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## Presenters

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### Surety Bonds 101 – 'A Primer'

#### The Miller Act (1935):

Contractor required to post performance and payment bonds on Federal Project. ...**Treasury Listed** Surety

#### Insurance:

The law of large numbers applies... **expectation of loss**  
Losses of a few are paid by the premium of many  
Players – Insurance Company & Insured

#### Surety:

3<sup>rd</sup> Party **Indemnity** Contract... '**hold harmless**'  
Surety agrees to perform on behalf of the principal in event of default  
In **theory**, the business is **underwritten to 'zero' loss ratio**  
Premium is fee for prequalification

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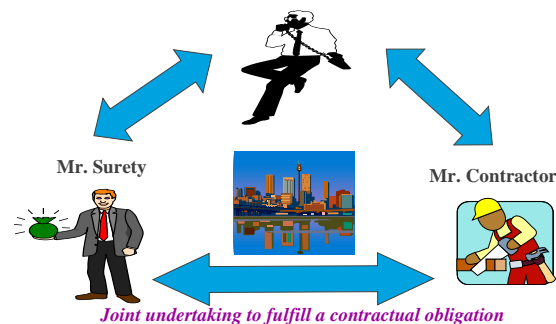
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### SURETY - THREE PARTY RELATIONSHIP

Mr. Obligee (Owner)



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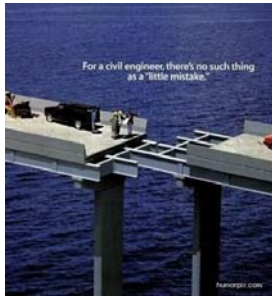
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It's all about the performance obligation...



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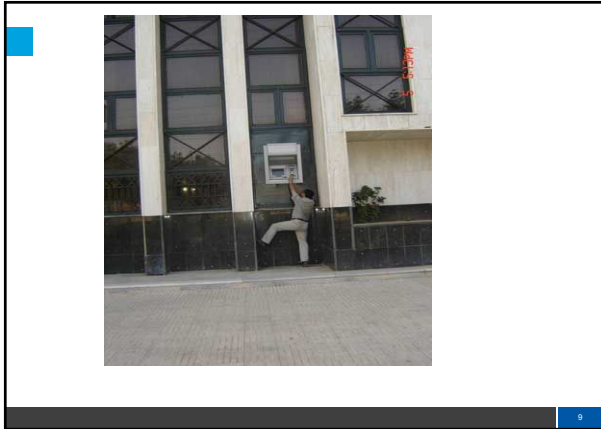
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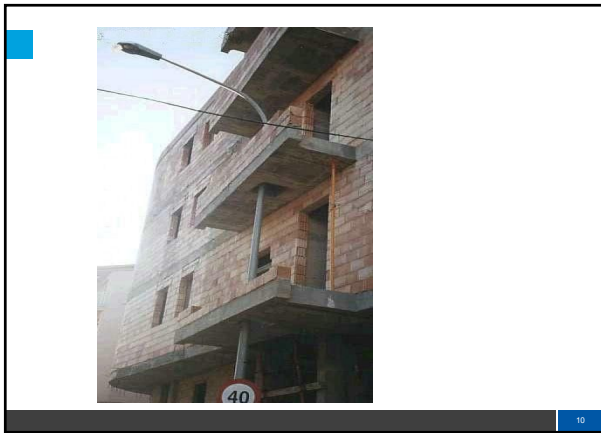
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**Surety Bonds 101 – ‘A Primer’**

**Bonds guarantee the terms and conditions of the contract...**

**Contract Surety:**

- \* Bid Bonds
- \* Performance Bonds
- \* Payment Bonds (Labor & Material)

**Classes:** General, Subcontractors and Subdivision

**Commercial Surety (Miscellaneous):**

- \* License & Permit
- \* Court & Fiduciary
- \* Custom
- \* Workers Compensation
- \* Misc.

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**Surety Bonds 101 – ‘A Primer’**

**Contract Surety Example...**

Project – Road reconstruction of Broadway & 49<sup>th</sup> Street

Obligee – City of NY Department of Transportation

Surety – ABC Guarantee

Principal – Performance Contractors, LLC

**Remedies:**

- Step in the shoes of the principal...viable contractor
- Bring in a completion contractor...defective work
- Tender the penal sum of the bond...

**Mitigation:** salvage & subrogation, indemnity and contract balances...

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**Underwriting the Principal (Contractor)...The Three ‘C’s’**

**Character** - stature within the community, **business & personal record**, trade payment records, references

**Capacity** - prior **experience**, estimating control, **management** / supervisory skills, necessary equipment and **depth of organization**

**Capital** - **financial wherewithal** corporate / personal indemnity, banking facilities (**access**), equipment / fixed assets

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**Underwriting the Principal (Contractor)...The Three "C's"**

- Financial wherewithal – **Balance Sheet**
- **Credit** and Access to Capital
- **Indemnification (Corporate & Personal)**
- Work in Progress (Bonded and Unbonded)
- Management – Continuity
- Experience and Proven Track Record
- **Risk Appetite – capital vs. capacity**
- Job Selection – type and location

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**Sample Work in Progress...**

Project	ABC Construction			Total
	Job 1	Job 2	Job 3	
<b>Contract Amt (Bond)</b>	<b>\$2,380,000</b>	<b>\$2,798,365</b>	<b>\$192,450</b>	<b>\$5,370,815</b>
Cost to Date	\$1,000,000	\$2,417,720	\$0	\$3,417,720
Billings to Date	\$1,200,000	\$2,622,464	\$0	\$3,822,464
Estimated GP	\$210,000	\$250,000	\$10,000	\$470,000
<b>Cost to Complete</b>	<b>\$1,170,000</b>	<b>\$130,645</b>	<b>\$182,450</b>	<b>\$1,483,095</b>
Total Cost	\$2,170,000	\$2,548,365	\$182,450	\$4,900,815
Earned Profit	\$96,774	\$237,183	\$0	\$333,958
Excess B/C	\$200,000	\$204,744	\$0	\$404,744
Billed U/E Profit	\$103,226	\$0	\$0	\$103,226
Profit to Earn	\$113,226	\$12,817	\$10,000	\$136,042
<b>Percent Complete</b>	<b>46.08%</b>	<b>94.87%</b>	<b>0%</b>	<b>69.74%</b>
Gross Margin	8.82%	8.93%	5.2%	8.75%
<b>Backlog</b>	<b>\$1,283,226</b>	<b>143,462</b>	<b>\$192,450</b>	<b>\$1,619,137</b>

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**The Primary Surety Players....**

**Top 10 Writers...**

Group	Direct WP	Direct L/R
<b>Travelers Bond</b>	\$991,622,397	-1.2%
Liberty Mutual	\$832,837,019	15.7%
<b>Zurich Insurance (F&amp;D)</b>	\$482,310,578	5.4%
<b>C N A Insurance</b>	\$434,336,482	14.0%
<b>Chubb &amp; Son</b>	\$297,286,287	34.1%
Hartford	\$210,598,771	21.7%
HCC Surety Group	\$148,820,784	13.0%
International Fidelity	\$118,769,830	6.8%
Ace Ltd	\$105,916,055	34.8%
Arch Capital	\$105,916,055	49.6%

# 100                    \$1,975,312  
 (The Surety & Fidelity Association of America – CY 2008, US & Canada)

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**Surety Reinsurance – Prospect Account**

- Cedant History
- Historical Track Record – Results
- **Target Niche – Geographic Reach**
- Underwriting Posture / Discipline
- **Experienced Claims Operations**
- Opportunity – Motivation
- **Proposed Structure – Balance**
- Terms and Conditions (Contract)
- Risk Management & Controls (**Credit Models**)
- **Aggregation of Exposures**

...To the Actuarial Department for pricing...

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**Key Pricing Considerations by Treaty Structure**

**PRO RATA**

- Expense Structure
  - Ceding Commission - flat vs. sliding scale
  - Profit commission
- CY impacts from contractor default
- Bond Durations

**EXCESS OF LOSS**

- Shorter-tailed than Pro Rata
  - Extended discovery period can lengthen reporting
- Losses Discovered
- Retention
  - Working layers vs. Cat Layers
- Pricing Tools
  - Experience Rating
  - **Exposure Based Pricing Models**
- Reinstatements and Aggregate Deductibles

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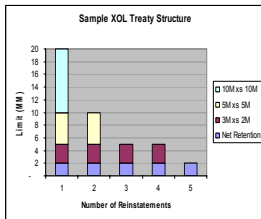
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**Excess of Loss Structure with Reinstatements**



- Net Retention = \$2M
  - **1<sup>st</sup> XOL**  
\$3M xs \$2M with 3 paid reinstatements
  - **2<sup>nd</sup> XOL**  
\$5M x \$5M with 1 paid reinstatement;
  - **3<sup>rd</sup> XOL**  
\$10M xs \$10M
- Total aggregate coverage \$32M  
Co-participation of 5%-20% not uncommon

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**Pricing Contract Surety XOL Treaties**

**What is the reinsurers liability? What info do we need?**

- Principal Names
- Total In-force Bonded Liability per Principal
- Premium (associated with exposure)
- Contractor type
- Credit Rating

**Key Elements of Pricing**

- ELR Forecast
- Experience Rating
  - Some credibility for working layers
  - Model validation
- XOL Exposure Pricing Model
  - Default and correlation
  - Modeling Severity
- **Choice of Exposure Base**

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**A good exposure base - What is best for Contract Surety?**

**Desirable attributes of an exposure base** (Principals of Ratemaking)

- Varies with the hazard
- Practical (readily available)
- Verifiable (not easy to manipulate)

**Total in-force Bonded liability best meets our requirements**

- Directly related to loss
- Consistent, available, verifiable

**Why not cost to complete?**

- Estimation → Inconsistency
- Timing
- Uneven cost distribution over length of project

**Why not line of credit?**

- Not directly related to loss
- A guideline
- Impacted by another variable: Utilization

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**Basic Pricing Model Elements – Contract Surety XOL**

**Exposure**

- Liability, premium, classification code by principal
  - General Contractor
  - Subcontractor
  - Subdivision

**Severity**

- Loss as % of in-force bonded liability
- Mean (PEL), Volatility (PML), Min, Max (vary by size and type)

**Frequency**

- 1-year Probability of default
- Data sources – Internal credit scoring models, KMV/Moody's, etc.

**Correlation (Credit cycle)**

**Reinstatement Structure**

**Simulation - @Risk or other program**

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### Severity Solutions

#### Surety Company Historical Claims Data

- Evaluate loss as % bonded liability per principal
- By size and type of contractor
- Exposure at time of loss a **MUST**
- Statistical analysis of mean, standard deviation, tail

#### SFAA construction loss severity study data call

- PEL (Mean)
- PML (90<sup>th</sup> percentile)
- 7 classification codes for contract surety

#### Key observations

- Severity varies by size and type of contractor
- As contractor size increases, severity decreases
- Subcontractor PEL and PML factors > GC factors

#### Severity Distribution Options

- Beta (or Beta General)
- LogNormal
- Exponential

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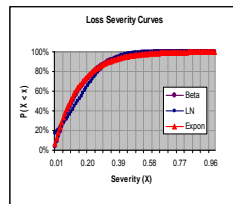
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### Severity Distributions for Sample General Contractor

ABC General Contractor - In-force Bonded Liability = \$100M

Statistic	BetaGeneral (1.5,7,003,1)	LogNormal (15,15)	Exponential (15)
PEL	15%	15%	15%
CV:	84%	100%	100%
PML (90%):	33%	31%	35%
99th %:	51%	42%	45%
99th %:	69%	74%	69%
Max:	100%	100%	100%



- LN and Exponential - adjust parameters to reflect manual cap

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### A Contract Surety XOL Simulation Model

#### Each iteration, generate claims > \$250K to portfolio

- Generate defaults
  - o Modify default → probability of claim > \$250K
- If claim triggered, generate loss based on severity parameters
  - o Set Minimum severity = \$250K
  - o Adjust for Collateral
- Claims Correlation → frequency shock
- Allocate Claims to layers
  - o Aggregate
  - o Reinstatement limits

#### Truncation and Losses < \$250K

- Significance
  - o 2-4% of the loss ratio
- Allocate to net retention

#### Gross Losses on Principals not exposing XOL Treaty

- Allocate to net retention

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**A Surety XOL Simulation Model - Continued**

- SUM {
- Balance to Gross Loss Ratio**
    - Losses < 250K on principals in simulation
    - Simulated losses to treaty
    - Losses beyond treaty limits
    - Gross losses on non-exposed principals
  - Convert to Loss Cost**
    - Premium base
    - Earned Premium or Treaty subject premium
  - Reinstatement Structure**
    - Number; Aggregate Cap
    - Reinstatement Premium expressed as % of treaty rate
    - Cost is pro rata to time and amount
    - Higher reinstatement premium → lower up-front rate

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**Simulation Model Output to Final Rates**

- Mean Loss Cost vs. Full Modeled Loss Distribution**
  - Focus on full range of results from 0-100% probability distribution
  - Profit Margin
    - At the Mean
    - Average Weighted Margin over full distribution
    - Dependant on Skewness
- Maximum downside after reinstatements**
  - Impact of Paid vs. Free
  - Acceptable Margin
- Expense and Risk Load**

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**Evolution of pricing information**

- 2004**
  - Principal threshold
  - Work on hand, cost to complete, line of credit
    - Almost everything **except** the penal sum of the bonds
    - Fill in with Exposure limits profile
  - Claims without associated exposure
  - Surety company skepticism over data requests
- 2010**
  - Per principal data often provided from ground-up
  - In-force bonded liability + expired last 12 months
  - Associated premium for all principals
  - Claims experience with exposure (more often)



**2011 and beyond...**

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### The FUTURE...



- Improved data consistency by surety company
  - Clarity in Exposure Definitions
- Historical Losses with associated Exposure
  - Few Sureties provide this right now
  - Large Claims – evaluation of Maximum severity
- Commercial Surety Pricing model parameter development
- Less skepticism, more collaboration with surety cedants

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### Let's Take a Step Back

- **Conversion of SFAA Severities is Not a Piece of Cake**
  - Basically only have 2 points on a curve
  - What loss distribution?
  - What maximum?
- **And Once They Are Converted, There is More to Do**
  - SFAA or Proprietary
  - Collateral
  - Capping
  - In-force vs. (In-force + PY Terminated)

Guy Carpenter

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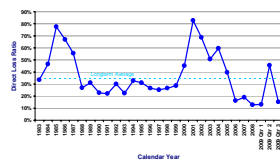
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### So We've Got Severity, What Next?

- **Frequency**
  - Common: Implied by assumed LR
  - Better: Based on LR and relative credit scores
  - Adjusted for probability of loss, given technical default

- **Surety Cycle**
  - How likely is a shock year?
  - Normal assumption = once every 7-10 years
  - Explicit or implicit
  - Increase in frequency



Source: The Surety & Fidelity Association of America

Guy Carpenter

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**Just What is the Chance of a Shock?**

- **Sureties**
  - Tight underwriting going into crisis
  - Principals entered crisis in good shape
  - Orderly takedown of exposure for both principals and sureties
  - Current consensus = somewhat elevated LRs, but not CRISIS
- **Reinsurers**
  - Small-mid size sureties w/ no losses and no subdivision are ok
  - Less comfortable with everyone else

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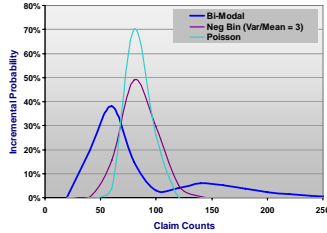
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**So How Do You Build in The Shock?**

- **Methods**
  - Implicit
  - Mixed Poisson
  - Change in Defaults
  - Others



- **Example: Mixed Poisson w/ Lognormal Mixing**
  - 2 Frequency Distributions: Poisson( $\lambda$ ) and Poisson( $3\lambda$ )
  - Mix using Lognormal(1, selected CV) and Shock Probability = 25%

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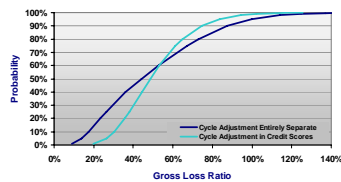
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**Frequency and Cycle Effects Can be Difficult to Separate**

- Cycle effect may be reflected in assumed loss ratio
- **Credit ratings may already include cycle effects**
  - Real ratings *do*
  - Shadow ratings *may or may not* } Reflect current economic conditions
  - Real problem if cycle effects mess up relative defaults
  - Can't use actual changes in cycle-adjusted defaults

Actual Speculative Default Rate

Year	Default Rate
1998-2008	4.4%
2007	0.9%
2009	13.0%



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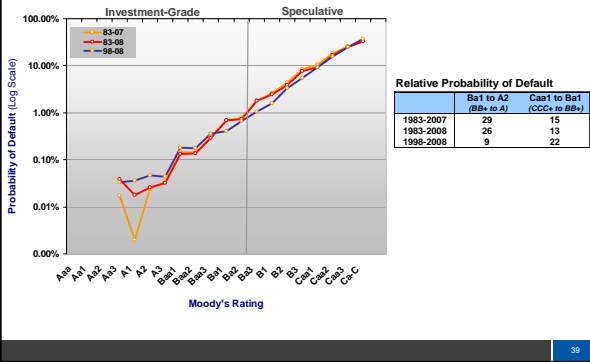
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### What do Credit Scores Mean Anyway?




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### Don't Get Us Started on Payout Patterns

Dev't Year	Before Salvage		After Salvage	
	Paid	Incurred	Paid	Incurred
1	18	20	16	0
2	51	51	32	0
3	66	66	40	0
4	73	73	41	0
5	75	75	36	0
6	75	75	25	0
7	100	100	49	0
8	100	100	48	0
9	100	100	37	0
10	100	100	23	0
11	100	100	17	0
12	100	100	0	0

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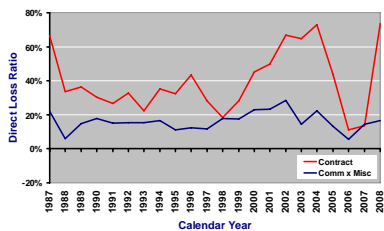
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### What About Commercial?



	Contract	Commercial	Comm x Misc
1987-97	34%	17%	14%
1998-08	35%	31%	17%
Mean	35%	25%	16%
St. Dev.	18%	21%	2%
CV	51%	83%	34%

Source: SFAA

Guy Carpenter

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**More Work is Needed for Commercial**

- **Little Work so Far Industry-wide**
  - Collecting data is hard work
  - Benefit was perceived to be small
- **But Work has Begun**
  - Guy Carpenter has model based on industry database
  - Some sureties have internal PML models
  - Adjustments to SFAA model

**Loss as % Inforce Bond Limits**

Type	Mean	Max
License and Permit	15-20%	100%
Court	50%	100%
Customs	10%	30-50%
Public Official	2-10%	100%
Work Comp	35-75%	100%
Misc	25-100%	100%

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**Surety Outlook....Reinsurer Perspective**

**Challenges...**

- Where's the work???
  - Stimulus Program...shovel ready?
  - States – Municipalities...matching funds
  - Private Sector Shut Down
- Increased competition...
  - Private to Public
  - Multiple bidders
- Credit Markets...remain tight
- Debt Service
- Unemployment: 9.7%...mid teens...high 20's
- Declining Revenue Base...outside the box
- Green Construction...LEED Certification
- Anticipated Losses (lag)

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**Surety Outlook....Reinsurer Perspective**

**Mitigators...**

- Construction Workouts
- Increased Reinsurance Retentions (XOL) / Balanced Structures
- Principal O/H Reductions
- Declining Exposure Base...increased risks
- U / W Discipline...maintained

**It's all about the bottom line...**

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