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# **The 2012 Reinsurance Market: Changing Tides**

January 1, 2012

**HOLBORN®**

## The 2012 Reinsurance Market: Changing Tides

Over the last twelve months, U.S. reinsurance **programs with rate increases outnumbered those with decreases**. In many areas, market minimum rates on line increased by meaningful amounts between mid-year 2011 and January, 2012. This is the first time since 2006 that the overall market has risen significantly. Many year-end renewals were completed later than in prior years.

In addition, **primary rates in the U.S. have also been rising**, with flat to slight increases in most commercial classes during the summer months, and moderate increases on most renewals in the 4th quarter. Personal property rates have been rising in many areas for over a year due to catastrophe concerns.

We expect that overall **reinsurance market capital levels will be down** when December 31 figures are posted. Reinsurers with disproportionate exposure to large foreign events or sovereign debt problems in Europe will show relatively larger declines. For most classes of business and for most U.S. zones, industry capital more than supported the current demand. Only in Florida and the Northeast were levels of demand above current supply.

**A key driver of industry capital and results has been an unprecedented worldwide run of catastrophe losses**, and to a much lesser degree, U.S. weather-related events. We expect development on these losses to reduce reinsurers' profits in 2012, as the market has not yet fully reported the Time Element loss in Japan, the June aftershocks in New Zealand, or the flood damage in Thailand.

Part of the recent frequency of large events is simply chance. However, our review of large loss experience over the last 50 years shows a consistent trend in large losses that the market has now begun to reflect. A major cause is **exposure growth outside of the U.S.**, and while reducing available capital, price corrections should be relatively gentler here. The factors increasing foreign exposure levels include the spread of the free-market economic system, especially in Eastern Europe and Asia, more economic development in many countries, increased financing (and insurance) on properties and autos, broader forms of insurance coverage and, until very recently, soft terms and conditions in what had been seen as reinsurance "cold spot" territories, such as Asia and Latin America.

Although there have been surprising developments in Europe, both positive and negative, exchange rates did not change much overall during 2011. Reinsurers partly wrote down the sovereign debt of Greece and other peripheral members of the Euro zone. Some European regulators are now suggesting that all government bonds need to be carried at less than par value. This would sharply reduce the capital levels and share prices of insurers and banks in the peripheral countries, and to a lesser extent in the stronger economies of France, Switzerland and Germany. The likely **restructuring of the EU and the Euro zone may cause large swings in capital levels** for certain reinsurers during 2012 and is a further source of uncertainty. Concern about sovereign debt has recently caused downgrades.

## **Overview**

Our analysis follows at the links shown below:

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## **A. Current U.S. Market Conditions**

### **I. Property Catastrophe**

Catastrophe renewals at mid-year 2011 were largely loss free, but premiums on most coastally-exposed accounts increased moderately due to catastrophe model changes.

Accounts that renewed at year-end are more typically inland companies, and while model changes were often smaller, many accounts had experienced tornado or other weather losses in 2011, and in some cases in several previous years. On lower layers, specific increases largely tracked with individual experience. In many areas, top layer rates on line trended higher.

**January 1, 2012**

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### Property catastrophe rate-on-line increases

	Coastal Exposed		Non - Coastal	
	with Recent Loss	without Loss	with Recent Loss	without Loss
January, 2006	+25% to +100%	+10% to +25%	+20% to +50%	+5% to +15%
April – July, 2006	+60% to +300%	+30% to +100%	Few placements	Few placements
January, 2007	+15% to +40%	0% to +20%	+10% to +25%	-10% to +10%
April – July, 2007	-10% to 0%	-20% to -10%	Few placements	Few placements
January, 2008	-20% to -10%	-20% to -10%	-15% to -5%	-15% to +5%
April – July, 2008	-15% to -5%	-20% to -10%	Few placements	Few placements
January, 2009	+15% to +50%	+5% to +20%	+10% to +40%	0% to +10%
April – July, 2009	+15% to +40%	+10% to +20%	Few placements	Few placements
January, 2010	-5% to 0%	-15% to -5%	+5% to +15%	-10% to -5%
April – July, 2010	-15% to -5%	-10% to -5%	Few placements	Few placements
January, 2011*	Few placements	-10% to +5%	-5% to +10%	-10% to -5%
April – July, 2011	Few placements	0% to +20%	Few placements	Few placements
January, 2012	+10% to +50%	+5% to +12.5%	+10% to +50%	+5% to +10%

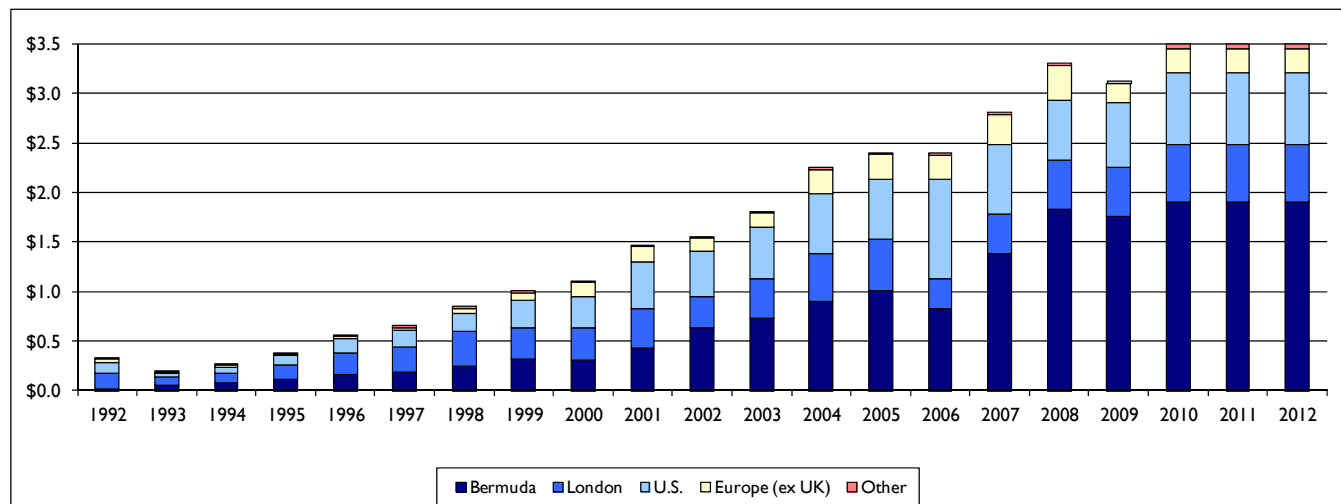
Notes: Measured in dollar amounts for programs with comparable exposure levels, all-layers combined.

\*Includes mid-year anniversary renewals that were placed prior to April.

### Coastal and national accounts

Many of these accounts renewed at mid-year. Some national programs placed substantially higher limits at mid-year 2011, although both State Farm and Allstate placed less, and other large programs were reduced at year-end. Reinsurers generally reacted to RMS v.II changes, international losses, or both by holding their capacity level. Many reported reserving their expiring capacity for renewal business and having little, if any, to offer new relationships.

## Property catastrophe capacity



Note: Size of largest actual U.S. placement in \$Billions, based on maximum amount exposed in any zone by a single ceding company program, including aggregate excess contracts. Excludes Cat bond capacity or side cars. Market regions are shown by underwriting office, not domicile.

## Florida and Gulf

Florida-exposed companies have been buying larger programs from the market to supplement the FHCF's reduced bonding capacity. Most private sector insurers faced higher Cat model estimates under RMS v.11, although Citizens Insurance did not. Many domestic companies are highly concentrated and had difficulty affording enough protection. Florida remains the largest commitment of reinsurers' capacity in the world, at about \$80 billion. Florida programs saw relatively larger rate increases than many other U.S. programs in 2011.

In addition to the higher losses on inland locations in RMS v.11 and earlier in AIR v.10, the RMS update also reflects building code and construction differences between the Gulf and Atlantic coastlines. Reinsurers cited these changes as further support for higher prices on Gulf-exposed renewals.

## Other U.S. zones

Capacity remains tight in the Northeast for wind exposure and in Southern California for shake exposure. The Northeast also faces much higher hurricane model estimates in RMS v.11. In California, however, reinsurers reflected the lower earthquake model results which were introduced in 2009. Outside of those few peak concentration zones, regional capacity was still ample.

## Involuntary markets

Two large programs re-entered the market in 2011. Citizens Insurance, which writes 40% of the Florida personal wind market values (as either Homeowners or Wind-only policies) and over 60% in the more-exposed southern counties, placed a \$550 million program. The Texas Windstorm Insurance Association placed a \$636 million program. TWIA had gone bare following Hurricane Ike. Both placements cost more than the facilities' earlier treaties.

## Collateralized reinsurance and Cat bonds

For the first time, Cat bond investors have lost significant amounts of capital on several Japanese exposed bonds and two U.S. inland wind bonds. Fund managers and “alternative asset” investors also have invested directly in insurance risk by providing fully-funded limits, largely in peak zones and for retrocessions. Many hedge funds have focused lately on opportunistic positions in European bonds, with higher interest spreads, and have not been as supportive of insurance risk as in the past. Several multi-strategy funds remain interested in insurance risk and can move quickly if opportunities meet their return requirements. New Cat bond placements in 2011 varied in size, but considering the reduced placements on outstanding multi-year bonds, total commitments remain below 2007 volumes.

## Retrocessions and ILWs

The retrocessional market showed increased interest, but at current prices there was limited traditional supply. Some reinsurers have placed quota shares of their excess of loss portfolios, often with support from primary insurers, who were either willing to provide reciprocity to a major trading partner, or sought diversification. Many of these quota shares had significant losses in 2011.

ILW placements outside of the U.S. attached as low as \$5 billion, and many were triggered by the international earthquakes. The market reports high interest in ILW’s, but little agreement on terms.

## 2. Clash, WC and Life Catastrophe

Overall market capacity for some peak zones has tracked with industry capital. Costs for some lower layers fell as reinsurance prices were impacted by lower subject premium or levels of underlying exposures. Higher layer ROLs are consistent with market minimums for Property Cat. There is a continuing trend to place per person covers and higher MAOLs in Catastrophe covers.

Clash, WC and Life Catastrophe	
January, 2006	-5% to +5%
April – July, 2006	-10% to 0%
January, 2007	-10% to 0%
April – July, 2007	-15% to -10%
January, 2008	-15% to -10%
April – July, 2008	-20% to -10%
January, 2009	-3% to +5%
April – July, 2009	-5% to +3%
January, 2010	-15% to -5%
April – July, 2010	-15% to -5%
January, 2011	-15% to +5%
April – July, 2011	-5% to +5%
January, 2012	0% to +5%

Note: Measured in dollars amounts or ROLs.

Comparable programs at renewal.

### 3. Policy - Exposed Contracts

With lower subject bases, some mid-year renewals were at lower premium amounts. But by year-end, many renewals showed increased estimated subject premiums as audit returns stabilized and original rate increases took effect. These types of treaties do not depend on capital levels as much as Catastrophe covers do. Rates for renewals were largely driven by accounts' individual experience which has often been poor, sometimes offset by higher subject premiums.

	Working	High Excess With Recent Losses	High Excess With No Loss
January, 2006	0% to +10%	+15% to +25%	0% to +15%
April – July, 2006	0% to +30%	+25% to +50%	+5% to +15%
January, 2007	0% to +40%	+10% to +25%	-10% to 0%
April – July, 2007	10% to -5%	0% to +10%	10% to 0%
January, 2008	-10% to -2.5%	0% to +10%	10% to 0%
April – July, 2008	-5% to +5%	-0% to +10%	-10% to 0%
January, 2009	-5% to +10%	+25% to +50%	0% to +10%
April – July, 2009	-5% to +10%	+25% to +50%	0% to +10%
January, 2010	-5% to 0%	0% to +15%	-10% to +5%
April – July, 2010	-5% to 0%	0 to +15%	-10% to -5%
January, 2011	-5% to +10%	+5% to +20%	-5% to -10%
April – July, 2011	-5% to +5%	+5% to +20%	-5% to +5%
January, 2012	-5% to +12.5%	+10% to +25%	-5% to +5%

Note: Measured as rates on subject income, not dollar amounts

#### Property Per Risk

Since the 2008 economic downturn, there has been an increased number of losses (often fires) to large risks worldwide and to many U.S. middle market accounts. This drove rate increases in some cases. The higher frequency may be related to housekeeping and maintenance. We have not seen an uptick in arson. The increased frequency reverses a favorable trend that has helped the industry's profitability, despite low direct prices. Insurance to value has also been a challenge, due to low real estate prices. Reinsurers have been closely assessing catastrophe peril exposures, especially in areas with large model increases.

#### Casualty, including Umbrella

A number of foreign players (such as AWAC, Aspen, Catlin and Tokio Millennium) have entered the on-shore Casualty market in the last few years.

Reinsurers expressed concerns about very low interest rates, soft pricing in the primary market, decreasing reserve adequacy and (in a recent change) adverse trends in WC. Reinsurers noted that, in the longer term, the Federal deficit and a weaker dollar can increase inflation and healthcare reform will raise the medical costs covered by WC and liability coverages.

## **4. Terrorism Coverage**

Reinsurers have been writing their terrorism exposures without retrocessions or TRIA protection (and often competing for capacity with their affiliates' direct operations), and the market has developed differently than for natural perils:

- At the top end of programs, limits were generally kept at or below the companies' TRIA retentions, which had fallen with subject premium incomes.
- Somewhat less capacity is available (over \$1 billion per ceding company, less in "Tier 1" cities). This is ample for most regional carriers, but not for nationwide accounts with multi-billion dollar TRIA retentions. Some commercial nationals have not bought terror protection beyond TRIA. Regional carriers often had broader coverage in underlying programs and also purchased higher Cat and Clash limits for terror.
- NBCR coverage is more constrained at \$500 million (less for key cities) and it remains expensive. It was more common in regional account and Life and Accident placements.
- Companies exposed in the Northeast, and especially in metropolitan New York, have found capacity tight for both windstorm and terrorism and often chose to limit their terrorism protection, in order to maximize windstorm coverage.

## **5. Outlook for Mid-year Renewals**

We expect reinsurers' capital levels to be flat at best in early 2012, as 2011 Cat losses will continue to develop and prior Casualty reserve redundancies have already been reflected. Reinsurers' share prices will remain below their book values. Few reinsurers will have met their earnings targets over the last several years. Recent trends of mergers, management changes and re-underwriting will continue. Underwriters are asking more about areas that have not been modeled in the past, such as Flood and foreign exposures.

## B. 2011 Loss Activity

Holborn tracked 28 large events this year with over \$110 billion in direct losses. Losses to reinsurers are the highest ever when measured in dollars, and near record levels when measured relative to reinsurers' premiums and capital, or the worldwide economy.

### I. 2011 Reinsured Events

Event	Date	Description	Reported Deaths	Direct Loss (\$Mn)	Reinsured Loss (\$Mn)
Queensland Floods	12/2010 - 1/2011	Series of floods. 75% of Queensland declared a disaster zone. Major damage in Brisbane.		\$5,000	\$2,000 to \$2,500
Alberta Horizon Fire	January 6th	Fire at Canadian Natural Resource's oil sands plant near Fort MacKay, Alberta, with both extensive physical damage and extended shut down.	0	\$1.350	Direct
Victoria Floods	January 14th	High intensity rainfall caused flash flooding in the Australian state of Victoria.	2	\$1,000	\$250 - \$500
Northeast U.S. Ice and Snow	January 18th	Heavy snowfalls and ice; many collapse and leak claims.	0	>\$5,000	Moderate
Cyclone Yasi	February 3rd	Landfall in northern Queensland, Australia.	1 Indirect	\$2,000	\$750 - \$1,000
Gryphon Shutdown	February 4th	Maersk Oil's floating production vessel, Gryphon, lost anchors during a storm. Lost production of 14,500 barrels a day.	0	\$1,000	Direct
Christchurch Earthquake (NZ I I)	February 22nd	Epicenter 6.2 miles southeast of Christchurch.	172	\$15,000	\$12,500
Japan Earthquake and Tsunami	March 11th	Offshore epicenter 80 miles from Sendai, popul. 1 Mn. Tsunami of 25 to 75 feet. Level 7 nuclear event.	>20,000	> \$50,000	>\$20,000
Mississippi Floods	April and May	Among largest recorded along U.S. waterway in past century. 25,000 homes evacuated.		\$3,000	Moderate
Alabama Tornado Outbreak	April 27th	Series of tornado outbreaks affecting Tuscaloosa and Birmingham, Alabama.	249	\$6,000	\$1,000 - \$2,000
Alberta Wildfires	May 15th	Fires near Great Slave Lake in northern Alberta shut down oil sand operations and destroyed most of a resort town of 7,000.	0	\$1,000	<\$500
Joplin, MO Tornado Outbreak	May 22nd	Multiple vortex tornado through Joplin, MO.	160	\$4,000	\$1,250 - \$1,750
Springfield Tornado Outbreak	June 1st	New England tornado devastated Springfield, MA and surrounding areas. Outbreak spawned seven tornados affecting MA & ME.	3	\$400	\$100
Cyprus Power Station	June 11th	An explosion at a munitions dump in S. Cyprus ignited 2,000 tons of explosives damage the island's largest power station.	12	\$1,000	Direct
Christchurch Aftershock (NZ I I I)	June 13th	Aftershock from the earthquake that occurred in February.	0	\$5,000	\$4,000
Mumbai Terror Attacks	June 13th	Bombings at the opera house, bazaar and a bus shelter.	19	Significant	<\$100
Copenhagen Floods	July 2nd	Storm with heavy rain and some surge. Subway system flooded.		\$850	\$250 to \$500
UK Riots	August 6th - 10th	Riots and looting in several English cities, partly covered by government plan.		\$250 to \$500	<\$100
Midwest Hailstorm	August 18th	Hundred mph straight-line winds with "baseball-sized" hail across Dakotas, MN, IA and WI		\$1,000	<\$200
Hurricane Irene	August 28th	Landfalls in Northern Outer Banks as a 'I', near Atlantic City as a 'I' and Coney Island as a TS. Extensive rain and flooding in Hudson Valley and New England. 7.5 million locations lost power.	44	\$5,000 to \$7,500	\$1,500
Typhoon Talas	September 4th	Landfall in Honshu, NE of Tokyo. Extremely heavy rainfall caused heavy flooding. 700 homes inundated.	100+	\$350	<\$100
Tropical Storm Lee	September 4th	Gulf Coast landfall with moderate damage, one foot of rain in Susquehanna Valley of NY and PA following Irene caused further flooding, especially near Binghamton, NY		\$500	<\$100
Texas Wildfires	September 20th	3.8 million acres burned.		\$500	<\$100
Typhoon Roke	September 21st	Landfall on Honshu, NE of Tokyo TS winds in Tokyo, inland flooding		\$600	<\$100
Van, Turkey Earthquake	October 29th	Epicenter 40 miles from Iranian border	>500	<\$1,000	Little
Thai Floods	Since July	Bangkok and other cities affected. Extensive CBI.	>600	> \$10,000	> \$5,000
Halloween Weekend Blizzard	October 29th	Nor'easter caused heavy snowfall, extensive tree limb damage and power outages.	5	Approx. \$1,000	\$200 to \$300
Toulouse-Genoa Floods	November 4th	Large storm with over 12 inches of rain caused widespread damage in Western Europe and North Africa, with the worst damage in SE France and NW Italy.	6	\$1,000	\$200 - \$400
28 Events	N. America, Europe, Asia, Australia, New Zealand	EQ, Tornado, Hurricane, Flood, Risk and Terror	>20,000	Over \$110,000	Over \$50,000
5 Events over .01% of GDP	Asia, Australia, New Zealand	EQ and Flood	>20,000	Over \$80,000	Over \$40,000

## 2. 2010 and 2011 in Context

**Large losses in 2010 and 2011 are a larger hit to professional reinsurers' earnings and capital than in 2004 and 2005.**

Accident Year	Midpoint Loss Estimates (\$Bns)	Percent of Gross Premiums	Percent of Beginning Capital
2001	\$24.0	19.1%	30.9%
2002	\$1.5	1.0%	2.0%
2003	–	–	–
2004	\$4.0	2.0%	2.8%
2005	\$28.0	15.1%	19.3%
2006	–	–	–
2007	–	–	–
2008	\$6.5	3.4%	3.8%
2009	–	–	–
2010	\$13.5	6.3%	6.3%
2011	\$48.0	22.1%	22.4%

Notes: Holborn loss and LAE industry estimates for events over 0.01% of G7 GDP to reinsurers.

Pre-tax, nominal (i.e., uninflated) dollars.

All coverages combined, including direct lines.

Premiums and capital for worldwide panel of firms predominantly in reinsurance. These reinsurers do not assume 100% of the industry loss.

Companies in run-off excluded from on-going capital totals.

Major losses in the last two years cost reinsurers as much as in the preceding eight years combined, including Katrina and the 9/11 attacks. Our analysis of the larger 2011 events follows.

## 3. Major Foreign Losses

### New Zealand Earthquakes

The South Island was hit by magnitude 6.3 and 5.6 quakes on February 22<sup>nd</sup>, very close to Christchurch, which has a regional population near 500,000. Magnitude 6.0 and 5.2 shocks occurred on June 13<sup>th</sup>. These were notably shallow events, and more damaging than the magnitudes alone suggest. All were aftershocks to the September 4, 2010 magnitude 7.1 quake (epicentered 25 miles to the west) but are considered two further occurrences under standard insurance and reinsurance contracts.

Many buildings were total collapse losses, more than seen last September. As in Chile last March, there are standing buildings that are still constructive total losses. Almost all property is insured for a primary earthquake layer by the government commission, with many owners placing excess layers

commercially above that. There is little privately insured PA or WC business in New Zealand, although there were losses on Life and Travel coverages.

Loss reports by insurers are far higher than the Cat models estimated, with significant losses to Time Element and excess property coverages. We estimate \$15 billion in direct losses for the February occurrence, and \$5 billion for June.

### Japan March 11<sup>th</sup> Earthquake and Tsunami

The magnitude 9.0 quake was one of the five strongest in the previous hundred years. It was the strongest ever near a major city in a developed country. The shake, tsunami and resulting fires damaged property over a wide area, most notably the reactors and fuel storage pools at the Fukushima power station, causing extended evacuations.

### Losses by Coverage

Estimated Losses By Coverage (Including Demand Surge)	
Shake and Fire Following	\$16 Bn to \$23 Bn
Tsunami on-shore	\$7 Bn to \$12 Bn
<u>Tsunami on the Coast</u>	<u>\$3 Bn to \$5 Bn</u>
<b>Sub-total: Modeled Lines</b>	<b>\$30 Bn to \$38 Bn</b>
CBI and on-shore Cargo	\$5 Bn to \$10 Bn
Life and Accident	\$2 Bn to \$4 Bn
<u>Travel, Auto "Gap", Credit</u>	<u>\$1 Bn to \$2 Bn</u>
<b>All Insured Losses</b>	<b>\$33 Bn to \$52 Bn</b>
<u>Loss Adjustment</u>	<u>\$2 Bn to \$4 Bn</u>
<b>Market Loss and LAE</b>	<b>\$45 Bn to \$55 Bn</b>

### Losses by Market Segment

Market Segment	Direct Losses	Ceded to Cat	Ceded to Risk	Non-Market Retro	Net
Japanese General	\$15 Bn to \$20 Bn	(\$4 Bn to \$8 Bn)	(\$2 Bn to \$4 Bn)	\$0	\$8 Bn to \$16 Bn
Co-operatives	12 Bn to 16 Bn	(4 Bn to 6 Bn)	0	0	6 Bn to 12 Bn
Foreign Direct	8 Bn to 12 Bn	(1 Bn to 2 Bn)	(1 Bn to 2 Bn)	0	6 Bn to 10 Bn
Life Companies	2 Bn to 4 Bn	(0 Bn to 2 Bn)	0	0	2 Bn to 3 Bn
Rated Reinsurers	5 Bn to 15 Bn	8 Bn to 12 Bn	3 Bn to 5 Bn	(1 Bn to 2 Bn)	17.5 Bn to 27.5 Bn
Cat Bonds / Collateralized	0	0	0	1 Bn to 2 Bn	1 Bn to 2 Bn
<b>Total</b>	<b>\$45 Bn to \$55 Bn</b>				<b>\$45 Bn to \$55 Bn</b>

Sources: *Holborn estimates based on Cat models where applicable, market loss reports and publicly traded companies' disclosures.*

## **Foreign Flood Losses – Thailand, Europe and Australia**

Following the heaviest monsoon season in the last fifty years in Thailand and neighboring countries, the Chao Phraya river has been above flood stage in Bangkok and other areas since July. Holborn estimates that the industry loss is well over \$10 billion direct and over \$5 billion ceded. We base our estimates on reports that:

- 1,000 factories in the Bangkok area are flooded. A large Honda assembly plant and 25% of the world capacity for disk drives are out.
- 750,000 homes and 1,000 schools are flooded.
- The death toll is over 650.
- Thailand is the richest country in the area, and fast growing, although still relatively poor with GDP per capita about 11% of the U.S. level.
- Their insurance market is more developed than many in Asia. Thailand's property insurance to GDP ratio is 40% - 45% of the U.S., which should approximate the take-up rate on domestic business in general. The rate for Flood is lower.
- The larger factories are foreign owned, many by the Japanese, and have higher take-up rates. Their programs have both Flood and CBI coverage, although often with sublimits.
- Values and take-up rates imply a \$3 billion to \$5 billion loss for direct physical damage, with Time Element and Cargo in addition.
- Reinsurers had disclosed over \$2.5 billion in assumed losses by mid-December.

The market context also includes billion dollar flood losses this year in Brisbane, Copenhagen, the Mississippi Valley, Northeast U.S. (on Irene and Lee) and most recently in Toulouse and Genoa. (Details on page 8.)

## **4. Major U.S. Losses**

NOAA estimated that over 1,880 separate tornados touched down in 2011 causing both widespread and locally extreme damage.

The April 26<sup>th</sup> – 28<sup>th</sup> tornado outbreak spanned 14 states, but loss was especially severe in northern Alabama, including Tuscaloosa (population 93,000) and portions of Birmingham (population 212,000). The death toll is above 340, with 250 deaths in Alabama alone; it represents the largest loss of U.S. lives from a natural disaster since Hurricane Katrina. Based on insurers' loss reports, we estimate the cost of this outbreak at \$4 billion in direct losses and the total loss in April, including other outbreaks, at \$10 billion.

On May 22<sup>nd</sup>, a series of 48 tornadoes struck the northern and southern plains. One tracked through the center of Joplin, Missouri (population 50,000) causing major damage to buildings and infrastructure. The local hospital was badly damaged, with market loss reports of \$600 million for this risk alone. The death toll is 160. We estimate \$3 billion in insured losses for the outbreak.

Rain from the storms in May and an earlier wet spring raised the Mississippi, Missouri and other rivers to flood stage, but the levee system succeeded in protecting larger cities. Controlled levee releases caused extensive crop damage and some damage to smaller towns, and several thousand

farms and their equipment. We estimate the total insured auto, property, equipment and crop loss as at least \$2 billion dollars.

Hurricane Irene’s category “1” landfall in North Carolina caused a moderate amount of damage to insured coastal properties as well as crop losses in the northeast part of the state. The second landfall near Atlantic City, also a category “1”, caused limited direct loss to structures. However, there was extensive flood, sewer back-up, power interruption and sump pump failure claims. Over 7.5 million utility customers were without power, in some cases for over 10 days. The most devastating part of the loss occurred further north, with extensive flooding in the Hudson River Valley and Southern Vermont. There were significant losses from Flood under all-risks policies and excess above the Federal Flood program. We estimate the total loss to be over \$6 billion.

The “Halloween Weekend” blizzard in the Northeast on October 29th caused an almost equal amount of power interruption. However, there was little wind and no flood component to this loss. A deep and dense snowfall on trees still in leaf caused fallen limbs, which brought down power lines and damaged autos and outdoor property, such as fences, sheds and shrubs. However, the vast majority of homeowners had only moderate damage within their deductibles. We estimate this loss near \$1 billion.

## 5. 2011 Atlantic hurricane season summary

2011 was a very active year with 18 named storms and three "major" hurricanes (of category 3 or higher). Both were above the historical averages of eleven named storms and two major hurricanes. Only Irene made landfall at hurricane strength, and only as a “1”. Both Irene and Lee (the following week) brought heavy rain and damaging flooding, especially in Vermont and central New York State.

Storm	Dates	Max. Windspeed MPH	Min. Pressure	Highest Category	U.S. Landfall Category	Landfall Location at TS or Hurricane Strength	Deaths (incl. missing)
Tropical Storm Arlene	6/29 - 7/1	65	994	TS		Between Veracruz and Tampico, Mexico	25
Tropical Storm Bret	7/17 - 7/22	65	996	TS			0
Tropical Storm Cindy	7/20 - 7/22	70	994	TS			0
Tropical Storm Don	7/27 - 7/30	50	998	TS	Below TS		0
Tropical Storm Emily	8/6 - 8/7	50	1003	TS		Dominican Republic	4
Tropical Storm Franklin	8/12 - 8/13	45	1004	TS			0
Tropical Storm Gert	8/13 - 8/16	65	1000	TS			0
Tropical Storm Harvey	8/19 - 8/22	60	994	TS		Near Veracruz, Mexico	3
Hurricane Irene	8/20 - 8/29	120	942	3	2 at I 1 at TS	Cape Lookout, NC (Cat 1); Little Egg Harbor, NJ (Cat 1); Coney Island, NY (TS)	56
Tropical Storm Jose	8/28 - 8/29	45	1007	TS			0
Hurricane Katia	8/29 - 9/10	135	946	4			4
Tropical Storm Lee	9/2 - 9/5	60	986	TS	Below TS		21
Hurricane Maria	9/6 - 9/16	80	979	1		Newfoundland	0
Tropical Storm Nate	9/7 - 9/12	70	994	TS		Near Veracruz, Mexico	5
Hurricane Ophelia	9/21 - 10/03	140	940	4		Newfoundland	0
Hurricane Philippe	9/24 - 10/09	90	976	1			0
Hurricane Rina	10/23 - 10/28	110	966	2		Bypassed Cancun, Mexico	0
Tropical Storm Sean	11/6 - 11/12	65	983	TS			0
<b>18 Storms</b>	<b>6/29 - 11/12</b>	<b>140</b>	<b>940</b>	<b>4</b>	<b>Up to I</b>	<b>9</b>	<b>118</b>

## **6. Outlook for 2012**

### ***Hurricanes***

This year's high activity was related to the continuing La Niña condition in the Pacific Ocean, which inhibits wind shear in Atlantic weather patterns. The Bermuda High varied in location, but was generally far enough easterly to allow storms to turn north before reaching the U.S. mainland. The easterly location and the La Niña conditions may have been related. For 2012, the Pacific is more likely to show an El Niño phase, which would moderate storm activity in the Atlantic.

### ***Earthquakes***

The frequency of large earthquake losses has been surprising to many reinsurers. However, we believe the concern should be about insured values in parts of the world that bought less insurance decades ago, rather than any new trend in seismic activity. Our review of large industry losses in Appendix 2 shows that both earthquake and weather related losses have been rising faster than the worldwide economy. A summary of large and costly earthquakes in Appendix 4 also shows that the loss trends are more economic than geological.

### ***Tornados***

The U.S. experienced a high number of tornados in 2011, but not a record level. Inland weather is cyclical. So, after a bad year like 2011 we expect a greater than average number of storms in 2012, although not necessarily in the same regions. To some extent, the death toll was abnormally high because two medium-sized cities, Joplin and Birmingham, were directly affected. Over the long-term, fatalities in tornados have been trending down, probably due to better building codes, earlier warnings and improved first aid and hospital care.

### ***Insured losses***

Business written in 2009 through 2011 reflects lower building values, and thus tends to have depressed insured values. In addition, coverage terms had been softening for many years, with increased use of blanket limits and more liberal coverage for flood and earthquake on middle-market commercial business. There was more exposure per dollar of premium or TIV than would have been the case earlier. While both the market and the economy show signs of recovery, most of the business that will earn in 2012 has already been written, and worse than average loss experience may continue. Holborn's study of industry loss trends suggests that the normal level of large losses for 2012 would be two occurrences that each cost reinsurers one or more points on their loss ratios, totaling \$11 billion in reinsured losses.

## C. Worldwide Reinsurance Results

We analyzed the consolidated experience of the worldwide reinsurance industry that is active in the United States. The study included all rated professional reinsurers, except companies that have ceased writing business or are government sponsored, such as the Federal Flood program and SRA in the United States, CCR in France, etc. We included companies that are not purely reinsurers but that are influential lead markets in the U.S. Finally, we excluded reinsurers that exclusively reinsure county and township mutuals. Reported data were adjusted for foreign affiliates and exchange rates.

The worldwide reinsurance industry is:

- **Moderately profitable** overall (9% compound ROE in 2001- 2010)
- **Volatile** (calendar year ROE's ranging between -9% and +20%)
- **Flat** (the 2011 market shows only marginally more premiums than 2003's)
- **Consolidating** (with TRC-Alleghany, HarborPoint-Max, BRIT, Hardy, Omega and Flagstone's Lloyd's operations in recent news)

Holborn estimates 2011 results of:

- **Net earned premiums** – \$180 billion to \$190 billion (up approximately 2%)
- **Combined ratio** – 105% to 110%, the first underwriting loss for the industry since 2005's three major hurricanes.
- **Net income** – Slightly positive, but not on reinsurance operations.
- **Return on equity** – Approximately 2% (likely the lowest since 2005)
- **Year-end Capital** – Down slightly at \$210 billion to \$215 billion (GAAP basis except for RAA members)
- **Assets** – Down moderately due to underwriting losses, stock buy-backs and sovereign debt write-downs
- **Large losses** – Large industry events in 2011 added 20 to 25 points to reinsurers' all lines loss ratios, far more than our normalized estimate of 6 points
- **Less financial flexibility** – With falling or negative cash flow, unrealized capital losses on long-term bond portfolios, and share prices that do not make cash mergers or new issues attractive.

### Worldwide industry results

	Gross Premiums Written	Net Premiums Earned	Net Underwriting Gain	Combined Ratio	Net Income/Loss	Capital Funds	Return on Equity
2001	\$125,655	\$97,047	(\$17,328)	117.9%	(\$7,148)	\$74,422	-9.2%
2002	156,393	125,691	6,117	95.1%	4,169	80,271	5.6%
2003	203,412	173,934	14,349	91.8%	11,314	126,905	14.1%
2004	203,781	181,778	12,582	93.1%	14,151	145,110	11.2%
2005	185,906	164,895	(7,726)	104.7%	2,265	152,013	1.6%
2006	196,633	168,101	27,203	83.8%	30,765	195,383	20.2%
2007	207,110	180,877	29,852	83.5%	32,772	206,726	16.8%
2008	194,399	169,907	18,005	89.4%	5,522	170,894	2.7%
2009	213,307	187,131	26,037	86.1%	26,771	212,724	15.7%
2010	215,157	184,320	21,631	88.3%	22,675	214,681	10.7%
2011 (est.)	\$215,000 to \$220,000	\$180,000 to \$190,000	(\$8,500) to (\$18,500)	105% to 110%	\$2,000 to \$6,000	\$210,000 to \$215,000	1% to 3%
10-Year Average	\$190,175	\$163,368	\$13,072	92.0%	\$14,325	\$157,913	9.1%

Notes: \$/Mns. Gross premiums include retrocessions.

### Normalized Results

We also reviewed underwriting results adjusting for reserve strengthening that reinsurers disclosed and large losses, based on a 50-year history of large reinsured events. In 2011, we expect events with reinsured losses that reached .01% of the GDP of the G7 countries (roughly \$2 billion to reinsurers in 2011) to normally contribute 6.3% to reinsurers' combined ratios. This is based on actual experience in the fifty years between 1960 and 2009, trended forward to reflect greater globalization and use of insurance and reinsurance. Details are shown in Appendix I.

### Reinsurance industry combined ratios



Notes: Trade basis, calendar year. Details in Appendix I.

On this normalized basis, with large losses smoothed at average levels and without the disclosed amounts of reserve strengthening, results are much less volatile. Reinsurers' booked results in 2011 were roughly fifteen points worse than expected, due to large loss experience that is 20 points worse than average, partly offset by five or more points of reserve weakening. Normalized results have been trending up, due to softer pricing and terms.

### Industry capital peaked in 2010

	Net Income/Loss	Increases from Exchange Rates	Reductions from Restructuring and Mergers	Unrealized Gains (After-tax)	Net Capital Additions	Total Changes in Capital Funds
2001	(\$7,148)	(\$1,810)	\$0	(\$2,000)	\$3,472	(\$3,485)
2002	4,169	6,875	6,800	(5,000)	6,605	5,849
2003	11,314	6,253	7,100	7,500	14,467	46,634
2004	14,151	4,734	0	0	(681)	18,204
2005	2,264	(8,688)	0	2,000	10,077	5,652
2006	30,604	8,045	(5,000)	5,000	4,505	43,153
2007	32,611	6,804	0	0	(28,581)	10,834
2008	5,527	(8,039)	(1,500)	(35,000)	3,270	(35,742)
2009	26,506	4,483	0	12,000	(1,383)	41,606
2010	26,711	(1,915)	0	(12,000)	(11,539)	1,257
2011	\$2,000 to \$6,000	Approx. \$0	0	(2,500)	(2,500)	0 to (\$5,000)
<b>2001-2010 Average</b>	<b>\$14,671</b>	<b>\$16,742</b>	<b>\$620</b>	<b>(3,000)</b>	<b>Approx. \$0</b>	<b>\$16,000</b>

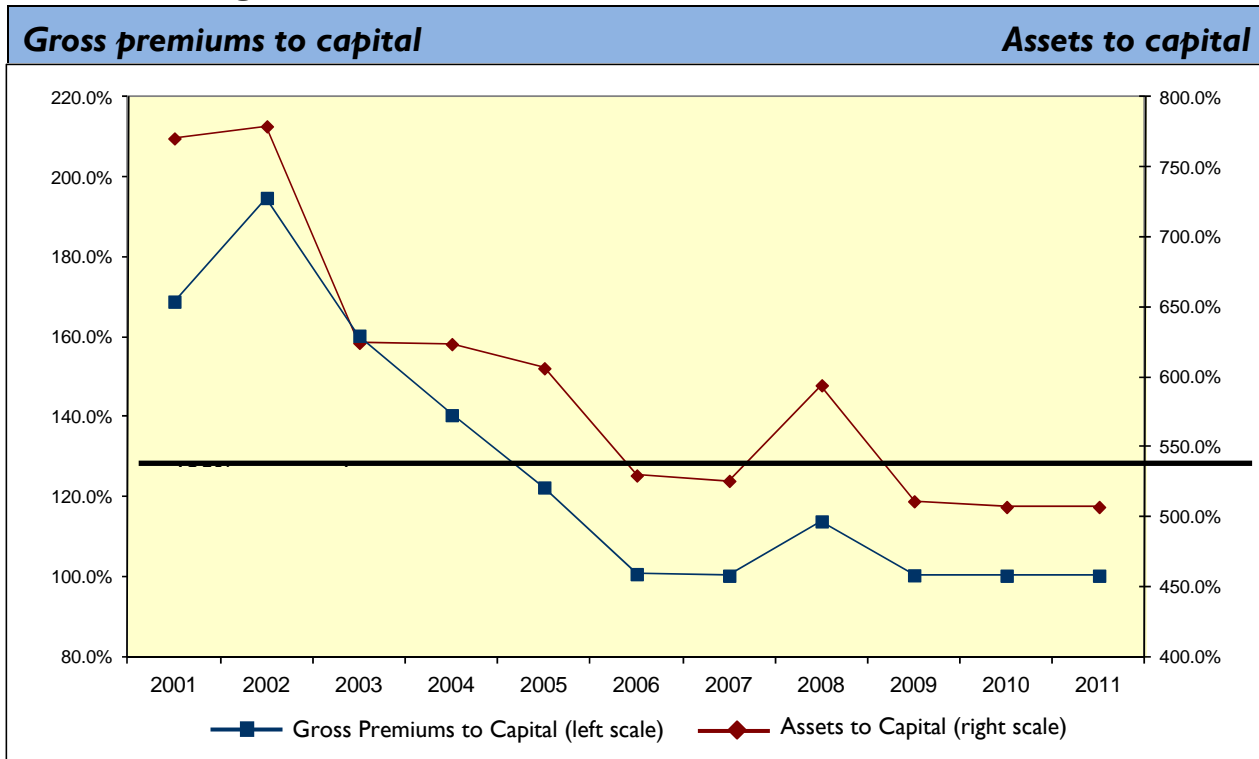
Notes: \$Mns. Restructurings involve: Munich-Allianz, Hannover-DHI, Converium-SCOR, Swiss-ERC, XL-SCA, Partner-Paris and Validus-IPC. Unrealized gains are Holborn estimates based on changes in stock index levels and individual reinsurers' disclosures. Negative amounts shown as capital increases, especially in 2007 and 2010 are largely stock repurchases. Net capital increases are calculated to balance to total change, and include miscellaneous items, with dividends and buy-backs shown as decreases.

### Growth in premiums versus capital

	Gross Premiums Written	Premium Growth Rate	Adjusted For Exchange Rates	Year-end Capital Funds	Premium Leverage Ratio	Asset Leverage Ratio
2001	\$125,655			\$74,422	168.8%	7.71x
2002	156,393	24.3%	25.0%	80,271	194.8%	7.81x
2003	203,412	29.8%	23.0%	126,905	160.3%	6.24x
2004	203,781	0.1%	-7.1%	145,110	140.4%	6.23x
2005	185,901	-8.8%	-10.7%	150,762	123.3%	6.06x
2006	195,961	5.4%	6.5%	193,915	100.6%	5.30x
2007	206,423	5.3%	3.1%	204,750	100.2%	5.26x
2008	193,563	-6.2%	-7.8%	169,008	113.8%	5.93x
2009	212,381	9.7%	11.3%	210,613	100.3%	5.10x
2010	215,157	0.3%	1.2%	214,681	100.2%	5.06x
2011	\$215,000 to \$220,000	0% to 2%	0% to 2%	\$210,000 to \$215,000	100% to 102%	5.00x
<b>10-Year Average</b>	<b>\$189,863</b>	<b>6.7%</b>	<b>4.9%</b>	<b>\$157,044</b>	<b>130.3%</b>	<b>6.07x</b>

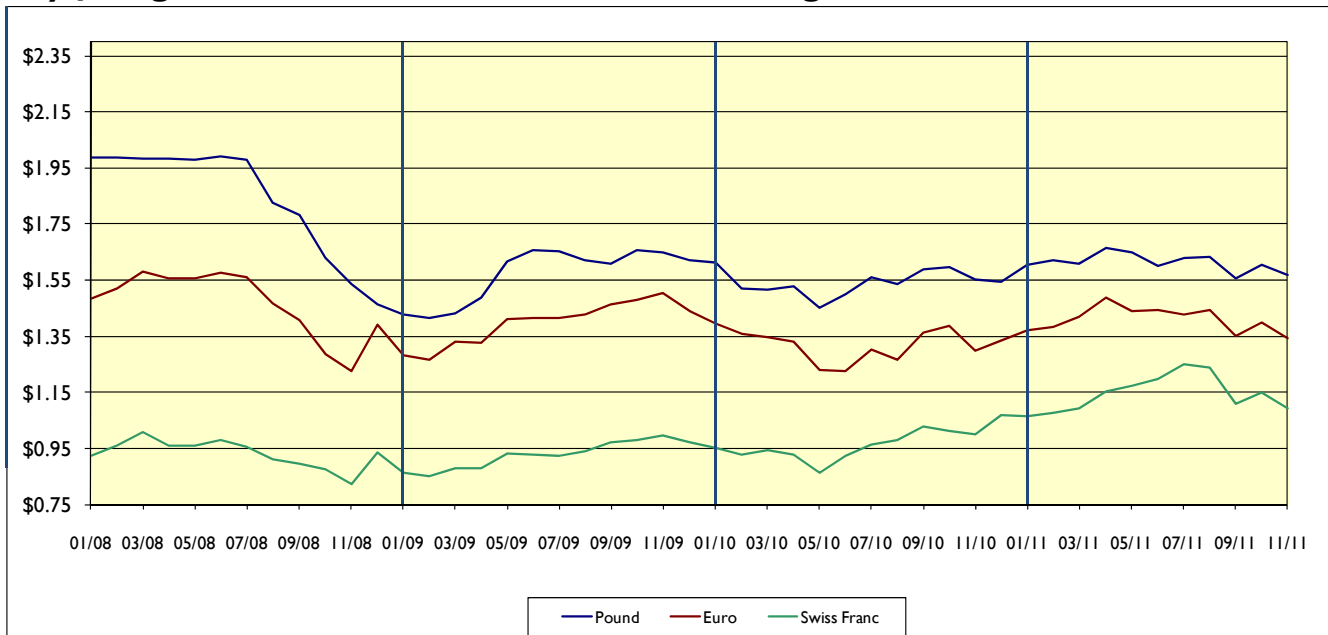
Note: \$Mns.

**Market leverage ratios**



Holborn estimates that at a market average premium-to-capital ratio above 125% (shown as a black line in the graph above), some reinsurers would need to reduce capacity for purely financial reasons.

**Key foreign currencies have been stable overall against the U.S. dollar in 2011**



A stronger dollar reduces worldwide industry capital levels and premium volumes, when measured in U.S. dollars.

## 2012 Outlook

Holborn forecasts that the market will show moderate growth and an increase in leverage ratios. Earnings will likely reflect better non-Cat loss ratios following recent rate increases, offset by reserve increases on 2011 Cat losses and capital losses related to European debt.

	Gross Premiums Written	Combined Ratio	Net Income	New Capital	Change in Capital	Year-end Capital	Gross Leverage Ratio
<b>2012 Forecasts</b>	\$225,000 to \$235,000	90% to 95%	\$5,000 to \$15,000	\$5,000	\$5,000 to \$10,000	\$215,000 to \$225,000	100% - 105%
<b>2011 Estimates</b>	\$215,000 to \$220,000	105% to 110%	\$0 to \$5,000	(\$5,000) to \$0	(\$5,000) to \$0	\$210,000 to \$215,000	100% to 102%
<b>2001–2010 Averages</b>	\$190,175	92.0%	\$14,325	\$1,364	\$13,396	\$157,913	127.0%

Note: \$Mns.

## D. For More Information

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Holborn prepares the latest information on these issues in a variety of easy-to-use formats. We provide updates on recent and potential catastrophe events for several regions through an e-mail service. We also offer clients a monthly summary of reinsurer financial news and rating information. Holborn's Eye-in-the-Sky<sup>(SM)</sup> data management tool provides individually-tailored alerts on events that expose clients' accumulations.

### **About Holborn**

Holborn is the largest independent reinsurance brokerage firm in the U.S., offering advanced analytic tools, global market access and responsive account services to clients. The company was formed in 1920, making us one of the most experienced reinsurance brokers in the world. We are owned exclusively by our employees. This contributes to Holborn's stable client base and noteworthy ability to attract and retain talent.

Please contact Holborn at 212-797-2285 for reprints of this or previous Holborn Perspectives whitepapers, and for more information. They are also available from our website at:

<http://www.holborn.com/perspectives.aspx>

## *Appendices*

1. Normalized Industry Results
2. Holborn Industry Large Loss Study: 1960 to 2011
  - a. Major North American losses
  - b. Major reinsured losses
  - c. Record reinsured losses
3. Public Reinsurers' Reported 2011 Cat Losses
  - a. 1<sup>st</sup> Half 2011 announced losses
  - b. Reinsurers with "Cat creep" reported during 3<sup>rd</sup> quarter of 2011
4. Major Earthquakes Compared: 1960 to 2011

## I. Normalized Industry Results

### Results excluding disclosed strengthening and reinsured losses over .01% of G7 GDP

	Net Income/ (Loss)	Casualty Reserve Strengthening	Property Reserve Strengthening	Estimated Large Losses	Tax Effect	Pro Forma Net Income
2001	(7,148)	\$3,853	(\$3,000)	\$20,400	(\$5,447)	\$8,658
2002	\$4,169	\$2,750	\$3,000	\$1,275	(\$1,794)	\$9,400
2003	\$11,314	\$1,722	\$0	\$0	(\$364)	\$12,672
2004	\$14,151	\$3,970	(\$2,000)	\$3,400	(\$1,086)	\$18,435
2005	\$2,265	\$7,805	(\$10,000)	\$23,800	(\$4,067)	\$19,804
2006	\$30,765	(\$9,686)	\$8,000	\$0	\$304	\$29,384
2007	\$32,772	\$1,699	\$4,000	\$0	(\$1,186)	\$37,285
2008	\$5,522	\$358	(\$2,000)	\$7,225	(\$1,166)	\$9,939
2009	\$26,771	(\$3,706)	\$2,000	\$0	\$356	\$25,421
2010	\$22,675	(\$1,544)	(\$10,000)	\$11,475	\$14	\$22,620
2011 (Est.)	\$0 to \$5,000	(\$5,000)	(\$5,000)	\$40,800	(\$6,437)	\$25,000 to \$30,000
<b>2001-2010 Average</b>	<b>\$14,326</b>	<b>\$722</b>	<b>(\$1,000)</b>	<b>\$6,758</b>	<b>(\$1,443)</b>	<b>\$19,362</b>

Notes: \$Mns. No tax-effect on unconsolidated Bermuda companies or Lloyd's syndicates. Reserve strengthening reflects only amounts disclosed for U.S. casualty excess business, and Holborn estimates of major property losses that emerge in the year following events. Industry Cat losses for professional reinsurers are shown here at 85% of estimated industry totals.

### Results excluding reserve strengthening and with large losses at average levels

	Pro Forma Net Income		Normalized Combined Ratio	Normalized Return
	No Strengthening and No Large Losses	But Normal Large Losses		
2001	\$8,658	\$4,974	101.1%	6.4%
2002	\$9,400	\$5,411	93.8%	7.0%
2003	\$12,672	\$7,924	94.3%	9.9%
2004	\$18,435	\$13,001	93.9%	10.2%
2005	\$19,804	\$13,786	96.1%	9.5%
2006	\$29,384	\$22,745	89.6%	15.1%
2007	\$37,285	\$30,136	85.3%	15.5%
2008	\$9,939	\$2,428	92.7%	1.2%
2009	\$25,421	\$17,904	92.1%	10.6%
2010	\$22,620	\$14,437	94.0%	6.9%
2011 (Est.)	\$25,000 to \$30,000	\$16,000 to \$21,000	90% to 95%	7% to 10%
<b>2001-2010 Average</b>	<b>\$19,362</b>	<b>\$13,275</b>	<b>93.3%</b>	<b>9.2%</b>

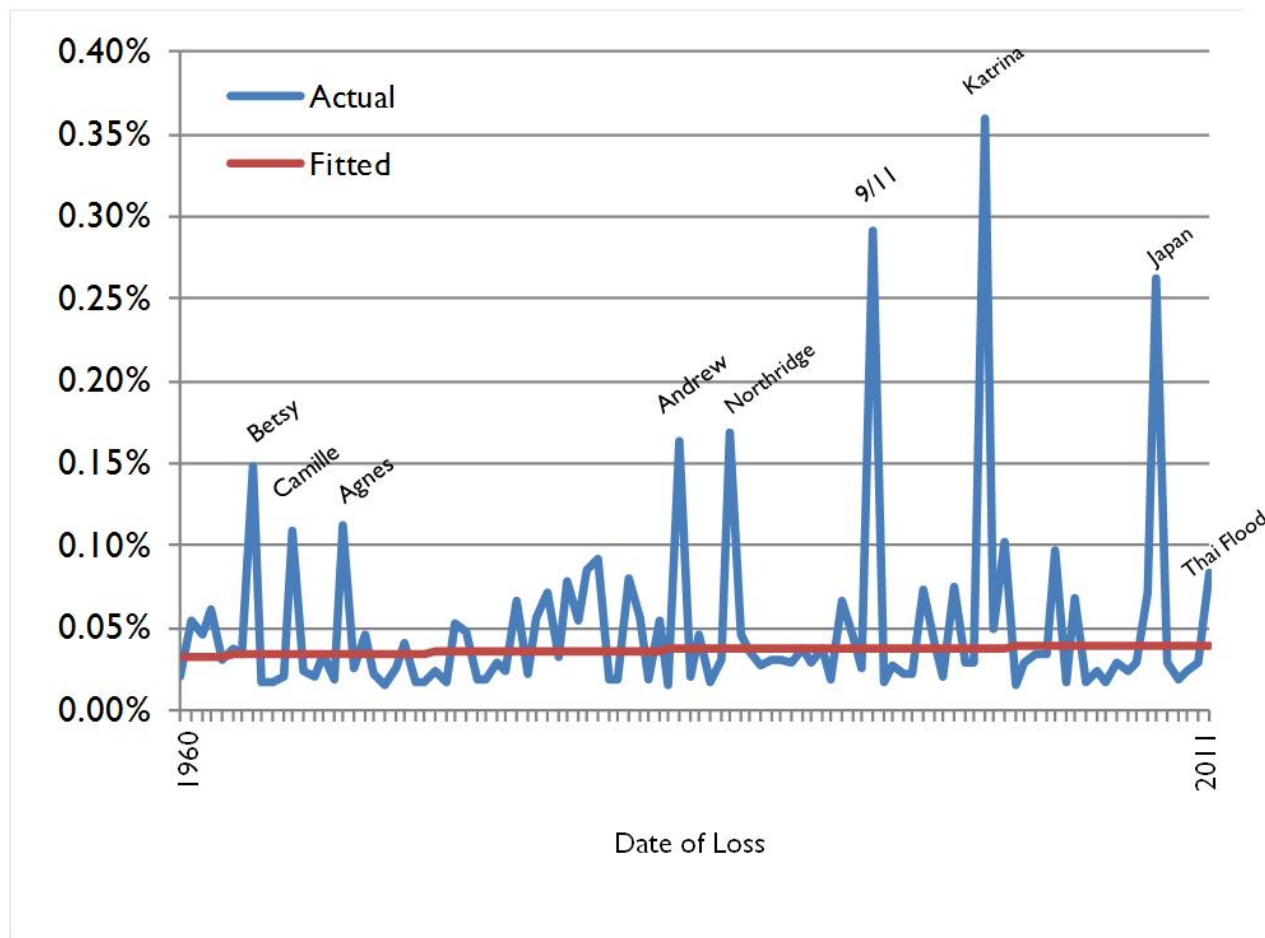
Note: \$Mns. Large loss are events where ceded losses are over .01% of G7 GDP and are normalized based on a fifty-year study of estimated losses to GDP.

## 2. Holborn Industry Large Loss Study: 1960 to 2011

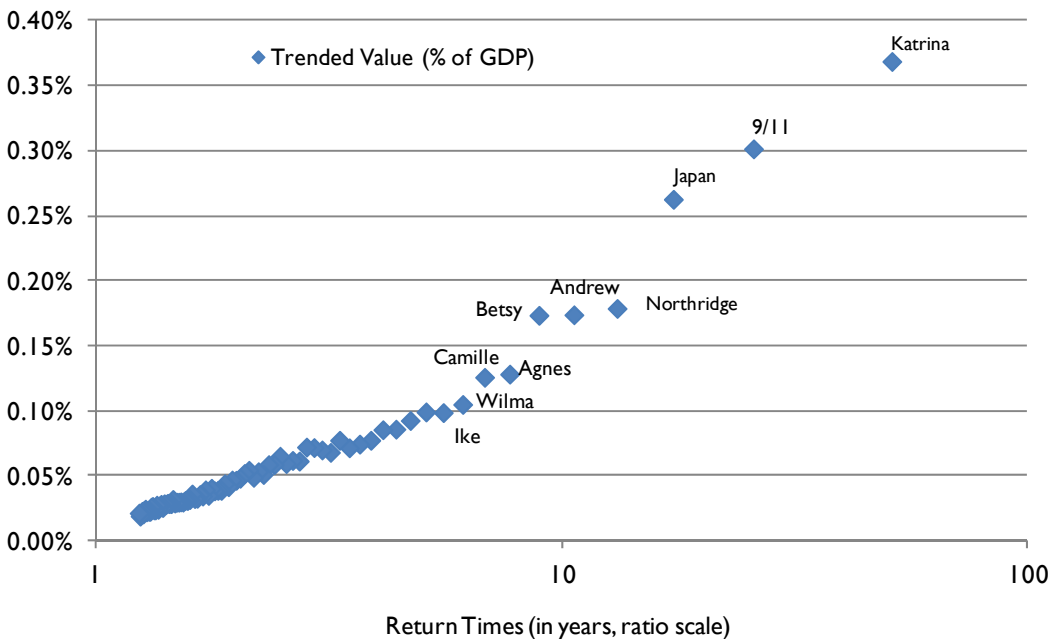
There are many sources of large loss information but they generally do not match how reinsurance responds. Holborn has compiled this information and restated it on a consistent pre-tax basis. We attempted to include all coverages that directly arise from each occurrence, and to report ultimate amounts. All private-sector companies are included; however, government-owned facilities are excluded: JER, CCR, IRB, and Federal Flood. It includes all major events reported by Sigma, III, NOAA and our clients' submissions, also every earthquake, hurricane, typhoon, tornado, flood, fire and transportation disaster listed in Wikipedia for these years. 265 events are currently included.

Foreign currencies were converted at rates in effect at the date of loss. Losses are tracked relative to the GDP of the G7 countries, which includes all of the top insurance markets. Some interpolations were needed for exchange rates between Bretton Woods and introduction of the Euro.

### Top 100 Direct Losses (as % GDP) Since 1960 All Perils Combined



### Historical Return Times for Loss Amounts



By ranking the losses and counting the number of times they reach different levels in our 52-year study, we can estimate the return times for events with these loss amounts. The largest loss, Katrina, is estimated as a 1-in-52 year event. The 10<sup>th</sup> highest amount, equal to Ike, is estimated to recur at a 5.2 year frequency.

## A. Major North American Losses Since 1960 (Events over 0.5% of U.S. DWP)

Year	Event	Magnitude	Reported Deaths	Insured Lives	Direct Loss (\$)	Direct Loss / U.S. DEP	Direct Loss / G7 GDP	Reinsured Loss (\$Mn)
1960	Hurricane Donna	4	364	150	\$400	2.584%	0.0548%	<\$100
1960	NYC Mid-air collision		134	65	\$100	0.646%	0.0137%	<\$100
1961	Hurricane Carla	4	43		\$350	2.160%	0.0459%	<\$100
1962	Columbus Day Storm	Equiv. of 4	47		\$250	1.459%	0.0306%	<\$100
1964	Alaska Earthquake	9.2	131	60	\$350	1.802%	0.0375%	<\$100
1965	Palm Sunday Tornadoes	F4	271	100	\$350	1.669%	0.0346%	<\$100
1965	Hurricane Betsy	4	76		\$1,500	7.155%	0.1485%	Approx. \$500
1967	Oaklawn Tornado Outbreak	F5	58		\$200	0.815%	0.0171%	<\$100
1967	Hurricane Beulah	3	58		\$200	0.815%	0.0171%	<\$100
1969	Hurricane Camille	5	259	100	\$1,500	5.112%	0.1091%	\$200 - \$600
1970	Lubbock Tornado	F5	26		\$350	1.061%	0.0239%	<\$100
1970	Hurricane Celia	3	28		\$300	0.909%	0.0205%	<\$250
1970	Bayway Refinery		0		\$500	1.515%	0.0342%	\$200 - \$300
1971	Mississippi Valley Tornado Outbreak	F5	123	50	\$300	0.825%	0.0187%	<\$100
1972	Hurricane Agnes	1	130	60	\$2,000	5.026%	0.1123%	\$1,000 - \$1,500
1973	Mississippi River Flood		33		\$500	1.153%	0.0247%	<\$200
1974	Xenia Tornado Outbreak (CAT 74)	F5	330		\$1,000	2.155%	0.0458%	\$200 - \$400
1974	Hurricane Carmen	4	4		\$300	0.647%	0.0137%	<\$100
1975	Omaha Tornado	F4	3	3	\$1,000	1.979%	0.0414%	\$250 - \$500
1975	Hurricane Eloise	3	80		\$375	0.742%	0.0155%	<\$100
1976	Hurricane Belle	3	10		\$450	0.760%	0.0167%	<\$250
1978	U.S. Blizzard		100	50	\$800	0.968%	0.0237%	<\$250
1979	Red River Valley Tornado Outbreak	F4	58	50	\$650	0.706%	0.0171%	<\$250
1979	American Airlines 191 crash		273	125	\$500	0.543%	0.0131%	Direct
1979	Hurricane Frederic	3	12		\$2,000	2.172%	0.0526%	\$500 - \$750
1980	Mt. St. Helens		57		\$2,000	2.013%	0.0479%	\$200 - \$400
1980	Hurricane Allen	5	290		\$750	0.755%	0.0180%	<\$200
1980	MGM Grand Fire		85		\$750	0.755%	0.0180%	<\$250
1983	Hurricane Alicia	3	21		\$1,500	1.316%	0.0290%	\$500 - \$750
1984	Carolinas Tornado Outbreak	F4	57		\$750	0.615%	0.0132%	\$200 - \$400
1985	Hurricane Elena	4	0		\$1,500	1.058%	0.0246%	Approx. \$500
1985	Mexico City Earthquake	8.3	10,153	5,000	\$4,000	2.820%	0.0657%	\$500 - \$1,500
1985	Hurricane Gloria	2	8		\$1,300	0.917%	0.0213%	<\$500
1985	Hurricane Juan	1	24		\$750	0.529%	0.0123%	<\$500
1988	Hurricane Gilbert	4	341		\$6,000	2.836%	0.0790%	\$2,000 - \$3,000
1989	Hurricane Hugo	4	56		\$7,000	3.189%	0.0858%	\$2,000 - \$3,000
1989	Loma Prieta Earthquake	6.9	63		\$7,500	3.417%	0.0919%	\$2,000 - \$3,000
1989	Phillips Petroleum Explosion		23		\$1,500	0.683%	0.0184%	Direct

## Major North American Losses Since 1960 (cont'd)

Year	Event	Magnitude	Reported Deaths	Insured Lives	Direct Loss (\$s)	Direct Loss / U.S. DEP	Direct Loss / G7 GDP	Reinsured Loss (\$Mn)
1991	Hurricane Bob	2	15		\$1,750	0.739%	0.0192%	<\$750
1992	Hurricane Andrew	5	26		\$15,500	6.405%	0.1628%	\$3,000 - \$4,000
1992	Hurricane Iniki	4	6		\$1,500	0.620%	0.0158%	\$750 - \$1,500
1992	Nor'easter		4		\$2,000	0.826%	0.0210%	\$500 - \$750
1993	"White Hurricane"		300		\$4,500	1.785%	0.0460%	Approx. \$1,000
1993	Mississippi and Missouri Flood		50		\$3,000	1.190%	0.0306%	<\$1,000
1994	Northridge Earthquake	6.7	72		\$17,500	6.633%	0.1685%	\$5,000 - \$6,000
1995	Texas Hill (Cat 38)		13		\$4,000	1.464%	0.0364%	<\$1,000
1995	Hurricane Marilyn	3	15		\$1,500	0.549%	0.0137%	Approx. \$500
1995	Hurricane Opal	4	70		\$3,000	1.098%	0.0273%	\$1,000 - \$2,000
1996	Hurricane Fran	3	26		\$3,500	1.247%	0.0302%	\$1,000 - \$2,000
1998	North American Ice Storm		35		\$1,500	0.507%	0.0118%	\$400 - \$600
1998	Hurricane Georges	3	604		\$4,000	1.352%	0.0313%	\$1,000 - \$2,000
1999	Hurricane Floyd	4	77		\$5,000	1.649%	0.0372%	\$1,000 - \$2,000
2001	Hurricane Allison	TS	41		\$3,500	1.014%	0.0248%	\$1,000 - \$2,000
2001	September 11th Attacks		3,017	2,750	\$41,000	11.878%	0.2908%	\$20,000 - \$25,000
2003	St. Louis Tornadoes	F4	45		\$3,500	0.794%	0.0221%	\$1,000 - \$2,000
2003	California Wildfires		15		\$3,500	0.794%	0.0221%	\$500 - \$1,000
2004	Hurricane Charley	4	35		\$12,500	2.671%	0.0725%	\$1,500 - \$2,500
2004	Hurricane Frances	2	49		\$7,000	1.496%	0.0406%	\$1,000 - \$2,000
2004	Hurricane Ivan	3	123	60	\$13,000	2.778%	0.0754%	\$1,500 - \$2,500
2004	Hurricane Jeanne	3	3,035		\$5,000	1.068%	0.0290%	\$1,000 - \$2,000
2005	Hurricane Katrina	3	1,836	1,250	\$65,000	13.495%	0.3603%	\$20,000 - \$24,000
2005	Hurricane Rita	3	120	60	\$9,000	1.869%	0.0499%	\$2,000 - \$3,000
2005	Hurricane Wilma	2	35		\$18,500	3.841%	0.1026%	\$3,000 - \$4,000
2006	Northeast US Blizzard		154		\$3,000	0.610%	0.0158%	\$1,000
2007	California Wild Fires		14		\$3,000	0.604%	0.0148%	\$750 - \$1,000
2008	U.S. Floods		13		\$2,500	0.508%	0.0122%	\$750 - \$1,000
2008	Hurricane Gustav	2	153		\$7,000	1.423%	0.0341%	\$1,000 - \$2,000
2008	Hurricane Ike	4	195	55	\$20,000	4.067%	0.0974%	\$6,000 - \$7,000
2008	New England Ice Storm		4		\$2,500	0.508%	0.0122%	\$500
2010	Northeast Blizzards		>40		\$5,000	1.066%	0.0242%	\$500 - \$1,000
2011	Northeast U.S. Ice and Snow		0	0	>\$5,000	1.263%	0.0286%	Moderate
2011	Mississippi Floods				\$3,000	0.632%	0.0143%	Moderate
2011	Alabama Tornado Outbreak	F3	249	125	\$6,000	1.263%	0.0286%	\$1,000 - \$2,000
2011	Joplin, MO Tornado Outbreak	F5	160		\$4,000	0.842%	0.0190%	\$1,250 - \$1,750
2011	Hurricane Irene	I	44		\$6,000	1.316%	0.0298%	\$1,500
<b>1960 - 2011 Total</b>	<b>75 Events</b>			<b>&gt;24,500</b>	<b>\$350 Bn to \$390 Bn</b>			<b>\$100 Bn to \$135 Bn</b>
<b>52 Year Averages</b>	<b>1.44 per year</b>			<b>&gt;470</b>	<b>\$7 Bn to \$8 Bn</b>	<b>2.7%</b>	<b>0.036%</b>	<b>\$2 Bn to \$2.5 Bn</b>

## B. Major Reinsured Losses Since 1960 (events over .01% of G7 GDP)

Year	Event	Magnitude	Insured Lives	Direct Loss (\$Mn)	Reinsured Loss (\$Mn)	Reinsured Loss / G7 GDP
1960	Hurricane Donna	4	150	\$400	<\$100	0.0183%
1961	Hurricane Carla	4		\$350	<\$100	0.0153%
1962	North Sea Flood	Equiv. of 4	100	\$500	<\$250	0.0204%
1962	Columbus Day Storm	Equiv. of 4		\$250	<\$100	0.0102%
1964	Alaska Earthquake	9.2	60	\$350	<\$100	0.0125%
1965	Palm Sunday Tornadoes	F4	100	\$350	<\$100	0.0115%
1965	Hurricane Betsy	4		\$1,500	Approx. \$500	0.0494%
1969	Hurricane Camille	5	100	\$1,500	\$200 - \$600	0.0363%
1970	Bayway Refinery			\$500	\$200 - \$300	0.0171%
1972	Hurricane Agnes	1	60	\$2,000	\$1,000 - \$1,500	0.0702%
1974	Xenia Tornado Outbreak (CAT 74)	F5		\$1,000	\$200 - \$400	0.0137%
1974	Cyclone Tracy	3		\$550	\$200 - \$350	0.0126%
1975	Omaha Tornado	F4	3	\$1,000	\$250 - \$500	0.0138%
1979	Hurricane Frederic	3		\$2,000	\$500 - \$750	0.0175%
1983	Hurricane Alicia	3		\$1,500	\$500 - \$750	0.0121%
1985	Mexico City Earthquake	8.3	5,000	\$4,000	\$500 - \$1,500	0.0164%
1987	European Floods			\$4,000	\$1,000 - \$1,500	0.0190%
1987	U.K. Winter Storm (87J)	Equiv. of 1		\$5,000	\$1,000- \$1,250	0.0178%
1988	Piper Alpha Explosion		100	\$2,500	\$1,000 - \$2,000	0.0230%
1988	Hurricane Gilbert	4		\$6,000	\$2,000 - \$3,000	0.0329%
1989	Exxon Valdez Oil Spill			\$4,500	Direct	0.0276%
1989	Hurricane Hugo	4		\$7,000	\$2,000 - \$3,000	0.0306%
1989	Loma Prieta Earthquake	6.9		\$7,500	\$2,000 - \$3,000	0.0306%
1990	Winter Storm Daria (Burns' Day)	Equiv. of 1		\$7,000	\$2,000 - \$3,000	0.0285%
1990	Winter Storm Vivian	Equiv. of 1		\$5,000	\$1,000 - \$2,000	0.0171%
1991	Typhoon Mireille	4		\$5,000	\$2,000 - \$3,000	0.0164%
1992	Hurricane Andrew	5		\$15,500	\$3,000 - \$4,000	0.0368%

## Major Reinsured Losses Since 1960 (cont'd)

Year	Event	Magnitude	Insured Lives	Direct Loss (\$)	Reinsured Loss	Reinsured Loss / G7 GDP
1992	Hurricane Iniki	4		\$1,500	\$750 - \$1,500	0.0118%
1993	"White Hurricane"			\$4,500	Approx. \$1,000	0.0153%
1994	Northridge Earthquake	6.7		\$17,500	\$5,000 - \$6,000	0.0529%
1995	Kobe Earthquake	6.8	3,200	\$5,000	<\$2,000	0.0152%
1995	Hurricane Opal	4		\$3,000	\$1,000 - \$2,000	0.0137%
1996	Hurricane Fran	3		\$3,500	\$1,000 - \$2,000	0.0129%
1998	Hurricane Georges	3		\$4,000	\$1,000 - \$2,000	0.0118%
1999	Hurricane Floyd	4		\$5,000	\$1,000 - \$2,000	0.0124%
1999	Typhoon Bart	5		\$4,000	\$1,000 - \$2,000	0.0112%
1999	Taiwan Earthquake	7.6		\$5,000	\$2,000 - \$3,000	0.0186%
1999	Winter Storm Lothar	Equiv. of 2		\$9,000	\$3,000 - \$4,000	0.0261%
1999	Winter Storm Martin	Equiv. of 3		\$6,000	\$1,000 - \$2,000	0.0112%
2001	Hurricane Allison	TS		\$3,500	\$1,000 - \$2,000	0.0106%
2001	September 11th Attacks		2,750	\$41,000	\$20,000 - \$25,000	0.1596%
2002	Central European Floods			\$4,000	\$1,000 - \$2,000	0.0102%
2004	Hurricane Charley	4		\$12,500	\$1,500 - \$2,500	0.0116%
2004	Hurricane Ivan	3	60	\$13,000	\$1,500 - \$2,500	0.0116%
2005	Hurricane Katrina	3	1,250	\$65,000	\$20,000 - \$24,000	0.1220%
2005	Hurricane Rita	3	60	\$9,000	\$2,000 - \$3,000	0.0139%
2005	Hurricane Wilma	2		\$18,500	\$3,000 - \$4,000	0.0194%
2008	Hurricane Ike	4	55	\$20,000	\$6,000 - \$7,000	0.0317%
2010	Chile Earthquake	8.8	400	\$14,000	\$9,000 - \$12,000	0.0508%
2010	Canturbury Earthquake (NZ I)	7.1		\$6,000	\$2,500 - \$3,500	0.0145%
2011	Queensland Flood			\$5,000	\$2,000 - \$2,500	0.0107%
2011	Christchurch Earthquake (NZ II)	6.3		\$15,000	\$12,500	0.0595%
2011	Japan Earthquake and Tsunami	9.0	<10,000	> \$50,000	>\$20,000	0.1071%
2011	Christchurch Aftershock (NZ III)	6.3	1	\$5,000	\$4,000	0.0190%
2011	Thai Floods		>600	>\$10,000	>\$5,000	0.3410%
<b>1960 to 2009</b>	<b>48 events</b>		<b>Approx. 25,000</b>	<b>\$330 Bn to \$350Bn</b>	<b>\$100Bn to \$150Bn</b>	
<b>50-year Average</b>	<b>0.96 Per year</b>		<b>500</b>	<b>\$6.6Bn to \$7.0Bn</b>	<b>\$2Bn to \$3Bn</b>	<b>0.02% to 0.03%</b>
<b>2010 and 2011</b>	<b>7 events</b>		<b>&gt;10,000</b>	<b>\$100Bn to \$125Bn</b>	<b>\$55Bn to \$75Bn</b>	
<b>2-year Average</b>	<b>3.50 per year</b>		<b>&gt;5,000</b>	<b>\$50Bn to \$65Bn</b>	<b>\$27.5Bn to \$37.5Bn</b>	<b>0.15% to 0.25%</b>

## C. Record Reinsured Losses

**Eight of the 25 largest reinsured events occurred in the last two years.**

Rank	Year	Event	Direct Loss (\$s)	Reinsured Loss (\$Mn)	Reinsured Loss /% G7 GDP
1	2011	Japan Earthquake and Tsunami	> \$50,000	>\$20,000	0.1071%
2	2001	September 11th Attacks	\$41,000	\$20,000 - \$25,000	0.1596%
3	2005	Hurricane Katrina	\$65,000	\$20,000 - \$24,000	0.1220%
4	2010	Chile Earthquake	\$14,000	\$9,000 - \$12,000	0.0508%
5	2011	Christchurch Earthquake (NZ 11)	\$15,000	12,500	0.0595%
6	2008	Hurricane Ike	\$20,000	\$6,000 - \$7,000	0.0317%
7	1994	Northridge Earthquake	\$17,500	\$5,000 - \$6,000	0.0529%
8	2011	Thai Floods	> \$10,000	>\$5,000	0.2270%
9	2011	Christchurch Aftershock (NZ 111)	\$5,000	4,000	0.0190%
10 (tie)	2005	Hurricane Wilma	\$18,500	\$3,000 - \$4,000	0.0194%
10 (tie)	1992	Hurricane Andrew	\$15,500	\$3,000 - \$4,000	0.0368%
10 (tie)	1999	Winter Storm Lothar	\$9,000	\$3,000 - \$4,000	0.0261%
13	2010	Canterbury Earthquake (NZ 1)	\$6,000	\$2,500 - \$3,400	0.0145%
14 (tie)	2005	Hurricane Rita	\$9,000	\$2,000 - \$3,000	0.0139%
14 (tie)	1989	Loma Prieta Earthquake	\$7,500	\$2,000 - \$3,000	0.0306%
14 (tie)	1989	Hurricane Hugo	\$7,000	\$2,000 - \$3,000	0.0306%
14 (tie)	1990	Winter Storm Daria (Burns' Day)	\$7,000	\$2,000 - \$3,000	0.0285%
14 (tie)	1988	Hurricane Gilbert	\$6,000	\$2,000 - \$3,000	0.0329%
14 (tie)	1991	Typhoon Mireille	\$5,000	\$2,000 - \$3,000	0.0164%
14 (tie)	1999	Taiwan Earthquake	\$5,000	\$2,000 - \$3,000	0.0186%
21	2011	Queensland Flood	\$5,000	\$2,000 - \$2,500	0.0107%
22 (tie)	2004	Hurricane Ivan	\$13,000	\$1,500 - \$2,400	0.0116%
22 (tie)	2004	Hurricane Charley	\$12,000	\$1,500 - \$2,500	0.0116%
24 (tie)	1988	Piper Alpha Explosion	\$2,500	\$1,500 - \$2,000	0.0230%
24 (tie)	2010	Deepwater Horizon	\$2,500	\$1,500 - \$2,000	0.0085%

Notes: *Holborn loss and LAE estimates.  
Nominal (i.e., uninflated) dollars.  
Worldwide, all coverages combined.  
Reinsured loss includes direct participations by reinsurers.  
Deepwater excludes D&O.*

### 3. Public Reinsurers' Reported 2011 Cat Losses

#### A. 1st Half 2011 Announced Losses (\$thousands)

Reinsurer Group	2011 NZ/Aust Storms (000's)	2011 Japan Earthquake (000's)	2011 U.S. 2nd Qtr. Tornadoes (000's)	2011 Combined Total Loss (000's)	Group Surplus 12/31/2010 (000's)	Percent of Surplus NZ/Aust	Percent of Surplus Japan	Percent of Surplus Tornadoes	Percent of Surplus Total Loss
<b>Reporting two or more events</b>									
Flagstone Re	\$145,000	\$105,000		\$250,000	\$1,134,733	12.78%	9.25%		22.03%
Chaucer	\$27,600	\$48,500		\$76,100	\$493,498	5.59%	9.83%		15.42%
* Novae Group		\$70,000		\$70,000	\$455,776		15.36%		15.36%
PartnerRe	\$305,000	\$730,000	\$60,000	\$1,095,000	\$7,206,919	4.23%	10.13%	0.83%	15.19%
Amlin P.L.C.	\$201,500	\$185,000		\$386,500	\$2,682,651	7.51%	6.90%		14.41%
Hiscox	\$116,000	\$105,000	\$55,900	\$276,900	\$1,965,477	5.90%	5.34%	2.84%	14.09%
Montpelier	\$90,000	\$126,000		\$216,000	\$1,628,800	5.53%	7.74%		13.26%
Platinum Underwriters	\$160,000	\$87,000		\$247,000	\$1,895,455	8.44%	4.59%		13.03%
Munich Re	\$1,490,000	\$2,130,000	\$125,000	\$3,745,000	\$30,770,014	4.84%	6.92%	0.41%	12.17%
RenaissanceRe	\$220,000	\$220,000		\$440,000	\$3,939,214	5.58%	5.58%		11.17%
Hannover Re	\$342,900	\$354,200	\$46,000	\$743,100	\$6,838,538	5.01%	5.18%	0.67%	10.87%
Omega	\$22,100	\$23,600		\$45,700	\$421,563	5.24%	5.60%		10.84%
Catlin	\$173,100	\$200,000		\$373,100	\$3,448,000	5.02%	5.80%		10.82%
AXIS Capital	\$295,000	\$285,000		\$580,000	\$5,624,970	5.24%	5.07%		10.31%
Torus Insurance Holdings	\$35,000	\$60,000		\$95,000	\$950,600	3.68%	6.31%		9.99%
Aspen Ins. Holdings	\$90,000	\$160,000	\$60,000	\$310,000	\$3,241,900	2.78%	4.94%	1.85%	9.56%
Swiss Re	\$1,125,000	\$1,200,000		\$2,325,000	\$25,344,000	4.44%	4.73%		9.17%
SCOR S.E.	\$267,200	\$257,200		\$524,400	\$5,812,470	4.60%	4.42%		9.02%
Everest Re Group	\$220,000	\$320,000		\$540,000	\$6,283,517	3.50%	5.09%		8.59%
Transatlantic Holdings	\$115,000	\$240,000		\$355,000	\$4,284,459	2.68%	5.60%		8.29%
Endurance Specialty	\$60,000	\$125,000	\$50,000	\$235,000	\$2,848,153	2.11%	4.39%	1.76%	8.25%
Validus Holdings	\$37,500	\$139,000	\$65,000	\$241,500	\$3,504,831	1.07%	3.97%	1.85%	6.89%
Argo International	\$40,000	\$60,000		\$100,000	\$1,626,100	2.46%	3.69%		6.15%
Arch Capital	\$97,500	\$80,000	\$100,000	\$277,500	\$4,513,003	2.16%	1.77%	2.22%	6.15%
QBE Ins Group	\$425,000	\$125,000		\$550,000	\$10,311,000	4.12%	1.21%		5.33%
Alterra Capital	\$32,000	\$80,000	\$23,000	\$135,000	\$2,918,270	1.10%	2.74%	0.79%	4.63%
XL Group plc	\$162,500	\$240,000	\$62,500	\$465,000	\$10,613,049	1.53%	2.26%	0.59%	4.38%
Allied World	\$35,000	\$75,000		\$110,000	\$3,100,000	1.13%	2.42%		3.55%
* Ariel Holdings		\$42,500		\$42,500	\$1,545,218		2.75%		2.75%
ACE Ltd.	\$210,000	\$225,000		\$435,000	\$22,974,000	0.91%	0.98%		1.89%
<b>Totals</b>	<b>\$6,367,300</b>	<b>\$7,944,500</b>	<b>\$647,400</b>	<b>\$14,959,200</b>	<b>\$176,747,947</b>				<b>8.5%</b>
<b>Reporting one event</b>									
Hardy Group	\$16,800			\$16,800	\$237,978	7.06%			
Lancashire Holdings Ltd.		\$75,000		\$75,000	\$1,286,900		5.83%		
R+V Ruck		\$107,000		\$107,000	\$5,894,958		1.82%		
<b>Grand Total</b>	<b>\$6,384,100</b>	<b>\$8,126,500</b>		<b>\$15,158,000</b>	<b>\$184,167,783</b>				<b>8.2%</b>
*Novae and Ariel reported a combined estimate which has been reported in the Japan column Loss estimates for each group are taken at the mid-point of their ranges.									

## **B. Reinsurers Reporting Material “Cat Creep” During Third Quarter of 2011**

Alterra  
Amlin  
Arch  
Aspen  
AWAC  
AXIS  
Chaucer  
Endurance  
Everest  
Gen Re  
HCC  
Markel  
Montpelier  
Munich  
Odyssey  
Partner  
Platinum  
Renaissance  
Transatlantic  
Validus  
XL

## 4. Major Earthquakes Compared: 1960 to 2011

### Strongest insured earthquakes by magnitude

Year	Event	Region	Magnitude	Description	Reported Deaths	Direct Loss (\$Mns)	Insured Loss / G7 GDP	Reinsured Loss
1960	Valdivia Earthquake	Rest of World	9.5	Earthquake in Chile caused a tsunami that hit Hilo, HI (killing 61), Japan (killing 142) NZ and the Philippines	5,100	\$150	0.0206%	<\$100 Mn
1964	Alaska Earthquake	North America	9.2	Devastated Anchorage, widespread tsunami damaged nearby harbors	131	\$350	0.0375%	<\$50 Mn
2004	Indian Ocean Tsunami	Asia	9.2	Epicenter off the west coast of Sumatra, Indonesia, damage spread for several thousand miles.	230,000	\$5,000	0.0290%	\$500 Mn - \$1 Bn
2011	Japan Earthquake and Tsunami	Japan	9.0	Offshore epicenter 80 miles from Sendai, popul. 1 Mn. Tsunami of 25 to 75 feet. Level 7 nuclear event.	>20,000	> \$50,000	0.2619%	>\$20 Bn
2010	Chile Earthquake	Rest of World	8.8	Epicenter near the coast of Pelluhue, 400 miles south of Santiago.	524	\$14,000	0.0677%	\$9 Bn - \$12 Bn
1985	Mexico City Earthquake	North America	8.3	Epicenter located off the Mexican Pacific coast.	10,153	\$4,000	0.0657%	\$5 Bn - \$1.5 Bn
2007	Peru Earthquake	Rest of World	8.0	Epicenter 90 miles southeast of Lima. Over 40,000 buildings damaged or destroyed.	519	\$400	0.0020%	<\$250 Mn
2009	Samoa Tsunami	Rest of World	8.0	Offshore earthquake caused 20+ ft. waves.	200+	\$250	0.0013%	Limited
2008	Sichuan Earthquake	Asia	7.9	Epicenter located 50 miles west-northwest of Chengdu (capital of Sichuan).	90,000	\$1,000	0.0049%	\$250 Mn - \$500 Mn
2007	Chile Earthquake	Rest of World	7.7	Epicenter on the northern coastline of Chile, near Bolivia, 4,000 homes destroyed.	2	\$1,000	0.0049%	\$250 Mn - \$500 Mn
1999	Izmit, Turkey Earthquake	Europe	7.6	Epicenter in northwest Turkey, 60 miles east of Istanbul.	17,217	\$4,000	0.0298%	\$500 Mn - \$1 Bn
1999	Taiwan Earthquake	Rest of World	7.6	Epicenter in Jiji, 100 miles south of Taipei	2,415	\$5,000	0.0372%	\$2 Bn - \$3 Bn
2009	Indonesia Earthquake	Asia	7.6	Epicenter located at Padang, provincial capital.	1,115	\$1,000	0.0051%	\$500 Mn
2011	Van, Turkey Earthquake	Asia	7.2	Epicenter 40 miles from Iranian border	>600	<1,000	<0.005%	Little
2010	Canterbury Earthquake (NZ 1)	Australia/New Zealand	7.1	Canterbury, NZ.	Few	\$6,000	0.0290%	\$2.5 Bn to \$3.5 Bn
2010	Haiti Earthquake	Rest of World	7.0	Epicenter near Port au Prince.	60,000 to 120,000	\$1,000	0.0048%	<\$250 Mn
1989	Loma Prieta Earthquake	North America	6.9	Located in the San Francisco Bay Area. Fires and collapses in S.F.	63	\$7,500	0.0919%	\$2 Bn - \$3 Bn

### Costliest earthquakes by direct losses

Year	Event	Region	Magnitude	Description	Reported Deaths	Direct Loss (\$Mns)	Insured Loss / U.S. DEP	Insured Loss / G7 GDP	Reinsured Loss
2011	Japan Earthquake and Tsunami	Japan	9.0	Offshore epicenter 80 miles from Sendai, popul. 1 Mn. Tsunami of 25 to 75 feet. Level 7 nuclear event.	>20,000	> \$50,000	1.1612%	0.2619%	>\$20 Bn
2011	Christchurch Earthquake (NZ 1)	Australia/New Zealand	6.3	Epicenter 6.2 miles southeast of Christchurch.	172	\$15,000	2.322%	0.0714%	\$12.5Bn
1994	Northridge Earthquake	North America	6.7	Epicenter was near Los Angeles. Building collapses in L.A.	72	\$17,500	7.163%	0.1685%	\$5 Bn - \$6 Bn
2010	Chile Earthquake	Rest of World	8.8	Epicenter near the coast of Pelluhue, 400 miles south of Santiago.	524	\$14,000	3.251%	0.0677%	\$9 Bn - \$12 Bn
1989	Loma Prieta Earthquake	North America	6.9	Located in the San Francisco Bay Area. Fires and collapses in S.F.	63	\$7,500	3.630%	0.0919%	\$2 Bn - \$3 Bn
2010	Canterbury Earthquake (NZ 1)	Australia/New Zealand	7.1	Canterbury, NZ.	Few	\$6,000	1.393%	0.0290%	\$2.5 Bn to \$3.5 Bn
1995	Kobe Earthquake	Japan	6.8	Epicenter was near Tokyo. Thousands of homes burned, largely uninsured.	6,434	\$5,000	1.968%	0.0455%	<\$2 Bn
1999	Taiwan Earthquake	Rest of World	7.6	Epicenter in Jiji, 100 miles south of Taipei	2,415	\$5,000	1.743%	0.0372%	\$2 Bn - \$3 Bn
2004	Indian Ocean Tsunami	Asia	9.2	Epicenter off the west coast of Sumatra, Indonesia, damage spread for several thousand miles.	230,000	\$5,000	1.165%	0.0290%	\$500 Mn - \$1 Bn
2011	Christchurch Aftershock (NZ 11)	Australia/New Zealand	6.3	Aftershock from the earthquake that occurred in February.	0	\$5,000	1.161%	0.0238%	\$4Bn
1985	Mexico City Earthquake	North America	8.3	Epicenter located off the Mexican Pacific coast.	10,153	\$4,000	3.002%	0.0657%	\$5 Bn - \$1.5 Bn
1999	Izmit, Turkey Earthquake	Europe	7.6	Epicenter in northwest Turkey, 60 miles east of Istanbul.	17,217	\$4,000	1.394%	0.0298%	\$500 Mn - \$1 Bn
2009	L'Aquila, Italy Earthquake	Europe	6.3	Abruzzo Region. Injured 1,500+ and left 65,000 homeless.	308	\$2,000	0.464%	0.0101%	\$500 Mn - \$750 Mn
1989	Newcastle Earthquake	Australia/New Zealand	5.6	Epicenter located around Newcastle, New South Wales. 160 people were hospitalized	13	\$1,500	0.726%	0.0184%	\$300 Mn - \$750 Mn
2007	Chile Earthquake	Rest of World	7.7	Epicenter on the northern coastline of Chile, near Bolivia, 4,000 homes destroyed.	2	\$1,000	0.221%	0.0049%	\$250 Mn - \$500 Mn

## Costliest earthquakes by direct losses to GDP

Year	Event	Region	Magnitude	Description	Reported Deaths	Direct Loss (\$Mns)	Insured Loss / G7 GDP	Reinsured Loss
2011	Japan Earthquake and Tsunami	Japan	9.0	Offshore epicenter 80 miles from Sendai, popul. 1 Mn. Tsunami of 25 to 75 feet. Level 7 nuclear event.	>20,000	> \$50,000	0.2619%	>\$20 Bn
2011	Christchurch Earthquake (NZ I I)	Australia/New Zealand	6.3	Epicenter 6.2 miles southeast of Christchurch.	172	\$15,000	0.0714%	\$12.5Bn
1994	Northridge Earthquake	North America	6.7	Epicenter was near Los Angeles. Building collapses in L.A.	72	\$17,500	0.1685%	\$5 Bn - \$6 Bn
1989	Loma Prieta Earthquake	North America	6.9	Located in the San Francisco Bay Area. Fires and collapses in S.F.	63	\$7,500	0.0919%	\$2 Bn - \$3 Bn
2010	Chile Earthquake	Rest of World	8.8	Epicenter near the coast of Pelluhue, 400 miles south of Santiago.	524	\$14,000	0.0677%	\$9 Bn - \$12 Bn
1985	Mexico City Earthquake	North America	8.3	Epicenter located off the Mexican Pacific coast.	10,153	\$4,000	0.0657%	\$5 Bn - \$1.5 Bn
1995	Kobe Earthquake	Japan	6.8	Epicenter was near Tokyo. Thousands of homes burned, largely uninsured.	6,434	\$5,000	0.0455%	<\$2 Bn
1964	Alaska Earthquake	North America	9.2	Devastated Anchorage, widespread tsunami damaged nearby harbors	131	\$350	0.0375%	<\$100Mn
1999	Taiwan Earthquake	Rest of World	7.6	Epicenter in Jiji, 100 miles south of Taipei	2,415	\$5,000	0.0372%	\$2 Bn - \$3 Bn
1999	Izmit, Turkey Earthquake	Europe	7.6	Epicenter in northwest Turkey, 60 miles east of Istanbul.	17,217	\$4,000	0.0298%	\$500 Mn - \$1 Bn
2004	Indian Ocean Tsunami	Asia	9.2	Epicenter off the west coast of Sumatra, Indonesia, damage spread for several thousand miles.	230,000	\$5,000	0.0290%	\$500 Mn - \$1 Bn
2010	Canterbury Earthquake (NZ I)	Australia/New Zealand	7.1	Canterbury, NZ.	Few	\$6,000	0.0290%	\$2.5 Bn to \$3.5 Bn
2011	Christchurch Aftershock (NZ I I I)	Australia/New Zealand	6.3	Aftershock from the earthquake that occurred in February.	0	\$5,000	0.0238%	\$4Bn
1960	Valdivia Earthquake	Rest of World	9.5	Earthquake in Chile caused a tsunami that hit Hilo, HI (killing 61), Japan (killing 142) NZ and the Phillipines	5,100	\$150	0.0206%	<\$50Mn

## Deadliest earthquakes by insured lives

Year	Event	Region	Magnitude	Description	Reported Deaths	Insured Lives	Direct Loss (\$Mns)
2011	Japan Earthquake and Tsunami	Japan	9.0	Offshore epicenter 80 miles from Sendai, popul. 1 Mn. Tsunami of 25 to 75 feet. Level 7 nuclear event.	>20,000	10,000	> \$50,000
2008	Sichuan Earthquake	Asia	7.9	Epicenter located 50 miles west-northwest of Chengdu (capital of Sichuan).	90,000	7,500	\$1,000
1985	Mexico City Earthquake	North America	8.3	Epicenter located off the Mexican Pacific coast.	10,153	5,000	\$4,000
2004	Indian Ocean Tsunami	Asia	9.2	Epicenter off the west coast of Sumatra, Indonesia, damage spread for several thousand miles.	230,000	5,000	\$5,000
1995	Kobe Earthquake	Japan	6.8	Epicenter was near Tokyo. Thousands of homes burned, largely uninsured.	6,434	3,200	\$5,000
1999	Izmit, Turkey Earthquake	Europe	7.6	Epicenter in northwest Turkey, 60 miles east of Istanbul.	17,217	1,500	\$4,000
2010	Haiti Earthquake	Rest of World	7.0	Epicenter near Port au Prince.	60,000 to 120,000	1,000	\$1,000
2010	Chile Earthquake	Rest of World	8.8	Epicenter near the coast of Pelluhue, 400 miles south of Santiago.	524	400	\$14,000
1960	Valdivia Earthquake	Rest of World	9.5	Earthquake in Chile caused a tsunami that hit Hilo, HI (killing 61), Japan (killing 142), NZ and the Phillipines	5,100	125	\$150
2009	L'Aquila, Italy Earthquake	Europe	6.3	Abruzzo Region. Injured 1,500+ and left 65,000 homeless.	308	125	\$2,000
1968	Belice Earthquake	Europe	6.4	Epicenter located in Sicily, Italy.	370	100	\$250
1964	Alaska Earthquake	North America	9.2	Devastated Anchorage, widespread tsunami damaged nearby harbors	131	60	\$350
2009	Samoa Tsunami	Rest of World	8.0	Offshore earthquake caused 20+ ft. waves.	200+	40	\$250
1999	Taiwan Earthquake	Rest of World	7.6	Epicenter in Jiji, 100 miles south of Taipei	2,415	Significant	\$5,000
2007	Peru Earthquake	Rest of World	8.0	Epicenter 90 miles southeast of Lima. Over 40,000 buildings damaged or destroyed.	519	Significant	\$400

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