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Operational risk and equity prices

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ABSTRACT

We use an empirical model to categorize firms into portfolios based on operational risk. Using these portfolios, we show that a strategy of buying firms in the highest decile of operational risk and shorting firms in the lowest decile of operational risk earned a positive but insignificant risk-adjusted average return of 0.72% per month from 1990 to 2000. However, from 2001 to 2010, the same strategy earned a significantly negative risk-adjusted average return of −1.50% per month. This change occurred during a time characterized by an increasing number of high profile operational losses and regulatory changes surrounding operational risk.

1. Introduction

Operational risk has traditionally been considered a relatively small risk for businesses. However, the number and magnitude of operational losses over the past decade has brought increased media and regulatory attention to operational risk. Given the broad range of events encompassed by operational risk and the magnitude of operational losses that firms have begun to face, it is important for managers and investors to understand if there is a link between operational risk and stock returns.[1] Therefore, in this paper, we investigate the relationship between operational risk and stock returns.

If operational risk is incorporated into stock prices, one might expect investors to earn high returns for holding stocks of companies with high operational risk. However, it may be the case that operational risk has negative implications for firm value, which would cause a negative relationship between operational risk and stock returns. It is also possible that the relationship between operational risk and stock returns changed in 2001, as a large number of high profile operational

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[1] The BCBS defines seven types of operational losses. These definitions are presented in Appendix A.

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losses, such as those involving Enron, WorldCom, and Tyco, took place around this time. These large losses demonstrated the degree with which operational risk can negatively influence firm value and how operational risk may be related to lax internal controls. Regulatory changes, such as the Basel II Accord and the Sarbanes–Oxley Act, demonstrated that operational risk was becoming an important issue that required regulatory attention. Thus, during this time, large losses enhanced the visibility of operational risk for regulators, the media, and likely investors as well. This increased attention, along with the negative implications that operational risk has for firm value, may have caused the market to react to the harm that could result from operational risk or to the negative characteristics that are often associated with operational risk.

To examine the relationship between operational risk and stock returns, we follow the literature on distress risk pricing and use an intensity-based approach. To estimate operational risk intensities, we use a model similar to that of Chernobai et al. (2011), who use a Poisson model to estimate the expected number of operational risk events that financial firms experience in a month. They find that a number of firm-specific and macroeconomic covariates are significantly determinants of operational risk. Our Poisson model incorporates many of these same covariates. However, rather than focusing on financial firms only, we extend the literature by examining operational risk for both financial and non-financial firms.

To determine how operational risk is related to future stock returns, we estimate our model at the beginning of each year from 1990 through 2010 using only data that was available to the public at the time of the estimation. We then use the model coefficients to obtain fitted values for each firm, and we use the last fitted value for each firm in the last year of the estimation period as a proxy for that firm's operational risk intensity for the upcoming year. We use these intensities to sort firms into 10 portfolios based on their estimated operational risk intensities. Finally, we compute the average return investors would obtain from investing in a portfolio that buys firms in the highest operational risk decile and sells firms in the lowest operational risk decile. We refer to this portfolio as the long-short portfolio.

When we examine the stock returns obtained by the long-short portfolio from 1990 to 2010, we find that there is no significant relationship between operational risk and stock returns. However, when we separate our sample into two subperiods, 1990 to 2000 and 2001 to 2010, we find that there was a dramatic change in the relationship between operational risk and stock returns in the second subperiod. From 1990 to 2000, the long-short portfolio earned a significantly positive average return of 1.03% per month, indicating that investors were rewarded for bearing operational risk. The risk-adjusted return for the long-short portfolio during this time period is 0.72%, although it is insignificant with a p-value of approximately 0.06. From 2001 to 2010, however, we find that the long-short portfolio earns a significant average monthly return of −1.69% and a significant four factor alpha of −1.50% per month. Thus, our evidence shows that the relationship between operational risk and stock returns experienced a negative shift in the 2001 to 2010 time period. We find that this shift occurs for both financial firms and non-financial firms. In addition, the results hold for large firms and are robust to controlling for financial distress, idiosyncratic volatility, and liquidity risk.

2. Data and operational risk model

Chernobai et al. (2011) employ a Poisson model using monthly data to estimate the arrival intensity of operational risk events. This type of intensity based methodology is often used in the financial distress risk literature to forecast bankruptcy and default (see Shumway, 2001; Chava et al., 2004; Campbell et al., 2008; Duffie et al., 2007). Given the widespread use of intensity based methods for corporate bankruptcy and default prediction, applying similar intensity based methods to operational risk is a natural carryover. We use a Poisson model with monthly data to estimate operational risk intensities. We use the following model for arrival intensities:

$$\lambda_{ijt} = \exp(\alpha_j + \beta' X_{it} + \gamma' Y_t + \delta J_t) \tag{1}$$

where λ_{ijt} is the operational risk intensity for firm i in industry j during month t In the model, α_j is an industry fixed effect, X_{it} is a matrix of firm specific covariates, Y_t is a matrix of macroeconomic covariates, and J_t is a dummy variable for the month of January. We include a January dummy because,