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FINANCE, INVESTMENT & RISK MANAGEMENT CONFERENCE

15-17 JUNE 2008
HILTON DEANSGATE, MANCHESTER

"Catastrophe Risk Financing Under Changes in Hurricane Activity"

&

"Current Research at Manchester Accounting and Finance Group"

Andreas Milidonis, Ph.D.

Lecturer in Finance
Manchester Accounting and Finance Group (MAFG)
Centre for the Analysis of Investment Risk (CAIR)
Manchester Business School (MBS)
The University of Manchester

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1. Catastrophe Risk – Motivation

- Tax-disadvantages of Equity Financing vs. Debt Financing (for Insurers).
- Tax Cost: increases insurance prices, decreases quantity of insurance demanded and eventually requires Federal subsidies.
- A Partial Solution would be to establish:

  Tax-Deferred Pre-Event Catastrophe Loss Reserves.
- Such reserves defer (remove) Tax-Cost of Equity Financing.
- Removal of this tax cost is expected to lower Insurance prices for Catastrophe coverage

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1. Catastrophe Risk – Research Questions

Given data for the Florida Catastrophe Insurance market:

1. What would be the decrease in the price of catastrophe insurance if the Tax-Cost of Equity Financing would be deferred?
2. What would be the corresponding increase in the Quantity of Homeowners' Insurance demanded?
3. What would be the net effect to the Federal Government?

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1. Catastrophe Risk – Stylised Insurance Model

T	T+1
Collect (P+K)	Claims paid out
	Taxes Paid out
	Residuals to Equity-Holders

Variables taken into account :

- P = Premiums
- K = Capital (Equity Financing)
- λ = Layer of Insurance
- α = Attachment point
- r = Required rate of return
- L = Cat. Loss random variable.
- τ = Corporate Tax
- B = Tax shield
- Π = Payoff
- f(L) = PDF of Cat Risk
- Γ = Insolvency Prob.

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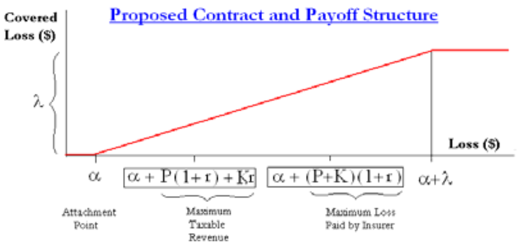
1. Catastrophe Risk – Theoretical Model



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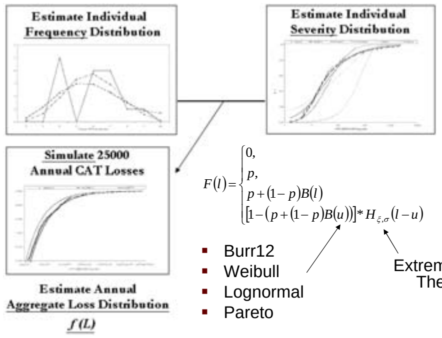
1. Catastrophe Risk – Methodology

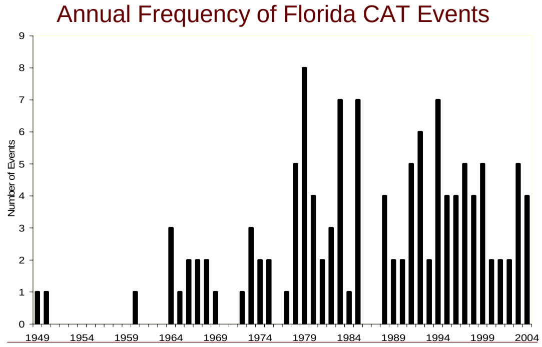


$$F(l)=\begin{cases}0, & l<0\\ p, & l=0\\ p+(1-p)B(l) & 0\le l<u\\ \left[1-\left(p+(1-p)B(u)\right)\right]*H_{\xi,\sigma}(l-u) & l\ge u\end{cases}$$

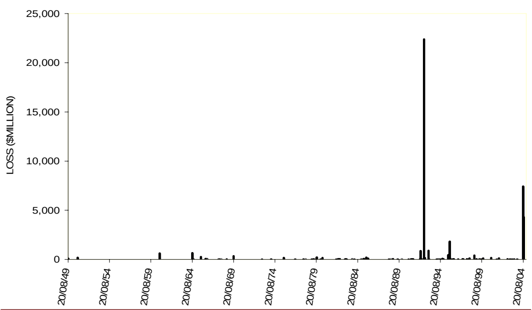
- Burr12
- Weibull
- Lognormal
- Pareto

Extreme Value Theory

1. Catastrophe Risk – Data
Annual Frequency of Florida CAT Events



1. Catastrophe Risk – Data
Individual CAT Event Severity (1949-2004)



1. Catastrophe Risk – Results
Annual Aggregate Catastrophe Loss Distributions

Descriptive Statistics	Estimated Distribution based on 1949-2004 data	Estimated Distribution based on 1990-2004 data
Probability of loss = $ 0.00 billion	32.18%	1.90%
Probability of loss > $ 0.25 billion	19.56%	55.95%
Probability of loss > $ 0.5 billion	11.61%	42.73%
Probability of loss > $ 1 billion	6.33%	31.81%
Probability of loss > $ 2 billion	3.22%	23.39%
Probability of loss > $ 5 billion	1.26%	15.47%
Probability of loss > $ 10 billion	0.62%	11.29%
Probability of loss > $ 20 billion	0.30%	8.23%
Probability of loss > $ 50 billion	0.12%	5.42%
Probability of loss > $100 billion	0.06%	3.99%
Probability of loss > $200 billion	0.03%	2.91%

1. Catastrophe Risk – Results (Florida specific)

1. The expected decrease in the price of catastrophe insurance equals the *loading* of "Tax-Cost of Equity Financing":
   - About 44% for a contract of $0-100Billion (1990-2004 distribution)
   - About 323% for a contract of $0-100Billion (1949-2004 distribution)
2. The corresponding increase in the Quantity of Homeowners' Insurance demanded:
   - About 50% using the 1990-2004 distr.
   - About 70% using the 1949-2004 distr.
3. What would be the net effect to the Federal Government?
   - Expected Tax Income would decrease.
   - Expected Disaster Assistance would decrease.
   - Net effect depends on assumptions. An overall gain is expected.

Author's Contact Information

Paper forthcoming in the *ASTIN Bulletin* (2008).

Download Extended Working Paper from:
http://ssrn.com/author=601775

Contact Author: **Andreas Milidonis, PhD**
Lecturer in Finance
Accounting & Finance Division
Manchester Business School

Email: Andreas.Milidonis@mbs.ac.uk
Web: http://www.personal.mbs.ac.uk/amilidonis

2. Current Research At Manchester Accounting and Finance Group (MAFG)

- MAFG research rated world-class.
- Research in Accounting and Finance received highest possible rating in the 1992, 1996 and 2001 Research Assessment Exercises.
- Top Accounting Department in Europe (Chan, Chen & Cheng, 2006)
- Centre for the Analysis of Investment Risk (CAIR)
  - An externally-funded research centre located in the MAFG
- Enterprise Risk Management Institute International (ERMII)
  - A non-profit Research & Educational organization initiated by an international group of universities (Manchester among them) and professional organizations (Casualty Actuarial Society, Institute of Actuaries of Australia).

2. Accounting Group: Research Profile and Achievements

- Research Profile:
  - Market Based Accounting Research
  - Auditing and Accountability
  - Business and Public Policy
  - Management Accounting
  - Public Sector Accounting and Accountability
- Achievements:
  - Publications in top Accounting Journals.
  - Significant Research Grant Income
  - Professor Martin Walker: British Accounting Association Distinguished Academic.

2. Finance Group: Research Profile and Achievements

- Research Profile:
  - Asset pricing
  - Derivatives, Interest Rates and Real Options
  - Financial Econometrics
  - Credit Risk Modelling
  - Corporate Finance and Governance
  - Insurance and Risk Management
- Achievements:
  - Publications in top Finance Journals
  - Significant Research Grant Income

2. Centre for the Analysis of Investment Risk (CAIR)

- An externally-funded research centre located in the MAFG
- Launched in the summer of 2005.
- Current Co-Directors:
  - Prof. Michael Bowe & Prof. Massimo Guidolin
- CAIR's mission is to incorporate:
  - Research on traditional capital markets analysing the determination and measurement of investment risk premium
  - Risk assessment and management of issues relating to internal and external financial accountability
  - Work on corporate governance (including auditing, corporate financial reporting and financial communication)
  - Analysis of investment risk arising from the quality of accounting information

2. Enterprise Risk Management Institute International (ERMII)

- A non-profit Research & Educational organization initiated by an international group of universities (Manchester among them) and professional organizations.
- Objectives:
  - To promote multi-disciplinary, international, research in the emerging discipline of **Enterprise-wide Risk Management** .
  - To develop international standards for Quantitative Risk Managers in major economic sectors (banking, insurance, investment, energy and other utilities, and non-financial industries).
- Founding Members:
  - Universities in the USA (Carnegie, Columbia, Georgia State, North Carolina State, Illinois Urbana-Champaign), Canada (Waterloo), EU (Heriot-Watt, Manchester, I.S.F.A) and Australia (New South Wales).
  - Professional Organizations (Casualty Actuarial Society, Institute of Actuaries of Australia).

References

- Kam C. Chan, C. Chen, and L. Cheng (2006). A ranking of accounting research output in the European region, *Accounting and Business Research*, Volume 36, No. 1, 3-17.

Websites:

- MBS: www.mbs.ac.uk
- MAFG: www.mbs.ac.uk/research/accountingfinance
- CAIR: www.mbs.ac.uk/research/analysisinvestment/
- ERMII: www.ermii.org
- ERM Symposium: www.ermsymposium.org