
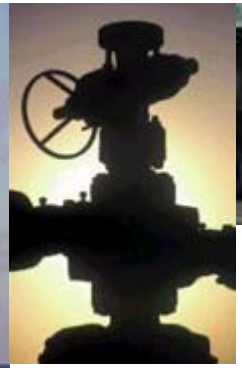

Analysis of Offshore Risk and Post-Hurricane Reaction

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Introduction

What Is Risk?

- A concept that denotes the probability of some undesirable event.
- Risk usually has implications, primarily a loss of value if the undesirable event occurs.
- Typically associated with the expected value of a negative event occurring. The expected value is calculated as the probability of the event times its consequences.

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Common Offshore Physical Risks

Transportation Risks

- Boat accidents
- Helicopter accidents

Operator-Related Risks

- Operator error
- Operator negligence

Weather-Related Risks

- Hurricane
- Wind
- Wave

Equipment-Related Risks

- Crane accidents
- Equipment defects and malfunctions

Environmental-Related Risks

- Blowouts
- Fires and Explosions
- Spills
- Unintentional Discharges
- Pipeline strikes/failures
- Platform strikes/failures

Importance of Understanding Offshore Risk

Potential Reasons for Increased Importance

- Belief that the frequency of hurricane events could be increasing for a variety of reasons.
- In the current case, the value of the event's impact has increased considerably since
    - there are a larger number of potentially impacted higher valued assets.
    - the loss of production from the event has higher than historical normal value.

Why Is This Important for MMS?

- If correct, these changes can impact the cost and profitability of offshore activities.
- These changes may impact the attractiveness of future and continued investments in the GOM.

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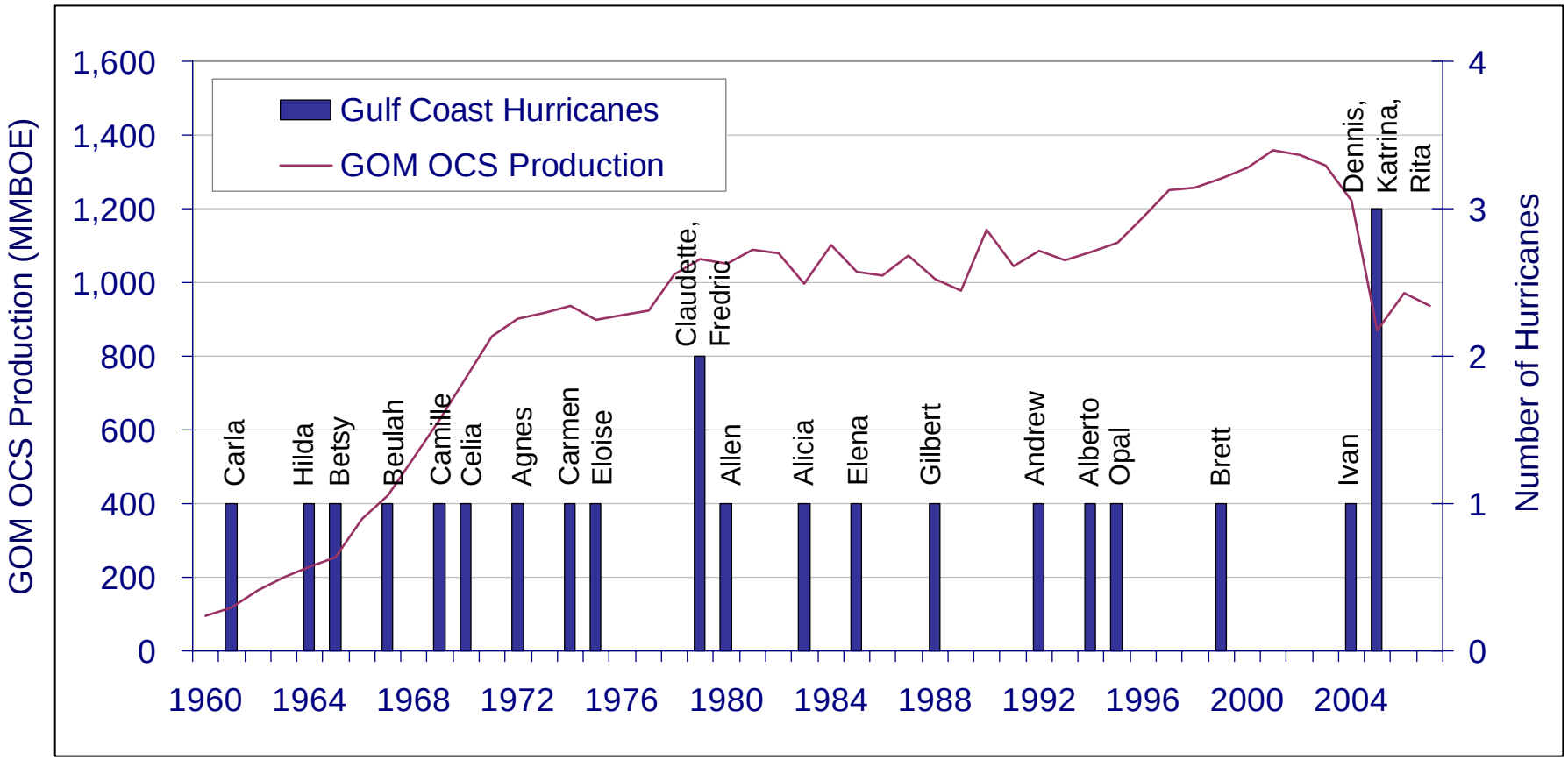
GOM OCS Production and Hurricanes



Sources: LA Dept. of Natural Resources (2009); U.S. Dept.of Commerce, NOAA, Atlantic Oceanographic and Meteorological Laboratory (2009); and U.S. Dept. of Commerce, NOAA (2009)

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How Do you Reduce Risk?

- Two common forms of risk reduction actions: (a) insurance and (b) diversification.
- This research examines pre- and post-storm (Hurricane Katrina and Rita) activity to examine which form of risk reduction activity tended to be more prevalant.

Offshore Insurance

Offshore Oil and Gas Insurance

- Similar to other forms of commercial insurance that are based upon a premium-deductibles structure.
- Historically (late 1960s, early 1970s) deductibles were allowed to go to relatively low levels.
- Few underwriters but many brokers – underwriters rarely met with the actual companies.
- Oil spills and other environmental events of the late 1960s and early 1970s (forward) put increasing pressure on the industry.
- Stakes increased as production moved to more capital inventive and costly investments.
- Insurance options included:
  a) traditional insurance
  b) self-insurance
  c) club or pooling insurance
  d) catastrophe bonds

Traditional Insurance

- Typically a premium and deductible structure. In recent times total cap on overall coverage.
- Annual premiums usually run around 0.75 percent of total platform/structure replacement value.
- Typical $1 billion facility would pay $7.5 MM per year at such levels.
- Some reported statistics have companies spending as much as 0.4 percent of gross revenue on physical insurance products.

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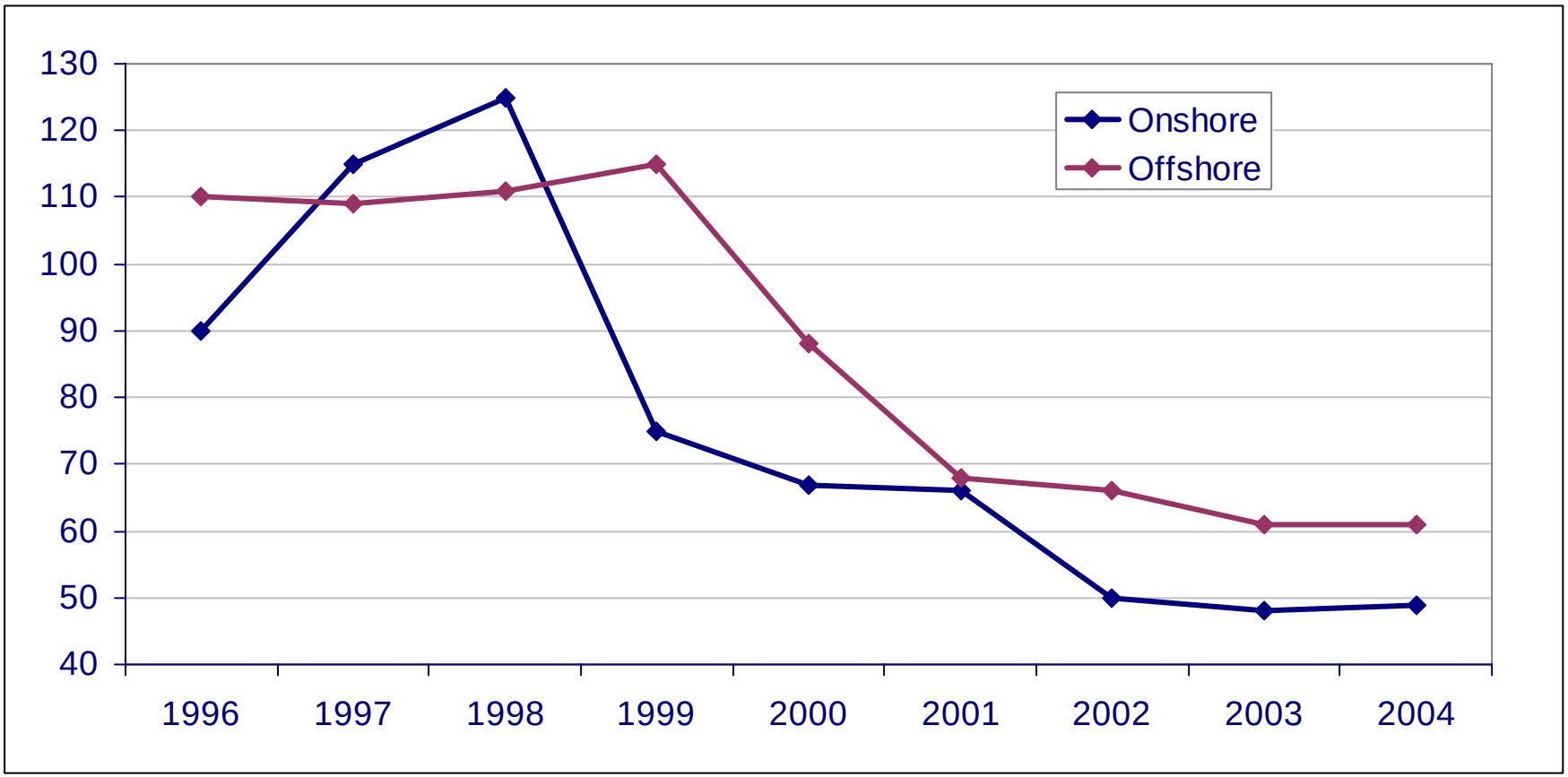
Number of Energy Insurers Worldwide



Note: Values are estimated from source.

Source: Gosselin (2006)

Pre-Katrina Insurance Trends

- Premiums had been falling since 2001 and prior to storms (2004) had seen significant reduction.
- Premiums 2004-2005 (pre-storm) are reported to have fallen by as much as 20%.
- Competition, lack of major claims, long stream without major claims are some of the reasons for the reductions in premiums.

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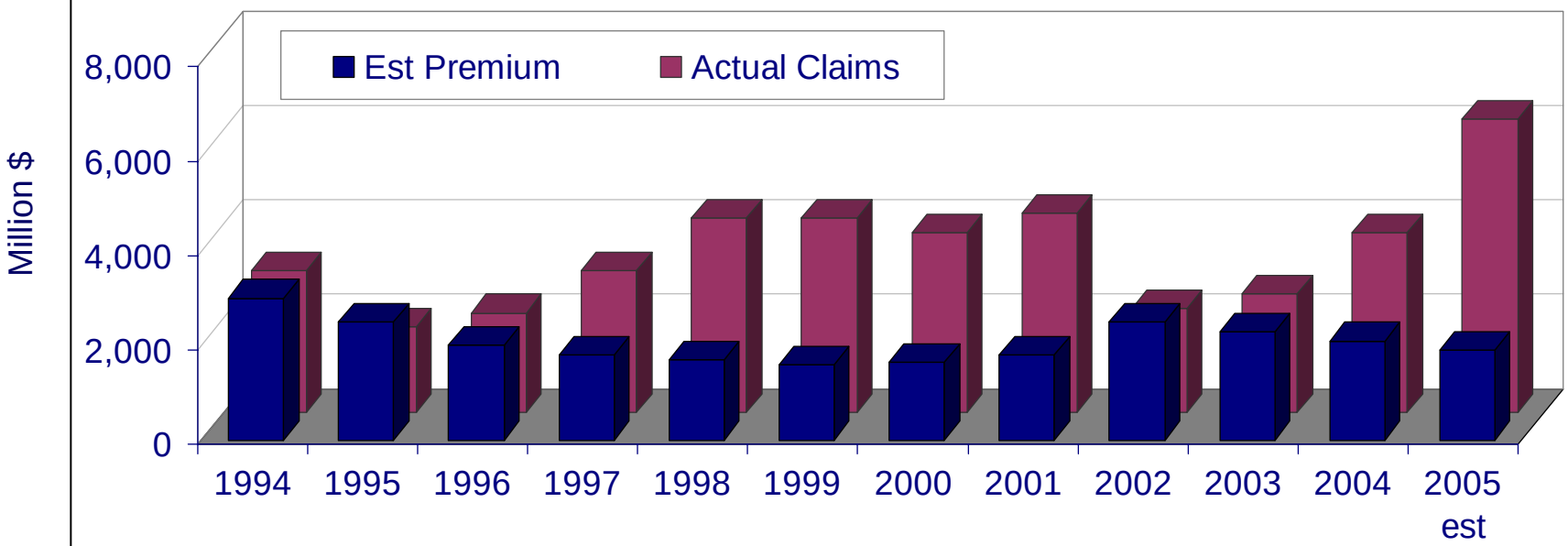
Estimated Energy Losses 1994–2005
Global Energy Premium vs. Claims
Onshore and Offshore

	1994-2004	1994-2005 est
GWP	$ 27,850	$ 30,080
Claims	$ 35,000	$ 42,450
L/R	1.26	1.41



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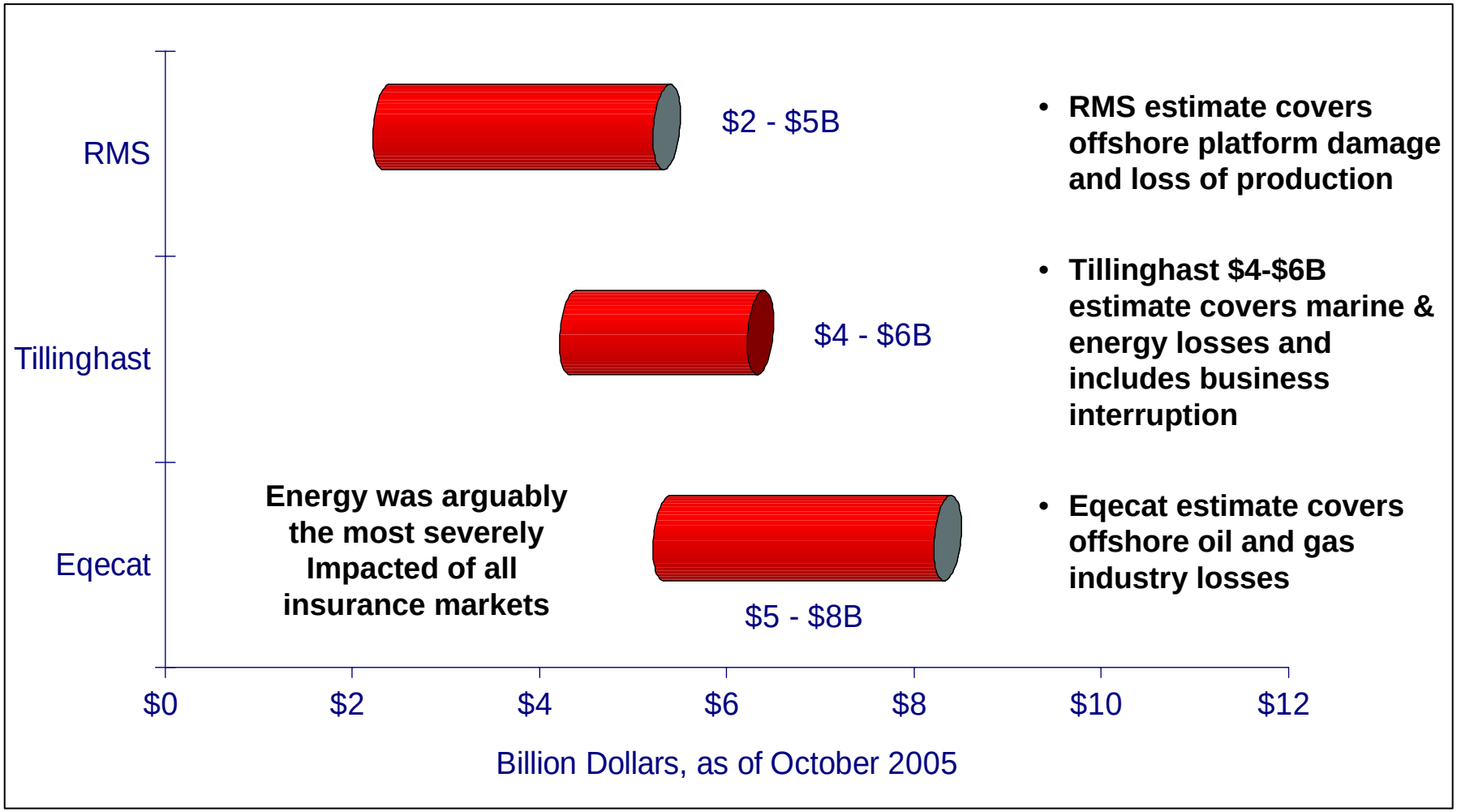
Energy Insured Loss Estimates – Katrina Only

Insurance damage losses will have to be made up – reduced coverage, higher premiums, and coverage caps



- **RMS estimate covers offshore platform damage and loss of production**
- **Tillinghast $4-$6B estimate covers marine & energy losses and includes business interruption**
- **Eqecat estimate covers offshore oil and gas industry losses**

Source: Hartwig (2006)

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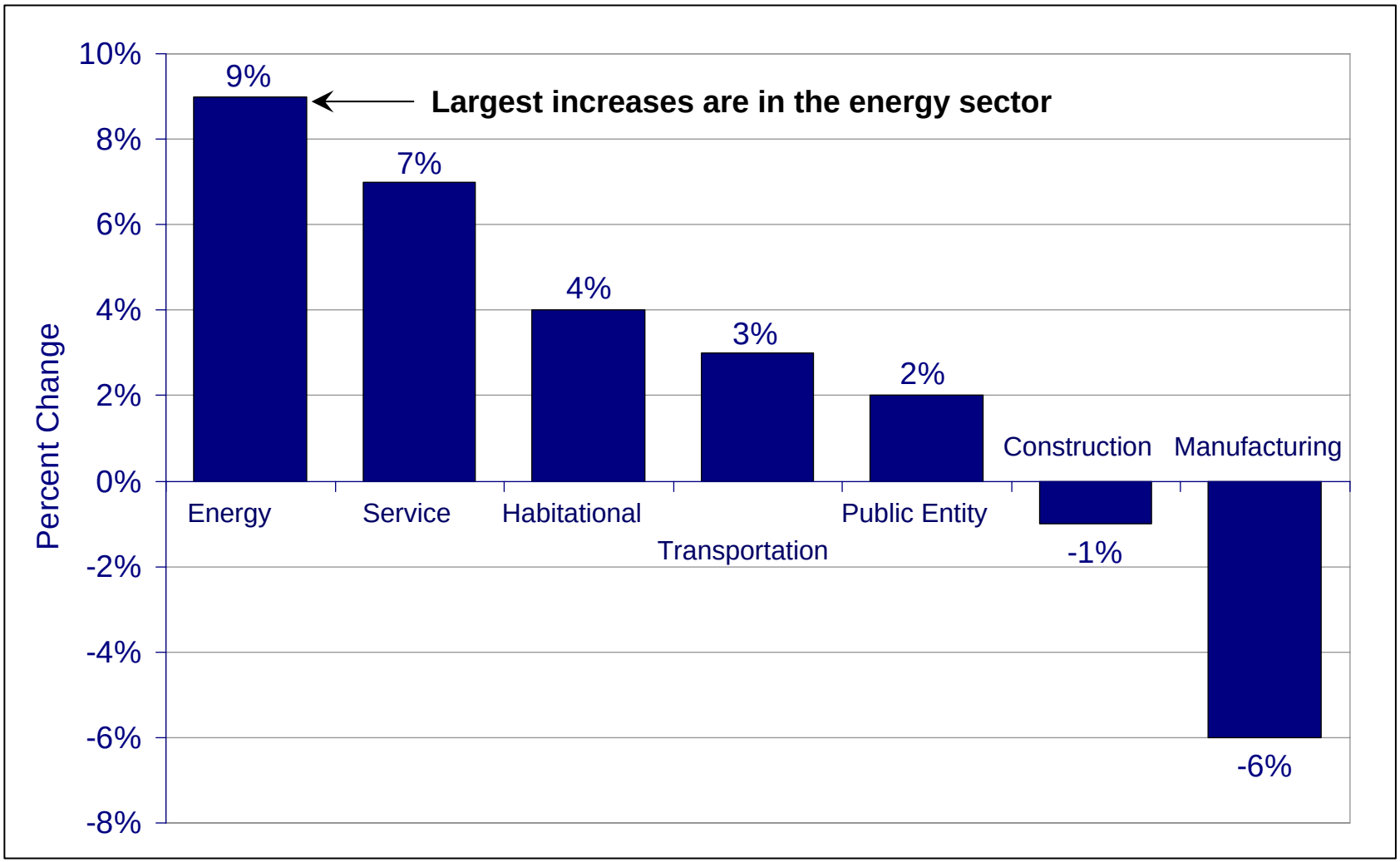
Average Rate Increase/Decrease by Industry Class (2005–2006)



Source: MarketScout.com

Post-Katrina Insurance Trends

- Increasing premiums with some individual reports of over 100% increase in insurance costs (not clear if this was limited to physical costs alone, or included business interruption).

- Less coverage:

  - Higher deductibles
  - Total claims caps – basic caps at $1 MM with amounts in excess covered under supplemental programs.
  - OIL Insurance – reduced pre-event claims from max of $1 billion to $500 MM.

Self-Insurance

- Larger companies can individually insure all or parts of their operations.
- Typically done through the creation of a financial storm reserve (deferred account) into which capital is transferred for recovery.
- Reserves can be drawn upon in times of catastrophic events.
- Challenges:
  - Determining the appropriate reserve balance
  - Determining the reserve build-up schedule
  - Assessing opportunity cost of capital

Pool or Club Insurance

- Groups of similarly-situated companies pool their resources for coverage.
- Challenges in defining “similarly-situated” companies involve defining their risk and exposure profiles.
- Relatively homogeneous groups are much easier to work within this framework than others.
- Some examples are in the oil and gas industry as well as in supporting industries like shipping/maritime.
- Oil Insurance Ltd. (“OIL”) is an example although its formation principles have changed over time.

Example: OIL Insurance

- Formed in 1971 in reaction to large catastrophic challenges for onshore (refinery) and offshore (oil spill) incidents.
- Originally formed as what is referred to as a “spread-loss” company.
- Located in Bermuda and has 2008 net income of over $37 billion (2006 had net income loss of $118 million).
- Originally formed by 15 oil and gas companies (many integrated). Participation was as large as 50 in 1992, today approximately 43 companies.
- Coverage is limited to physical damage, well control, and pollution control.
- Collectively, these companies have balance sheets that dwarf those of most commercial insurance companies.

Example: OIL Insurance (continued)

- Original governing documents noted:

  "… the parties have found that there is no longer available to petroleum companies, on terms consistent with sound business practice, commercial insurance covering substantial risks including catastrophe coverage for on-shore and off-shore property, pollution, and bring under control wild oil or gas wells …

  … Parties have determined that this requires the formation of a new insurance company whose shareholders will be those petroleum-related companies that become policy holders of the new company."

Example: OIL Insurance (continued)

- Originally set up like a risk-financing facility.
- Premiums were collected in advance and segregated reserves were maintained. These reserves were specifically identifiable to the individual participants.
- For a claim in excess of the reserve, company would pay a “retroactive premium” amortized over 5 years, to replenish its own account in the fund.
- Note: this does not shift or reduce risk (just reimbursement risk). As a result, Supreme Court (*Lincoln Loan Assc.*) ruled that these types of mechanisms are not a true insurance expense and are deductible for tax purposes.
- OIL then reformed upon more traditional lines that pooled the reserve. Shift from “spread-loss” to “mutual” insurance company.
- Assumed that all faced same risk and that size was only differentiating factor for premium purposes.

Catastrophe Bonds "Cat Bonds"

- Financial securities developed to shift risk from offshore producers/operators to the market.
- Market determines the value of risk, which varies as securities are traded across parties and time.
- Very efficient means of shifting risk (provided there is a market).
- Bonds are purchased at price plus return for fixed period.
- Proceeds are used to cover the losses from a qualifying catastrophic event.
- If event does not occur by maturity date, investor gets returns.
- Market has grown rapidly since 2005 where it was $994 MM – recently, $4.631 billion (2007).

Changes in Diversification

Diversification

- Another means of reducing risk is to simply reduce exposure by sharing the risk (and rewards) with other willing parties.
- Securing different owners/operators as partners in a particular project is an example of diversifying risk through ownership.
- Parties can enter into swapping agreements where risk-averse party trades its higher return/higher risk asset with more risk-seeking party that has lower (relative) risk/lower return asset.
- Our second analysis has been in examining ownership changes to determine whether these types of activities were occurring in the aggregate after the 2005 tropical season.
- We examined a number of different ownership structures pre- and post-storm to see if there were any significant empirical changes in the number of owners or the “velocity” of ownership changes.

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Top 25 Operators by Pre-Storm Volume: Oil

	Operator	Pre Storm Volume (MMBbls)	Post Storm Volume (MMBbls)	Difference (%)
1	Shell Offshore Inc.	288.1	300.4	4.3%
2	BP Exploration & Production Inc.	157.4	256.2	62.8%
3	Chevron U.S.A. Inc.	129.8	120.3	-7.4%
4	Kerr-McGee Oil & Gas Corporation	69.9	90.2	29.0%
5	Exxon Mobil Corporation	46.5	37.8	-18.7%
6	Apache Corporation	33.0	49.8	50.8%
7	Hess Corporation	27.5	26.2	-4.8%
8	Nexen Petroleum U.S.A. Inc.	17.9	n.a.	n.a.
9	Marathon Oil Company	17.1	14.5	-15.1%
10	Pogo Producing Company	16.1	n.a.	n.a.
11	Eni Petroleum Co. Inc.	14.4	28.9	101.1%
12	Devon Energy Production Company, L.P.	13.5	12.0	-10.7%
13	BP America Production Company	13.1	n.a.	n.a.
14	Murphy Exploration & Production Company - USA	12.4	30.9	148.9%
15	Newfield Exploration Company	12.0	n.a.	n.a.
16	Shell Gulf of Mexico Inc.	11.7	14.4	23.7%
17	Dominion Exploration & Production, Inc.	10.9	27.6	153.0%
18	Union Oil Company of California	10.8	n.a.	n.a.
19	Anadarko Petroleum Corporation	10.5	25.6	144.1%
20	Murphy Exploration & Production Company	10.0	n.a.	n.a.
21	Devon Louisiana Corporation	9.4	n.a.	n.a.
22	Walter Oil & Gas Corporation	8.1	10.4	27.8%
23	Stone Energy Corporation	8.1	12.8	58.7%
24	BHP Billiton Petroleum (GOM) Inc.	7.7	n.a.	n.a.
25	TOTAL E&P USA, INC.	6.6	n.a.	n.a.

Note: Pre-storm is Aug 2003 through July 2005; Post-storm is Oct 2005 through Dec 2008

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Top 25 Operators by Pre-Storm Volume: Natural Gas

	Operator	Pre Storm Volume (Bcf)	Post Storm Volume (Bcf)	Difference (%)
1	Shell Offshore Inc.	1,004.7	981.5	-2.3%
2	Chevron U.S.A. Inc.	677.6	590.0	-12.9%
3	BP Exploration & Production Inc.	584.5	411.8	-29.5%
4	Kerr-McGee Oil & Gas Corporation	476.6	469.6	-1.5%
5	Exxon Mobil Corporation	439.8	348.0	-20.9%
6	Apache Corporation	363.9	550.6	51.3%
7	Newfield Exploration Company	252.7	198.3	-21.5%
8	Union Oil Company of California	248.2	152.9	-38.4%
9	Pioneer Natural Resources USA, Inc.	169.1	n.a.	n.a.
10	Walter Oil & Gas Corporation	151.0	128.2	-15.1%
11	Devon Energy Production Company, L.P.	146.2	115.1	-21.3%
12	Dominion Exploration & Production, Inc.	135.9	148.5	9.3%
13	Hess Corporation	128.2	105.8	-17.5%
14	TOTAL E&P USA, INC.	127.1	n.a.	n.a.
15	Forest Oil Corporation	125.3	n.a.	n.a.
16	Stone Energy Corporation	119.7	101.5	-15.2%
17	El Paso Production GOM Inc.	118.5	n.a.	n.a.
18	The Houston Exploration Company	107.7	n.a.	n.a.
19	BP America Production Company	106.7	n.a.	n.a.
20	Hydro Gulf of Mexico, L.L.C.	99.7	83.7	-16.0%
21	Eni Petroleum Co. Inc.	98.3	158.8	61.5%
22	W & T Offshore, Inc.	97.8	135.5	38.6%
23	Marathon Oil Company	96.0	n.a.	n.a.
24	Remington Oil and Gas Corporation	95.0	n.a.	n.a.
25	GOM Shelf LLC	94.5	111.5	18.0%

Note: Pre-storm is Aug 2003 through July 2005; Post-storm is Oct 2005 through Dec 2008

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Production on Leases with Structures Damaged or Destroyed by Katrina/Rita

Impact on Structure	Pre-Storm Production (MMBbls)	Post-Storm Production (MMBbls)	Percent Change
Damaged	125.5	133.8	6.6%
Destroyed	31.9	1.6	-94.9%
Total	157.4	135.4	-14.0%

Impact on Structure	Pre-Storm Production (Bcf)	Post-Storm Production (Bcf)	Percent Change
Damaged	680.9	508.1	-25.4%
Destroyed	161.2	47.8	-70.4%
Total	842.1	555.9	-34.0%

Note: Pre-storm is Aug 2003 through July 2005; Post-storm is Oct 2005 through Dec 2008

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Lease Ownership Changes

Impact on Structure	Pre-Storm Number of Owners*	Post-Storm Number of Owners**	Percent Change
Damaged	1.87	1.85	-0.7%
Destroyed	1.63	1.65	1.1%
All Leases	1.51	1.38	-8.6%

Note: *Average number of owners per month during the pre-storm period (August 2003 through July 2005).

**Average number of owners per month during the post-storm period (October 2005 through December 2008).

Questions, Comments, & Discussion

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