Time Horizons in Risk Assessment

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Michael Wacek

Time Dependency of Financial Variables

Many financial values vary over time, e.g.:

- Stock prices
- Ultimate loss ratio estimates
- Capital (GAAP and statutory)
- Such values can be seen as observations from a time-dependent stochastic process

Market Value of Common Stocks S&P 500 Stock Index



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Estimated Ultimate Loss Ratio Commercial Auto Liability (U.S. Industry) / Accident Year 2003



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Statutory Capital & Surplus Odyssey America Reinsurance Corporation



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Temporal Aspects of Risk Assessment

- Risk assessment is about the future
- How will financial variables behave...?
 - Tomorrow
 - Next week
 - Next quarter
 - Next year

Selected time horizon depends on context and purpose

Value-at-Risk (VaR)

- VaR has emerged as a favorite financial risk measure
- Defines downside risk as the amount of loss corresponding to a given cumulative probability ("confidence level")
- VaR_{99.5%} refers to the 99.5 percentile loss (adverse change) amount
- Because financial risks are time-dependent, a *time horizon* must also be defined
 - Traders typically use *daily* time horizon
 - Solvency II calls for *one-year* time horizon

Value-at-Risk Time Horizons

Shorter time horizons typically imply lower VaR_α amounts for given α

- Daily VaR_{99%} ≤ One-Year VaR_{99%}
- Shorter time horizons typically imply higher confidence level statements
 - Daily $VaR_{99\%}$ = One-Year $VaR_{99\%-c}$ (0 < c < 99%)
- Similar to effect in cat analysis of using smaller or larger geographic regions for probability statements, e.g.:
 - 100-year return time Louisiana-only loss amount (Louisiana VaR_{99%}) typically less than countrywide VaR_{99%} loss amount

Commercial Auto Liability Example Accident Year 2007

Estimated ultimate net loss ratio

- U.S. industry
- Schedule P (Part 2 Losses / Part 1 Premiums)
- 62.4% as of 12/31/07

How will that estimate change over ...

- One year?
- Two years?
- Time to ultimate settlement?
- History provides a guide



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Choice of Time Horizon for Risk Assessment Case for One-Year Horizon

- Coincides with main time unit used for financial reporting
- Corresponds to typical insurer planning horizon
- Many financial and insurance variables expressed in annual terms, e.g.:
 - Interest rates
 - Investment returns
 - Common stock volatility
 - Loss ratios
 - Loss development
- Natural horizon for enterprise risk management
- Solvency II uses one-year horizon VaR_{99.5%}

Choice of Time Horizon for Risk Assessment Case for Longer than One-Year Horizon

Implies larger capital requirement, thus providing greater solvency protection

Capital Adequacy / One-Year Horizon

- One-year horizon consistent with strong solvency protection
- Butsic pioneered concept in early 1990s
- Solvency Measurement for Property-Liability Risk-Based Capital Applications"
- Argued that long term solvency protection achievable by periodic capital rebalancing to maintain a constant low exposure to insolvency over a short horizon

Capital Adequacy / One-Year Horizon

- Yours truly presented a fully elaborated example of Butsic's approach in a 2007 paper
- <u>"Consistent Measurement of Property-Casualty Risk-Based</u> <u>Capital Adequacy"</u>
- Paper calibrated capital to a target Expected Policyholder Deficit (EPD)
- Would work equally well with VaR or TVaR
- Several of the following charts are taken from that 2007 paper

Excerpt A from Wacek Paper



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Excerpt B from Wacek Paper



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Excerpt C from Wacek Paper



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Excerpt D from Wacek Paper



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Excerpt E from Wacek Paper



Enterprise Risk Management / One Year Horizon

- ERM requires aggregation of risks from all sources
- Aggregation requires common time horizon
- One-year risk horizon fits with typical insurer planning horizon
- Example to follow

ERM Example – ABC Insurance Holdings, Inc.

- Hypothetical insurance holding company
- September 30, 2008 consolidated GAAP equity of \$1 billion
- **Key measure: One-year CHANGE IN GAAP EQUITY from 9/30/08**
- Enterprise risks modeled separately and in combination

ERM Example – ABC Insurance Holdings, Inc.

ERM modeling date: 9/30/08

Prospective Underwriting Risks through 9/30/09

- Accident year ending 9/30/09 as of 9/30/09
 - Underwriting result with expected catastrophe losses
 - "Unexpected" catastrophe losses (deviation from expected)
- Prior accident year loss reserve development
- Ceded reinsurance (change in reserve for uncollectibles)

Prospective Investment Risks through 9/30/09

- Bonds
- Common stocks
- Cash
- Other invested assets and liabilities (e.g., credit default swaps)

ABC Insurance Holdings Value-at-Risk Table

Downside and Upside Potential (% of GAAP Equity) by Major Risk Source

One-Y	ear GAAP Eq	uity Gains	& Losses by	y Return Tim	ie - Based o	n Portfolio F	lisks as of s	9/30/08		
	Downside Risks (P		re-Tax) Return Tir		ne Legend:	< 0%	0% - 5%	<mark>5% - 15%</mark>	15% - 30%	> 30%
	Actual 9/30/08 (1)		5-Year Return Time Pre-Tax Loss		25-Year Return Time Pre-Tax Loss		100-Year Return Time Pre-Tax Loss		250-Year Return Time Pre-Tax Loss	
	Amount	% GAAP	Amount	% GAAP	Amount	% GAAP	Amount	% GAAP	Amount	% GAAP
Major Risk Source	(Millions)	Equity	(Millions)	Equity	(Millions)	Equity	(Millions)	Equity	(Millions)	Equity
Fixed Income Investments	\$2,250	225.0%	\$60	6.0%	\$214	21.4%	\$306	30.6%	\$340	34.0%
Net Common Stocks (at Mkt)	\$200	20.0%	\$32	3.2%	\$61	6.1%	\$74	7.4%	\$82	8.2%
Common Stocks (at Equity)	\$10	1.0%	(\$1)	-0.1%	(\$0)	0.0%	\$0	0.0%	\$0	0.0%
Cash / Short Term Investments	\$300	30.0%	(\$3)	-0.3%	(\$3)	-0.3%	(\$3)	-0.3%	(\$3)	-0.3%
Other Invested Assets ex CDS Etc.	\$5	0.5%	\$1	0.1%	\$2	0.2%	\$3	0.3%	\$3	0.3%
Credit Default Swaps (CDS) - Long	\$10	1.0%	\$9	0.9%	\$9	0.9%	\$9	0.9%	\$9	0.9%
Ceded Recoverables / Contingencies	\$400	40.0%	\$13	1.3%	\$24	2.4%	\$31	3.1%	\$35	3.5%
Net Foreign Currency (FX) Exposure	\$100	10.0%	\$5	0.5%	\$11	1.1%	\$14	1.4%	\$16	1.6%
Net Loss Reserves	\$1,600	160.0%	\$70	7.0%	\$171	17.1%	\$247	24.7%	\$306	30.6%
Abnormal Cat Losses (2)	\$150	15.0%	\$82	8.2%	\$321	32.1%	\$467	46.7%	\$549	54.9%
Acc Yr U/W Result (Cat-Adjusted) (3)	\$84	8.4%	(\$38)	-3.8%	\$7	0.7%	\$35	3.5%	\$55	5.5%
All Risk Sources (Pre-Tax)	\$1,000	100.0%	\$40	4.0%	\$281	28.1%	\$471	47.1%	\$568	56.8%
All Risk Sources (After-Tax)	T		\$26	2.6%	\$183	18.3%	\$306	30.6%	\$414	41.4%
	Upside Op	portunities	(Pre-Tax)	Return Tin	ne Legend:	< 0%	0% - 5%	5% - 15%	15% -30%	> 30%
	Upside Op Actual 9/3	portunities 30/08 (1)	(Pre-Tax) 5-Year Re	Return Tin	ne Legend: 25-Year Ro	< 0% eturn Time	0% - 5% 100-Year F	5% - 15% Return Time	15% -30% 250-Year R	> 30% eturn Time
	Upside Op Actual 9/3	portunities 30/08 (1)	(Pre-Tax) 5-Year Re Pre-Ta	Return Tine ax Gain	ne Legend: 25-Year Ro Pre-Ta	< 0% eturn Time ax Gain	0% - 5% 100-Year F Pre-Ta	5% - 15% Return Time ax Gain	15% -30% 250-Year R Pre-Ta	> 30% eturn Time x Gain
Major Dick Source	Upside Op Actual 9/3 Amount (Millions)	907tunities 30/08 (1) % GAAP	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions)	Return Time eturn Time ax Gain % GAAP	ne Legend: 25-Year Ro Pre-Ta Amount (Millions)	< 0% eturn Time ax Gain % GAAP	0% - 5% 100-Year F Pre-Ta Amount (Millions)	5% - 15% Return Time ax Gain % GAAP	15% -30% 250-Year R Pre-Ta Amount	> 30% eturn Time x Gain % GAAP
Major Risk Source	Upside Op Actual 9/3 Amount (Millions)	90/08 (1) % GAAP Equity	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions)	Return Time eturn Time ax Gain % GAAP Equity 27.0%	ne Legend: 25-Year Ri Pre-Ta Amount (Millions)	< 0% eturn Time ax Gain % GAAP Equity	0% - 5% 100-Year F Pre-Ta Amount (Millions)	5% - 15% Return Time ax Gain % GAAP Equity	15% -30% 250-Year R Pre-Ta Amount (Millions)	> 30% eturn Time x Gain % GAAP Equity
Major Risk Source Fixed Income Investments	Upside Op Actual 9/3 Amount (Millions) \$2,250 \$200	portunities 30/08 (1) % GAAP Equity 225.0% 20.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$23	Return Time eturn Time ax Gain % GAAP Equity 27.0%	ne Legend: 25-Year Ri Pre-Ta Amount (Millions) \$514	< 0% eturn Time ax Gain % GAAP Equity 51.4% 11 7%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16 3%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756	> 30% eturn Time x Gain % GAAP Equity 75.6%
Major Risk Source Fixed Income Investments Net Common Stocks (at Mkt) Common Stocks (at Mkt)	Upside Op Actual 9/3 Amount (Millions) \$2,250 \$200	portunities 30/08 (1) % GAAP Equity 225.0% 20.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$4	Return Time ax Gain % GAAP Equity 27.0% 5.3%	ne Legend: 25-Year Ri Pre-Ta Amount (Millions) \$514 \$117	< 0% eturn Time ax Gain % GAAP Equity 51.4% 11.7%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0%
Major Risk Source Fixed Income Investments Net Common Stocks (at Mkt) Common Stocks (at Equity) Cash / Short Tarm Investments	Upside Op Actual 9/3 Amount (Millions) \$2,250 \$200 \$10 \$300	0/08 (1) % GAAP Equity 225.0% 20.0% 1.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$1 \$2	Return Time ax Gain % GAAP Equity 27.0% 5.3% 0.1% 0.9%	ne Legend: 25-Year R Pre-Ta Amount (Millions) \$514 \$117 \$2 \$12	< 0% eturn Time ax Gain % GAAP Equity 51.4% 11.7% 0.2% 1.3%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163 2 15	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$3 \$17	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.3% 1 7%
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Major Risk Source Fixed Income Investments Net Common Stocks (at Mkt) Common Stocks (at Equity) Cash / Short Term Investments Other Invested Assets ex CDS Etc. Credit Default Swane (CDS) - Long	Upside Op Actual 9/3 Amount (Millions) \$2,250 \$200 \$10 \$300 \$5 \$10	portunities 30/08 (1) % GAAP Equity 225.0% 20.0% 1.0% 30.0% 0.5% 1.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$1 \$9 \$2 (\$2 (\$2)	Return Time ax Gain % GAAP Equity 27.0% 5.3% 0.1% 0.9% 0.2%	ne Legend: 25-Year Ri Pre-Ta Amount (Millions) \$514 \$117 \$2 \$13 \$4 \$2 \$13	<0% eturn Time ax Gain % GAAP Equity 51.4% 11.7% 0.2% 1.3% 0.4% 0.9%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163 2 15 5 23	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5% 0.5% 2.3%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$3 \$17 \$6 \$35	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.3% 1.7% 0.6% 3.5%
Major Risk Source Fixed Income Investments Net Common Stocks (at Mkt) Common Stocks (at Equity) Cash / Short Term Investments Other Invested Assets ex CDS Etc. Credit Default Swaps (CDS) - Long Ceded Recoverables / Contingencies	Upside Op Actual 9/3 Amount (Millions) \$2,250 \$200 \$10 \$300 \$5 \$10 \$400	portunities 30/08 (1) % GAAP Equity 225.0% 20.0% 1.0% 30.0% 0.5% 1.0% 40.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$1 \$9 \$2 \$2 \$2 \$4	Return Time atturn Time ax Gain % GAAP Equity 27.0% 5.3% 0.1% 0.2% 0.2% 0.4%	ne Legend: 25-Year Ri Pre-Ta Amount (Millions) \$514 \$117 \$2 \$13 \$4 \$9 \$4 \$9 \$4	< 0% eturn Time ax Gain % GAAP Equity 11.7% 0.2% 1.3% 0.4% 0.9% 0.4%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163 2 15 5 23 4	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5% 0.5% 2.3% 0.4%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$3 \$17 \$6 \$35 \$4	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.3% 1.7% 0.6% 3.5% 0.4%
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Major Risk Source Fixed Income Investments Net Common Stocks (at Mkt) Common Stocks (at Equity) Cash / Short Term Investments Other Invested Assets ex CDS Etc. Credit Default Swaps (CDS) - Long Ceded Recoverables / Contingencies Net Foreign Currency (FX) Exposure Net Loss Reserves	Upside Op Actual 9/3 Amount (Millions) \$2,250 \$200 \$10 \$300 \$55 \$10 \$400 \$100 \$1600	2007 Contemport Contem	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$11 \$9 \$2 (\$2) \$4 \$5 \$76	Return Time ax Gain % GAAP Equity 27.0% 5.3% 0.1% 0.9% 0.2% 0.4% 0.5% 7.6%	ne Legend: 25-Year R Pre-Ta Amount (Millions) \$514 \$117 \$2 \$13 \$4 \$9 \$4 \$11 \$142	< 0% eturn Time ax Gain % GAAP Equity 51.4% 0.2% 1.3% 0.4% 0.4% 0.4% 1.1% 0.4%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163 2 15 5 23 4 15 177	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5% 0.5% 0.5% 0.5% 0.4% 1.5% 0.4% 1.5%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$33 \$17 \$6 \$35 \$4 \$17 \$205	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.3% 1.7% 0.6% 3.5% 0.4% 1.7% 0.4%
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Major Risk Source Fixed Income Investments Net Common Stocks (at Mikt) Common Stocks (at Equity) Cash / Short Term Investments Other Invested Assets ex CDS Etc. Credit Default Swaps (CDS) - Long Ceded Recoverables / Contingencies Net Foreign Currency (FX) Exposure Net Loss Reserves Abnormal Cat Losses (2) Acc Yr U/W Result (Cat-Adjusted) (3) All Risk Sources (Pre-Tax)	Upside Op Actual 9/3 Amount (Millions) \$200 \$10 \$300 \$55 \$10 \$400 \$100 \$1600 \$150 \$84 \$1,000	2007 Unities 30/08 (1) % GAAP Equity 225.0% 20.0% 1.0% 30.0% 0.5% 1.0% 40.0% 10.0% 160.0% 8.4% 100.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$1 \$9 \$2 (\$2) \$4 \$4 \$5 \$76 \$98 \$130 \$389	Return Time ax Gain % GAAP Equity 27.0% 5.3% 0.1% 0.2% -0.2% 0.4% 0.5% 7.6% 9.8% 13.0% 38.9%	ne Legend: 25-Year R Pre-Ta Amount (Millions) \$514 \$117 \$2 \$13 \$4 \$9 \$4 \$11 \$142 \$126 184 \$644	< 0% eturn Time ax Gain % GAAP Equity 51.4% 11.7% 0.2% 1.3% 0.4% 0.9% 0.4% 0.9% 0.4% 1.1% 14.2% 12.6% 18.4%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163 2 15 5 23 4 15 177 135 225 810	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5% 2.3% 0.4% 1.5% 22.5% 81.0%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$33 \$17 \$66 \$35 \$4 \$17 \$205 \$138 245 \$945	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.6% 0.6% 3.5% 0.4% 1.7% 20.5% 13.8% 24.5%
Major Risk Source Fixed Income Investments Net Common Stocks (at Mikt) Common Stocks (at Equity) Cash / Short Term Investments Other Invested Assets ex CDS Etc. Credit Default Swaps (CDS) - Long Ceded Recoverables / Contingencies Net Foreign Currency (FX) Exposure Net Loss Reserves Abnormal Cat Losses (2) Acc Yr U/W Result (Cat-Adjusted) (3) All Risk Sources (Pre-Tax) All Risk Sources (After-Tax)	Upside Op Actual 9/3 Amount (Millions) \$200 \$10 \$300 \$55 \$10 \$400 \$1100 \$150 \$1400 \$150 \$84	2008 (1) % GAAP Equity 225.0% 20.0% 1.0% 30.0% 0.5% 1.0% 40.0% 10.0% 15.0% 8.4% 100.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$1 \$9 \$2 (\$2) \$4 \$5 \$76 \$98 \$130 \$389 \$235	Return Time asturn Time bit constraint asturn Time asturn asturn	ne Legend: 25-Year R: Pre-Ta Amount (Millions) \$514 \$117 \$2 \$13 \$4 \$9 \$4 \$11 \$142 \$126 184 \$644 418	< 0% eturn Time ax Gain % GAAP Equity 51.4% 11.7% 0.2% 1.3% 0.4% 0.9% 0.4% 0.9% 0.4% 1.1% 14.2% 12.6% 18.4%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 163 2 163 2 15 5 23 4 15 177 135 225 810 526	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5% 2.3% 0.5% 2.3% 0.4% 1.5% 22.5% 81.0%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$33 \$17 \$66 \$35 \$4 \$17 \$205 \$138 245 \$945 \$65 \$65 \$65 \$15	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.3% 1.7% 0.6% 3.5% 0.4% 0.6% 3.5% 0.4% 1.7% 20.5% 13.8% 24.5% 94.5% 61.5%
Major Risk Source Fixed Income Investments Net Common Stocks (at Mkt) Common Stocks (at Equity) Cash / Short Term Investments Other Invested Assets ex CDS Etc. Credit Default Swaps (CDS) - Long Ceded Recoverables / Contingencies Net Foreign Currency (FX) Exposure Net Loss Reserves Abnormal Cat Losses (2) Acc Yr U/W Result (Cat-Adjusted) (3) All Risk Sources (Pre-Tax) All Risk Sources (After-Tax) Notes	Upside Op Actual 9/3 Amount (Millions) \$2,250 \$200 \$300 \$300 \$300 \$55 \$10 \$400 \$1100 \$11,600 \$150 \$84 \$1,000	portunities 30/08 (1) % GAAP Equity 225.0% 20.0% 1.0% 30.0% 30.0% 1.0% 40.0% 160.0% 15.0% 8.4% 100.0%	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$1 \$9 \$2 (\$2) \$4 \$5 \$76 \$98 \$130 \$389 \$233	Return Time sturn Time ax Gain % GAAP Equity 27.0% 5.3% 0.1% 0.9% 0.2% 0.4% 0.5% 7.6% 9.8% 13.0% 25.3%	ne Legend: 25-Year R: Pre-Ta Amount (Millions) \$514 \$117 \$2 \$13 \$4 \$9 \$4 \$11 \$142 \$126 184 \$44 \$184	< 0% eturn Time ax Gain % GAAP Equity 51.4% 11.7% 0.2% 1.3% 0.4% 0.9% 0.4% 0.9% 0.4% 0.9% 1.1% 14.2% 12.6% 18.4% 64.4%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163 2 15 5 23 4 15 177 135 225 810 526	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5% 2.3% 0.4% 1.5% 17.7% 13.5% 22.5% 81.0%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$3 \$17 \$6 \$35 \$4 \$17 \$205 \$138 245 \$45 \$45 \$45 \$6 \$35 \$4 \$17 \$205 \$138 245 \$45 \$6 \$35 \$4 \$17 \$205 \$138 \$245 \$6 \$35 \$4 \$17 \$205 \$138 \$245 \$6 \$35 \$4 \$17 \$205 \$138 \$245 \$35 \$4 \$17 \$205 \$138 \$245 \$35 \$4 \$17 \$205 \$138 \$245 \$35 \$4 \$17 \$255 \$4 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$17 \$205 \$138 \$245 \$245 \$25 \$245 \$245 \$25 \$25 \$25 \$25 \$245 \$25 \$25 \$25 \$25 \$25 \$25 \$25 \$2	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.3% 1.7% 0.6% 3.5% 0.4% 0.4% 0.4% 1.7% 20.5% 13.8% 24.5% 94.5% 61.5%
Major Risk Source Fixed Income Investments Net Common Stocks (at Mikt) Common Stocks (at Equity) Cash / Short Term Investments Other Invested Assets ex CDS Etc. Credit Default Swaps (CDS) - Long Ceded Recoverables / Contingencies Net Foreign Currency (FX) Exposure Net Loss Reserves Abnormal Cat Losses (2) Acc Yr U/W Result (Cat-Adjusted) (3) All Risk Sources (Pre-Tax) All Risk Sources (After-Tax) Notes 1. Balance Sheet Amounts and % of GAAP	Upside Op Actual 9/3 Amount (Millions) \$22,250 \$200 \$10 \$300 \$300 \$15 \$10 \$400 \$11,600 \$1,600 \$1,600 \$1,600 \$1,600	2008 (1) % GAAP Equity 225.0% 20.0% 1.0% 30.0% 0.5% 1.0% 40.0% 10.0% 160.0% 8.4% 100.0% Cat Losses ar	(Pre-Tax) 5-Year Re Pre-Ta Amount (Millions) \$270 \$53 \$1 \$9 \$2 (\$2) \$4 \$5 \$76 \$98 \$130 \$389 \$233 \$233 \$233 \$233 \$233 \$243 \$253 \$253 \$253 \$253 \$253 \$253 \$253 \$253 \$253 \$253 \$255	Return Time sturn Time ax Gain % GAAP Equity 27.0% 5.3% 0.1% 0.2% -0.2% 0.4% 0.5% 9.8% 13.0% 25.3%	ne Legend: 25-Year R. Pre-Ta Amount (Millions) \$514 \$117 \$2 \$13 \$4 \$9 \$4 \$11 \$142 \$126 184 \$44 \$142 \$126 184 \$44 \$148	< 0% eturn Time ax Gain % GAAP Equity 51.4% 11.7% 0.2% 1.3% 0.4% 0.9% 0.4% 1.2% 12.6% 18.4% 64.4% 41.8%	0% - 5% 100-Year F Pre-Ta Amount (Millions) 657 163 2 15 5 23 4 15 177 135 225 810 526 Equity	5% - 15% Return Time ax Gain % GAAP Equity 65.7% 16.3% 0.2% 1.5% 2.3% 0.4% 1.5% 2.3% 0.4% 1.5% 22.5% 81.0% 52.6%	15% -30% 250-Year R Pre-Ta Amount (Millions) \$756 190 \$33 \$17 \$66 \$35 \$4 \$17 \$205 \$138 245 \$945 \$615 \$1,000.0	> 30% eturn Time x Gain % GAAP Equity 75.6% 19.0% 0.3% 1.7% 0.6% 3.5% 0.4% 1.7% 1.7% 13.8% 20.5% 13.8% 24.5% 94.5% 61.5%
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CAS 2008 Annual Meeting – Time Horizons in Risk Assessment Michael Wacek

ABC Insurance Holdings Downside / Upside Profile



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ABC Insurance Holdings – TVaR Loss Profile



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ABC Insurance Company – TVaR Gain Profile



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