economic Analysis (BEA) and is the measure of nonfarm business sector output. The output is deflated by an index to remove the effect of changing prices. I use industry-level aggregations because aggregate labor effects have a significant industry component based on results in Neal (1995). The number of hours worked is calculated based on the BLS National Compensation Survey and Current Population Survey and adjusted to ensure that volatility in vacation, sick, and holiday hours do not affect the hours worked used in the calculation. Labor productivity is seasonally adjusted by the BLS.

The accounting measures are annual goodwill and restructuring charges for the industry,

[4]The BLS provides industry-level data at different aggregations of NAICS. I use four-digit NAICS.

as indicated in the following equations:

$$GW_{j,t} = \frac{1}{I} \sum_{i=1}^{I} \frac{gw_{i,t}}{at_{i,t-1}} \tag{1}$$

$$RESTR_{j,t} = \frac{1}{I} \sum_{i=1}^{I} \frac{restr_{i,t}}{at_{i,t-1}} \tag{2}$$

where gw is the goodwill impairment charge, $restr$ is the restructuring charge, at is total assets, and j indicates industry, i indicates firm, and t indicates year. These calculations aggregate the dollar amount of each firm's annual charge scaled by the firm's total assets as of the beginning of the year across all firms in the industry, I. Annual measurement aligns with the annual measurement of labor productivity. Not all firms are able to impair goodwill, because not all firms have capitalized goodwill at the start of the fiscal year.[5] Therefore, firms that do not have capitalized goodwill at the start of the year are excluded from the industry mean.

The first set of hypotheses suggests that goodwill and restructuring charges are associated with changes in aggregate labor productivity. I estimate the following regressions as a test of whether fluctuations in goodwill and restructuring charges are associated with changes in aggregate labor productivity:

$$LP_{j,t} = \alpha_j + \beta_1 * GW_{j,t} + \varepsilon_{j,t} \tag{3}$$

$$LP_{j,t} = \alpha_j + \beta_1 * RESTR_{j,t} + \varepsilon_{j,t} \tag{4}$$

where LP is aggregate labor productivity and other variables are as defined previously.[6]

[5] This is either because the firm has not made an acquisition involving goodwill or because the firm has already impaired all of its goodwill.

[6] For ease of exposition, I use the same notation for coefficients and error terms in various equations. In all likelihood, they differ.

To the extent that either charge is associated with aggregate labor productivity, I expect β_1 to be significant and negative because human capital-related charges should increase when labor productivity is lower.

It is possible that goodwill and restructuring charges convey the same information about the productivity of human capital, and therefore I estimate the following regression to determine if the two hypothesized human capital-related charges provide orthogonal information at the industry level:

$$LP_{j,t} = \alpha_j + \beta_1 * GW_{j,t} + \beta_2 * RESTR_{j,t} + \varepsilon_{j,t}. \tag{5}$$

To the extent that goodwill and restructuring charges provide orthogonal information about how the industry values human capital, I expect β_1 and β_2 to both be significant and negative.

3.2 Human capital-related charges as indication of human capital risk

If goodwill and restructuring charges demonstrate variation consistent with being human capital-related, then they also have the potential to provide investors with an indication of the human capital-related systematic risk of the firm. That is, if the firm is exposed to the aggregate fluctuations in human capital productivity, then the firm is more likely to incur more human capital-related charges during times of low aggregate labor productivity, and lower human capital related charges when aggregate labor productivity is higher.

To test this, I measure the time-series correlation of each firm's human capital-related charges with aggregate labor productivity as the average Pearson correlation of goodwill and restructuring charges with aggregate labor productivity:

$$hcr_i = \frac{\rho_j^{gw}\left(gw_{i,t}, LP_{j,t}\right) + \rho_j^{restr}\left(restr_{i,t}, LP_{j,t}\right)}{2} \tag{6}$$

where hcr is the measure of systematic human capital risk in the firm, ρ is the Pearson correlation coefficient, and other variables are as previously defined.

I measure systematic risk using the aggregate CAPM-beta. Specifically, for each firm, I estimate the annual CAPM-beta using a regression of firm returns, less the risk free rate, on the aggregate market returns less the risk-free rate over a historical 60 month window:

$$[R_{i,s} - RF_s] = \alpha_{i,t} + \beta_{i,t}^{CAPM} * \Big[R_s^{mkt} - RF_s\Big] + \varepsilon_{i,s} \tag{7}$$

where $R_{i,s}$ is the stock return for month s and firm i, RF_s is the risk-free rate for month s, and R_s^{mkt} is the return of the aggregate market for month s. The $\beta_{i,t}^{CAPM}$ is the systematic risk of firm i for the year t. Because the measure of human capital risk is at a firm level, and not a firm-year level, I calculate the firm-level systematic risk of the firm as the time-series mean of $\beta_{i,t}^{CAPM}$:

$$\beta_i^{CAPM} = \sum_{t=1}^{T} \frac{1}{T} \beta_{i,t}^{CAPM} \tag{8}$$

The test to evaluate whether human capital-related charges can provide an indication of human capital risk is to estimate the following regression:

$$\beta_i^{CAPM} = \alpha_0 + \beta_1 * hcr_i + \varepsilon_i \tag{9}$$

where all variables are describe above. To the extent that β_1 is significant in Equation (9), it provides evidence that firms with higher correlations between goodwill and restructuring charges and aggregate changes in labor productivity are more exposed to systematic human capital risk.

4 Data (*under revision*)

I collected the labor productivity data from the BLS's Labor Productivity Tables. The BLS provides labor productivity data by NAICS industry on their website.[7] The data are provided for each year and each 4-digit NAICS industry from 1987 to 2020 in percent changes from the prior year. I collected my accounting and returns data from Compustat's FUNDA table and CRSP's monthly stock file. I obtained market returns and Fama and French (1993) and Carhart (1997) portfolio returns from Kenneth French's website at Dartmouth College.[8]

I use goodwill and restructuring charges from 1996 to 2020. I start in 1996 because that is when restructuring and goodwill impairment charges are populated in Compustat. Goodwill and restructuring charges are negative, because they are reductions of net income. I remove any positive goodwill charges, as goodwill impairments are not reversible. I also require that beginning-of-year assets are at least \$5 million and stock price is over \$1 to reduce the effect of small scalars.

Table 2 provides the descriptive statistics for the industry-level measures of labor productivity, $LP_{j,t}$, restructuring charges, $RESTR_{j,t}$, goodwill charges, $GW_{j,t}$, the percent of firms in the industry taking a goodwill charge, $PCT\_GW_{j,t}$, or restructuring charge, $PCT\_RESTR_{j,t}$, and the number of firms in an industry, $N_{i,t}$. Industry-level measures require at least 10 firms in the industry-year to be included in the sample.

Table 3 provides the bi-variate correlations. The correlation between labor productivity, $LP_{j,t}$ and restructuring charges, $RESTR_{j,t}$ (goodwill charges, $GW_{j,t}$) is positive and significant, indicating that there are more of each charge when labor productivity falls.

[7] I downloaded the labor productivity data from https://www.bls.gov/productivity/tables/ on December 12, 2022.

[8] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html

5 Results (*under revision)*

To test hypothesis 1a and 1b I estimate equations (3) and (4). I also estimate equation 5 to assess whether restructuring and goodwill charges provide orthogonal information. The results are in Table 4, and show that goodwill and restructuring charges are both associated with changes in labor productivity, and that each provides orthogonal information about the effect of changes in labor productivity.

In table 5 I re-estimate equations (3), (4), and 5, however I also include year fixed effects. The inclusion of year fixed effects requires that the association between aggregate labor productivity and goodwill and restructuring charges differ across industries, and not just over time. This test can help determine whether the associations in question are primarily aggregate or within industry. If the coefficients remain significant, then the association between goodwill and restructuring charges and labor productivity is primarily within industry. If not, the association is primarily across industries.

The results in table 5 indicate that the associations are primarily within industry, as the results hold with the inclusion of year fixed effects. The coefficients on the measure of goodwill charges, GW, and restructuring charges, $RESTR$, remains significant and positive. However, there is also a significant cross-industry component to the associations, as the coefficients on GW and $RESTR$ appear lower than those in table 4.

Table 6 provides descriptive statistics for the major firm-level measures. To calculate the correlations, at least 10 observations within the firm time-series are required. The CAPM-beta, β^{CAPM} is the average rolling 5-year historical annual beta for the firm. The Pearson correlations (untabulated) between CAPM-beta, β^{CAPM}, and the firm's human capital risk measure, hcr_i is 0.12. The Pearson correlations (untabulated) between CAPM-beta, β^{CAPM}, and the correlation between goodwill (restructuring) and labor productivity, ρ^{gw} (ρ^{restr}), is 0.08 (0.12). These results suggest that some of the systematic risk of the

firm may be associated with human capital risk, as measured by the fluctuations in human capital-related charges.

To test hypothesis 2, I estimate equation (9) using the firm-level sample described in table 6. The results are in table 7. Each firm has one observation, and therefore there are no firm or year fixed effects in this regression. The regression results suggest that both goodwill and restructuring charges are informative about the firm's systematic risk. That is, when firms have a higher correlation between goodwill (restructuring) charges and aggregate labor productivity, these firms are also likely to have higher systematic risk, as measured by β^{CAPM}. These results are consistent with hypothesis 2, and I interpret these results as an indication that both goodwill and restructuring charges, despite being subject to discretion, are indicative of the degree of exposure a firm has to systematic human capital risk.

6 Conclusion

This study's objective is to determine if the timing of goodwill and restructuring charges indicates a firm's systematic human capital risk. Human capital, the combination of talent and a firm's processes and technologies, is an increasingly important asset. However, human capital investment is risky because the payoffs are particularly uncertain. Also, the payoffs may be correlated in a market, making human capital subject to systematic risk. While financial statements do not provide human capital valuation, this study hypothesizes that goodwill and restructuring charges provide an indication of when a firm's human capital has diminished in value, and therefore their coincedence with lower aggregate labor productivity indicates systematic risk exposure. Tests find that both goodwill and restructuring charges demonstrate significant correlations with industry labor productivity. Further, these correlations are each indicative of a firm's overall systematic risk as

measured by the CAPM. Overall, this study's findings can inform standard setters about the usefulness of goodwill and restructuring charges for assessing a firm's systematic risk exposure.

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Variable	Description
$gw_{i,t}$	Firm-level annual goodwill impairment expense scaled by total assets as of the beginning of the fiscal year.
$restr_{i,t}$	Firm-level annual restructuring expense scaled by total assets as of the beginning of the fiscal year.
$LP_{j,t}$	Industry-level percentage change in annual labor productivity from the prior year.
$GW_{j,t}$	Average annual industry goodwill impairment expense scaled by total assets as of the beginning of the fiscal year.
$GW\_W_{j,t}$	The sum of the industry's goodwill impairment charges scaled by the sum of the industry's total assets as of the beginning of the fiscal year
$GW\_PCT_{j,t}$	The number of firms in the industry incurring a goodwill impairment charge divided by the number of firms in the industry
$RESTR_{j,t}$	Average annual industry restructuring expense scaled by total assets as of the beginning of the fiscal year.
$RESTR\_W_{j,t}$	The sum of the industry's restructuring charges scaled by the sum of the industry's total assets as of the beginning of the fiscal year
$RESTR\_PCT_{j,t}$	The number of firms in the industry incurring a restructuring charge divided by the number of firms in the industry
$SUM_{j,t}$	The sum of $GW_{j,t}$ and $RESTR_{j,t}$.
$SUM\_W_{j,t}$	The sum of $GW\_W_{j,t}$ and $RESTR\_W_{j,t}$.
$SUM\_PCT_{j,t}$	The sum of $GW\_PCT_{j,t}$ and $RESTR\_PCT_{j,t}$.

$PIGROW_{j,t}$	The industry average earnings growth calculated as the annual increase in firm pretax income, less restructuring and goodwill charges, scaled by beginning of the year assets.
ρ_i^{gw}	The firm-level Pearson correlation between scaled firm goodwill impairment expense ($gw_{i,t}$) and industry percentage change in annual labor productivity ($LP_{j,t}$).
ρ_i^{restr}	The firm-level Pearson correlation between scaled firm restructuring expense ($restr_{i,t}$) and industry percentage change in annual labor productivity ($LP_{j,t}$).
hcr_i	The firm-level mean of ρ_i^{gw} and ρ_i^{restr} as defined above.
ρ_i^{sum}	The firm-level Pearson correlation between scaled sum of firm restructuring expense ($restr_{i,t}$) and goodwill impairment ($gw_{i,t}$) and industry percentage change in annual labor productivity ($LP_{j,t}$).
$\beta_{i,t}^{CAPM}$	The coefficient on the return on the market less the risk free rate in the CAPM regression specified in Equation (8) using rolling five-year monthly returns and unlevered using the firm debt-to-equity ratio and the statutory tax rate.
β_i^{CAPM}	The firm-level time-series mean of $\beta_{i,t}^{CAPM}$.
$\beta_{j,t}^{CAPM}$	The industry-year mean of $\beta_{i,t}^{CAPM}$.
β_t^{CAPM}	The industry mean of $\beta_{i,t}^{CAPM}$.
$\rho_j^{variable_{j,t}}$	The timeseries Pearson correlation of the industry measure of goodwill or restructuring charges, $variable_{j,t}$, and $LP_{j,t}$.

cr_i	The firm-level mean of the correlation between firm goodwill charges ($gw_{i,t}$) and industry capital productivity and firm restructuring charges ($restr_{i,t}$) and industry capital productivity.
ρ^{sum_CP}	The correlation of the sum of the firm's goodwill charges and restructuring charges and industry capital productivity.

Table 1: Variable descriptions.

Table 2: Descriptive statistics

Variable	N	Mean	SD	Min	25P	Med	75P	Max
$LP_{j,t}$	1624	2.34	7.05	−17.60	−1.60	1.80	5.70	27.10
$RESTR_{j,t}$	1624	−2.65	3.24	−15.52	−3.98	−1.59	−0.05	0.13
$RESTR\_W_{j,t}$	1624	−0.00	0.00	−0.02	−0.00	−0.00	−0.00	0.00
$RESTR\_PCT_{j,t}$	1624	0.26	0.22	0.00	0.03	0.24	0.43	0.80
$GW_{j,t}$	1624	−6.11	10.72	−54.70	−7.65	−1.18	0.00	0.00
$GW\_W_{j,t}$	1624	−0.00	0.01	−0.06	−0.00	−0.00	0.00	0.00
$GW\_PCT_{j,t}$	1624	0.10	0.12	0.00	0.00	0.07	0.14	0.67
$PIGROW_{j,t}$	1624	0.00	0.05	−0.14	−0.02	0.00	0.02	0.17
$\beta_{j,t}^{CAPM}$	1624	0.84	0.38	0.13	0.55	0.81	1.08	1.98
$N_{j,t}^{IND}$	1624	44.58	64.35	10.00	14.00	23.00	40.50	533.00

Table 2: Descriptive statistics for the industry-level measures. The table includes observations for which all variables are present for the years 1996–2020. $N_{j,t}^{IND}$ is the number of firms in the industry-year. The other variable definitions appear in Table 1. All continuous variables are winsorized at the industry-year level at 1% and 99%.

Table 3: Correlations

		1	2	3	4	5	6	7	8	9
1	$LP_{j,t}$		0.12	0.13	−0.13	0.09	0.08	−0.10	0.14	0.08
2	$RESTR_{j,t}$	0.13		0.77	−0.71	0.29	0.21	−0.31	0.05	−0.28
3	$RESTR\_W_{j,t}$	0.14	0.89		−0.57	0.26	0.24	−0.28	0.06	−0.20
4	$RESTR\_PCT_{j,t}$	−0.14	−0.85	−0.81		−0.29	−0.23	0.41	*−0.02*	0.30
5	$GW_{j,t}$	0.10	0.55	0.54	−0.54		0.66	−0.55	0.16	−0.16
6	$GW\_W_{j,t}$	0.10	0.54	0.54	−0.54	0.92		−0.46	0.12	−0.08
7	$GW\_PCT_{j,t}$	−0.11	−0.51	−0.51	0.57	−0.81	−0.79		−0.12	0.07
8	$PIGROW_{j,t}$	0.16	0.08	0.08	*−0.04*	0.16	0.14	−0.13		0.05
9	$\beta_{j,t}^{CAPM}$	*0.00*	−0.35	−0.32	0.34	−0.32	−0.31	0.20	*0.05*	

Table 3: Bi-variate correlations for the 1,624 industry-year observations for the years 1996 – 2020. Items in italics are *not* significant at a $p = 0.1$ level. Pearson (Spearman) correlations are above (below) the diagonal. The variable definitions appear in Table 1. All continuous variables are winsorized at the industry-year level at 1% and 99%.

Table 4, Panel A: Industry averages of firm-level scaled charges

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	$LP_{j,t}$	$LP_{j,t}$	$LP_{j,t}$	$LP_{j,t}$	$LP_{j,t}$	$LP_{j,t}$	$LP_{j,t}$	$LP_{j,t}$
$GW_{j,t}$	0.059***		0.039**		0.113***		0.085***	
	(3.63)		(2.32)		(6.81)		(4.96)	
$RESTR_{j,t}$		0.264***	0.226***			0.466***	0.380***	
		(4.91)	(4.03)			(7.67)	(6.06)	
$SUM_{j,t}$				0.065***				0.119***
				(4.59)				(8.09)
Constant	2.703***	3.041***	3.181***	2.917***				
	(13.47)	(13.53)	(13.69)	(13.60)				
Fixed Effects	*None*	*None*	*None*	*None*	*Industry*	*Industry*	*Industry*	*Industry*
Observations	1,624	1,624	1,624	1,624	1,619	1,619	1,619	1,619
R-squared	0.008	0.015	0.018	0.013	0.165	0.171	0.184	0.175

Table 4, Panel B: Industry totals of goodwill and restructuring charges

VARIABLES	(1) $LP_{j,t}$	(2) $LP_{j,t}$	(3) $LP_{j,t}$	(4) $LP_{j,t}$	(5) $LP_{j,t}$	(6) $LP_{j,t}$	(7) $LP_{j,t}$	(8) $LP_{j,t}$
$GW\_W_{j,t}$	64.746***		43.743**		83.601***		58.357***	
	(3.43)		(2.26)		(4.35)		(2.99)	
$RESTR\_W_{j,t}$		213.474***	191.255***			294.715***	262.755***	
		(5.28)	(4.60)			(6.48)	(5.63)	
$SUM\_W_{j,t}$				73.856***				93.888***
				(4.87)				(5.95)
Constant	2.590***	3.026***	3.123***	2.872***				
	(13.71)	(13.97)	(14.16)	(14.01)				
Fixed Effects	*None*	*None*	*None*	*None*	*Industry*	*Industry*	*Industry*	*Industry*
Observations	1,624	1,624	1,624	1,624	1,619	1,619	1,619	1,619
R-squared	0.007	0.017	0.020	0.014	0.150	0.162	0.167	0.159

Table 4, Panel C: Number of firms taking goodwill and restructuring charges in the industry

VARIABLES	(1) $LP_{j,t}$	(2) $LP_{j,t}$	(3) $LP_{j,t}$	(4) $LP_{j,t}$	(5) $LP_{j,t}$	(6) $LP_{j,t}$	(7) $LP_{j,t}$	(8) $LP_{j,t}$
$GW\_PCT_{j,t}$	-5.937^{***}		$-3.404**$		-8.775^{***}		-4.274^{**}	
	(-4.19)		(-2.21)		(-5.75)		(-2.56)	
$RESTR\_PCT_{j,t}$		-4.205^{***}	-3.445^{***}			-7.464^{***}	-6.345^{***}	
		(-5.41)	(-4.06)			(-8.14)	(-6.26)	
$SUM\_PCT_{j,t}$				-3.334^{***}				-5.452^{***}
				(-5.73)				(-8.29)
Constant	2.925^{***}	3.441^{***}	3.577^{***}	3.547^{***}				
	(13.13)	(12.88)	(13.06)	(13.02)				
Fixed Effects	*None*	*None*	*None*	*None*	*Industry*	*Industry*	*Industry*	*Industry*
Observations	1,624	1,624	1,624	1,624	1,619	1,619	1,619	1,619
R-squared	0.011	0.018	0.021	0.020	0.157	0.175	0.179	0.176

Table 4: Summary statistics from the regressions of labor productivity on average industry-year goodwill and restructuring charges (Panel A), industry-year totals of goodwill and restructuring charges (Panel B), and number of firms taking goodwill and restructuring charges (Panel C). The t-stats are below the coefficients in parentheses. The variable definitions appear in Table 1. All continuous variables are winsorized at the industry-year level at 1% and 99%.

Table 5: Regression of industry labor productivity growth on human capital measures, controlling for income

VARIABLES	(1) $LP_{j,t}$	(2) $LP_{j,t}$	(3) $LP_{j,t}$	(4) $LP_{j,t}$	(5) $LP_{j,t}$	(6) $LP_{j,t}$	(7) $LP_{j,t}$	(8) $LP_{j,t}$	(9) $LP_{j,t}$
$GW_{j,t}$	0.099***								
	(5.93)								
$RESTR_{j,t}$		0.456***							
		(7.58)							
$SUM_{j,t}$			0.107***						
			(7.28)						
$GW\_W_{j,t}$				71.149***					
				(3.72)					
$RESTR\_W_{j,t}$					282.455***				
					(6.27)				
$SUM\_W_{j,t}$						83.765***			
						(5.32)			
$GW\_PCT_{j,t}$							−7.708***		
							(−5.06)		
$RESTR\_PCT_{j,t}$								−7.473***	
								(−8.25)	
$SUM\_PCT_{j,t}$									−5.236***
									(−8.03)
$PIGROW_{j,t}$	19.158***	22.133***	18.674***	21.281***	21.820***	20.545***	20.436***	22.955***	21.185***
	(5.06)	(5.97)	(4.97)	(5.62)	(5.85)	(5.45)	(5.41)	(6.21)	(5.72)
Fixed Effects	*Industry*	*Industry*	*Industry*	*Industry*	*Industry*	*Industry*	*Industry*	*Industry*	*Industry*
Observations	1,619	1,619	1,619	1,619	1,619	1,619	1,619	1,619	1,619
R-squared	0.178	0.190	0.188	0.167	0.181	0.175	0.173	0.196	0.194

Table 5: Summary statistics from the regressions of labor productivity on average industry-year goodwill and restructuring charges, industry-year totals of goodwill and restructuring charges, and number of firms taking goodwill and restructuring charges, controlling for pretax income. The t-stats are below the coefficients in parentheses. The variable definitions appear in Table 1. All continuous variables are winsorized at the industry-year level at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Correlations of industry-level human capital risk measures

		1	2	3	4	5	6	7	8	9	10	11
1	ρ_j^{GW}		0.35	0.98	0.69	0.33	0.61	−0.60	−0.38	−0.46	0.22	0.29
2	ρ_j^{RESTR}	0.39		0.47	0.31	0.60	0.45	−0.40	−0.59	−0.57	0.29	0.36
3	ρ_j^{SUM}	0.98	0.52		0.69	0.39	0.66	−0.61	−0.45	−0.52	0.24	0.33
4	$\rho_j^{GW\_W}$	0.75	0.32	0.75		0.33	0.84	−0.52	−0.23	−0.36	0.30	0.37
5	$\rho_j^{RESTR\_W}$	0.33	0.61	0.39	0.29		0.66	−0.39	−0.38	−0.46	0.29	0.30
6	$\rho_j^{SUM\_W}$	0.70	0.44	0.72	0.89	0.59		−0.53	−0.28	−0.47	0.34	0.49
7	$\rho_j^{GW\_PCT}$	−0.61	−0.43	−0.63	−0.51	−0.40	−0.58		0.37	0.72	−0.38	−0.32
8	$\rho_j^{RESTR\_PCT}$	−0.41	−0.66	−0.49	−0.24	−0.39	−0.31	0.45		0.83	−0.21	−0.32
9	$\rho_j^{SUM\_PCT}$	−0.51	−0.65	−0.58	−0.38	−0.44	−0.50	0.77	0.87		−0.33	−0.44
10	ρ_j^{PIGROW}	0.25	0.34	0.26	0.33	0.25	0.38	−0.40	−0.27	−0.38		0.23
11	β_j^{CAPM}	0.31	0.27	0.36	0.37	0.21	0.45	−0.32	−0.34	−0.45	0.22	

Table 6: Bi-variate correlations between the correlation between goodwill and restructuring charge measures and systematic risk. The variable definitions appear in Table 1. There are 69 industry observations. Spearman (Pearson) correlations are above (below) the diagonal. All correlations are significant at p=0.1.

Table 7: Regression of systematic risk on industry-level human capital risk measures

VARIABLES	(1) β_j^{CAPM}	(2) β_j^{CAPM}	(3) β_j^{CAPM}	(4) β_j^{CAPM}	(5) β_j^{CAPM}	(6) β_j^{CAPM}	(7) β_j^{CAPM}	(8) β_j^{CAPM}	(9) β_j^{CAPM}
ρ_j^{GW}	0.256**								
	(2.25)								
ρ_j^{RESTR}		0.232*							
		(1.80)							
ρ_j^{SUM}			0.309***						
			(2.80)						
$\rho_j^{GW\_W}$				0.332***					
				(2.78)					
$\rho_j^{RESTR\_W}$					0.156				
					(1.36)				
$\rho_j^{SUM\_W}$						0.411***			
						(3.59)			
$\rho_j^{GW\_PCT}$							−0.276**		
							(−2.16)		
$\rho_j^{RESTR\_PCT}$								−0.300**	
								(−2.54)	
$\rho_j^{SUM\_PCT}$									−0.429***
									(−3.64)
ρ_j^{PIGROW}	0.154	0.146	0.134	0.111	0.181	0.059	0.110	0.140	0.056
	(1.25)	(1.14)	(1.11)	(0.89)	(1.43)	(0.48)	(0.84)	(1.15)	(0.46)
Constant	0.763***	0.766***	0.749***	0.773***	0.782***	0.767***	0.763***	0.751***	0.732***
	(19.67)	(19.25)	(19.22)	(21.27)	(20.46)	(21.77)	(19.56)	(18.89)	(19.13)
Observations	69	69	69	69	69	69	69	69	69
R-squared	0.115	0.092	0.148	0.147	0.073	0.203	0.110	0.132	0.207

Table 7: Summary statistics from the regressions of industry systematic risk (β_j^{CAPM}) on the timeseries correlation between the measures of goodwill and restructuring charges and labor productivity ($LP_{j,t}$), controlling for pretax income excluding goodwill and restructuring charges. The t-stats are below the coefficients in parentheses. The variable definitions appear in Table 1. All continuous variables are winsorized at the industry-year level at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Descriptive statistics of human capital measures by year

year	Mean $gw_{i,t}$	Mean $restr_{i,t}$	N $gw_{i,t}$	N $restr_{i,t}$
1996	−0.2451	−0.02869	2802	8048
1997	−0.2043	−0.06191	3031	8423
1998	−0.2963	−0.05824	2947	8292
1999	−0.1018	−0.04606	2915	7957
2000	−1.9392	−0.16962	2932	7697
2001	−5.0989	−4.46296	2796	7444
2002	−10.1434	−3.77676	2865	7256
2003	−7.2718	−3.30275	3591	6390
2004	−3.1102	−2.58461	3369	5809
2005	−3.9111	−1.91063	3518	5715
2006	−3.6946	−1.90066	3373	5366
2007	−4.6606	−2.00685	3261	5264
2008	−20.0694	−2.46396	3350	5184
2009	−11.7742	−3.33237	2934	4545
2010	−3.1755	−1.94773	2865	4585
2011	−5.1051	−1.87714	2949	4672
2012	−5.4047	−2.10796	2941	4537
2013	−3.8614	−2.47597	2979	4579
2014	−3.2865	−2.43798	3193	4843
2015	−7.9631	−2.19552	3243	4855
2016	−6.9426	−2.42519	3397	4910
2017	−4.9381	−2.66360	3061	4532
2018	−4.8010	−2.33577	2972	4475
2019	−5.1015	−2.40713	2913	4323
2020	−8.3831	−2.72000	2826	4287

Table 8: Means and number of firm-level goodwill and restructuring charges by year. The variable definitions appear in Table 1.

Table 9: Correlations of firm-level human capital risk measures

		1	2	3	4	5
1	ρ_i^{gw}		0.1651	0.7838	0.1937	0.0517
2	ρ_i^{restr}	0.1864		0.5496	0.2360	0.1434
3	ρ_i^{sum}	0.7895	0.5739		0.2755	0.0907
4	ρ_i^{pigrow}	0.2023	0.2308	0.2805		0.1332
5	β_i^{capm}	*0.0516*	0.1080	0.0895	0.1104	

Table 9: Bi-variate correlations for the firm timeseries correlations with labor productivity using the years 1996 – 2020. Items in italics are *not* significant at a $p = 0.1$ level. Spearman (Pearson) correlations are above (below) the diagonal. The variable definitions appear in Table 1. All continuous variables are winsorized at the firm-year level at 1% and 99%.

Table 10: Regressions of risk on firm-level human capital risk measures

VARIABLES	(1) β_i^{CAPM}	(2) β_i^{CAPM}	(3) β_i^{CAPM}	(4) β_i^{CAPM}	(5) β_i^{CAPM}	(6) β_i^{CAPM}	(7) β_i^{CAPM}	(8) β_i^{CAPM}
ρ_i^{gw}	0.079				0.038			
	(1.55)				(0.74)			
ρ_i^{restr}		0.272***				0.243***		
		(5.85)				(5.19)		
ρ_i^{sum}			0.241***				0.205***	
			(5.29)				(4.45)	
hcr_i				0.270***				0.236***
				(5.52)				(4.79)
ρ_i^{pigrow}					0.226***	0.162***	0.181***	0.168***
					(4.37)	(3.82)	(4.40)	(4.06)
Constant	0.959***	1.013***	1.004***	1.008***	0.933***	0.998***	0.988***	0.992***
	(65.22)	(79.21)	(81.19)	(80.59)	(59.15)	(74.59)	(76.83)	(76.01)
Observations	989	1,954	2,115	2,044	989	1,949	2,110	2,039
R-squared	0.002	0.017	0.013	0.015	0.021	0.025	0.022	0.023

Table 10: Summary statistics from the regressions of firm systematic risk (β_i^{CAPM}) on the timeseries correlation between the measures of goodwill and restructuring charges and labor productivity ($LP_{j,t}$). The t-stats are below the coefficients in parentheses. The variable definitions appear in Table 1. All continuous variables are winsorized at the firm-year level at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Robustness tests of firm-level human capital risk measures

VARIABLES	(1) β_i^{CAPM}	(2) β_i^{CAPM}
hcr_i	0.261***	
	(3.48)	
cr_i	0.117*	
	(1.77)	
ρ_i^{sum}		0.240***
		(3.19)
$\rho_i^{sum\_CP}$		0.085
		(1.25)
Constant	1.039***	1.039***
	(66.59)	(67.20)
Observations	1,439	1,486
R-squared	0.025	0.021

Table 11: Summary statistics from the regressions of firm systematic risk (β_i^{CAPM}) on the timeseries correlation between the measures of goodwill and restructuring charges and labor productivity ($LP_{j,t}$), controlling for the correlation between goodwill and restructuring charges and industry capital productivity. The t-stats are below the coefficients in parentheses. The variable definitions appear in Table 1. All continuous variables are winsorized at the firm-year level at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1.