Asset Valuation Forecasting: Black Swans and the Top 5 Things You Can't Control

Presented by:
Dr. Wouter Botzen, VU University Amsterdam
Blerim Zeqiri, Alliance Residential Co.
Kevin Huss, Harbor Group Management

September 23-25, 2013
Turnberry Isle Miami
Dr. Wouter Botzen
Assistant Professor
Department of Environmental Economics, Institute for Environmental Studies (IVM), VU University Amsterdam

Blerim Zeqiri
Director of Revenue and Research
Alliance Residential Co.

Kevin Huss, Moderator
Director of Revenue Management
Harbor Group Management Co.
Black Swan?
A Black Swan has three attributes:

- **OUTLIER**: outside the realm of regular expectations
- **EXTREME IMPACT**
- **RETROSPECTIVE (ex ante) PREDICTABILITY**: human nature makes us concoct explanations for its occurrence after the fact
Our Top 5 Black Swan’s

1. NATURAL DISASTERS and CLIMATE CHANGE: Global warming, rising sea level, change to flood zones, earthquake, tsunami, tornado, wildfires, impact to real estate risk management.

2. MAN-MADE DISASTERS: Nuclear accidents, oil spills, chemical accidents, infrastructure, blackouts.

3. FINANCIAL EVENTS: Global recession, housing crisis, localized macro swings in employment and unemployment.

4. POLITICAL/SOCIAL EVENTS: Social upheaval, political crises, terrorist attacks, crime, war.

5. INTERNATIONAL EVENTS: Global economy, changes to sovereign GDP growth, national economy collapses, impact to oil and gas sectors, international war.
Black Swan - In the news

For Insurers, No Doubts on Climate Change, NYT, May 14, 2013

Rising Sea Levels Seen as Threat to Coastal U.S.

New Climate Data Depict a City More at Risk

Munich Reinsurance website on global warming risks

The Next Black Swan Is Right Around the Corner
http://etfdailynews.com/2013/09/03/the-next-black-swan-is-right-around-the-corner/
Impacts of Climate Change and Flood Risk on Real Estate Markets

Dr. Wouter Botzen

September 23-25, 2013
Turnberry Isle Miami
Hurricane Sandy
• Extremely large wind field
• Less than a 1 in 100 year event
• $50 billion of costs in the USA

Impact Sandy in New York City (NYC)
• Flooded 17% of the City’s land
• 88,700 buildings in flooded areas
• $19 billion of costs
Is Hurricane Sandy a Black Swan?

Survey among 1,000 homeowners in NYC floodplains

“Hurricane Irene: a wake-up call for New York City?”

J. C. J. H. Aerts and W. J. W. Botzen

Abstract. The weakening of Irene from a Category 3 hurricane to a tropical storm resulted in less damage in New York City (NYC) than initially was anticipated. It is widely recognized that the storm surge and associated flooding could have been much more severe. In a recent study, we showed that a direct hit to the city from a hurricane may expose an enormous number of people to flooding. A major hurricane has the potential to cause large-scale damage in NYC. The city’s resilience to flooding can be increased by improving and integrating flood insurance, flood zoning, and building code policies.

Despite Hurricane Irene in 2011 only about 20% took specific measures to reduce flood risk before Sandy
Global Trend Weather-Related Losses

Source: Munich Re (2013)
Climate Change and Hurricane Risk

• More severe hurricanes (*uncertain*)
  - Stronger winds can double damages from hurricanes (Nordhaus, 2010; Bouwer & Botzen, 2011, *Climate Change Economics*)

• Sea level rise increases surge levels and coastal erosion (*very likely*)
  - Can increase flood damage up to tenfold in global coastal cities (Hallegatte et al., 2013, *Nature Climate Change*)
Expert Analysis of Flood Risk

- Storm Model
- Inundation Model
- Flood Damage Model
- Output: $ loss per storm, $ loss per year
- Property Value
Insights Flood Risk Models

• **Expected property damage**
  - About $20 billion for a severe hurricane in NYC
  - Average NYC loss is about $85 mln/year (Aerts et al., *Risk Analysis*)

• **Long-term development in risk**
  - Climate change can increase flood risk in NYC up to tenfold

• **Benefits from protecting property**
  - Investing $1 in elevating newly built homes 4 ft. in NYC coastal flood zones saves on average $3- $10
Insurers Responses

• **National Flood Insurance Program (NFIP)**
  - Offers flood coverage at lower than actuarial prices
  - Severe deficits: increased from $20bn to $30bn after Sandy
  - Biggert-Waters Flood Insurance Reform Act of 2012
    - Risk based premiums
    - Flood-resistant building practices

• **Windstorm insurance**
  - Expand reinsurance coverage and reserves
  - Limit coverage and outstanding policies
  - Increase premiums
Individual Responses

Individuals are often badly prepared for low-probability high-impact (flood) events

- Myopia: short planning horizon
- Misperception of risk
- Overconfidence: “it will not happen to me”
- Threshold model: the low flood probability is below my threshold level of concern
- Professionals and policy makers show similar behavior: “it will not happen in my term of office”
Individual Responses after Sandy

Survey among 1,000 homeowners in NYC floodplains

60% answer that Sandy has increased their perceptions of flood risk

Preparedness improved after Sandy

But often higher risk awareness disappears a few years after the storm
Real Estate Market Responses

• In a rational and efficient market properties at a higher flood risk should sell at a constant price discount.

• Hedonic price models estimate the independent effects of flood risk on housing prices.

• Results show that a property located in a flood zone sells at a small (4%-12%) premium discount, although the discount is not always present (0%).

• Flood risk discounts on property values increase after a flood disaster, but then become smaller over time due to a “availability bias”.
Development Property Values

House price recovery in Pitt County (North Carolina) after it was hit by Hurricane Floyd in 1999

Source: Bin & Landry, 2013, JEEM
General Lessons

• Black Swans are costly outliers, but clear clues exist that they can happen
• Experts have developed refined models for estimating low-probability high-impact risks
• Individuals often underestimate infrequent disasters and badly prepare
• Property values decline substantially after a flood disaster, but eventually people forget about the risk and prices recover
• Climate change will increase floods, and act as a reminder of flood risks
• Insurance coverage will become more expensive
• Flood-proof building practices can be the solution and are cost-effective
Man-Made Disasters

Financial Events

Political & Social Events

International Events

Blerim Zeqiri
Man-Made Disasters

- Nuclear accidents, oil spills, chemical accidents, infrastructure, blackouts etc.
  - Created due to negligence and/or lack of upkeep
  - Frequency of use (law of large numbers)
Man-Made Disasters – Cont.

- Nuclear accidents such as Chernobyl (direct cause) or Fukushima (indirectly caused by the earthquake) – show lack of preparedness
Man-Made Disasters – Cont.

• Nuclear accidents – effects:
  – Chernobyl – 4,000 deaths and 350,000 people evacuated from three countries (Belarus, Russia, and Ukraine), long lasting soil degradation from radiation
  – Fukushima Daiichi – 600 deaths and 100,000 people evacuated, with long lasting devastation to soil and leak of contaminated radioactive water
Man-Made Disasters – Cont.

- Oil Freight Train Explosion – Canada
Financial Events

• Debt Ceiling
What are the risks?

• Government shutdown and potential default

• Market for T-bills requiring a risk premium and a jump in interest rates

• The downgrade alone by S&P in 2011 caused S&P 500 Index to fall 16.8% in less than 3 weeks

---

Boehner Sees Showdown Over Raising Debt Limit

By ASHLEY PARKER
Published: August 27, 2013

Speaker John A. Boehner says he is gearing up for “a whale of a fight” with President Obama over raising the federal debt ceiling, even though Mr. Obama has repeatedly said he has no plans to negotiate with Congressional Republicans over the nation’s debt limit and wants it lifted without a political showdown.
• Markets are not reflecting any risk premium of a potential default even if it is for a couple of days

• Bloomberg reported on Aug 5th that “bond investors remain unfazed by political confrontations…and credit markets disregard the standoff, with the 10-year Treasury notes declining throughout the year and only increasing recently under expectation that the Fed will stop the bond buying program”.

• What this means for multi-family real estates?
  • An average $50M property at 75% LTV and interest only, will pay $750K more in debt service for the year if interest rate increases by only 2%.
Political & Social Events

• Social upheaval, political crises, terrorist events, crime

• Previous Black Swans:
  – September 11th terrorist attacks – scale and impact – Global
    – On top of devastating loss of 3,000 lives, economic impact has been enormous

One 9/11 Tally:

$3.3 Trillion

By SHAN CARTER and AMANDA COX  Published September 6, 2011

Al Qaeda spent roughly half a million dollars to destroy the World Trade Center and cripple the Pentagon. What has been the cost to the United States? In a survey of estimates by The New York Times, the answer is $3.3 trillion, or about $7 million for every dollar Al Qaeda spent planning and executing the attacks. While not all of the costs have been borne by the government — and some are still to come — this total equals one-fifth of the current national debt. All figures are shown in today’s dollars.
• Previous Black Swans:
  - Rodney King Riots – scale and impact – Local
    - 51 lives lost, economic impact has been estimated at $800M - $1BB for Los Angeles Metro
International Events

Global economy, changes to sovereign GDP growth, national economy collapses, impact to oil and gas sectors, international war, etc.

- Emerging economies: BRICs and others slowing down drastically
  - Risk has been amplified with expected rate increase by the Fed
  - Currently the emerging markets constitute 50% of world output (PPP), up from 40% a decade ago
  - As was the case with Asian Financial Crisis, one country can drag the rest into a major financial crisis

WSJ

Emerging World Loses Growth Lead

Global Trade Decline Dulls Developing Markets as Outlook Brightens in More-Established Economies
• China - economic stagnation or accelerated decline leading to massive cash outflows and economic collapse
  – Would impact world manufacturing, pushing prices up on all consumer goods

  – Cause massive losses for companies invested in China directly, or indirectly (such as institutional investors).

  – Massive bank losses, including Western banks that have expanded lending to Chinese businesses over the past decade

  – Would cause tightening of credit markets worldwide, at least until exposure to Chinese markets is sorted out

  – Potential political unrest caused by economic collapse that can spread quickly throughout China – not unlike the Arab Spring
Dodgy data may add $1 trillion to Chinese economy: Report

Published: Friday, 16 Aug 2013 | 9:01 AM ET
By: Arjun Kharpal, special to CNBC.com

"There is strong evidence indicating that the rate of real Chinese GDP growth, and ultimately total real GDP, may be significantly overstated," said Christopher Balding, associate professor at Peking University's HSBC Business School, and the report's author.

Through "significant and systematic irregularities", official estimates overstate China's true GDP by 8 to 12 percent, or $1 trillion, according to Balding.
Fitch says China credit bubble unprecedented in modern world history

China’s shadow banking system is out of control and under mounting stress as borrowers struggle to roll over short-term debts, Fitch Ratings has warned.

“Fitch warned that wealth products worth $2 trillion of lending are in reality a "hidden second balance sheet" for banks, allowing them to circumvent loan curbs and dodge efforts by regulators to halt the excesses.”

“Overall credit has jumped from $9 trillion to $23 trillion since the Lehman crisis. "They have replicated the entire US commercial banking system in five years."

“The ratio of credit to GDP has jumped by 75 percentage points to 200pc of GDP, compared to roughly 40 points in the US over five years leading up to the subprime bubble, or in Japan before the Nikkei bubble burst in 1990.”
China's Leader Embraces Mao as He Tightens Grip on Country

"Mr. Xi's attitude toward political reform is a critical issue in China today because the country may be entering a prolonged period of slower economic growth and mounting public discontent over environmental problems, patchy public services and widespread corruption."

“But people in the latter camp [reformers] were alarmed when Mr. Xi made a speech in December in which he declared that the Soviet Union had collapsed because of a lack of ideological conviction among its leaders, and because there was no "real man" to stop the process."
Presenter Contact Information

Dr. Wouter Botzen  
Assistant Professor  
Department of Environmental Economics,  
Institute for Environmental Studies (IVM),  
VU University Amsterdam  
wouter.botzen@vu.nl

Blerim Zeqiri  
Director of Revenue and Research  
Alliance Residential Co.  
bzeqiri@allresco.com

Kevin Huss, Moderator  
Director of Revenue Management  
Harbor Group Management Co.  
khuss@harborg.com