

PREDICTING BUSINESS INTERRUPTION LOSSES FROM NATURAL DISASTERS: LESSONS FROM HURRICANE KATRINA

Research Proposal for Ackoff Doctoral Student Fellowship

Nitin Bakshi, OPIM Department, Wharton School
Under supervision of Professors P. Kleindorfer and H. Kunreuther

October 5, 2007

DESCRIPTIVE SUMMARY: Our goal is to come up with an empirical model for predicting the severity of supply chain disruption caused by natural disasters such as Hurricane Katrina. An estimate of the severity of disruption can be obtained by capturing both direct and indirect losses incurred due to interruption of regular business activity. Such a model will be of use in determining appropriate mitigation strategies to reduce the frequency and severity of losses. It will help in classification of supply chains on the dimension of 'resilience', or ability to bounce back from disruptions. Such a predictive model could also be valuable in determining the premium to be charged to firms seeking various forms of insurance against business interruption losses.

Our hypothesis is that certain characteristics of the supply chains and markets in which a firm operates will determine, in large measure, the impact of a major disaster like Hurricane Katrina. These characteristics may include disaster preparedness and crisis management systems in place, supplier-switching costs, interconnectedness, competition in the market for the final product, financial health of the firm, and historical trends in sales and profitability. What follows are a series of dependent and independent variables that could be used in an empirical analysis to determine precursors of business interruption losses. Based on these, a set of hypotheses are stated to illustrate the scope and import of the data analysis that could be undertaken with appropriate data.

To calibrate our model we have approached the Insurance Industry for data pertaining to business interruption losses incurred on account of Hurricane Katrina, and already met with some success on this front. We plan to continue to seek data from other insurers.

OUTLINE OF REGRESSION MODEL

DEPENDENT VARIABLE

Severity of Disruption caused by Hurricane Katrina

Suggested proxy:

- Breakup of direct and indirect losses from a disruption as determined by the insurance claims filed.
- Duration of disruption of normal business activity.

Alternate

Stock market reaction (short and long term)

Hypothesis 1: The stock market reaction to a disruption may be negative in the short run, but the long-run impact on the shareholder value of firms which manage the recovery phase well, is favorable.

INDEPENDENT VARIABLES AND CORRESPONDING HYPOTHESES

1. Switching Cost

Suggested proxy: Use cost structure and information on supplier base to estimate vulnerability of relationships on supply side.

Hypothesis 2: Firms with higher supplier switching cost will experience greater severity of disruption.

2. Competition in Output Market

Suggested proxy: Herfindahl-Hirschman Index (HHI index).

Hypothesis 3: Firms with greater competition in the output market will experience greater severity of disruption.

3. Nature/Quality of Operations

Suggested proxy: Industry sector.

Hypothesis 4: Firms with JIT/leaner operations will experience greater severity of disruption.

4. Interconnectedness

Suggested proxy: (Modified) Relatedness Index used by Fan and Lang (2000).

Hypothesis 5: Firms with higher degree of interconnectedness will experience greater severity of disruption.

5. Supply Chain Visibility

Suggested proxy: ERP/IT systems in place.

Hypothesis 6: Better supply chain visibility leads to shorter recovery time from disruptions. Overall, it leads to a lower severity of disruption.

6. Financial Health

Suggested proxy: Credit Rating.

Hypothesis 7: Firms with better financial health and liquidity experience lower severity of disruption.

7. Geographical Spread of market

Suggested proxy: Measure of geographical diversification of market.

Hypothesis 8: For a given disruptive event, firms with greater geographical diversification experience lower severity of disruption.

8. Degree of Unbundling of Supply Chain

Suggested proxy: Degree of Outsourcing (essentially the ratio of sales to property plant and equipment).

Hypothesis 9: Firms with greater dependence on non-local outsourcing will experience a lower severity of disruption.

9. Size of firm

Suggested proxy: Revenues, number of employees.

Hypothesis 10: Smaller firms experience greater severity of disruption.

10. Organizational Factors

Suggested proxy: Training of employees; existence of DRP/BCP, ISO standards; EHS (Environment, Health and Safety) performance.

Hypothesis 11: Firms with better disaster preparedness measures in place will experience lower severity of disruption.

11. Previous disaster experience

Suggested proxy: Yes/No variable.

Hypothesis 12: Firms that have previous experiences with managing a disaster will experience lower severity of disruptions.

THESIS ADVISOR:

Noah Gans

