The risk relevance of restructuring

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Abstract

The systematic risk of a firm is important but challenging to assess, and it is often estimated using production outputs such as cash flows. This study investigates whether the timing of restructuring expense, indicating decreases in inputs to production, is informative about systematic risk. In expectation of demand shocks, firms exercise project abandonment options and reduce inputs to production. Demand shocks may be firm-specific or economy-wide, but only economy-wide shocks will manifest macroeconomic changes. Accordingly, observing whether a firm reduces inputs in concert with, or independently of, the macroeconomy can indicate systematic risk. Tests show that firms reducing investment in productive inputs in conjunction with the aggregate economy have higher levels of stock return-based measures of systematic risk. Further, restructuring by firms with higher systematic risk leads decreases in GDP and aggregate production growth, highlighting the macroeconomic informativeness of restructuring. Overall, these results show the importance of firm decisions regarding inputs to production for systematic risk assessment and as a macroeconomic indicator.

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1. Introduction

The systematic risk of a firm depends on the projects that the firm undertakes. Determining the projects' exposure to undiversifiable macroeconomic shocks can be challenging. Often outsiders may use one or more firm outputs, such as stock returns, earnings, or cash flows, to assess systematic risk (Ball et al., 2022; Ellahie, 2021; Sharpe, 1964). In contrast, observing firm inputs may also indicate systematic risk. By observing when the firm is abandoning projects, outsiders can assess management's demand expectations. If the firm is expecting a negative demand shock, the present value of a project's expected cash flows may dip below the project's abandonment option value, and the firm will reduce or reallocate project inputs (Berger et al., 1996; Robichek and Van Horne, 1967). This demand shock may be either idiosyncratic or economy-wide, so observing abandonment alone is inadequate for risk assessment. Instead, the abandonment needs to be considered in context of the macroeconomy. If the firm reduces productive input investment in simultaneity with a broad range of other firms across the macroeconomy, then likely the firm is exposed to macroeconomic demand shocks. If the firm adjusts inputs independently of the macroeconomy, then the firm is likely exposed to idiosyncratic demand shocks. Relative to conventional stock return-based approaches, observing project abandonment lies closer to observing firm fundamentals, in tune with arguments for using cash flow betas or managerial characteristics (Ball et al., 2022; Ellahie, 2021; Schoar et al., 2024).

This study focuses on restructuring expense, which is a transitory fair-value accrual management makes when it expects to substantially reorganize operations, necessitating material employee termination, contract termination, and other facility closure costs. This sudden divestment in productive inputs is often initiated in response to declines in the market for the firm's output (John et al., 1992). Because restructuring is accrued when the restructuring plan is communicated to employees (Financial Accounting Standards Board, ASC 420-10-05-1), the accrual is a more timely indicator of abandonment than cash flow or headcount changes. Because of adjustment costs, particularly in labor markets, firms do not accrue the expense lightly (Anderson et al., 2003; Banker et al., 2013). As a part of special items, restructuring is responsive to economy-wide news and the firm's economic circumstances, and it is related to GDP and job destruction (Abdalla and Carabias, 2022; Hann et al., 2021; John et al., 1992). These characteristics suggest the possibility that, in context of macroeconomic information, restructuring expenses are risk relevant.

Restructuring also provides distinct insight into labor divestment that is difficult to obtain elsewhere in the financial statements. Generally, labor investments are not capitalized and therefore changes in their value are unobservable. However, when layoffs and employee relocation generate expected costs, they are accrued at fair value in a restructuring liability and a related expense (Financial Accounting Standards Board, ASC 420-10-05-1). For firms that depend on labor as a significant input to production, this likely is a substantial fraction of the restructuring expense (Jennings et al., 1998). Because the expense is denominated in monetary units, and not employees, restructuring expense is increasing in the cost to replace the labor terminated (Ghaly et al., 2017). Given that firms are increasingly using talent as an input to production, and that a wider range of firms are restructuring over time, the expense may be a uniquely useful window into firm demand expectations.

Firms may abandon projects in expectation of either idiosyncratic or macroeconomic demand shocks, and therefore restructuring alone is inadequate for systematic risk assessment. Instead, the restructuring should be considered in context of the macroeconomic environment. If the macroeconomic signals indicate expectations of a macroeconomic demand shock when the firm is restructuring, that is likely affecting the firm. If the firm restructures when there is no indication of a macroeconomic demand shock, the restructuring suggests an idiosyncratic demand shock.

Following this logic, I construct the restructuring beta, β_i^{Restr}, following the familiar capital asset pricing model formula. Specifically, β_i^{Restr} is the average coefficient from time-series Tobit regression of firm restructuring expense on two macroeconomic indicators for productive input investment. Higher β_i^{Restr} indicates more exposure to aggregate demand shocks.[1]

I use two macroeconomic indicators that reflect changes in the economy's investment in inputs based on their similarity to the costs included in restructuring and their demonstrated relations with realized demand shocks. First, I use aggregate employment growth to measure the macroeconomic demand for labor inputs, mirroring the labor demand information in restructuring. The positive relation between employment declines and macroeconomic demand shocks is well-grounded (Brainard and Cutler, 1993; Chodorow-Reich and Wieland, 2020; Gali, 1999; Hamermesh and Pfann, 1996). Second, I use aggregate capital expenditure growth to mirror the portion of restructuring related to the divestment of physical assets. Pairing capital expenditure growth with employment growth also helps restructuring beta account for labor–capital substitutions.[2]

Validation tests confirm that restructuring has a systematic component (Abdalla and Carabias, 2022; Hann et al., 2021). Using a sample of firms that incurred restructuring expenses between 2001 and 2022, inclusive, I find a positive association between aggregate quarterly restructuring expense and aggregate growth in employment and capital investment. This means that, on average, aggregate restructuring expenses move in concert with aggregate indicators of productive input investment, and that this systematic component

[1] Higher restructuring expenses are more negative amounts in the data.

[2] While market portfolio-based measures can be constructed from returns or accounting data as a proxy for macroeconomic data, these proxies largely omit broad cross-sections of the economy, including private firms and public assets, and therefore are unlikely to be representative of the macroeconomy. Accordingly, I use the broader macroeconomic measures directly in my primary analyses (Ball et al., 2022).

of restructuring is important across a wide variety of firms.

As an initial test of the risk-relevance of restructuring, I calculate firm return-based market betas using the the Fama-French-Carhart four-factor model (Carhart, 1997; Fama and French, 1993), and regress them on restructuring beta, β_i^{Restr}. The measures are positively correlated. To ensure that the information in restructuring is not reflected in operating earnings, I also construct an operating earnings-based alternative to β_i^{Restr}. I regress operating earnings on the two macroeconomic indicators, and the mean coefficient is the earnings-based alternative measure, β_i^{OI}. Tests show that operating earnings does not substitute for restructuring charges with respect to information about systematic risk.

The main test estimates the Fama-French-Carhart four-factor model by portfolio based on restructuring beta, β_i^{Restr}. Market betas increase over the quartiles of β_i^{Restr}, supporting the conclusion that the timing of restructuring can provide systematic risk-relevant information. The results are consistent when either of the individual macroeconomic measures of expected demand shock are used individually to determine β_i^{Restr}. Results are also consistent when estimating market betas by β_i^{Restr} portfolio conditional on the operating earnings-based measure or estimating market betas using out-of-sample returns.

Additional tests investigate differences in post-restructuring outcomes for firms with higher restructuring betas. If systematically risky firms reduce labor and physical capital investment in expectation of a firm, and therefore macroeconomic, demand shock, then there should be evidence of macroeconomic demand shocks subsequent to these firms' restructuring activities. Consistent with this notion, when firms with higher β_i^{Restr} incur restructuring expense, aggregate sales, aggregate expense, and GDP growth are lower in the year thereafter, consistent with the realization of aggregate demand shocks after firms with high β_i^{Restr} restructure. These results provide evidence of restructuring's usefulness in understanding and predicting macroeconomic changes.

I also investigate whether firms that restructure in response to expected macroeconomic demand shocks are more likely to reverse restructuring charges. Hutton et al. (2012) show that firm managers have less information about the aggregate economy versus analysts, and Kim et al. (2016) show that managers reduce voluntary disclosure during times of aggregate uncertainty. Because aggregate demand shocks put managers at an information disadvantage, those managers may be more likely to mis-estimate restructuring costs and subsequently need to reverse charges. I find that reversals are increasing with the sensitivity of restructuring to aggregate demand shock, consistent with this notion.

Two extensions reinforce the overall findings. The first extension uses a separate macroeconomic measure of demand shock expectations as an alternative to macroeconomic labor and physical capital investment growth. Specifically, I use changes in the level of the CBOE volatility index (VIX) as an overall indicator of expected macroeconomic demand shocks. Increases in the VIX are associated with aggregate demand shocks and lower subsequent growth (Foerster et al., 2014; Leduc and Liu, 2016). Restructuring betas measured using VIX provide similar results to the main analyses.

A second extension calculates restructuring beta at the industry level and only uses firms that do not report restructuring expense during the sample period to test whether an industry restructuring beta is informative when the firm-level measure is incalculable. These findings provide evidence that the information about systematic risk conveyed through restructuring is partially a function of industry characteristics and therefore potentially useful in assessment of firms without observed restructuring.

This study aims to contribute in three ways. First, this study highlights the usefulness of observing firm decisions when assessing risk. The firm's projects determine its exposure to macroeconomic changes. When macroeconomic changes require management to abandon projects and reallocate resources, observing reallocations can reveal the systematic risk exposure of the firm's projects. This study is one of the few that emphasizes the usefulness of fundamental activities for risk assessment and underscores the call for a deeper understanding of the risk-relevance of financial statement information (Barth, 2015).

Second, this study contributes to the literature on transitory accruals and specifically restructuring expense. Generally accepted accounting principles (GAAP) require the inclusion of restructuring expense in operating earnings, but this expense is often excluded from non-GAAP earnings, earnings used in compensation calculations, street earnings, and operating earnings measures provided by third parties, including Computstat (Bradshaw and Sloan, 2002; Dechow et al., 1994; Laurion, 2020). Restructuring expenses are criticized for reducing matching and the value relevance of earnings, and for being easy to manipulate (Bens and Johnston, 2009; Elliott and Hanna, 1996; Fairfield et al., 2009; Moehrle, 2002). As a counterpoint to this literature, this study provides evidence of the risk relevance of restructuring and its usefulness in valuation. Further, the additional tests in this paper also provide evidence of how restructuring by certain firms may be a bellwether for changes in aggregate output.

Finally, this study sheds light on what causes firms to reduce productive input investment, including labor. To the extent that labor markets in a geography or industry are dominated by firms with systematic risk exposure, labor market participants may be exposed to relatively more volatility in their wages over the course of their careers. Because the nature of labor markets is important to both workers and the government, the results in this paper may be of use to both groups.

The remainder of this paper is organized as follows. Section 2 provides a discussion of the research related to systematic risk, restructuring charges, and the hypothesis tested in this study. Section 3 describes the research design and measurement. Section 4 describes the data, section 5 provides the results of the tests, and section 6 provides additional analyses. Section 7 concludes the study.

2. Related literature and hypothesis

Factors of production generate output for the firm to sell. The firm adjusts labor and capital investment based on changes in product demand expectations (Gali, 1999; Hamermesh and Pfann, 1996). This study proposes that the timing of these adjustments can be informative about firm risk.[3]

There may be several reasons why a firm expects a demand shock. This study considers two collectively exhaustive categories of reasons: idiosyncratic and systematic. Idiosyncratic reasons are relevant to the firm specifically, but not to the broader market. Product demand shocks caused by the firm's product design, for example, fall into this category. These generate risk to the firm, but are diversifiable, as the same risk does not affect all firms in the same way at the same time. Systematic demand shocks, on the other hand, affect a broad cross-section of firms in the same way and therefore are undiversifiable and have a significant effect on firm and portfolio valuation. A demand shock created by interest rate changes is an example of a systematic shock.

If the demand shock is economy-wide, many firms will reduce their investments in productive inputs, resulting in changes in macroeconomic indicators. If an individual firm reduces its labor and capital investment in simultaneity with the aggregate market, it is likely also affected by the aggregate demand shock and therefore exposed to systematic risk. All other things being equal, the more the firm is affected by the aggregate shock, the more the firm will make adjustments to its input investment.[4]

[3]In this study I focus on the two-factor production model out of convention. This ignores less tangible factors of production such as organizational capital (Eisfeldt and Papanikolaou, 2013, 2014). I leave the investigation of the degree that restructuring may reflect changes in organizational capital or other factors of production to future research.

[4]Gali (1999) provides evidence of cyclical demand shocks affecting aggregate labor investment. Related

Restructuring expense arises from abandonment of a project. Projects are abandoned when the value of discounted expected future cash flows drops below project exit value (Berger et al., 1996; Robichek and Van Horne, 1967). Abandonment may manifest because of idiosyncratic or systematic reasons. The timing and degree of restructuring at a firm can signal its exposure to systematic risk. If the firm abandon projects and reduces inputs in concert with the input demand signals in the aggregate market, the firm is exposed to aggregate demand shocks and carries systematic risk. If the firm adjusts inputs independently of the aggregate market, then it is less systematically risky. This leads to the main hypothesis of this study:

Hypothesis 1 *Firms that restructure when macroeconomic signals of demand shock are lower carry more systematic risk than firms that restructure independently of macroeconomic signals of demand shock.*

Firms that reduce inputs when macroeconomic expected demand signals are lower may not carry more systematic risk than other firms. Firms may not adjust inputs as quickly as demand shocks would suggest (Fay and Medoff, 1985). One reason is that firms face labor adjustment costs (Anderson et al., 2003; Banker et al., 2013; Golden et al., 2020; Hamermesh and Pfann, 1996). Laying off employees requires dealing with regulatory, reputational, and morale-related issues, and therefore firms may delay or forgo labor divestments in light of aggregate demand shocks. Also, firms may carry higher inventories or cash to weather

research debates the degree to which cyclical shocks and sectoral shocks cause macroeconomic employment changes. Lilien (1982) challenges traditional Keynesian explanations of unemployment by introducing the sectoral shift hypothesis. However, the degree to which the sectoral shift hypothesis describes macroeconomic employment changes may be limited, as broad market shocks cause employment growth dispersion resembling sectoral shocks (Abraham and Katz, 1986). Brainard and Cutler (1993) indicates that time-series deviations in employment are better described by macroeconomic shocks. More recently, Chodorow-Reich and Wieland (2020) shows that the effect of sectoral employment shift is conditional on aggregate downturns in the economy. Regardless, this study does not aim to contribute to this debate. As long as either a) cyclical demand shocks are the dominant reason for declines in labor and capital investment, or b) sectoral demand shocks causing substantial macroeconomic employment and capital declines are not simultaneously offset by demand growth in other sectors, either type of demand shock is undiversifiable.

the downward change in demand (Ghaly et al., 2017; Topel, 1982). Accordingly, whether restructuring provides information about systematic risk is an empirical question.

This study focuses on restructuring expense as an indication of firms divesting inputs to production. Restructuring costs are related to exit and disposal activities, and include a) one-time involuntary termination benefits, b) costs to terminate a contract that is not a lease, and c) other associated costs, such as costs to relocate employees 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 not recognized in expense over the period that the restructuring occurs but instead when the obligations related to the restructuring are created.[5]

Because it is a quarterly accrual, restructuring provides a timely indication of management's expectation of the effect of the demand shock on the firm; restructuring expense also matches the frequency of macroeconomic employment information. Because the portion related to labor divestment is denominated in dollars, and not employees, restructuring expense is correlated with the value of employees relocated or terminated, reflecting the difficulty of replacing them (Ghaly et al., 2017). Restructuring expenses are substantial, amounting to 80% of pre-restructuring income according to Dechow et al. (1994), and restructuring contains severance a vast majority (88%) of the time (Lin, 2006). The analysis in John et al. (1992) finds that restructuring results in a 5% workforce reduction and lower labor costs. The study also finds that firms often restructure for exogenous reasons, such as the state of the economy. As part of special items, restructuring increases during bad

[5]The rules related to restructuring expense changed slightly over the sample period. In 2003, EITF 94-3 was superseded by SFAS 146. The standards were largely similar; the main difference was that SFAS 146 required recognition of the restructuring liability when the liability is incurred, versus when management commits to a restructuring plan (Financial Accounting Standards Board, 2010). In 2018, ASC 842 modified the scope of restructuring from including only contracts that are not capital leases to contracts that are not leases (PwC, 2023).

macroeconomic news events, in the aggregate is predictive of changes in GDP (Abdalla and Carabias, 2022), and is informative about aggregate job creation and destruction (Hann et al., 2021).

While restructuring has potential to be informative about the firms divestment of productive inputs, it may fail to inform, for a few reasons. Restructuring has been criticized as an expense subject to managerial manipulation (Bens and Johnston, 2009; Elliott and Hanna, 1996; Moehrle, 2002). Specifically, Bens and Johnston (2009) finds that firms overstate restructuring expenses as part of "big bath" manipulations, but that the introduction of EITF No. 94-3 and higher SEC scrutiny moderate this manipulation. Also, restructuring expense is a signal only of divestment, not of investment. GAAP does not allow firms to use restructuring expense to indicate investments in expectation of positive demand shocks. Therefore the signal provided by restructuring expense is one-sided, limiting the scope of information that it can communicate about changes in the productive assets of the firm. Finally, adjustment costs are a well documented factor affecting the timeliness and degree to which labor in particular is divested (Chen et al., 2011; Golden et al., 2020; Topel, 1982). To the extent that adjustment costs prevent the timely recognition of restructuring, it will fail to provide risk relevant information.

There are several papers discussing alternatives to returns-based measures for assessing systematic risk. Closest to this paper are studies that investigate the usefulness of betas constructed from earnings. Early studies, including Ball and Brown (1969) and Gonedes (1973), demonstrate that earnings can provide information about systematic risk by calculating and demonstrating the association between earnings betas and future returns. However, Ismail and Kim (1989) suggest that earnings betas provide a subset of the information that cash flow betas provide, perhaps because earnings are less objective and difficult to understand. More recently, Ellahie (2021) constructs multiple earnings betas using 11 different measures of earnings, finding that expected earnings can provide a more effective measure of expected return relative to using firm and market returns. Ball et al. (2022) investigate the association between aggregate productivity and firm operating earnings, finding that the association indicates systematic risk. This study emphasizes the importance of using macroeconomic measures that reflect the wider economy and not just public companies. 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, can provide information about systematic risk. Their focus on persistent earnings omits restructuring specifically.

More closely related to the labor portion of restructuring, Kuehn et al. (2017) show that firms with sensitivity to labor market tightness are higher risk. Investors require higher compensation for investing in firms with more exposure to fluctuations in the labor market. Other papers investigate labor leverage: the notion that having large and inflexible labor creates operations that function similarly to financial leverage and increase the risk of the firm (Donangelo et al., 2019; Lev, 1974; Levhari and Weiss, 1974; Rosett, 2001, 2003). Schoar et al. (2024) show how managers can affect systematic risk by changing the projects the firm undertakes. My study differs from these in that it does not suggest that reliance on labor generates risk. The type or quantity of labor used by the firm is not the source of exposure to macroeconomic shocks. Instead, I use the timing of labor and capital flows out of the company as a signal to assess whether the firm is expecting to be affected by an aggregate demand shock.

3. Research Design and Measurement

3.1. The systematic component of restructuring

While the systematic nature of earnings and special items has been documented in Abdalla and Carabias (2022), Ball et al. (2022), and Hann et al. (2021), the novelty of using restructuring alone warrants validation. As an initial test, I determine whether restructuring charges fluctuate with macroeconomic employment. If so, then the sample of firms for which we can observe restructuring is exposed to aggregate shocks affecting aggregate investment in productive inputs. This is important because publicly listed firms comprise only a fraction of macroeconomic employment. The wider breadth of firms encompassed by macroeconomic indicators can provide better information about changes in the macroeconomy, but such changes may not be relevant to the sample we observe (Ball et al., 2022).

I measure firm restructuring expense, $restr_{i,t}$, as quarterly restructuring expense divided by total assets as of the same quarter one year prior, where i indicates firm and t indicates quarter. Because I am initially testing whether restructuring correlates with aggregate fluctuations in input investment, I calculate aggregate restructuring, $AGGrestr_t$, as the cross-sectional mean of $restr_{i,t}$by calendar quarter.

I use two macroeconomic signals of input investment selected to mirror the labor content of restructuring expense. First, I use the growth in seasonally adjusted aggregate employment, EMP_t, as a measure of macroeconomic labor investment. Specifically, I use the percent change in employment from the same calendar quarter a year ago for all workers in the non-farm business sector. I use quarterly observations from the Bureau of Labor Statistics (BLS) to match the frequency of restructuring observations and the non-farm business sector to provide a sample that is representative of the changes in labor growth across the U.S. economy.

Second, I use growth in aggregate capital expenditures provided by the Federal Reserve to mirror the physical capital content of restructuring expense. Specifically, I use the quarterly percent change of all sector total capital expenditures from the same quarter in the prior year, CAP_t. To the extent that certain demand shocks are more likely to elicit changes in physical inputs, CAP_t is likely to reflect this. Further, pairing macroeconomic physical capital investment with aggregate employment creates a portfolio of changes that allows for labor–capital substitutions to offset. The quarterly observations of CAP_t matches the frequency of $AGGrestr_t$ and EMP_t.

I use OLS regression to estimate the following timeseries regression:

$$AGGrestr_t = \alpha + \beta_1 \times MACRO_t + \varepsilon, \tag{1}$$

where $MACRO_t$ is either EMP_t or CAP_t and other variables are as defined above. Because restructuring expenses are correlated across the year, I incorporate Newey-West standard errors with lags for four observations in the estimation of Equation (1).

3.2. The restructuring-based measure of systematic risk

Restructuring, as an indication of productive input divestment, is by itself insufficient to determine whether a firm is exposed to systematic risk. The firm may be reducing its investment in labor because of an expected demand shock that is either economy-wide or specific to the firm. The context in which the firm takes the restructuring expense can help determine which is the case. If the firm terminates employees and related physical capital use when macroeconomic input investment growth is also low, the firm is likely exposed to an expected aggregate demand shock affecting a large fraction of the economy.

Following this logic, I calculate three versions of restructuring beta. The first is the firm's restructuring sensitivity to macroeconomic labor investment, and is the $\beta_i^{RestrEmp}$

from the Tobit regression of:

$$restr_{i,t} = \alpha_i + \beta_i^{RestrEmp} \times EMP_t + \varepsilon_{i,t}, \tag{2}$$

where $restr_{i,t}$ is as defined above, EMP_t is macroeconomic employment growth as defined above, i is the firm, and t is the quarter. I estimate this and other restructuring betas using Tobit regression. The latent variable of interest is the firm's change in productive input investment. Restructuring only allows us to observe divestment, and therefore the observable data is censored with an upper bound of zero. Tobit regression accounts for this censoring of the data.[6] To ensure a sufficient sample to estimate each restructuring beta, I require 30 quarters of data for each firm, five quarters of non-zero $restr_{i,t}$, and quarterly assets of $1 million. All restructuring betas are normalized to a mean of zero and standard deviation of one for interpretive ease.

The higher the $\beta_i^{RestrEmp}$, the more the firm is affected by expected aggregate demand shocks as indicated by aggregate labor investment. This regression approach follows the pattern of estimating a market beta, where firm returns are regressed on market returns, and the coefficient from the regression is the measure of systematic risk.

Similarly, I calculate the firm's restructuring sensitivity to macroeconomic physical capital investment as the $\beta_i^{RestrCap}$ from the Tobit regression of:

$$restr_{i,t} = \alpha_i + \beta_i^{RestrCap} \times CAP_t + \varepsilon_{i,t}, \tag{3}$$

where $restr_{i,t}$ is as defined above, CAP_t is macroeconomic physical capital investment growth as defined above, i is the firm, and t is the quarter. Higher levels of $\beta_i^{RestrCap}$

[6] In the data, some values for restructuring expense are greater than zero, which represent reversals of prior restructuring charges. These reversals comprise 2.3% of the observations of $restr_{i,t}$. For estimation of restructuring betas, positive values are assigned a value of zero.

indicate higher firm sensitivity to expected demand shocks as indicated by reduced physical capital investment growth. Both $\beta_i^{RestrEmp}$ and $\beta_i^{RestrCap}$ are normalized to a mean of zero and standard deviation of one for interpretive ease.

Finally, to combine the information from both measures into a single restructuring beta, β_i^{Restr}, I take the mean of $\beta_i^{RestrEmp}$ and $\beta_i^{RestrCap}$. This combines the sensitivity of restructuring to labor investment and physical capital investment growth.

There is a concern that restructuring reflects the current performance of the firm or is an expense that firms take when performance is poor as part of a "big bath" that accompanies macroeconomic downturns (Bens and Johnston, 2009). To address this concern, tests include an operating earnings-based alternative measure of systematic risk. Substituting restructuring with the growth operating earnings in Equations (2) and (3) provides the following:

$$oigrow_{i,t} = \alpha_i + \beta_i^{OIemp} \times EMP_t + \varepsilon_{i,t}, \tag{4}$$

$$oigrow_{i,t} = \alpha_i + \beta_i^{OIcap} \times CAP_t + \varepsilon_{i,t}, \tag{5}$$

where $oigrow_{i,t}$ is the quarterly operating earnings growth relative to the same quarter a year ago, scaled by total assets as of the beginning of the 12-month period and the other variables are as defined above. The coefficient on EMP_t (CAP_t), β_i^{OIemp} (β_i^{OIcap}), is the sensitivity of operating earnings to aggregate fluctuations in investment in labor (physical capital). Equations (4) and (5) are estimated using OLS, because earnings growth is not censored at zero. Both β_i^{OIemp} and β_i^{OIcap} are normalized to a mean of zero and standard deviation of one, and their mean, β_i^{OI}, is a summary measure that identifies firms that have earnings fluctuating in concert with macroeconomic indicators.[7]

[7] In this paper, and in Ball et al. (2022) and Ellahie (2021), operating earnings does not include restructuring expense.

3.3. Risk measurement

3.3.1. Firm-specific approach

I measure systematic risk using the beta on the market returns from the Fama-French-Carhart four-factor model (Carhart, 1997; Fama and French, 1993). This is widely used as a conventional measure of systematic risk. For each firm, I estimate the annual market beta using a regression of firm returns, less the risk-free rate, on the aggregate market returns, less the risk-free rate, and the returns for the SMB, HML, and UMD portfolios over a historical 60-month window:

$$\begin{aligned}[R_{i,s} - RF_s] = \alpha_{i,t} + \beta_{i,t}^{FF} \times \left[R_s^{mkt} - RF_s\right] + \beta_{i,t}^{SMB} \times R_s^{SMB} + \\ \beta_{i,t}^{HML} \times R_s^{HML} + \beta_{i,t}^{UMD} \times R_s^{UMD} + \varepsilon_{i,s}\end{aligned} \tag{6}$$

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}, R_s^{SMB}, R_s^{HML}, and R_s^{UMD} are the returns of the aggregate market, size, value, and momentum portfolios for month s. The $\beta_{i,t}^{FF}$ is the level of systematic risk exposure for firm i for the year t. Because restructuring betas are at a firm level, and not a firm-year level, I calculate the systematic risk of the firm as the time-series mean of $\beta_{i,t}^{FF}$, β_i^{FF}.

To test whether the firms that reduce productive inputs in conjunction with the macroeconomy are exposed to higher systematic risk, I follow Rosett (2001) and regress the returns-based measure of risk, β_i^{FF}, on the restructuring-based measures of systematic risk, $\beta_i^{RestrEmp}$, $\beta_i^{RestrCap}$, and β_i^{Restr}:

$$\beta_i^{FF} = \alpha_0 + \gamma_1 \times \beta_i^{RestrEMP} + \gamma_2 \times \beta_i^{OIemp} + Controls + \varepsilon_i, \tag{7}$$

$$\beta_i^{FF} = \alpha_0 + \gamma_1 \times \beta_i^{RestrCAP} + \gamma_2 \times \beta_i^{OIcap} + Controls + \varepsilon_i, \tag{8}$$

$$\beta_i^{FF} = \alpha_0 + \gamma_1 \times \beta_i^{Restr} + \gamma_2 \times \beta_i^{OI} + Controls + \varepsilon_i, \tag{9}$$

where the controls are fundamental firm characteristics that may affect measures of systematic risk. Specifically, I include firm size, $size$, measured as the log of the market value of equity, firm market-to-book ratio, mb, measured as the market value of equity divided by the book value of equity, and the debt-to-equity ratio, de, measured as the book value of debt divided by the book value of equity. All controls are timeseries means of annual firm characteristics.[8]

To the extent that firms are affected by aggregate demand shocks and reduce inputs in expectation of such shocks, they should have a higher restructuring-based measures of systematic risk and higher returns-based measures of systematic risk, β_i^{FF}. Therefore I expect γ_1 to be positive. Because the earnings-based alternative measures of systematic risk, β_i^{OIemp}, β_i^{OIcap}, and $\beta_i^{OI}$and the firm characteristics are included as controls, a significant positive coefficient suggests that restructuring provides information about systematic risk that is distinct from operating earnings and other firm characteristics.

3.3.2. Portfolio approach

As an alternative approach, this study employs portfolios constructed based on the restructuring betas, $\beta_i^{RestrEmp}$, $\beta_i^{RestrCap}$, and β_i^{Restr}. This approach provides a more direct association between the firm characteristics represented by the restructuring betas and return characteristics, because the returns-based measure of systematic risk is estimated for each portfolio specifically. Also, this approach can reveal any non-linearities in the relation between the restructuring betas and systematic risk as indicated by the returns-based measure.

[8]Firm size and market-to-book ratio are redundant, in that the effect of these firm characteristics on market beta are controlled through the use of the Fama-French-Carhart model. Regardless, I include them here to ensure that the restructuring betas are not correlated with β_i^{FF} because of these characteristics.

I construct portfolios of restructuring betas based on cross-sectional quartile rank. Portfolio membership is time-invariant as are $\beta_i^{RestrEmp}$, $\beta_i^{RestrCap}$, and β_i^{Restr}. For each portfolio, I estimate:

$$\begin{aligned}[R_{i,s} - RF_s] = \alpha_p + \beta_p^{FF} \times \left[R_s^{mkt} - RF_s\right] + \beta_p^{SMB} \times R_s^{SMB} + \\ \beta_p^{HML} \times R_s^{HML} + \beta_p^{UMD} \times R_s^{UMD} + \varepsilon_{i,s},\end{aligned} \tag{10}$$

where the variables are defined above in Equation (6), and the subscript p indicates portfolio. Because I expect that firms that are more exposed to systematic risk will record their restructuring expense when aggregate productive input investment growth is lower, the relation between restructuring and macroeconomic labor and capital investment growth, β_i^{Restr}, increases with systematic risk. Therefore, I expect that portfolios that have higher levels of β_i^{Restr} also have higher systematic risk as measured by the returns-based measure, β_p^{FF}.

The inclusion of returns to the size, value, and momentum portfolios, R_s^{SMB}, R_s^{HML}, and R_s^{UMD}, controls for common risk factors that may be associated with the restructuring based measure, β_i^{Restr}. To ensure that the information provided by restructuring expense is distinct from that of operating earnings, I form 25 portfolios based on the quintiles of the restructuring-based measure, β_i^{Restr}, and the earnings-based alternative, β_i^{OI}. To the extent that β_i^{Restr} provides information about systematic risk that is distinct from that of operating earnings, the returns-based measure of systematic risk, β_p^{FF}, should be higher for higher levels of β_i^{Restr} at all levels of β_i^{OI}.

3.3.3. Out-of-sample portfolio approach

Because restructuring beta, β_i^{Restr}, is estimated in the time-series, as is the returns-based measure, β_p^{FF}, the estimation windows overlap and systematic risk is measured as a time-invariant characteristic. As an alternative, this study employs a test that uses returns observed after the determination of restructuring beta.

To do this, I use quarterly restructuring, $restr_{i,t}$, and the macroeconomic labor and physical capital investment growth, EMP_t and CAP_t, to estimate restructuring beta, β_i^{Restr}, for each firm for each year from 2010 through 2020. Specifically, β_i^{Restr} is estimated using a growing window of quarterly observations starting from 2001 and ending in each of the years from 2010 through 2020. I construct annual quintile portfolios based on the levels of the restructuring-based measure, β_i^{Restr}. Firm returns are associated with each portfolio starting from June of the year subsequent to portfolio construction.

I estimate Equation (10) by portfolio. Because restructuring beta, β_i^{Restr}, is intended to identify firms that are exposed to aggregate demand shocks, I expect that portfolios with higher levels of β_i^{Restr} will provide higher estimations of returns-based systematic risk, β_p^{FF}.

4. Data and Sample

4.1. Sample

I collect restructuring expense from the quarterly Compustat file. The file provides restructuring expense starting in 1996; however, the data are sparsely populated until 2001 (Hann et al., 2021). Therefore, my sample starts in 2001 and ends in 2022. Firm stock returns are from the CRSP monthly stock return file. I collected the Fama-French-Carhart portfolio returns from Kenneth French's website at Dartmouth College and quarterly macroeconomic employment growth from the BLS website.[9] I obtained aggregate capital expenditure data

[9]Fama-French-Carhart returns are available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html. I obtained the data from the BLS's Labor Productivity and Cost Measures, Major Sectors table from https://www.bls.gov/productivity/tables/. The data are as of March 3, 2023. I use the percentage change in employment for the same quarter a year ago for all workers in the nonfarm business

from the Federal Reserve Bank of St. Louis's website.[10]

Firms that do not record restructuring sufficiently throughout the sample period are excluded because the determination of restructuring beta, β_i^{Restr}, requires variation in restructuring to calculate the measure.[11] Macroeconomic employment and captial investment growth is provided by calendar quarter and I match it to the Compustat fiscal quarter that ends on or within three months before the calendar quarter end. As a reference, all variable definitions are provided in Appendix A.

Table 1 provides descriptive statistics for restructuring, $restr_{i,t}$, operating earnings growth, $oigrow_{i,t}$, macroeconomic employment, EMP_t, and macroeconomic capital expenditure growth, CAP_t. Restructuring is reported as a negative number, so lower numbers indicate more restructuring expense. The mean of restructuring is -0.0040 and the median is 0, indicating a left-skewed distribution. This is consistent with other special items, which are recorded occasionally to report expected bad news (Basu, 1997; Hayn and Hughes, 2006). Operating income growth also appears left-skewed with a mean of -0.0023 and a median of 0.0015, again potentially reflecting the conservatism in earnings. Macroeconomic employment growth, EMP_t, is less skewed, with a mean of 0.0005 and a median of 0.0017. The positive mean and median are consistent with the general growth in employment occurring economy-wide over the 22 years in the sample. Similarly, macroeconomic capital expenditure growth, CAP_t, has a mean of 0.0038 and a median of 0.0048, both reflecting general capital investment growth over the sample period.

sector.

[10]The data source ID is FA895050005.Q, available at https://fred.stlouisfed.org/series/BOGZ1FA895050005Q, and were obtained on June 17, 2024. I use the percent change from year ago, seasonally adjusted annual rate.

[11]About 39.5% of the Compustat observations are associated with firms that have less than five non-zero observations of annual restructuring during the sample period and are therefore excluded from estimation of β_i^{Restr}. I discuss this further in section 6.4.

4.2. Validation of restructuring as a measure of productive input divestment

Table 2 provides the bivariate correlations of restructuring, $restr_{i,t}$, operating earnings, $oigrow_{i,t}$, macroeconomic employment growth, EMP_t, and macroeconomic capital expenditure growth, CAP_t. The Pearson (Spearman) correlation between restructuring, $restr_{i,t}$, and macroeconomic employment growth, EMP_t, is 0.06 (0.02). Restructuring also has a Pearson (Spearman) correlation with capital investment growth of 0.05 (0.02). The significantly positive associations indicate a systematic component to restructuring expense, as the average firm in the sample is likely to have more restructuring expense when macroeconomic investment into productive inputs is low. Operating earnings growth, $oigrow_{i,t}$, has a lower Pearson (Spearman) correlation with macroeconomic employment, EMP_t, of 0.02 (0.01), but higher Pearson (Spearman) correlations with macroeconomic capital expenditure growth, CAP_t, of 0.06 (0.09), perhaps indicating the particularly unique nature of restructuring to capture divestment in labor resources relative to operating earnings changes.

Table 3 provides the summary statistics from the OLS regression of Equation (1) testing the relation between aggregate restructuring expense, $AGGrestr_t$, and macroeconomic employment growth, EMP_t or capital expenditure growth, CAP_t. Aggregate operating income growth, $AGGoi_t$, controls for the information in operating income. Column 1 (column 2) shows that EMP_t (CAP_t) has a coefficient of 0.211 (0.082) with a t-statistic of 3.34 (5.29), indicating a significant positive relation between restructuring and aggregate employment growth (capital expenditure growth). Columns 3 and 4 perform the same estimation, but include $AGGoi_t$, the cross-sectional quarterly mean of operating income growth, to control for the information in operating income. Results are consistent with Columns 1 and 2, suggesting that restructuring responds to aggregate changes in employment and capital expenditure growth in a way not otherwise observable in operating income. Column 5 provides the summary statistics from the estimation of Equation (1), but includes both EMP_t and CAP_t, the measures of macroeconomic productive input investment, and $AGGoi_t$ as a control. Both EMP_t and CAP_t have statistically positive coefficients (0.141 and 0.057, with t-statistics of 2.39 and 2.47). This provides evidence that restructuring has a macroeconomic component that correlates with aggregate growth in both employment and capital expenditure, and that this correlation is not otherwise surmised from operating earnings.

5. Results

5.1. The risk relevance of restructuring expense

Table 4 provides descriptive statistics for the 3,139 firms for which the restructuring and earnings-based measures of systematic risk can be constructed.[12] The restructuring-based measures, $\beta_i^{RestrEmp}$ and $\beta_i^{RestrCap}$, have means of -0.6101 and -0.0062 and medians of 0.0941 and 0.230, indicating left-skewness in the distributions, consistent with the presence of outliers in the left tail of the distribution. Further, for both measures, the 25th percentile is less than zero, indicating that a fraction of the sample has restructuring expenses that move counter-cyclically with macroeconomic indicators of labor and capital expenditure growth. This is consistent with industries drawing resources from a variety of sources, not all of which may correlate with macroeconomic statistics (Neal, 1995). The mean and median of $\beta_i^{RestrEmp}$ are greater than those of $\beta_i^{RestrCap}$, indicating that restructuring may be more sensitive to aggregate changes in labor relative to capital expenditure growth. The operating earnings-based measures, β_i^{OIemp} and β_i^{OIcap}, show less left-skewness, perhaps

[12]For Tables 4 and 5, $\beta_i^{RestrEmp}$, $\beta_i^{RestrCap}$, β_i^{OIemp}, and β_i^{OIcap} are not normalized. In other tables, they are.

because of the higher frequency of observed earnings growth. The means of β_i^{Restr} and β_i^{OI} are both zero, and the standard deviations are near one, because these variables are the mean of two measures that are standardized with mean zero and standard deviations of one. The conventional returns-based measure of systematic risk, β_i^{FF}, has a mean and median near one (1.0765 and 1.0410), consistent with what would be expected for an average market beta across a diversified sample.

Table 5 provides the Pearson correlations between the restructuring betas, $\beta_i^{RestrEmp}$, $\beta_i^{RestrCap}$ and β_i^{Restr}, the operating earnings-based alternative measures, β_i^{OIemp}, β_i^{OIcap}, and β_i^{OI}, the returns-based measure, β_i^{FF}, and the controls for Equation (9). The restructuring-based measures, $\beta_i^{RestrEmp}$ and $\beta_i^{RestrCap}$, have a correlation of 0.63, consistent with the correlation between the macroeconomic labor and capital expenditure indicators of 0.70, and have a high correlation of 0.90 with the summary restructuring-based measure, β_i^{Restr}, by construction. In contrast, $\beta_i^{RestrEmp}$ and $\beta_i^{RestrCap}$ have lower correlations with their operating earnings-based counterparts, β_i^{OIemp} and β_i^{OIcap}, of -0.06 and -0.03. This is consistent with the restructuring-based measures providing information about systematic risk that is different from that provided by operating earnings. Both the restructuring-based measures and the operating earnings-based measures have positive correlations with the conventional returns-based measure of systematic risk, β_i^{FF}, ranging from 0.05 to 0.15, consistent with the potential for these measures to indicate the sensitivity of firms to aggregate demand shocks.

The summary statistics from the estimation of Equation (9) are tabulated in Table 6. The the results in Column 1 (Column 2) indicate that the restructuring beta based on labor (capital expenditure) growth, $\beta_i^{RestrEmp}$ ($\beta_i^{RestrCap}$), has a significant association with the returns-based measure of systematic risk, β_i^{FF}, with a coefficient of 0.028 (0.028) and a t-statistic of 3.19 (3.25). The operating earnings-based alternative measure, β_i^{OIemp} (β_i^{OIcap}), controls for operating earnings information that may substitute for restructuring expense. The results indicate that labor (capital) divestment, as reported in restructuring, provides systematic risk information that is not otherwise conveyed by operating earnings. The summary restructuring-based measures, β_i^{Restr}, supports this conclusion also in Column 3, where it has a coefficient of 0.036 and a t-statistic of 3.71. Overall, this is evidence consistent with Hypothesis 1, that firms that reduce productive inputs when macroeconomic labor and capital growth is lower carry more systematic risk than firms that reduce productive inputs at other times.

Table 7 provides the summary statistics from the estimations of Equation (10) by quartile of the restructuring betas, $\beta_i^{RestrEmp}$, $\beta_i^{RestrCap}$, and β_i^{Restr}. Panel A (Panel B) provides the results from the estimation of the conventional returns-based measure of systematic risk, β_p^{FF}, by the labor (capital expenditure) based restructuring beta. The results are consistent with those reported in Table 6, and indicate that systematic risk monotonically increases with the level of restructuring beta. The lowest portfolio of $\beta_i^{RestrEmp}$ ($\beta_i^{RestrCap}$) has an estimated β_p^{FF} of 0.952 (0.973), while the highest portfolio has an estimated β_p^{FF} of 1.102 (1.104), and the three (two) highest portfolios have estimations of β_p^{FF} that are significantly higher than the lowest portfolio. The presence of the size, value, and momentum portfolio returns ensures that restructuring beta is not a function of these characteristics. The results in Panel C, which uses portfolios based on the summary restructuring beta, β_i^{Restr}, provides consistent results, although the second portfolio has a β_p^{FF} that is lower than the first by 0.008.[13] The results are consistent with Hypothesis 1, that firms that divest productive inputs in conjunction with the macroeconomy carry more systematic risk than firms that divest at other times.[14]

[13]The difference of 0.008 between the two portfolios is not statistically significant.

[14]In untabulated tests, I find that the results reported in Table 7 are similar when employing the Fama and MacBeth (1973) regression.

Table 8 provides the estimation of Equation (10) by quartile of restructuring beta, β_i^{Restr}, and the operating earnings-based alternative measure, β_i^{OI}. The results are consistent with those in Table 7, in that the level of β_p^{FF} is significantly higher for the highest portfolio of β_i^{Restr} relative to the lowest portfolio at all levels of β_i^{OI}, with the estimations for the highest portfolio β_p^{FF} being between 1.023 and 1.214, and those for the lowest portfolio being between 0.911 and 1.075. The results support the conclusion that the risk-relevant information in restructuring is not subsumed by that in operating earnings.

The out-of-sample estimations of Equation (10) by quartile of restructuring beta, β_i^{Restr}, are in Table 9.[15] The results are largely consistent with those in Table 7. The levels of the returns-based measure of systematic risk, β_p^{FF}, increase from portfolio 1 to portfolio 5. The increase is monotonic to portfolio 3, which has a slightly higher measure of β_p^{FF} relative to portfolio 4 (a difference of 0.001). Portfolios 3 and 4 have significantly higher levels of β_p^{FF} relative to the lowest portfolio. The results provide assurance that the results in Table 7 are not attributable to the overlapping estimation of β_i^{Restr} and the returns for estimating β_p^{FF}. This is additional evidence that firms with restructuring charges that increase when macroeconomic productive input investment is lower have higher systematic risk relative to those with restructuring expenses that are uncorrelated with these macroeconomic indicators.

6. Additional Analyses

6.1. Post-restructuring outcomes

To further explore the characteristics of firms with high restructuring-based measures of systematic risk, I investigate differences in post-restructuring outcomes. The tests in section 5

[15]The out-of-sample estimations require firms to have 20 or more quarters of data and five or more non-missing observations of $restr_{i,t}$.

provide evidence that firms that divest labor and capital in concert with the macroeconomy are more systematically risky. The premise is that firms reduce their productive inputs if they expect a negative demand shock. If the shock is economy-wide, it will affect a broad cross-section of firms, reducing macroeconomic employment and capital expenditure growth. Therefore, firms that reduce productive inputs when macroeconomic employment and capital expenditure growth are low are likely exposed to the aggregate demand shock. In this way, the timing of the productive input divestment reveals the nature of the firm's risk.

Systematically risky firms are exposed to aggregate demand shocks, and in expectation adjust productive inputs. If their expectations are rational, those firms should realize the effect of the aggregate demand shocks after reducing their inputs. In other words, if systematically risky firms restructure in expectation of an aggregate demand shock, then the aggregate economy should have lower outputs and inputs after the firm engages in restructuring. I test whether this is the case by determining whether firms with higher β_i^{Restr} restructure in advance of realized demand shocks. Specifically, I test whether inputs (measured by aggregate expenses) and outputs (measured by aggregate sales and GDP) are lower following restructuring by firms with higher β_i^{Restr}.

For each quartile of restructuring beta, β_i^{Restr}, I calculate the means of three aggregate characteristics, aggregate sales growth, aggregate expense growth, and GDP growth, in the year subsequent to the quarter that firms take (do not take) a restructuring charge. I use aggregate sales growth and GDP growth as proxies for aggregate output from corporations and the broader macroeconomy, and I use aggregate expense growth as a proxy for aggregate productive input growth from corporations.[16] I expect that the difference in the

[16]Studies, including Abdalla and Carabias (2022), Hann et al. (2021), and Konchitchki and Patatoukas (2014a,b), show that earnings information leads GDP growth. This test, in contrast, tests whether restructuring from only firms with high systematic risk is predictive of GDP growth.

means of the measures will increase as β_i^{Restr} increases. That is, I expect that firms with higher systematic risk demonstrate larger drops in aggregate growth following restructuring, relative to firms with lower β_i^{Restr}, as firms with higher restructuring betas are more likely to restructure in expectation of an aggregate demand shock.

I measure subsequent aggregate demand shocks via aggregate sales growth, $AGGsalesGrow_t$, aggregate expense growth, $AGGexpGrow_t$, and GDP growth, $GDPgrow_t$. Aggregate sales (expense) growth is the cross-sectional average of the four-quarter change in sales (operating expenses, excluding depreciation), divided by total assets as of the beginning of the period, weighted by the market value of firm equity at the beginning of the period. Aggregate sales (expense) growth is measured for each calendar quarter and includes all firms with calendar quarter-ends. $AGGsalesGrow_t$ ($AGGexpGrow_t$) is the time-series mean of the four quarters subsequent to quarter t. GDP growth is the percent change in the seasonally adjusted GDP from the same quarter in the prior year.[17] $GDPgrow_t$ is the time-series mean of quarterly GDP growth over the four quarters starting in the first quarter after t. If firms with higher restructuring beta, β_i^{Restr}, are more likely to take restructuring in expectation of aggregate demand shocks, then I expect that $AggSaleGrow_t$, $AGGexpGrow_t$, and $GDPgrow_t$ will be lower for years after restructuring for those firms.

Panel A of Table 10 presents the means of post-restructuring aggregate sales growth, $AGGsalesGrow_t$, aggregate expense growth, $AGGexpGrow_t$, and GDP growth, $GDPgrow_t$, by whether firms took restructuring charges and quartile of the restructuring-based measure of systematic risk, $\beta_i^{Restr}$for firms with calendar quarter-ends. The column indicating the difference between years with or without restructuring shows that, for all quintiles of β_i^{Restr}, $AGGsalesGrow_t$ and $AGGexpGrow_t$ are lower after restructuring versus otherwise. However, the differences become more negative from the lowest quintile to the

[17]GDP data are obtained from the BEA's table 1.1.5.

highest quintile of β_i^{Restr}. Specifically, the difference in $AGGsalesGrow_t$ ($AGGexpGrow_t$) changes from -0.0005 (-0.0002) in the lowest portfolio to -0.0026 (-0.0022) in the highest portfolio, and the difference in differences is statistically significant at a 10% level. The decrease is monotonic for both $AGGsalesGrow_t$ and $AGGexpGrow_t$. For GDP growth, $GDPgrow_t$, the differences are also decreasing monotonically, but the lowest two portfolios of β_i^{Restr} restructure in advance of increasing GDP growth, while the higher portfolios restructure in advance of lower GDP growth, with the difference across the four portfolios decreasing from 0.0057 to -0.0072. This provide evidence that the systematic risk information provided by β_i^{Restr} is useful for interpreting the restructuring activities of firms and their aggregate demand shock expectations.

Panel B of Table 10 presents information similar to Panel A, but uses an out-of-sample returns-based measure of systematic risk, $\beta_{i,t}^{FF}$. Specifically, $\beta_{i,t}^{FF}$ is the firm-year estimation of Equation 6 using the 60 most recent months of historical returns and the Fama-French-Carhart portfolio returns. By using $\beta_{i,t}^{FF}$ instead of β_i^{Restr}, I am addressing the concern that the estimation period of β_i^{Restr} overlaps with the realization of subsequent demand shocks. The results are consistent with Panel A, with differences in $AGGsaleGrow_t$ decreasing from -0.0010 to -0.0013, differences in $AGGexpGrow_t$ decreasing from -0.0006 to -0.0015, and differences in $GDPgrow_t$ decreasing from 0.0001 to -0.0021. Differences-in-differences of the top two or three portfolios are significant in each case, similar to Panel A. Overall, these results confirm that restructuring can be useful in developing aggregate demand shock expectations, but only when taken in context of the firm's exposure to aggregate demand shocks.

6.2. Restructuring reversals

Firms can reverse restructuring expenses. Restructuring is an accrual made in expectation of future costs, and as information regarding these costs arrives, prior estimates may need revision. Naturally, if restructuring accruals are made under more uncertain conditions, then they are more likely to be reversed.

This study's prior results suggest that restructuring may arise in expectation of either aggregate or firm-specific demand shocks, and that firms with higher restructuring betas are more likely to restructure in response to aggregate demand shocks. This distinction is important, as managers are primarily experts in their own firms, and demonstrate less knowledge about the aggregate economy (Hutton et al., 2012). Therefore, managers restructuring in response to expected aggregate shocks are operating with more uncertainty than if they were restructuring in response to firm-specific shocks.

To investigate this hypothesis, I test whether firms that restructure in response to expected aggregate shocks later reverse more of their restructuring expenses. Specifically, I test the association between β_i^{Restr} and the incidence and magnitude of restructuring reversals. I measure the incidence of restructuring reversals, μ_i^{Rev}, as the firm-level mean of the number of quarters with $restr_{i,t}$ greater than zero. I measure the magnitude of restructuring reversals, $\mu_i^{Rev\$}$, as the firm-level mean of all values of $restr_{i,t}$ that are greater than zero, multiplied by 1,000. If firms that restructure in response to an aggregate demand shock do so under higher uncertainty, then I expect a positive association between the measures of reversal and β_i^{Restr}.[18]

The results of the test are presented in Table 11. The table presents summary statistics from an OLS regression of μ_i^{Rev} and $\mu_i^{Rev\$}$ on β_i^{Restr} and controls. I include β_i^{OI}, the alter-

[18]Moehrle (2002) finds that firms use restructuring reversals opportunistically to manage earnings. My results suggest a different rationale for reversals by certain firms. In all likelihood both reasons exist.

native operating income measure of systematic risk, as a control for other information in the firm's income statement and two measures of restructuring to control for the frequency and magnitude of the firm's overall restructuring behavior. The frequency of restructuring, $restrF_i$, is the percentage of quarters for which the firm's measure of restructuring, $restr_{i,t}$, is less than zero, indicating that the firm recorded restructuring expense. The magnitude of restructuring is the firm-level mean of restructuring expense, excluding reversals, calculated as the mean of $restr_{i,t}$ conditional on it being less than or equal to zero. Column 1 (2) provides the summary statistics for the regression of μ_i^{Rev} ($\mu_i^{Rev\$}$), and in both cases the coefficient on β_i^{Restr} is positive and significant, consistent with the idea that firms that restructure in response to expected aggregate demand shocks do so with more uncertainty and therefore are more likely to reverse restructuring. Column 3 (4) presents the regression of μ_i^{Rev} ($\mu_i^{Rev\$}$) including controls. The coefficient on β_i^{Restr} remains positive and significant, indicating that the results in Columns 1 and 2 are not attributable to the firm's restructuring behavior or the information in operating earnings. Overall, the results are consistent with the conclusions that firms with higher restructuring betas restructure in expectation of aggregate demand shocks.

6.3. VIX as a measure of expected demand shock

I use macroeconomic employment and capital expenditure growth to measure expected aggregate demand shock because labor and capital are important inputs to production that have observable changes at both the firm and aggregate level. The symmetry provided by using measures of labor and capital divestment at both levels provides alignment that is intuitive and logical. However, while demand shocks likely play a substantial role in macroeconomic productive input growth, there are other factors that can affect macroeconomic employment and capital expenditure. For example, the real business cycle literature proposes that technology shocks can reduce employment by making workers redundant, although the direction and magnitude of this effect is debated (Gali, 1999). Labor supply has generally been considered to have a limited effect on macroeconomic employment, although research continues (Hall, 1979; Prescott and Wallenius, 2012).

While I do not have evidence that these factors affect my interpretation that declines in labor and capital investment are a reflection of expected negative demand shocks, I provide additional evidence to support this assertion. As an alternative measure for expected aggregate demand shocks, I use the CBOE volatility index (VIX). VIX is calculated from the 30-day implied volatilities of options traded on the S&P 500 components and provides an aggregate market expectation for volatility. It is often referred to as the "fear index," and increases in VIX are associated with aggregate demand shocks and lower subsequent growth (Foerster et al., 2014; Leduc and Liu, 2016).

I calculate an alternative restructuring beta using VIX instead of macroeconomic productive input growth. Specifically, I estimate a Tobit regression of restructuring, $restr_{i,t}$, on mean annual VIX, multiplied by -1, as of quarter t, by firm. The coefficient on VIX is β_i^{VIX}, the alternative restructuring beta. Because VIX increases with expected demand shocks, I expect VIX multiplied by -1 to be positively correlated with restructuring for firms exposed to systematic risk. Accordingly, I expect higher levels of β_i^{VIX} are associated with higher levels of systematic risk and therefore higher levels of β_p^{FF}, indicating higher systematic risk.

The results of these tests are in Table 12. The table presents the estimation of Equation (10), but using portfolios based on the alternative restructuring beta, β_i^{VIX}, instead of β_i^{Restr}. Consistent with β_i^{VIX} measuring systematic risk, the estimations of β_p^{FF} are increasing over the four portfolios. The increase is monotonic. Portfolios 4 and 5 are significantly higher than portfolio 1, consistent with β_i^{VIX} measuring systematic risk. Overall, these results reinforce the interpretation of prior results and indicate that firms that divest labor and capital through restructuring during times of expected aggregate demand shocks have higher systematic risk.

6.4. Industry restructuring-based systematic risk

While the above analyses provide consistent evidence of the risk-relevance of restructuring, one drawback is that, to determine restructuring beta, firms need to have recorded restructuring expense over the period of interest. This may limit the usefulness of β_i^{Restr} for many firms. One potential solution is to instead generate an industry-level version of β_i^{Restr}. This provides two benefits. First, the aggregation of data within an industry provides a more complete view of the time-series variation in restructuring charges. Second, the firms without restructuring expense can be included in the analysis. There is evidence that labor markets are relatively similar within industries, as are stock returns, making industry groupings a natural choice (Chan et al., 2007; Neal, 1995; Topel, 1982).

To construct the industry restructuring beta, β_{ind}^{Restr}, I calculate the quarterly mean of $restr_{i,t}$ within four-digit NAICS industries, $restr_{I,t}$. I estimate Equation (4) and Equation (5) using $restr_{I,t}$ instead of $restr_{i,t}$.[19] The sum of the normalized coefficients on macroeconomic employment growth, EMP_t, and capital expenditure growth, CAP_t, is the industry restructuring beta, β_{ind}^{Restr}. This measure is identical for all firms in the same industry.

I estimate the Fama-French-Carhart regression, Equation (10), by quartile portfolio of industry restructuring beta, β_{ind}^{Restr}. I exclude all firms for which I am able to calculate a firm-specific restructuring beta, β_i^{Restr}, to ensure that the results are not attributable only to those firms. The results are presented in Table 13. Consistent with prior results, β_p^{FF} increases monotonically across the five portfolios, with a value of 0.661 in portfolio

[19] I use OLS estimation because $restr_{I,t}$ is uncensored.

1 and a value of 1.039 in portfolio 4. Portfolios 2 through 4 have a value of β_p^{FF} that is significantly larger than portfolio 1. Overall, these findings are consistent with prior results and demonstrate the usefulness of β_i^{Restr} across a broader cross-section of firms.

7. Conclusion

This study investigates the information content of the timing of labor and physical capital flows out of a firm. Both labor and physical capital are important, but expensive, inputs to production. When firms expect a negative demand shock, they are likely to reduce these inputs until demand recovers. Demand shocks may be macroeconomic or idiosyncratic. If they are macroeconomic, the firm will be divesting labor and capital at the same time as many other firms and macroeconomic productive input growth will be low. Following this logic, this study tests whether firms that divest labor and capital when macroeconomic input investment growth is low have more exposure to macroeconomic demand shocks and therefore higher systematic risk.

To do this, I employ a specific accounting expense: restructuring. Restructuring is often excluded from measures of earnings because it is not indicative of the continuing operations of the company, that is, it is not persistent. However, this study's findings provide evidence that restructuring is a value-relevant component of earnings, specifically with regard to risk assessment. Specifically, tests demonstrate that restructuring has a systematic component that is associated with economy-wide movements in both employment and capital expenditure growth. I develop a restructuring-based measure that quantifies the degree to which a firm reduces its investment in productive inputs in conjunction with the macroeconomy. A series of tests shows that restructuring beta is positively associated with market beta, the conventional measure of systematic risk, and that the risk-relevant information in restructuring is not also present in operating earnings or other fundamental firm characteristics.

Additional tests provide further insights. Firms with higher restructuring betas are subject to lower aggregate-level performance after restructuring, consistent with these firms experiencing aggregate demand shocks. Also, an alternative measure of expected aggregate demand shock, VIX, creates similar results, consistent with labor and capital expenditure growth offering insight regarding expected aggregate demand. Finally, industry-level restructuring betas provide risk-relevant information to firms that do not engage in restructuring during the sample period.

Overall, this study aims to contribute in three ways. The first is to demonstrate how the firm's fundamental activities can provide systematic risk information. To my knowledge, this is the first study to use the timing of productive input divestment as a signal of exposure to undiversifiable macroeconomic shocks, and the results shed light on how firms that are exposed to such shocks take actions in response. Second, because this study is focused on restructuring expense, the results highlight the usefulness of transitory accruals for risk assessment. Finally, this study emphasizes the call for more quantitative mandatory disclosure regarding investments and divestments of human capital assets by demonstrating the usefulness of the limited information currently disclosed.

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A. Variable definitions

Variable	Description
$restr_{i,t}$	Firm restructuring expense over the prior four quarters, scaled by total assets as of the beginning of the four-quarter period.
$oigrow_{i,t}$	Firm operating earnings growth from the same quarter a year ago, scaled by total assets as of the beginning of the four-quarter period.
EMP_t	The percentage change in macroeconomic employment from the same quarter in the prior year, divided by 1000.
CAP_t	The percentage change in macroeconomic capital expenditure growth from the same quarter in the prior year, divided by 1000.
$AGGrestr_t$	The mean of $restr_{i,t}$ across firms by calendar quarter.
$AGGoi_t$	The mean of $oigrow_{i,t}$ across firms by calendar quarter.
$\beta_i^{RestrEmp}$	The coefficient from firm-level regressions of restructuring ($restr_{i,t}$) on macroeconomic employment growth (EMP_t).
$\beta_i^{RestrCap}$	The coefficient from firm-level regressions of restructuring ($restr_{i,t}$) on macroeconomic capital expenditure growth (CAP_t).
β_i^{Restr}	A restructuring-based measure of systematic risk, calculated as the mean of normalized $\beta_i^{RestrEmp}$ and $\beta_i^{RestrCap}$.
β_i^{OIemp}	The coefficient from firm-level regressions of operating income growth ($oigrow_{i,t}$) on macroeconomic employment growth (EMP_t).
β_i^{OIcap}	The coefficient from firm-level regressions of operating income growth ($oigrow_{i,t}$) on macroeconomic capital expenditure growth (CAP_t).
β_i^{OI}	The operating earnings-based measure of systematic risk, calculated as the mean of normalized β_i^{OIemp} and β_i^{OIcap}.
β_i^{FF}	The firm mean coefficient on the return on the market less the risk free rate in the Fama-French-Carhart four-factor regression specified in Equation (6) using rolling five-year monthly returns.
$size_i$	The firm-level time-series mean of the log of market value of equity.
mb_i	The firm-level time-series mean of the market to book ratio.
de_i	The firm-level time-series mean of the book value of firm debt divided by the market value of firm equity.
$R_{i,t} - RF_t$	Monthly firm stock return less the risk free rate.

β_p^{FF}	The coefficient on the return on the market less the risk free rate in the Fama-French-Carhart four-factor regression specified in Equation (10) for the portfolio.
β_p^{SMB}	The coefficient on the size portfolio returns in the Fama-French-Carhart four-factor regression specified in Equation (10) for the portfolio.
β_p^{HML}	The coefficient on the value portfolio returns in the Fama-French-Carhart four-factor regression specified in Equation (10) for the portfolio.
β_p^{UMD}	The coefficient on the momentum portfolio returns in the Fama-French-Carhart four-factor regression specified in Equation (10) for the portfolio.
$AGGsalesGrow_t$	The mean aggregate sales growth over the year starting the quarter after quarter t. Aggregate sales growth is the weighted cross-sectional average of the four-quarter change in firm sales divided by total assets as of the beginning of the period. Aggregate sales growth is weighted by the market value of firm equity as of the beginning of the four-quarter period and is calculated for each calendar quarter.
$AGGexpGrow_t$	The mean aggregate operating expense growth over the year starting the quarter after quarter t. Aggregate operating expense growth is the weighted cross-sectional average of the four-quarter change in firm operating expenses, excluding depreciation, divided by total assets as of the beginning of the period. Aggregate expense growth is weighted by the market value of firm equity as of the beginning of the four-quarter period and is calculated for each calendar quarter.
$GDPgrow_t$	The mean GDP growth over a four-quarter period starting the quarter after quarter t. Aggregate GDP growth is calculated quarterly as the percent change in seasonally-adjusted GDP from the same quarter in the prior year.
μ_i^{Rev}	The time-series mean by firm of the number of observations for which $restr_{i,t}$ is greater than 0, indicating a reversal of prior restructuring charges.
$\mu_i^{Rev\$}$	The time-series mean by firm of $restr_{i,t}$ conditional on it being > 0, indicating the amount of reversed prior restructuring charges, multiplied by 1000.
$restrF_i$	The percent of quarters for which $restr_{i,t}$ is less than 0.
$restr\$_i$	The mean of $restr_{i,t}$ at the firm level, conditional on $restr_{i,t} \leq 0$.

β_i^{VIX}	An alternative restructuring-based measure of systematic risk, measured as the coefficient from firm-level regressions of restructuring ($restr_{i,t}$) on aggregate uncertainty, (VIX_t multiplied by -1).
β_{ind}^{Restr}	The restructuring-based measure of systematic risk calculated as the sum of the normalized coefficients on EMP_t and CAP_t from the estimation of Equations (2) and (3) by industry using industry-level restructuring. The measure is the same for all firms in the same industry.

Table 1: Descriptive statistics for firm-year restructuring, operating income growth, macroeconomic employment growth, and macroeconomic capital expenditure growth

Variable	N	Mean	SD	25P	Med	75P
$restr_{i,t}$	202,043	-0.0040	0.0094	-0.0033	0	0
$oigrow_{i,t}$	202,043	-0.0023	0.0288	-0.0054	0.0015	0.0095
EMP_t	202,043	0.0005	0.0029	-0.0002	0.0017	0.0019
CAP_t	202,043	0.0038	0.0064	0.0010	0.0048	0.0078

Table 1: Descriptive statistics for the firm-quarter measures of restructuring, operating earnings, macroeconomic employment growth, and macroeconomic capital expenditures. Macroeconomic variables do not vary across firms for fiscal quarters ending in the same calendar quarter. The table includes observations for which all variables are present for the years 2001–2022. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%.

Table 2: Correlations for firm-year restructuring, operating income growth, macroeconomic employment growth, and macroeconomic capital expenditure growth

		$restr_{i,t}$	$oigrow_{i,t}$	EMP_t	CAP_t
1	$restr_{i,t}$		-0.05^*	0.06^*	0.05^*
2	$oigrow_{i,t}$	0.01^*		0.02^*	0.06^*
3	EMP_t	0.02^*	0.01^*		0.70^*
4	CAP_t	0.02^*	0.09^*	0.60^*	

Table 2: Bivariate correlations for the 202,043 firm-quarter observations of restructuring, operating income growth, and macroeconomic employment and capital expenditure growth. Macroeconomic variables do not vary across firms for fiscal quarters ending in the same calendar quarter. The table includes observations for which all variables are present for the years 2001–2022. Significance at the $p<0.1$ level is indicted with *. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. Pearson (Spearman) correlations are above (below) the diagonal.

Table 3: Aggregate restructuring charges and productive input growth

VARIABLES	(1) $AGGrestr_t$	(2) $AGGrestr_t$	(3) $AGGrestr_t$	(4) $AGGrestr_t$	(5) $AGGrestr_t$
EMP_t	0.211^{***}		0.218^{***}		0.141^{**}
	(3.34)		(3.57)		(2.39)
CAP_t		0.082^{***}		0.110^{***}	0.057^{**}
		(5.29)		(5.10)	(2.47)
$AGGoi_t$			-0.038	-0.099^{***}	-0.074^{**}
			(-1.19)	(-2.73)	(-2.00)
Constant	-0.004^{***}	-0.004^{***}	-0.004^{***}	-0.004^{***}	-0.004^{***}
	(-24.62)	(-22.29)	(-25.78)	(-24.91)	(-26.88)
Observations	88	88	88	88	88
R-squared	0.39	0.27	0.41	0.38	0.46

Table 3: Summary statistics from the Newey-West regressions of firm restructuring on macroeconomic employment and capital expenditure growth (Columns (1) and (2)), including operating income growth (Columns (3), (4), and (5)) for the years 2001–2022. The t-statistics are below the coefficients in parentheses. T-statistics use Newey-West standard errors with lags for four observations. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. R-squared statistics are from the equivalent OLS regressions. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Descriptive statistics for firm-level variables

	N	Mean	SD	25P	Median	75P
$\beta_i^{RestrEmp}$	3139	-0.6101	5.9114	-0.5158	0.0941	0.9103
$\beta_i^{RestrCap}$	3139	-0.0062	1.2094	-0.2559	0.0230	0.3670
β_i^{Restr}	3139	0.0000	0.9025	-0.1000	0.0690	0.2763
β_i^{OIemp}	3139	0.0407	2.9110	-0.7542	0.2345	1.2049
β_i^{OIcap}	3139	0.2743	1.1794	-0.1486	0.2250	0.7656
β_i^{OI}	3139	0.0000	0.9273	-0.2991	0.0110	0.3974
β_i^{FF}	3139	1.0765	0.4842	0.7537	1.0410	1.3569
$size_i$	3139	13.5308	1.9415	12.1457	13.4859	14.8899
mb_i	3139	2.6890	4.3994	1.2186	1.9884	3.3568
de_i	3139	1.7647	7.2645	0.1042	0.2994	0.8237

Table 4: Descriptive statistics for restructuring betas, earnings betas, and firm characteristics. All measures are time-invariant. The table includes observations for the years 2001–2022. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%.

Table 5: Pearson correlations for firm-level variables

	$\beta_i^{RestrEmp}$	$\beta_i^{RestrCap}$	β_i^{Restr}	β_i^{OIemp}	β_i^{OIcap}	β_i^{OI}
$\beta_i^{RestrCap}$	0.63*					
β_i^{Restr}	0.90*	0.90*				
β_i^{OIemp}	-0.06*	-0.13*	-0.11*			
β_i^{OIcap}	0.02	-0.03*	-0.01	0.72*		
β_i^{OI}	-0.02	-0.09*	-0.06*	0.93*	0.93*	
β_i^{FF}	0.06*	0.05*	0.06*	0.05*	0.15*	0.11*
$size_i$	0.10*	0.04*	0.08*	0.14*	0.08*	0.12*
mb_i	-0.02	-0.01	-0.02	-0.01	0.00	-0.00
de_i	0.00	-0.01	-0.00	0.03	0.01	0.02

Table 5: Bivariate correlations for the restructuring betas, earnings betas, and firm characteristics. Significance at the p<0.1 level is indicted with *. All measures are time-invariant. The table includes observations for the years 2001–2022. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%.

Table 6: Regression of the returns-based measure of systematic risk on restructuring betas and controls

	(1)	(2)	(3)
VARIABLES	β_i^{FF}	β_i^{FF}	β_i^{FF}
$\beta_i^{RestrEmp}$	0.028***		
	(3.19)		
β_i^{OIemp}	0.022**		
	(2.54)		
$\beta_i^{RestrCap}$		0.028***	
		(3.25)	
β_i^{OIcap}		0.073***	
		(8.51)	
β_i^{Restr}			0.036***
			(3.71)
β_i^{OI}			0.056***
			(6.01)
$size_i$	0.006	0.005	0.004
	(1.22)	(1.10)	(0.89)
mb_i	−0.002	−0.002	−0.001
	(−0.78)	(−0.81)	(−0.74)
de_i	0.002*	0.002*	0.002
	(1.68)	(1.68)	(1.62)
Constant	1.002***	1.011***	1.022***
	(16.05)	(16.55)	(16.54)
Observations	3,139	3,139	3,139
R-squared	0.007	0.027	0.017

Table 6: Summary statistics from the regressions of Equation (9). The t-statistics are below the coefficients in parentheses. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Estimation of returns-based systematic risk by portfolio of restructuring beta

Panel A: Labor-based restructuring beta				
Portfolio	Lowest			Highest
	(1)	(2)	(3)	(4)
VARIABLES	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.952***	0.971***,‡	1.080***,‡	1.102***,‡
	(96.35)	(140.48)	(147.71)	(112.78)
β_p^{SMB}	0.861***	0.595***	0.636***	0.895***
	(56.30)	(55.08)	(55.80)	(59.98)
β_p^{HML}	−0.102***	0.250***	0.152***	−0.100***
	(−7.50)	(26.74)	(15.31)	(−7.52)
β_p^{UMD}	−0.136***	−0.078***	−0.115***	−0.223***
	(−14.33)	(−11.29)	(−15.87)	(−24.16)
Constant	−0.001***	0.002***	0.002***	−0.001**
	(−3.76)	(7.46)	(6.01)	(−2.19)
Observations	141,697	162,682	161,290	141,442
R-squared	0.138	0.200	0.215	0.183

Panel B: Capital expenditure-based restructuring beta				
Portfolio	Lowest			Highest
	(1)	(2)	(3)	(4)
VARIABLES	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.973***	0.977***	1.057***,‡	1.104***,‡
	(102.46)	(138.73)	(144.86)	(111.09)
β_p^{SMB}	0.875***	0.587***	0.631***	0.886***
	(59.31)	(53.41)	(55.74)	(58.16)
β_p^{HML}	−0.103***	0.260***	0.169***	−0.116***
	(−7.92)	(27.11)	(17.07)	(−8.59)
β_p^{UMD}	−0.159***	−0.084***	−0.114***	−0.198***
	(−17.23)	(−12.11)	(−16.00)	(−20.84)
Constant	−0.000	0.002***	0.002***	−0.001***
	(−1.16)	(6.72)	(5.69)	(−3.69)
Observations	147,324	161,317	159,119	139,351
R-squared	0.149	0.199	0.213	0.175

Panel C: Summary restructuring beta				
Portfolio	Lowest			Highest
	(1)	(2)	(3)	(4)
VARIABLES	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.972***	0.964***	1.063***,‡	1.111***,‡
	(101.17)	(137.83)	(145.51)	(112.81)
β_p^{SMB}	0.877***	0.585***	0.627***	0.892***
	(58.74)	(53.54)	(55.28)	(59.16)
β_p^{HML}	−0.087***	0.234***	0.160***	−0.094***
	(−6.60)	(24.60)	(16.14)	(−7.01)
β_p^{UMD}	−0.137***	−0.083***	−0.125***	−0.207***
	(−14.76)	(−12.07)	(−17.38)	(−22.16)
Constant	−0.001**	0.002***	0.002***	−0.001***
	(−2.21)	(7.67)	(5.55)	(−3.32)
Observations	146,319	161,626	158,324	140,842
R-squared	0.145	0.196	0.216	0.180

Table 7: Summary statistics from the estimation of Equation (10). The t-statistics are below the coefficients in parentheses. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1. Significant positive differences in β_p^{FF} from the lowest portfolio of restructuring beta at a p<0.10 level is indicated with ‡.

Table 8: Estimation of the returns-based measure of systematic risk by portfolio of restructuring beta conditional on the earnings-based alternative measure

β_i^{Restr} portfolio	(1)	(2)	(3)	(4)
β_i^{OI} portfolio				
(1)	0.915***	0.838***	0.965***	1.024***,‡
(2)	0.911***	0.885***	0.930***	1.023***,‡
(3)	1.011***	1.027***	1.091***,‡	1.162***,‡
(4)	1.075***	1.122***,‡	1.238***,‡	1.214***,‡

Table 8: This table provides the estimates of β_p^{FF} from the estimation of Equation (10) by portfolios determined by the level of restructuring beta, β_i^{Restr}, and the level of the operating income alternative measure, β_i^{OI}. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1. Significant positive differences in β_p^{FF} from the lowest portfolio of β_i^{Restr} at a p<0.10 level are indicated with ‡.

Table 9: Estimation of returns-based systematic risk using out-of-sample returns by portfolio of restructuring beta

Portfolio of β_i^{Restr}	Lowest (1)	(2)	(3)	Highest (4)
	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.936***	0.964***	1.004***,‡	1.003***,‡
	(65.94)	(88.66)	(89.83)	(74.63)
β_p^{SMB}	0.783***	0.470***	0.459***	0.696***
	(34.31)	(26.84)	(25.52)	(32.21)
β_p^{HML}	0.053***	0.249***	0.201***	0.010
	(2.97)	(18.01)	(14.12)	(0.61)
β_p^{UMD}	−0.077***	−0.133***	−0.088***	−0.091***
	(−4.19)	(−9.45)	(−6.13)	(−5.26)
Constant	−0.002***	−0.001	0.001*	−0.001**
	(−4.42)	(−1.29)	(1.69)	(−2.20)
Observations	3,740	4,210	4,272	3,866
R-squared	0.152	0.222	0.213	0.172

Table 9: Summary statistics from the estimation of Equation (10) using returns measured after the determination of β_i^{Restr}. The t-statistics are below the coefficients in parentheses. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1. Significant positive differences in β_p^{FF} from the lowest portfolio of β_i^{EMPL} at a p<0.10 level are indicated with ‡.

Table 10: Post-restructuring aggregate sales growth, expense growth, and GDP growth, by systematic risk portfolio

Panel A: Summary restructuring betaportfolios

Restructuring quarter:		No	Yes	Difference
	β_i^{Restr} portfolio			
$AGGsalesGrow_t$	(1)	0.0171	0.0166	-0.0005
	(2)	0.0171	0.0165	-0.0007
	(3)	0.0176	0.0160	$-0.0015^{\ddagger}$
	(4)	0.0182	0.0156	$-0.0026^{\ddagger}$
$AGGexpGrow_t$	(1)	0.0118	0.0116	-0.0002
	(2)	0.0119	0.0112	$-0.0007^{\ddagger}$
	(3)	0.0123	0.0107	$-0.0016^{\ddagger}$
	(4)	0.0127	0.0704	$-0.0022^{\ddagger}$
$GDPgrow_t$	(1)	0.0403	0.0460	0.0057
	(2)	0.0420	0.0447	$0.0027^{\ddagger}$
	(3)	0.0440	0.0408	$-0.0032^{\ddagger}$
	(4)	0.0441	0.0368	$-0.0072^{\ddagger}$

Panel B: Out-of-sample returns-based systematic risk portfolios

Restructuring quarter:		No	Yes	Difference
	$\beta^{FF}_{i,t}$ portfolio			
$AGGsalesGrow_t$	(1)	0.0173	0.0164	-0.0010
	(2)	0.0174	0.0163	-0.0010
	(3)	0.0175	0.0162	$-0.0013^{\ddagger}$
	(4)	0.0175	0.0162	$-0.0013^{\ddagger}$
$AGGexpGrow_t$	(1)	0.0112	0.0113	-0.0006
	(2)	0.0112	0.0110	$-0.0011^{\ddagger}$
	(3)	0.0112	0.0110	$-0.0012^{\ddagger}$
	(4)	0.0112	0.0108	$-0.0015^{\ddagger}$
$GDPgrow_t$	(1)	0.0429	0.0430	0.0001
	(2)	0.0430	0.0428	-0.0002
	(3)	0.0431	0.0425	$-0.0006^{\ddagger}$
	(4)	0.0436	0.0416	$-0.0021^{\ddagger}$

Table 10: Means of $AGGsalesGrow_t$, $AGGexpGrow_t$, and $GDPgrow_t$ by β^{Restr}_i (Panel A) or $\beta^{FF}_{i,t}$ (Panel B) portfolio and whether the firm incurred restructuring in the fiscal year. Differences in means are presented in the rightmost column. The ‡ indicates that the difference is lower than the difference in the lowest β^{Restr}_i portfolio at a p<0.1 level of statistical significance. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%.

Table 11: Restructuring reversal and restructuring beta

VARIABLES	(1) μ_i^{Rev}	(2) $\mu_i^{Rev\$}$	(3) μ_i^{Rev}	(4) $\mu_i^{Rev\$}$
β_i^{Restr}	0.004***	0.002***	0.003***	0.002***
	(4.46)	(3.77)	(3.27)	(2.90)
β_i^{OI}			−0.000	0.000
			(−0.20)	(0.25)
$restrF_i$			0.009***	−0.004*
			(2.58)	(−1.84)
$restr\$_i$			−1.728***	−1.765***
			(−8.31)	(−13.56)
Constant	0.024***	0.013***	0.013***	0.007***
	(30.28)	(25.47)	(8.67)	(7.63)
Observations	3,139	3,139	3,139	3,139
R-squared	0.006	0.005	0.052	0.075

Table 11: The summary statistics from the regression of the measures of restructuring expense reversal, μ_i^{Rev} and $\mu_i^{Rev\$}$, on restructuring beta, β_i^{Restr}, and controls. The t-statistics are below the coefficients in parentheses. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1.

Table 12: Aggregate uncertainty and the timing of restructuring charges

Portfolio of β_i^{VIX}	Lowest (1)	(2)	(3)	Highest (4)
	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.967***	0.982***	1.057***,‡	1.100***,‡
	(99.37)	(138.54)	(145.01)	(113.75)
β_p^{SMB}	0.866***	0.624***	0.613***	0.874***
	(57.19)	(56.59)	(54.14)	(58.89)
β_p^{HML}	−0.080***	0.199***	0.211***	−0.120***
	(−5.98)	(20.68)	(21.33)	(−9.17)
β_p^{UMD}	−0.137***	−0.094***	−0.111***	−0.214***
	(−14.38)	(−13.49)	(−15.48)	(−23.19)
Constant	−0.002***	0.002***	0.002***	−0.000
	(−4.26)	(6.76)	(5.90)	(−0.76)
Observations	143,307	162,701	158,785	142,318
R-squared	0.142	0.199	0.214	0.180

Table 12: The summary statistics from the estimation of Equation (10) using the alternative restructuring beta, β_i^{VIX}. The t-statistics are below the coefficients in parentheses. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1. Significant negative differences in β^{FF} from the lowest portfolio of β_i^{VIX} at a p<0.10 level are indicated with ‡.

Table 13: Estimation of the returns-based measure of systematic risk by portfolio of industry restructuring beta

Portfolio	Lowest			Highest
of β_{ind}^{Restr}	(1)	(2)	(3)	(4)
	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.661***	0.901***,‡	1.004***,‡	1.039***,‡
	(102.93)	(82.12)	(84.66)	(77.43)
β_p^{SMB}	0.533***	0.954***	0.870***	0.908***
	(55.44)	(55.83)	(49.02)	(48.20)
β_p^{HML}	0.402***	−0.219***	−0.223***	−0.398***
	(49.75)	(−16.28)	(−15.65)	(−24.66)
β_p^{UMD}	−0.092***	−0.092***	−0.275***	−0.349***
	(−15.11)	(−8.32)	(−24.01)	(−28.81)
Constant	0.001***	−0.007***	−0.004***	−0.002***
	(2.89)	(−16.04)	(−8.46)	(−3.12)
Observations	200,011	157,703	123,917	119,182
R-squared	0.126	0.097	0.138	0.146

Table 13: Summary statistics from the estimation of Equation (10) using industry restructuring beta, β_{ind}^{Restr}. Observations with restructuring during the sample period are excluded from the sample. The t-statistics are below the coefficients in parentheses. The variable definitions appear in Appendix A. All continuous variables are winsorized at 1% and 99%. The statistical significance of coefficients is indicated as: *** p<0.01, ** p<0.05, * p<0.1. Significant positive differences in β^{FF} from the lowest portfolio of β_{ind}^{Restr} at a p<0.10 level are indicated with ‡.