Insurance-Linked Securities

As an Investment Asset Class

- An introductory survey

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Outline

- Background
- Correlation with other financial asset classes
- Pricing theory and practices
- Portfolio construction
- Summary

Background - definition

- Insurance-linked securities (ILS) are financial instruments whose performance are primarily driven by insurance and/or reinsurance loss events

Background – definition

- Narrowly defined:144A securities whose coupon and interest payments are determined by the frequency and severity of insurance or reinsurance loss events. These are known as *cat bonds*

- Broadly, include cat bonds + sidecars + private insurance and reinsurance transactions in various forms

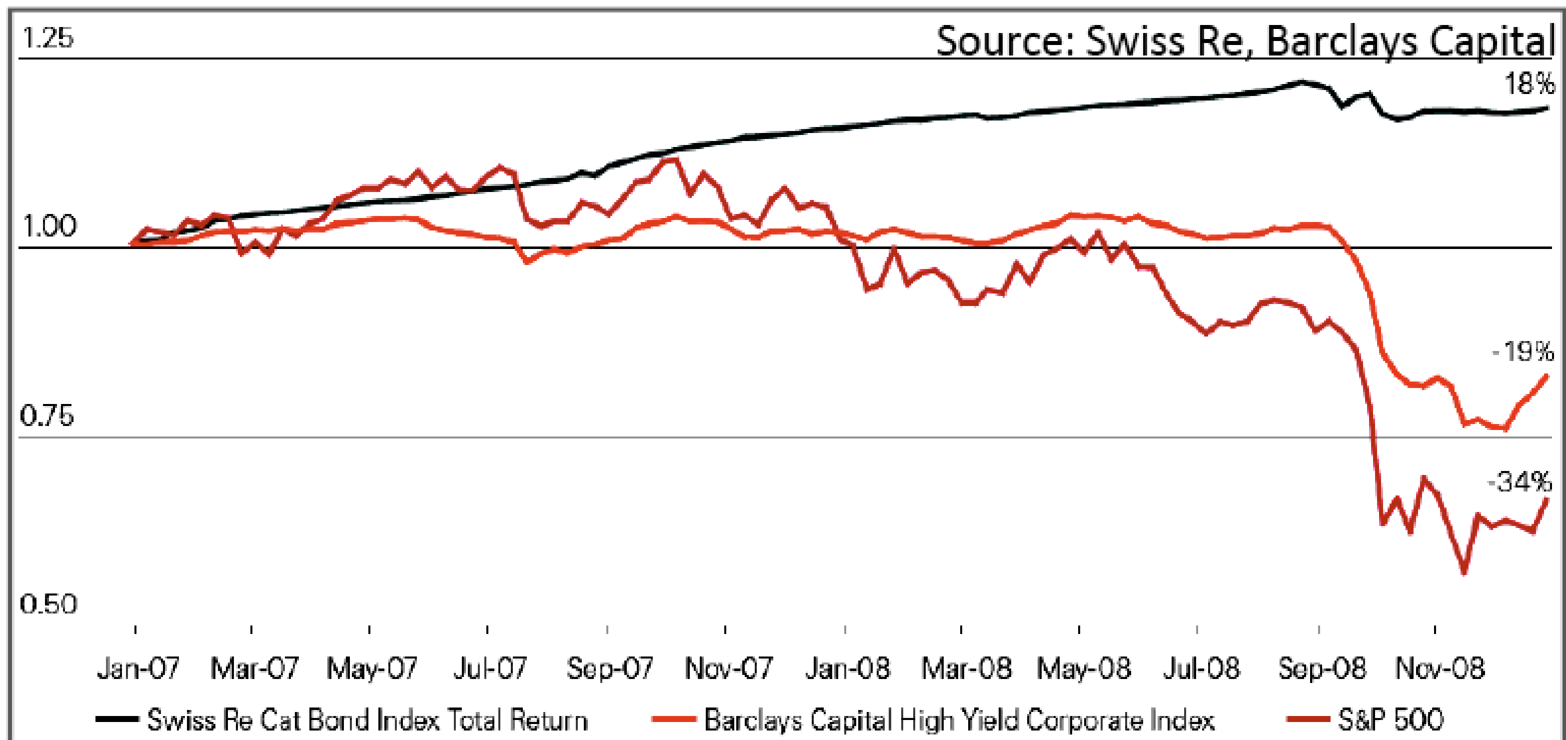
- In the broadest sense: all above + stocks and bonds of reinsurance companies

Background – investors

- Pension funds and multi-strategy hedge funds: consider ILS an uncorrelated asset class
- Insurance and reinsurance companies: use ILS as an alternative source of risk
- Dedicated ILS funds

Correlation with other financial asset classes

- A frequently made statement: ILS is an attractive asset class because it is uncorrelated with the overall financial market.



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Correlation – a more careful investigation

- The correlation between the risks of a cat bond and a general corporate bond:

ILS	General financial risk	correlation
insurance loss risk	credit risk	uncorrelated
insurance market pricing risk	interest rate risk	uncorrelated
liquidity risk	liquidity risk	correlated
collateral investment risk in collateral	credit risk	depending on ILS structure

- Hence, the “uncorrelated” nature must be interpreted with care

Investment of collateral

- ILS are typically fully collateralized
- Advantage: the buyer of protection is not subject the credit risk of the seller of protection
- Key: collateral must be invested conservatively; otherwise, both the protection buyer and the ILS investor are subject to substantial investment risk

Investment of collateral

- Example 1: a prudently-structured collateral for a cat bond
  - Collateral is invested in short-term debt guaranteed by the government
  - The investment income is guaranteed by the cat bond issuer
  - The principal and income are further guaranteed by a bank
  - The value of the trust is mark-to-market with top-up provisions

Investment of collateral

- Example 2: a risky cat bond collateral
  - Lack of strict investment guideline
  - The principal and income are guaranteed by only a bank
  - Lax mark-to-market and top-up provisions
  - Fortunately, these are no longer acceptable post 2008

Determine the fair price of ILS

- Option pricing model
  - Tempting, as ILS are exotic options after all
  - However, the underlying index is not traded, making it infeasible to use no-arbitrage-based option pricing models
- Reinsurance pricing framework
  - A more realistic choice – beyond the scope of this presentation to discuss reinsurance pricing in general
  - Focus on an interesting difference between ILS and traditional reinsurance pricing (next slide)

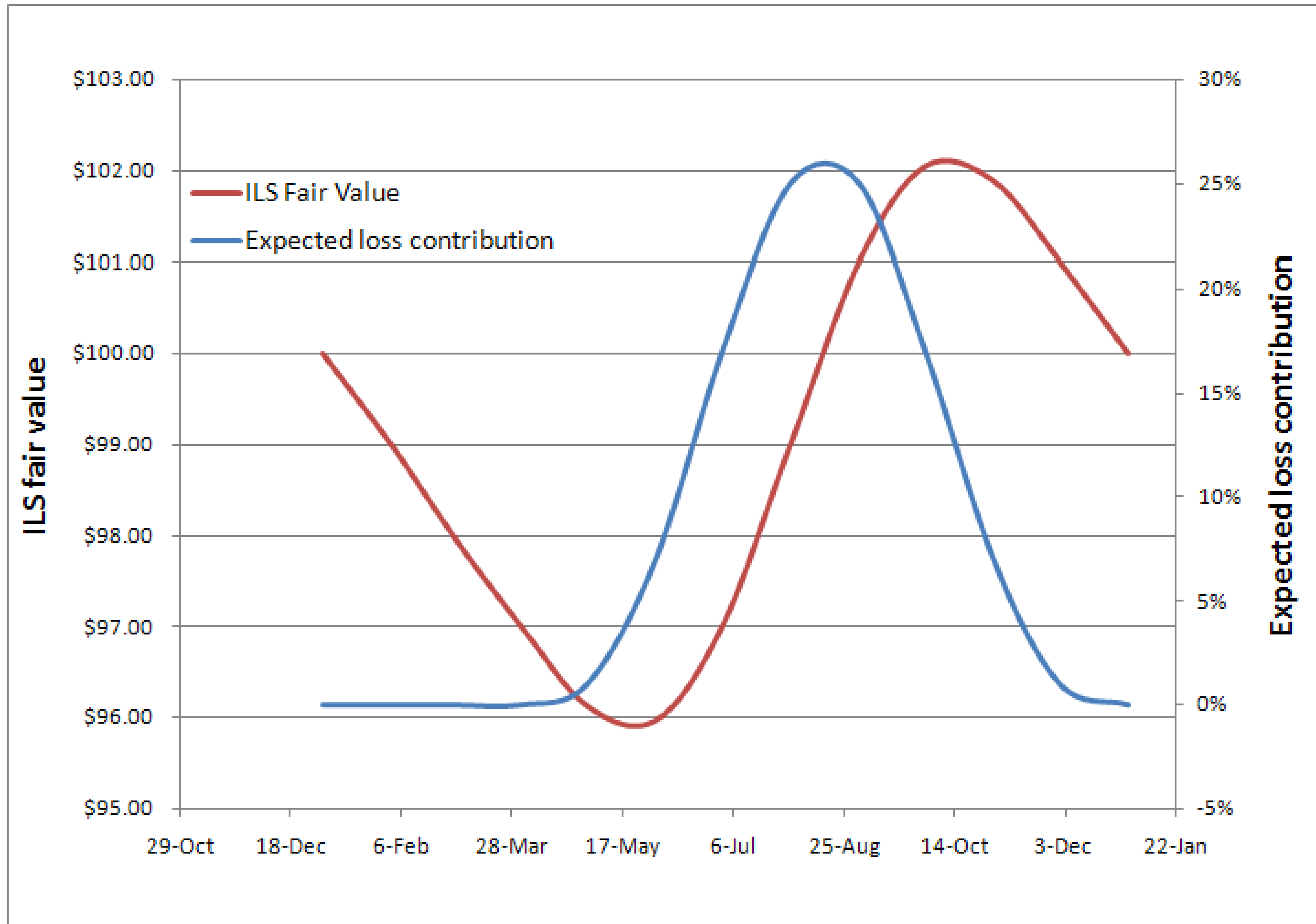
Special pricing consideration

- Traditional reinsurance
  - Generally, once a reinsurer establishes an actuarially sound price for a contract, the premium is earned over time (adjusted for losses)
- However, ILS investors must “mark to market”
  - Determine the fair value of an ILS continuously throughout the holding period
  - Fair value changes due to not only incurred losses but also seasonality of risk and reinsurance market price

ILS fair value and risk seasonality

- Most ILS receive premiums in equal installments evenly spaced over the term of the contract (e.g., quarterly premium payments)
- However, many risks exhibits seasonality (e.g., hurricane)
- Hence, the fair price of the ILS will adjust such that the premium is effectively earned at a pace consistent with how the level of risk evolves over the term of the contract
- Example: next slide

ILS fair value and risk seasonality



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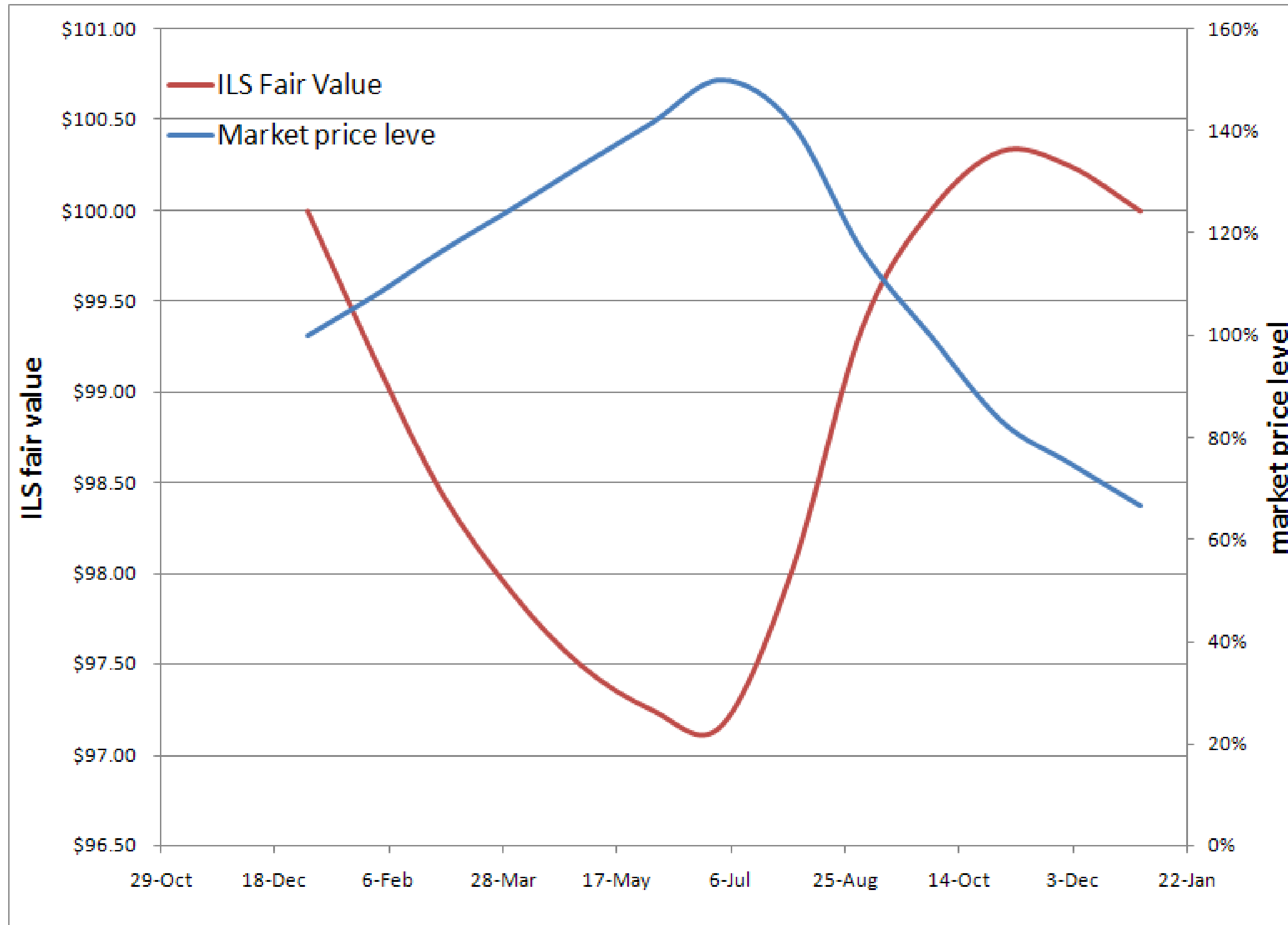
ILS fair value changes with the market price level

- The value of a debt instrument with a fixed coupon rate will go down (up) if the market interest rate goes up (down)
- Similarly, the value of an ILS contract, which typically receives fixed premium payments, will go down (up) if the market reinsurance price goes up (down)
- Example: next slide

ILS fair value changes with the market price level



Portfolio construction

- An optimal portfolio – a collection of long and short positions of ILS such that
  - Return is maximized at a given level of risk
  - Risk is minimized given required return
- Not the focus of this presentation to discuss reinsurance portfolio optimization in general
- Focus on unique aspects of ILS portfolio construction (next slide)

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ILS portfolio construction

- Existence of secondary markets for many ILS contracts
  - Creates greater flexibility for the portfolio manager
  - Requires mark-to-market consideration when evaluating risk/return and interdependence of candidate positions

ILS portfolio construction

- For a multi-strategy fund
  - It is essential to accurately parameterize the correlation between various types of ILS and other asset classes (stocks, bonds, real estates, etc.)
  - Zero correlation is an oversimplified assumption

ILS portfolio construction

- The diversification benefits of ILS contracts vary depending on the overall portfolio

  - For a dedicated ILS portfolio, it is typically not sensible to populate the portfolio exclusively with high stand-alone return from a highly concentrated areas (e.g., exposed to Florida hurricane). Instead, it is advisable to hold positions with moderate stand-alone return but exposed to non-peak areas

  - However, for a portfolio consisting of a broad array of assets (e.g., a pension fund) with ILS representing a small allocation, it is perfectly acceptable to focus on high-return contracts regardless the diversification benefits viewed within the ILS universe

Summary

- ILS as an emerging asset class
  - To investors, ILS offers attractive and quantifiable returns with manageable correlation with most other asset classes
  - To insurance and reinsurance companies, ILS facilitates transfer of risk directly to the capital market
- The nature of ILS, exhibiting the characteristics of both reinsurance and capital market instruments, present challenges and opportunities to both theoreticians and practitioners