ILS Mark-to-Model Valuation Frameworks

David Third - CAS Spring Meeting 2016

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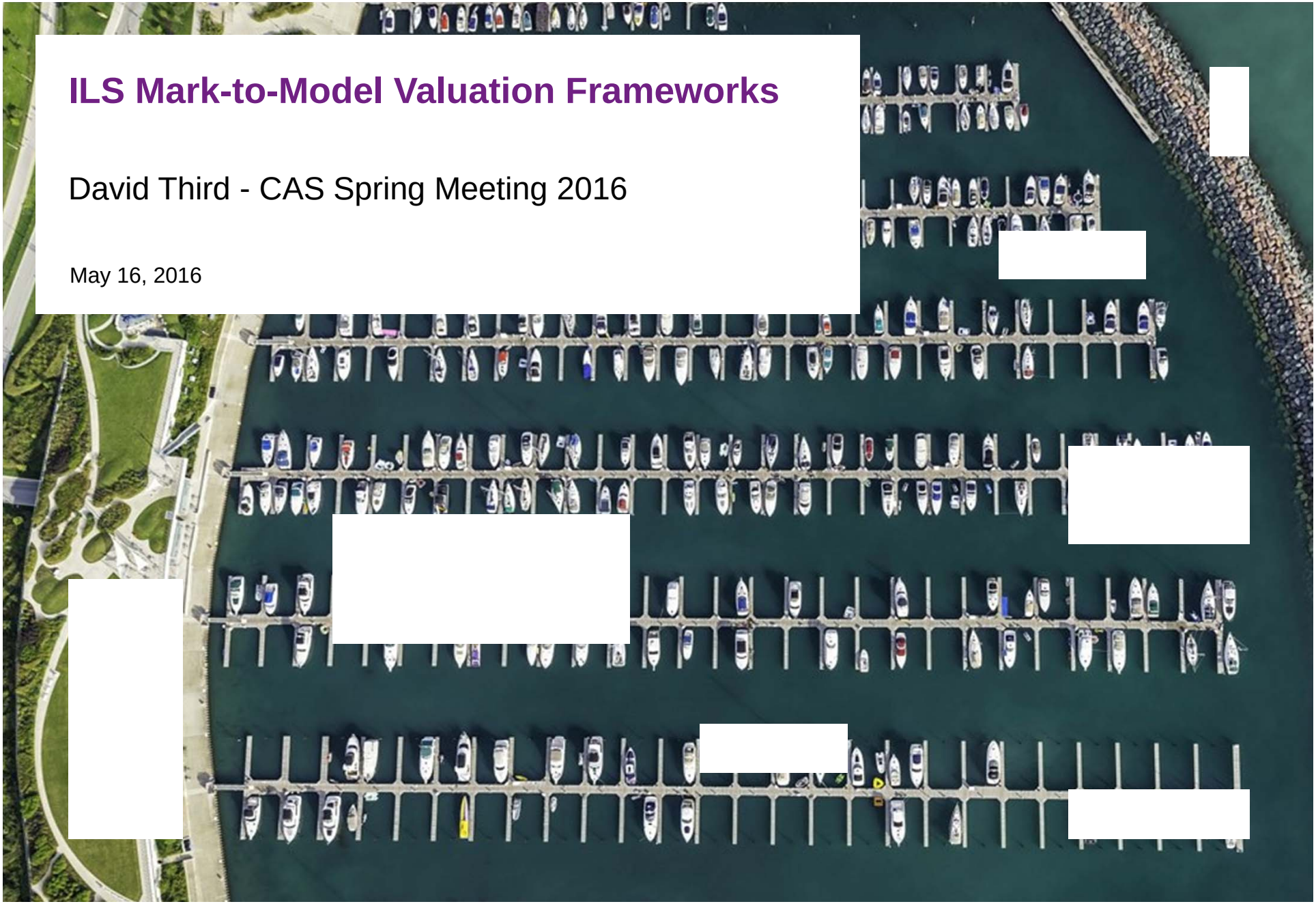

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ILS Mark-to-Model Valuation Frameworks

- Produce Positive Net Asset Values
- Reflect all Available Information
- Allow for all Risk Types on the Contract
- Arbitrage-Free
- Consistency with Observed Market Prices

Positive Net Asset Values

- Some methods can fail a basic test
- ILS can be viewed as a risk-free asset combined with an insurance based liability with a call on that asset
- Although collateral requirements can sometimes increase (e.g. adjustment premiums), in general we should demand that valuation frameworks produce positive values
- E.g. fixed Loss Cost Multiplier ("LCM") method can produce negative values
  - Initial Rate on Line ("RoL") = 6%, Initial Expected Loss on Line ("LoL") = 2%, LCM = 3.0
  - The contract becomes impaired and now LoL = 40%
  - NAV = Limit – LoL*LCM = 100% - 40%*3.0 = -20%

Reflect all Available Information

- A valuation framework should include all relevant information available at the valuation date
  - Arms length transaction between well informed parties
- Some contracts have features which can be sensitive to market data e.g. price/yield of crops for agriculture contracts
- Risk-free investment returns can affect deposited collateral
- Loss estimates need to be on a best estimate basis
  - Point estimates are not enough – a range of potential outcomes is needed because investors will demand a risk margin for uncertainty around known events
  - Striking an FVL the day after an event will require a different approach from traditional reserving
  - In particular, the flow of information from the cedant is critical, (e.g. what does it mean when the cedant says no losses? what does it mean when they don't say anything at all?)

Allow for all Risk Types on the Contract

- Investors require a risk margin for each type of risk on a contract, therefore a valuation framework should provide for each risk type
- In instances where contracts are not fully collateralized (e.g. via a fronting arrangement) own credit risk could provide a material discount to liabilities
- Where contracts allow the cedant to withhold collateral in the event of reported losses, this can be a significant risk to investors
- Because the ILS market is not as deep and liquid as many investment classes, investors may demand a liquidity premium
- For contracts impaired by known (but uncertain) loss events, investors may require a risk margin to compensate for uncertainty around loss amounts
- Even for contracts where no losses have been reported, there may be a need to reflect the potential for late reporting events to impact the contract

Arbitrage-Free

- We ***may*** require that a valuation framework be arbitrage-free
- It can be shown that any arbitrage-free model for assets based on an insurance loss process can be expressed in the form of a loaded loss process
  - i.e. a risk-neutral model with a loaded frequency/severity being used to produce fair values for the real-world process
  - In particular, any valuation framework of the form Premium = f(Expected Loss) is not arbitrage-free
- The Black-Scholes option pricing framework can provide inspiration, but we quickly hit problems with implementation in an insurance-linked setting
- If the ILS marketplace is not arbitrage-free, do we continue to demand that mark-to-model frameworks meet this criteria?

Consistency with Observed Market Prices

- The most common situation is a contract with a single trade (at inception) where we are looking to be able to produce a value throughout the life of the contract
  - Most models will perfectly fit this data point (if not then we have a profit/loss at inception which is problematic, assuming the initial trade meets arms length requirements)
- There are still some potential ways to test goodness-of-fit
  - Observed secondary market prices e.g. Cat Bond transactions
  - Checking consistency between similar contracts/programs

Consistency with Observed Market Prices