

Hurricane Irma. From the impact to financial returns to the nature of the catastrophe itself, Brookvine answers questions received from investors during this extreme weather event.

INTRODUCTION

Hurricane Irma was the most intense Atlantic hurricane to strike the United States since Katrina in 2005 and the first major hurricane to make landfall in Florida since Wilma, also in 2005. It followed Hurricane Harvey two weeks earlier- the first time on record two Atlantic tropical cyclones of such strength struck the continental United States in the same hurricane season.

This followed earlier "pre-season" forecasts suggesting 2017 would contain normal levels of hurricane activity. Moreover, as the storm system changed intensity, loss estimates varied dramatically. Eventually Irma's path was such that its impact was both far-reaching and devastating, with confirmed landfalls in Antigua and Barbuda, Saint Martin, Anguilla, Turks and Caicos, the Bahamas, Cuba and the United States. Yet the impact on insured values was far less than originally anticipated.

There are now three more storm systems churning in the Atlantic Ocean. Hurricane Maria poses the most immediate danger as it makes its way through the Caribbean islands toward the U.S. coastline.

With heightened hurricane activity, and the first major loss event for many ILS investors, we received queries from current and prospective investors during Irma. Questions ranged from those related to the financial impact on investment returns, to the nature of the catastrophe itself, trading opportunities and the reliability of forecasts of catastrophic events and insured losses.

The purpose of this paper is to record our answers to these questions asked by investors.

QUESTIONS ABOUT FORECASTING STORM ACTIVITY AND INSURED LOSSES

1. What was the forecast for the level of hurricane activity this season? Is it typically accurate?

A number of agencies provide pre-season forecasts for expected hurricane activity. Typically these forecasts are expressed as "normal" or "above/below normal." The U.S. government National Hurricane Centre states that on average the Atlantic basin has experienced around 12 named storms per year, of which around half develop into hurricanes and 2-3 of Category 3 strength or greater. Heading into the 2017 season the group of forecasters was split with roughly half calling for an average or below average season versus average or above.

Activity so far has been "above normal" with 13 named storms, seven hurricanes with four at Category 3 and above. Historical analysis does not support the accuracy of these forecasts and moreover, the forecasts do not predict when a storm will form or how strong it may prove to be. Pre-season forecasting is not a factor that Fermat takes into account when managing the portfolio.

2. Is there any correlation between the occurrence of a land-falling hurricane and an increase in the number of subsequent storms which make landfall?

While the right conditions out in the ocean can reasonably predict the number of hurricanes forming, there is no evidence for the auto-correlation of land-falling hurricanes i.e. a hurricane making landfall does not make it

more likely than another will.

A number of conditions need to be in place at precisely the right moment for a hurricane to make landfall e.g. high and low pressure systems, wind direction and strength.

3. Why do forecast loss estimates change so significantly?

The forecasts of loss estimates are critically dependent on both the strength and placement of the hurricane when it makes landfall. The further away is the system from making landfall, the greater the level of uncertainty about these two factors.

As the proximity of the hurricane to land gets closer, estimates about the likely placement and changes to intensity can be made with more certainty.

4. How are hurricanes categorised?

Strong winds determine the intensity of a hurricane. To be classified as a hurricane, a tropical cyclone must have maximum sustained winds of at least 74 mph (33 m/s; 64 kn; 119km/h) (Category 1). The highest classification in the scale, Category 5, contains storms with sustained winds exceeding 156 mph (70 m/s; 136 kn; 251 km/h).

QUESTIONS ABOUT IRMA'S LIKELY IMPACT ON ILS MARKETS AND ACTIVE FUNDS MANAGEMENT

1. How does an event like Irma impact the performance of the ILS market?

Depending on a number of factors leading up to a major hurricane making landfall (e.g. intensity, likely location), there is often an uptick in the amount of bond trading, referred to within the industry as "live cat" trading. Prices may move quite significantly during this period of uncertainty.

For example, in the lead up to Hurricane Irma making landfall, the Swiss Re Global Cat Bond Index fell by over 15% on Friday 8th September. However, as the event developed and estimates around the likely loss experience became clearer, the index quickly recovered two thirds of this drawdown to be down only 4.6% by the following Tuesday. There was very little trading activity at the market lows.

In the aftermath of Hurricane Irma's landfall, the industry will now assess the actual losses and identify those bonds directly affected. In the coming weeks the market should expect to see further clarity around those bonds that will suffer a direct capital loss and those which will ride out some market volatility.

2. What is the likely impact on future returns from ILS markets?

Prior experience has shown that the periods following a major event tend to produce outsized returns as the re/insurance market seeks to recapitalise. The lower the impact of insurance claims on the industry, the less is the impact on returns.

In the past month, there have been three events that will have a direct impact on the ILS market: Hurricane Harvey, Mexico Earthquake and Hurricane Irma. While the development of loss estimates continues, it does appear as though the combined effect of these events may drive ILS spreads a little wider, slightly improving the return outlook.

3. Is there any dislocation in ILS markets? How does this arise and does this create trading opportunities?

There is some dislocation in ILS markets. With sharply divergent forecasts of industry loss following Irma, certain bonds have been trading at substantial discounts to par value in the secondary market as uncertainty about their value exists. This is particularly the case for so-called Aggregate Loss Bonds that insure losses in a cascading fashion across multiple events. Those expecting a higher industry loss will naturally discount the future value of these bonds as they are now more exposed to future events. Yet those managers with access to sound, timely data, and not swayed by emotion, may find trading opportunities amongst these bonds. Trading at this time is a fine art and needs to be conducted as quietly and efficiently as possible.

QUESTIONS ABOUT THE IRMA STORM SYSTEM

1. Why was Hurricane Irma described earlier as the "perfect storm"?

Hurricane Irma formed off the coast of Africa and travelled in a relatively straight westerly direction without any impact from other weather systems. As it approached the Lesser Antilles region it passed over parts of the ocean that are particularly warm at this time of year. Warm ocean temperatures allow the hurricane to lift more water into its system which in turn allows it to produce more energy.

The almost complete absence of wind shear meant that Irma was able to continue to gain energy and intensity as it progressed West over particularly warm water. In fact, Irma was able to maintain Category 5 intensity and wind speeds of 185 miles per hour (298 kph) for some 37 hours, beating the prior record of 24 hours set by Super Typhoon Haiyan in 2013.

2. What caused Hurricane Irma to change course so sharply?

As Hurricane Irma was making its way from East to West across the Atlantic, there was a significant low pressure trough travelling West to East across the USA. Adding to the complexity around the progress and development of this low pressure trough was another hurricane (Katia).

As Hurricane Irma reached the southern end of Florida, it interacted with the low pressure trough moving in the opposite direction which resulted in the hurricane moving from its north westerly trajectory to a more northerly direction. Forecasters knew this interaction would be inevitable but it was unclear precisely when it would occur.

3. How does wind shear impact a hurricane?

A hurricane gains its strength from being able to maintain an organised counter-clockwise (in the Northern Hemisphere) wind pattern over warm water. However, hurricane systems do not exist in isolation and high/low pressure systems, ridges and troughs continue to make their way across the ocean.

When a weather system such as a trough produces a wind flow that cuts across a hurricane it has a shearing effect that disrupts the organised wind pattern of the hurricane which dampens the storm's force.

4. What happened to make Hurricane Irma lose intensity?

Two factors combined to make Irma lose intensity as it approached the southern coast of Florida:

- It interacted with the land mass of Cuba, sapping some of its strength
- As it progressed further westward it began to interact with a low pressure trough moving in the opposite direction which introduced a significant amount of wind shear.

In the space of 48 hours, Irma lost intensity from a Category 5 storm to a strong Category 3.

5. Why do hurricanes degrade so quickly after making landfall?

Hurricanes build their energy from taking up moisture from warm waters in a process called convection. The warmer the water the more readily a hurricane system can draw moist air into its system and generate greater convective energy.

When a hurricane system passes over land, the source of energy is removed and the hurricane loses the ability to replace the cold unstable air within its upper region. Removal of this energy source sees the system gradually weaken and break down.

It is also typical that as a hurricane moves toward land the level of wind shear from onshore weather systems assists in breaking down its organisation and strength.

6. Much was written about the changing configuration of the storm system, including the eyewall replacement cycle. What is the eyewall replacement cycle of a hurricane?

Eyewall replacement cycles occur naturally in particularly strong hurricanes (generally Category 3 or above). When the eye of a major storm becomes too small, it is not able to stay organised due to its own turbulence and begins to break apart. The area outside the original eyewall begins to rob the inner eyewall of its moisture and energy and with its more organised and less turbulent structure eventually replaces the inner eyewall.

This typically has two impacts on the hurricane:

- The hurricane loses some of its intensity i.e. it may lower in category strength
- The overall size of the storm increases to cover a larger area

Before Hurricane Irma began to interact with land across the Bahamas, it underwent six eyewall replacement cycles.

7. What is the relationship between a hurricane and a storm surge?

A suitably powerful hurricane generates an intense amount of wind strength. As well as pulling moist air from the ocean, these winds are able to move immense amounts of ocean in front of them.

Low lying coastal areas are particularly susceptible to water damage and flooding from storm surges created by the powerful winds.

For more information about Insurance Linked Securities or the Fermat ILS Yield Fund, please contact:

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Investment Strategy – Fermat ILS Yield Fund

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