SYSTEMIC RISK AND PROFESSIONAL LIABILITY

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Systemic Risk and Professional Liability

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Objectives

- Define systemic risk
- Discuss potential impact of systemic risk on Professional Liability
- Present a new tool that can be used to model two specific systemic risks
- Discuss history of systemic risk in Professional Liability lines
  - Underwriting cycle
  - D&O exposure in financial crises

Systemic Risk

- Risk to an entire system or sector
  - Conceived as a risk involving financial institutions, but other systems, such as the electric grid, can also suffer systemic risk
  - Wang (2010). Under this definition, the underwriting cycle in property and casualty insurance is an example of systemic risk.
  - Hiemestra focuses more on financial institutions and their role in the financial crisis, defines systemic risk as “the probability that a large number of firms, especially financial firms, could fail during a given time period”. (ERMII May 2010 Systemic Risk Workshop)
  - Risk that spills over into and has a significant effect the general economy

Does Insurance Present Systemic Risk Weiss List of Systemic Risk Factors

- Size: A very large company may pose a systemic risk if its bankruptcy can have a significant impact on the economy, i.e., it is “too big to fail”.
- Substitutability: If one product or company can substitute for another (i.e., catastrophe bonds for catastrophe reinsurance) there is substitutability. The absence of substitutability can be an indicator of systemic risk
- Interconnectedness or contagion occurs when a stress to one company causes a domino effect on other companies that share components of each others liabilities.
  - The LMX London reinsurance spiral where the same loss to a primary insurer cycled through many reinsurers because each had a share is an example.
- Concentration occurs when one or a few companies control a large percentage of an important product.
  - It can also involve geographic or type of product concentration.
  - When a large percentage of mortgages and mortgage derived securities were concentrated in the subprime sector, the entire financial system became vulnerable to a failure of this product.

Weiss List of Systemic Factors

- Liquidity - the availability a market in a security even in a distress situation.
  - A problem with the financial crisis is illiquidity of mortgages and derivatives
- Infrastructure: The financial institution or sector is a critical component of the functioning of the larger economy.
- Leverage: In finance refers to the asset to capital ratio. In property and casualty insurance it often refers to the liability to capital ratio.
  - The use of leverage multiplies the impact of declines in assets or increases in liabilities.
  - The higher the leverage the higher the risk.

Weiss Conclusions about Systemic Risk

- Weiss concluded that the insurance industry is not a generator of systemic risk.
  - No one insurance company that is large enough to cause a crisis
  - Insurance has relatively low barriers to entry and other products can substitute for insurance
  - Insurance companies are not extremely interconnected to other parts of the economy
  - Insurance companies do not show significant concentration
  - Relatively modest leverage compared to banks

Insurance and Systemic Risk

- Weiss believes insurers are vulnerable as recipients of systemic risk
  - In asset portfolios
  - For life insurers, some of their products, can (and did) suffer significant declines in a financial crisis

Modeling Systemic Risk

- JRMS survey identified the following two emerging systemic risk issues
  - Risk of severe inflation/hyperinflation
  - Risk of severe deflation/depression
- Using these inputs NAAC (North American Actuarial Council) funded a severe inflation/deflation research project

Paper Completed in 2011

- The Effect of Deflation or High Inflation on the Insurance Industry-
  - **Kevin C. Ahlgrim, ASA, MAAA, Ph.D.**
  - **Stephen P. D'Arcy, FCAS, MAAA, Ph.D.**

- http://www.casact.org/research/NAACCRG/

The Web Site With Paper and Model


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RESEARCH PROJECTS IN FINANCE

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THE EFFECT OF DEFLATION OR HIGH INFLATION ON THE INSURANCE INDUSTRY

The North American Actuarial Council Collaborative Research Group (NAAC CRG) is pleased to make available a research report examining issues in measuring inflation, the effect of inflation or deflation on the insurance industry, and risk mitigation strategies. Also included is a model that can be used to develop inflation/deflation projections under a regime switching approach. The report was authored by Kevin Ahlgrim and Stephen D'Arcy.

The report, model, and model user guide can be accessed below:

- The Effect of Deflation or High Inflation on the Insurance Industry Final Report
- Model (Excel 2003) (.xls)
- Model (Excel 2010) (.xlsm)
- Model User Guide
- Original RFP

Topics in Paper

- Provides some background on inflation.
- Reviews historical inflation rates.
- Examines the effect of inflation or deflation on the property-liability and life insurance industries.
- Proposes risk mitigation strategies for insurers to cope with either deflation or high inflation rates.
- Describes a publicly available model that can be used to develop inflation/deflation projections under a regime switching format that can readily be adjusted to reflect current financial uncertainty.

The Model

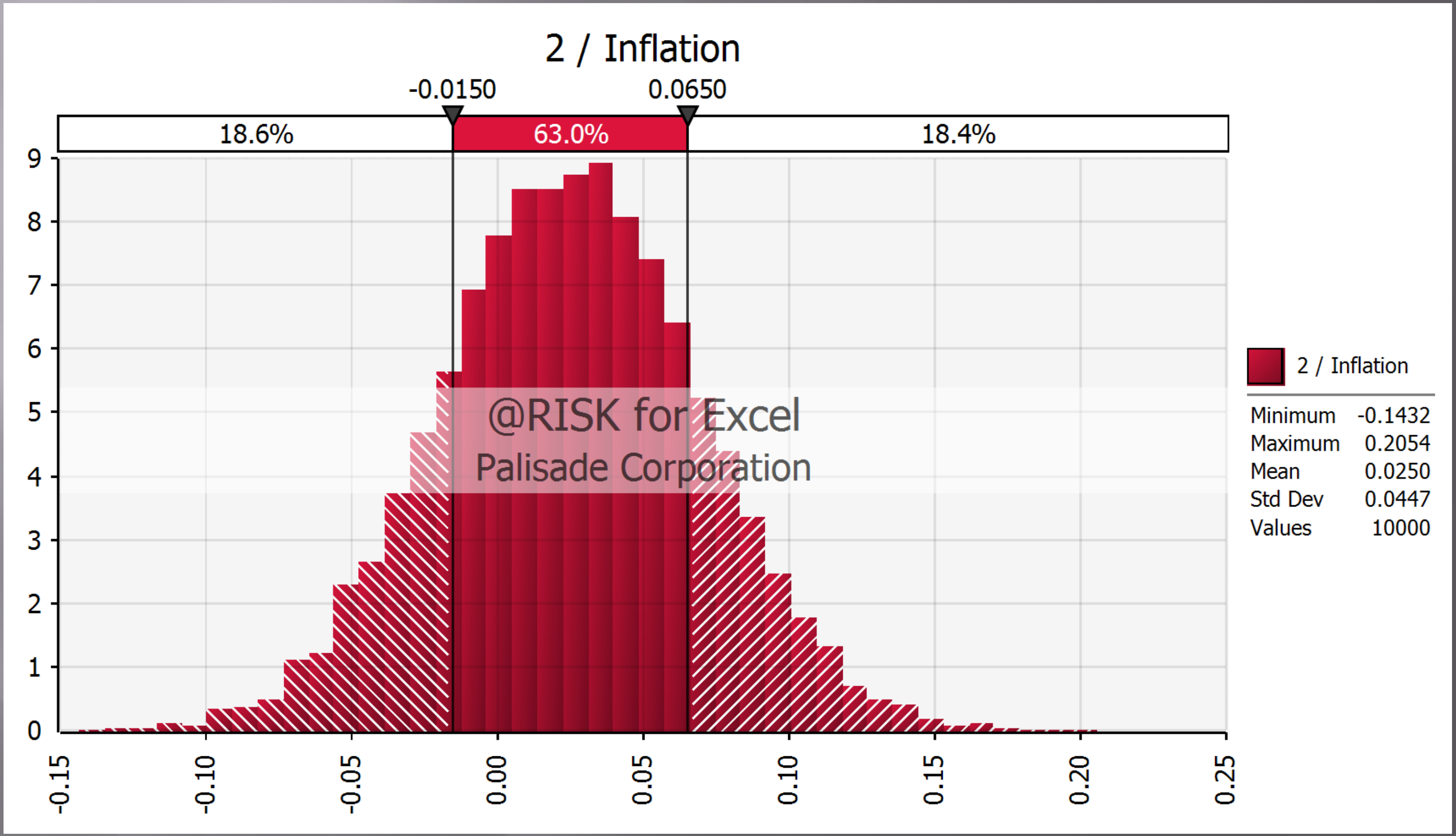
- Comes with a manual
- Manual describes the model
- Mean reverting process

$$dq_t = k(\theta - q_t)dt \quad + \sigma dB_t$$

Parameters

Variable	***Value***
k	1.0
θ	3.00%
σ	4.00%
Initial inflation	1.00%

Models Inflation over Multiple Years



Volatility Parameter

Projection Year	Std. Dev. of Inflation ($k = 1.0$)	Std. Dev. of Inflation ($k = 0.5$)	Std. Dev. of Inflation ($k = 0.1$)
1	4.00%	4.00%	4.00%
2	4.00	4.47	5.38
3	4.00	4.58	6.28
4	4.00	4.61	6.93
5	4.00	4.62	7.41
6	4.00	4.62	7.77
7	4.00	4.62	8.06
8	4.00	4.62	8.28
9	4.00	4.62	8.46
10	4.00	4.62	8.60
⋮	⋮	⋮	⋮

Regime Switching

- How did we model a change in inflationary regimes?
  - From stable or moderate inflation to high inflation or hyperinflation
  - From stable or moderate inflation to deflation or depression

Model Uses 3 Regimes

		Normal	High	Deflation
Now	Normal	90.0%	7.5%	2.5%
	High	11.0%	88.0%	1.0%
	Deflation	5.0%	5.0%	90.0%

Now Lets Demonstrate the Model

- We switch to Excel Model and show how it is used

Deflation

- Example Japan in 1990s
- U.S. in 1930s

Inflation

- Examples:
- High Inflation – U.S. in the 1970s
- Hyperinflation
  - Inflation rate > 100%
  - Argentina
  - Brazil

Effect of Deflation on Insurance

- Profitability was mixed during 1930s depression
- Premium goes down
- Investment returns low

Effect of Severe Inflation on Insurance

- Underwriting profit margin and insurance investment returns were negatively correlated with the inflation rate during the period 1951-1976.
- Inflation and the underwriting profit margin were not significantly correlated over period 1977-2006
- Investment returns and the year-to-year change in underwriting profit margin were both significantly negatively correlated with inflation over that period.
- Lowe and Warren (2010) describe the negative impact of inflation on property-liability insurers' claim costs, loss reserves and asset portfolios.
  - Actuaries may be slow to react to changes in inflation rate

Effect of Severe Inflation on Insurance (2)

- May experience adverse loss development
- Insurance investment returns were significantly negatively correlated with inflation during the period 1933-1981 and 1977-2006
- In addition, stock returns were significantly negatively correlated with inflation during the period 1933-1981 although not during the period 1977-2006
- What is impact of investment returns below insurance inflation rate?

Measures of Inflation

- CPI
- Rating Bureau
- Company Specific data
- Alternative measures – John Williams

CPI Inflation

- From **Ahlgrim, D'Arcy paper**
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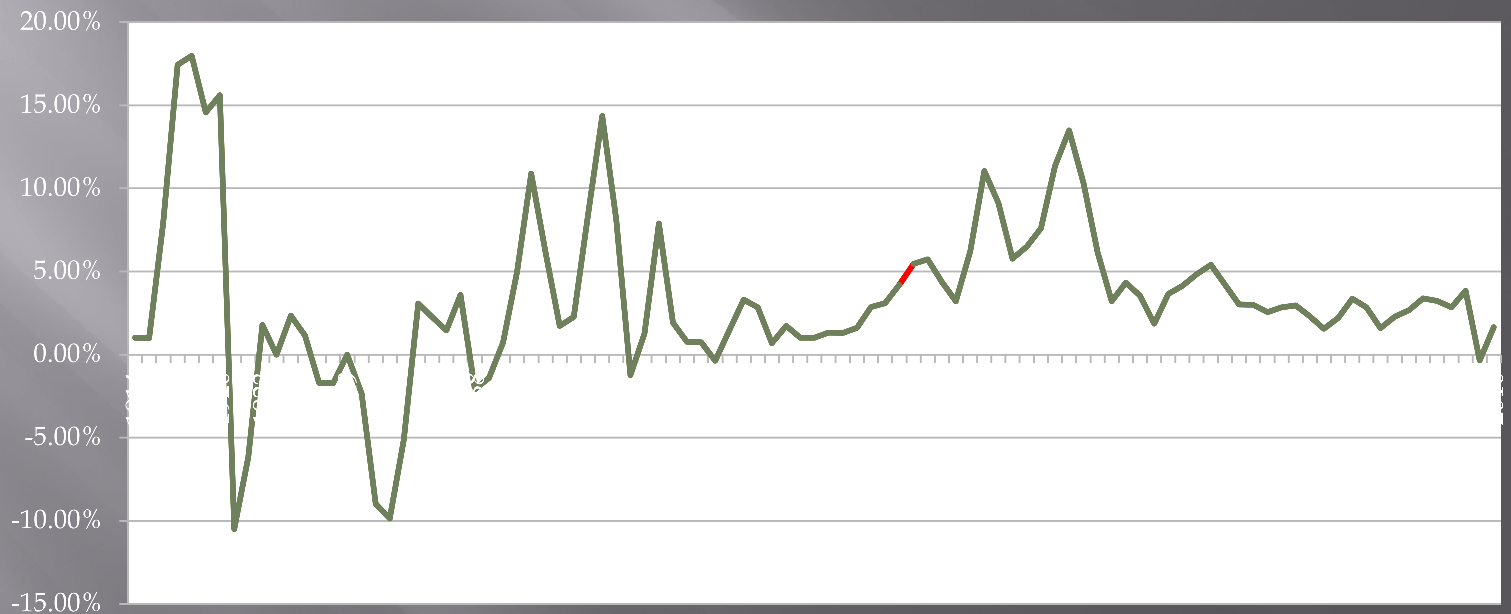
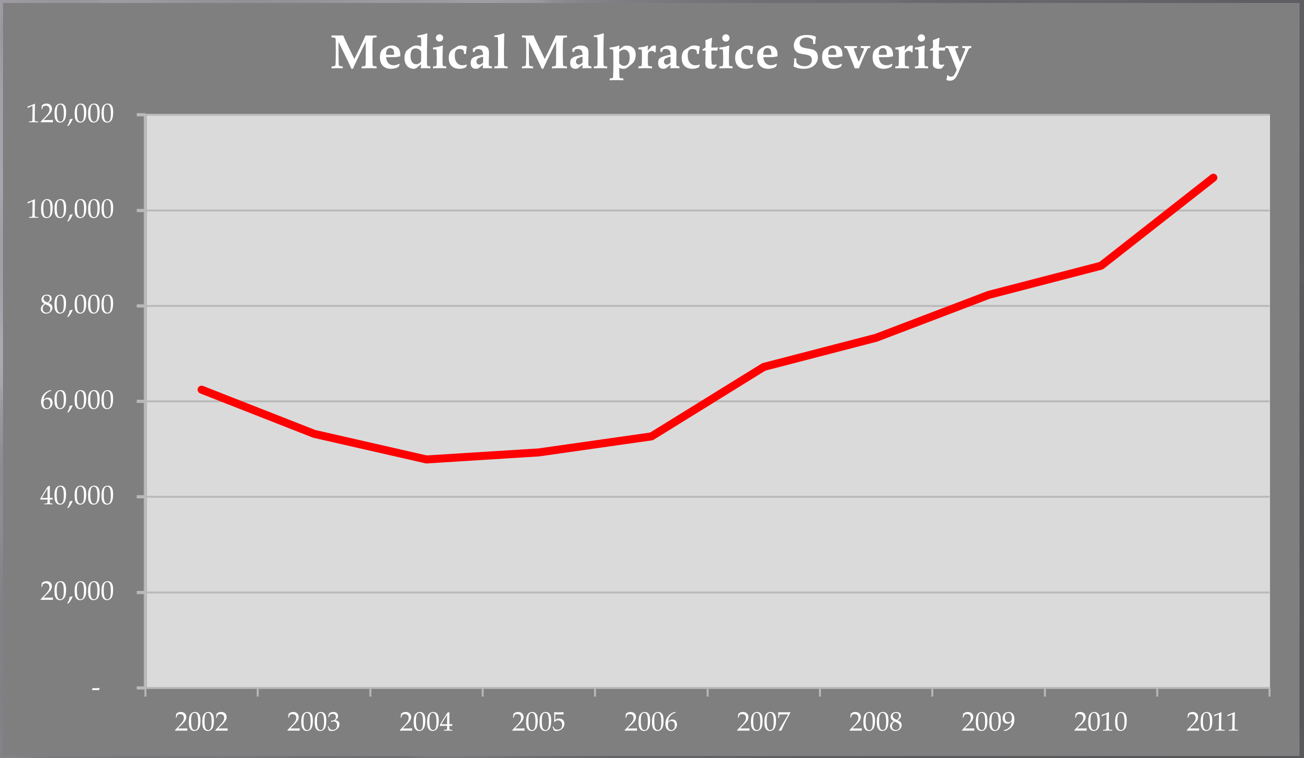
Figure 1: US Annual Inflation Rate (1914-2010)



Medical Malpractice Trend

- Based on data in 2011 Bests Aggregates and Averages
- Severity trend averaged 6%-7% in last 10 years

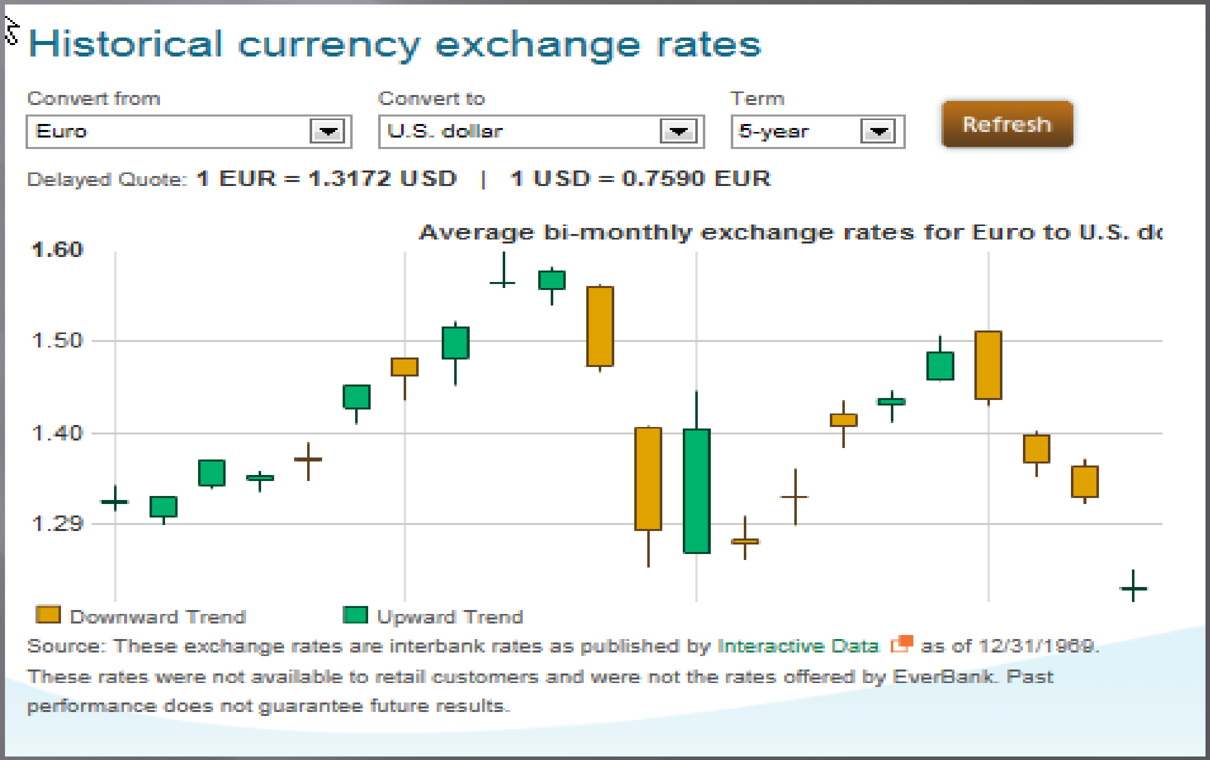


Risk Mitigation

- Ahlgrim, D'Arcy recommend contingency planning
- Consider impact of deflation/depression
- Consider impact in inflation/hyperinflation

Currency Fluctuation

- Exchange rate graphs from www.everbank.com
- Will the Euro survive or will some countries have to leave it?



Currency Fluctuation

- Bernanke will warn legislators Wednesday of possible "contagion“ from European difficulties (testimony date is Wednesday March 21, 2012)

- Change from earlier stance: The testimony appears to represent a change from February when he told a congressional panel: “Our basic conclusion is that direct exposure of U.S. banks to European sovereign debt is quite limited, particularly on the periphery.”

  ~*Economy Watch*

Sources of Trend predictions

- Web sites and newsletters make economic and social predictions
- Fincncialsense.com
- Trends Research Institute quarterly newsletter

Sources of Information on Addressing Trend in Actuarial Work

- 1991 Discussion Paper Program on Inflation Implications on P/C Insurance
- Butsic paper "The Effect of Inflation on Losses and Premium for Property-Liability Insurers" was on syllabus in past
  - Discusses accident date versus payment date impact of inflation and how to incorporate this

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