



Cyclicity in catastrophic and operational risk measurements

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Abstract

Using equity returns for financial institutions we estimate both catastrophic and operational risk measures over the period 1973–2003. We find evidence of cyclical components in both the catastrophic and operational risk measures obtained from the generalized Pareto distribution and the skewed generalized error distribution. Our new, comprehensive approach to measuring operational risk shows that approximately 18% of financial institutions' returns represent compensation for operational risk. However, depository institutions are exposed to operational risk levels that average 39% of the overall equity risk premium. Moreover, operational risk events are more likely to be the cause of large unexpected catastrophic losses, although when they occur, the losses are smaller than those resulting from a combination of market risk, credit risk or other risk events.

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0. Introduction

A natural point of departure for all elements of business risk measurement is the past. Future trends and current metrics are often extrapolated from an historical data series. However, this process is fundamentally flawed if there are cyclical factors that impact business measures of risk or performance. Historical data on operational risk gathered during an economic expansion may not be relevant for a period of recession. Estimates of default risk and recovery rates incorporate cyclical components that are correlated to systematic risk factors, such as macroeconomic fluctuations and regulatory shifts. All too frequently, however, researchers and practitioners alike ignore these cyclical factors and blithely extend an unadjusted trend line into the future. The metrics obtained using this methodology are fundamentally flawed. By aggregating across different macroeconomic regimes, these historical estimates do not accurately reflect either time period. It is the goal of this paper to demonstrate the importance of developing models to adjust for systematic and cyclical risk factors in business metrics.

Neglect of cyclical components in business and risk measurement is not the result of an oversight. Indeed, currently one of the major impediments to the adoption of the BIS New Capital Accord for international bank regulations is the proposal's neglect of cyclical factors.² Concerns focus on the procyclical nature of credit risk. That is, if there are systemic cyclicalities in bank risk exposures, for example, then aggregate bank capital requirements that are based on risk measurements with significant cyclical components may experience cyclical swings that may have unintended, adverse impacts on the macroeconomy. For example, if credit risk models overstate (understate) default risk in bad (good) times, then internal bank capital requirements will be set too high (low) in bad (good) times, thereby forcing capital-constrained banks to retrench on lending during recessions and expand lending during booms. Since most banks are subject to the same cyclical fluctuations, the overall macroeconomic effect of capital regulations is to exacerbate business cycles, thereby worsening recessions and overheating expanding economies – that is, the risk-adjusted capital requirements proposed by the BIS Basel Committee on Banking Supervision are procyclical.³

Academic and business researchers acknowledge the importance of cyclical factors in business measures of risk and performance. [Allen and Saunders \(2004\)](#) survey the state of the literature on adjusting risk measures for macroeconomic factors. [Lowe \(2002\)](#) suggests that a business cycle view would result in recessions following expansions and vice versa in a pattern similar to a sine wave. However, the poor track record of economic forecasting might cast doubts on such a simple specification of cyclical effects. [Lowe \(2002\)](#) acknowledges the difficulties in incorporating more complex cyclical models. Most risk measurement models, therefore, assume that key parameters are independent of macroeconomic factors.

This paper tests and rejects that hypothesis. We explicitly test whether cyclical risk factors are incorporated into measures of operational risk and catastrophic risk exposures in

² For description of the BIS proposals, see BIS (January 2001, March 2001, September 2001, March 2002).

³ Of course, prudential supervision could be used to mitigate these systemic factors, as in the case of “ring-fencing,” which is the supervisory process of “protecting a bank from adverse impact of events occurring in the wider corporate group, especially those engaging in unsupervised activities.” BIS (March 2002, p. 51).

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