

# LIQUIDITY RISK MANAGEMENT

Oleg Ruban

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# OUTLINE

- Overview of Liquidity Risk Management
- Data Challenges
- Bond Liquidity Surface Models
- Liquidity Observatory
- Conclusions

# MSCI INDEXES

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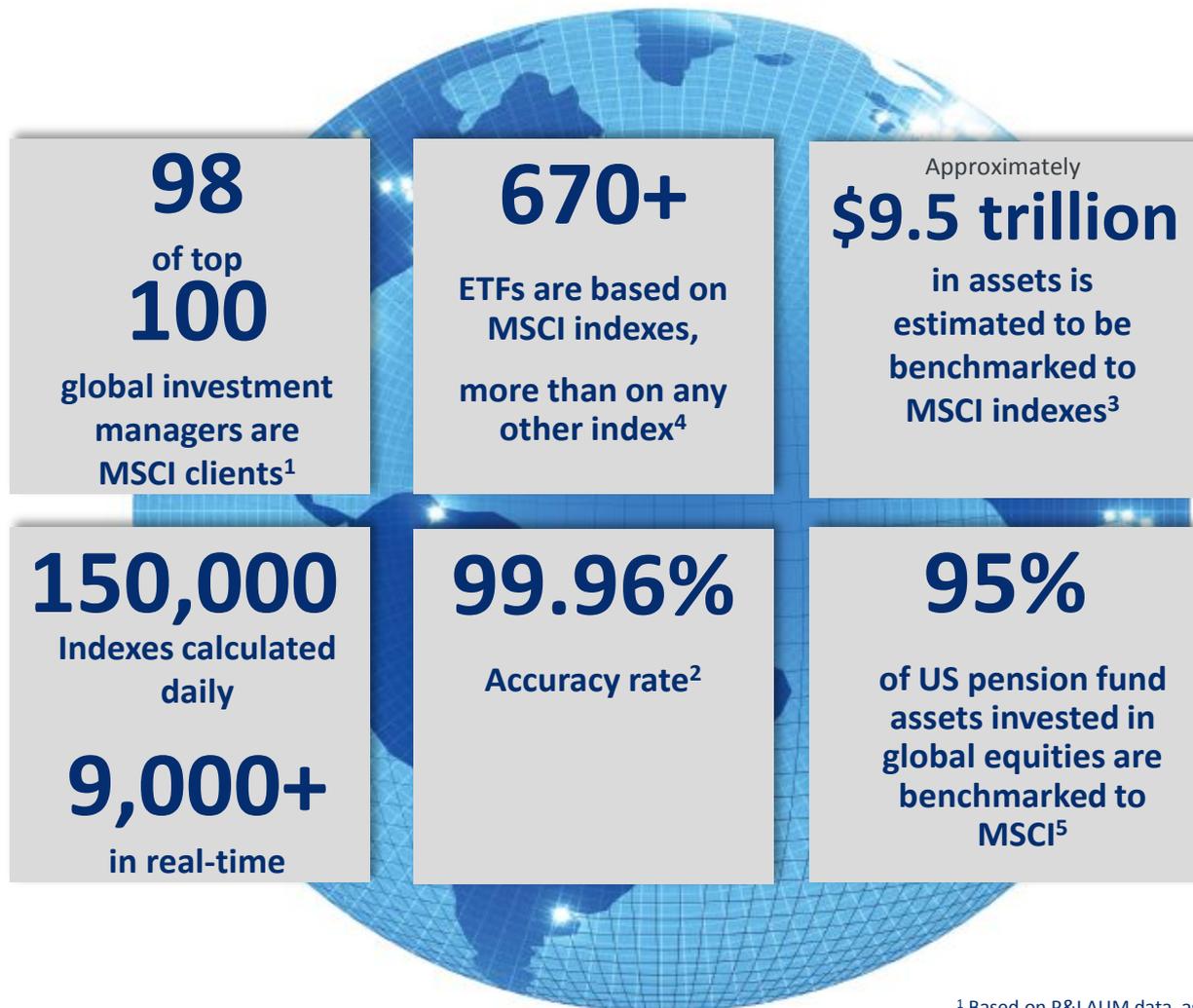
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**Investors count on MSCI Indexes**, as evidenced by the ~\$9.5 trillion in assets benchmarked to MSCI Indexes, as well as USD ~\$61 billion in aggregate notional outstanding of MSCI index linked futures & options

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MSCI is the **#1 provider** to the equity ETF industry in number of licensed ETFs

# MSCI: THE INDEX THAT LEADS



<sup>1</sup> Based on P&I AUM data as of Dec 2013 and MSCI data as of March 2015

<sup>2</sup> Accuracy calculated based on number of corrections performed over total number of securities or data points covered.

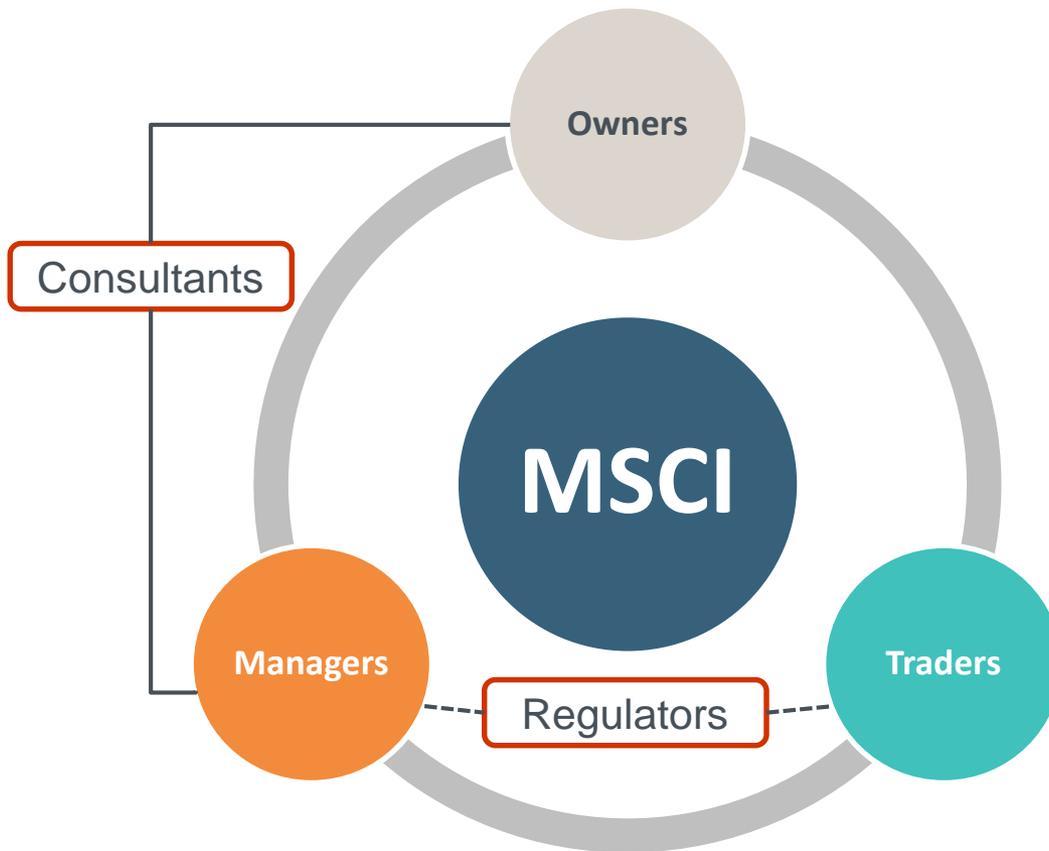
<sup>3</sup> As of March 31, 2015, as reported in June 30, 2015 by eVestment, Morningstar and Bloomberg.

<sup>4</sup> Primary listed as of September 2014.

<sup>5</sup> As of December 31, 2012, according to Intersec LLC.

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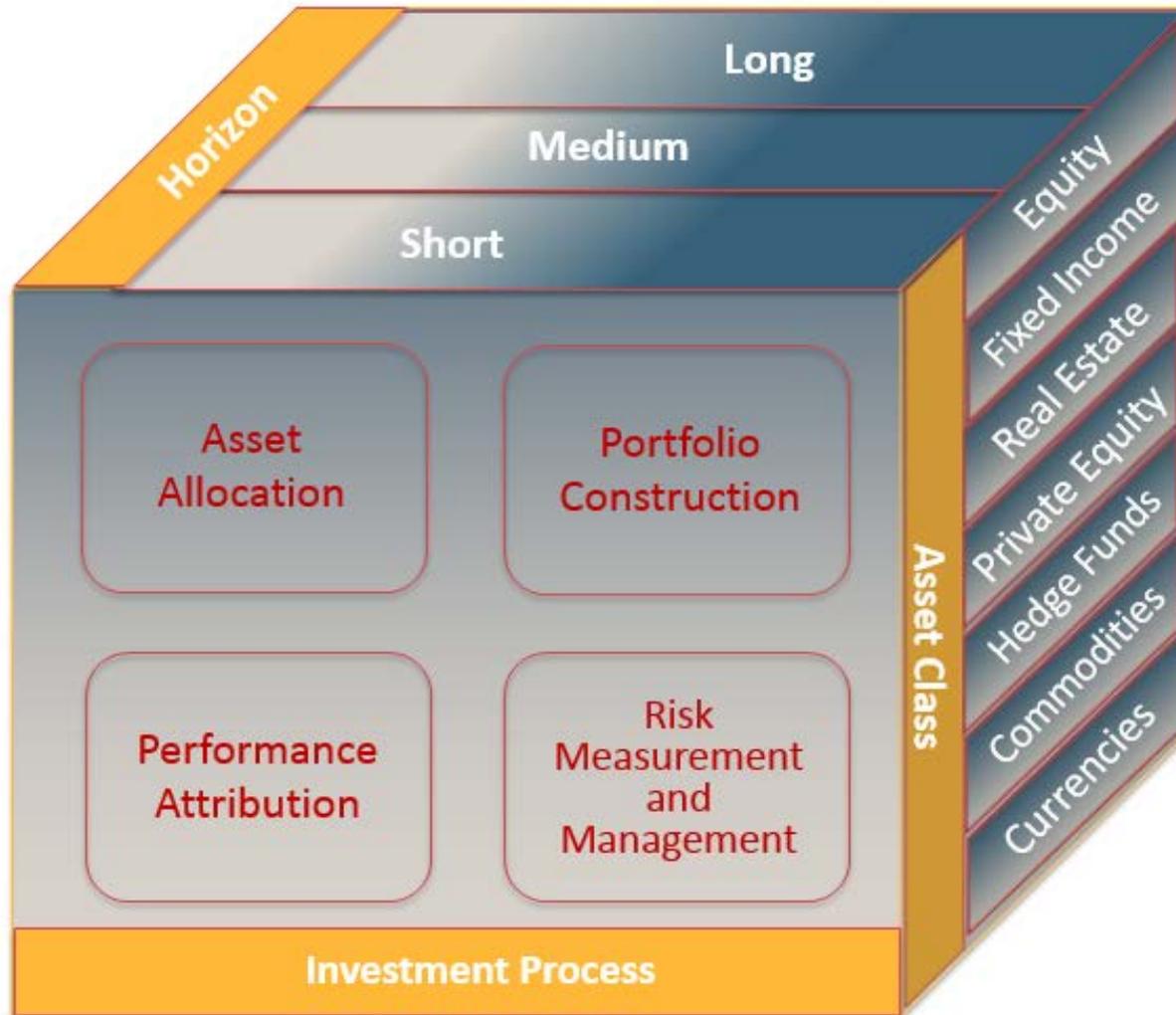


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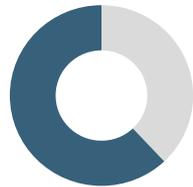
42

OF THE  
TOP 50  
GLOBAL ASSET  
OWNERS\*



50

OF THE  
TOP 50  
GLOBAL ASSET  
MANAGERS\*



31

OF THE  
TOP 50  
GLOBAL HEDGE  
FUNDS\*



27

OF THE  
TOP 50  
GLOBAL BANKS\*

1200+

Risk Management Analytics Clients

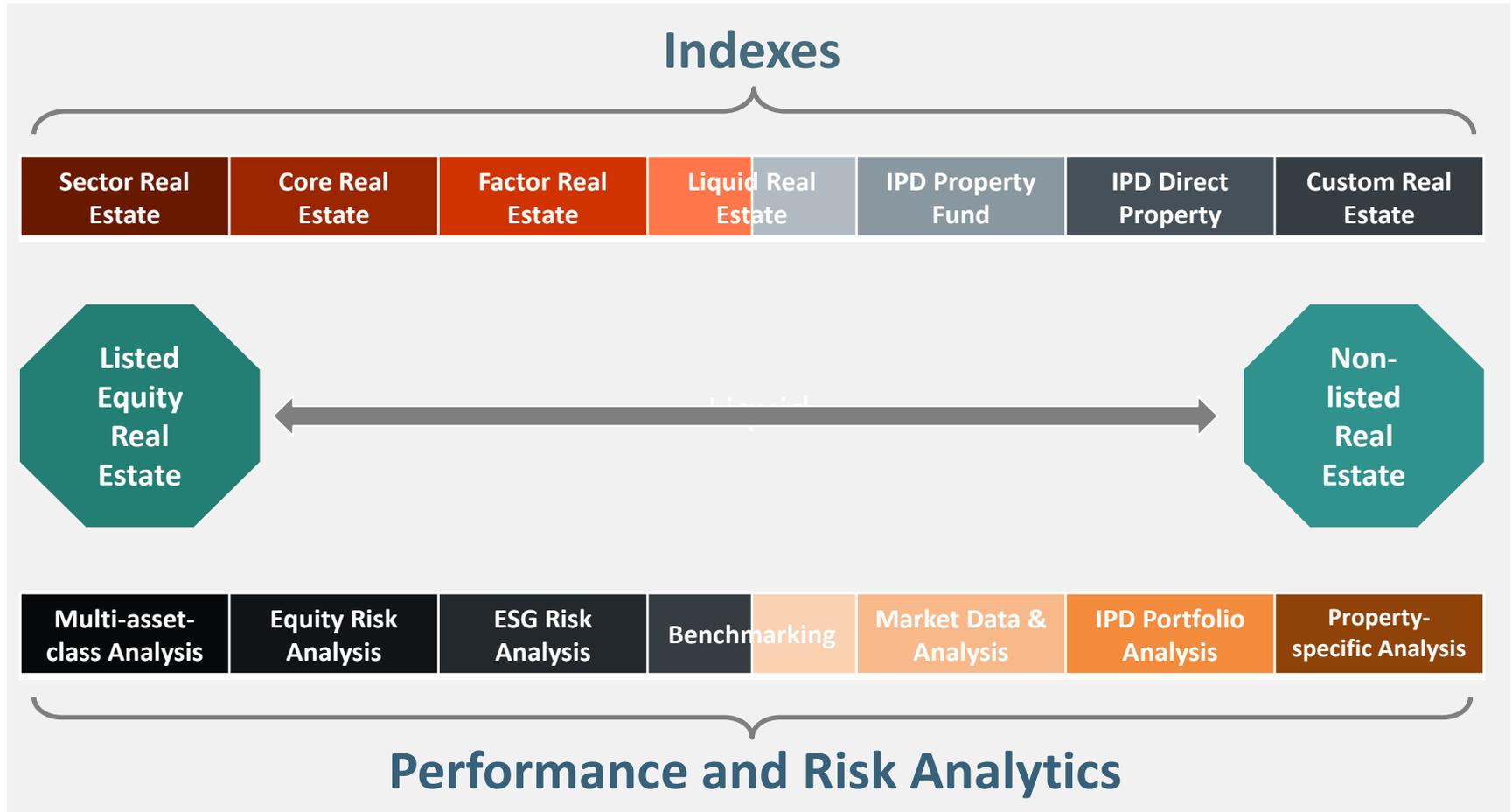
Asset Owners and Consultants	200 +
Asset Management	300 +
Banks & Others	350 +
Hedge Funds	200 +
Insurance	20+
Wealth Management	35 +

Sources: MSCI as of Dec 2014 and \*P&I ; \*\*Absolute Return; and \*\*\* The Banker, all



# MSCI REAL ESTATE

MSCI is a leading provider of real estate performance and risk analysis, providing critical business intelligence to real estate owners, managers, brokers and occupiers worldwide





# OVERVIEW OF LIQUIDITY RISK MANAGEMENT

Goals

Regulation

Challenges

Asset Liquidity Views

Portfolio Analytics



# LIQUIDITY RISK MANAGEMENT: GOALS AND SOLUTIONS

- Goal:
  - Establishing an industry standard for liquidity risk management
  
- Key features of our approach
  - Multi-Asset-Class
  - Asset liquidity risk measurement
  - Comprehensive liquidity models
  - Portfolio liquidity analytics

# A GLANCE AT LIQUIDITY REGULATION

- Post-crisis liquidity requirements
  - Asset Managers: “*why should I pay for you exit fees?*”
    - UCITS, AIFMD
      - measure asset liquidity and test it against redemption commitments
    - SEC
      - Considering to adopt and implement liquidity management programs
  - Banks
    - Basel: LCR, NSFR
      - assess assets/liabilities balance given prescribed asset liquidity
    - Basel: Fundamental Review of the Trading book
      - incorporate liquidity risk in market risk measures given assigned liquidity horizons
- Funds, as opposed to banks, are required to **measure** asset liquidity
  - Banks want to be able do it anyway

# TWO CHALLENGES TOWARD A LIQUIDITY RISK STANDARD

- Models

- Quantifying interplay between all aspects of asset liquidity risk
- Models need to be multi-dimensional
  - No single, comprehensive liquidity scoring

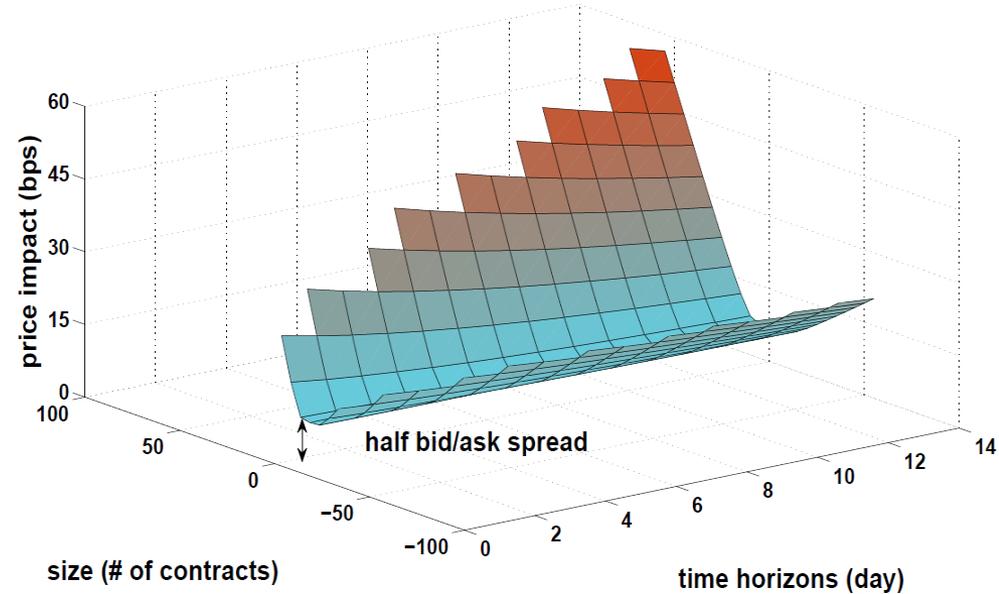
- Data

- Scarce, asset class specific
- Market transparency rules are changing. Data sources are not stable.
- Different asset classes  $\Rightarrow$  different market structure  $\Rightarrow$  different data  $\Rightarrow$  different models

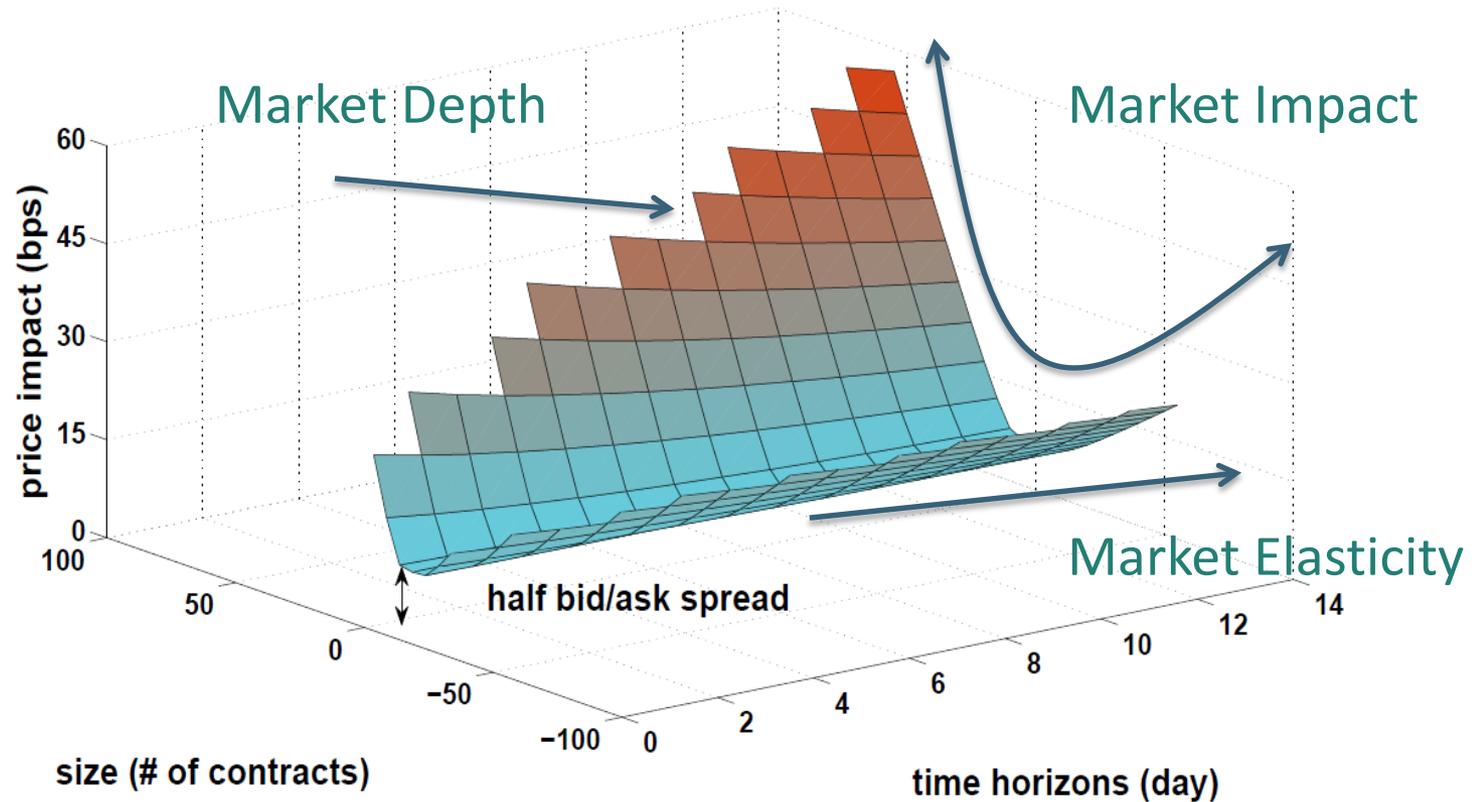


# LIQUIDITY SURFACES: SINGLE ASSET LIQUIDITY

- Liquidity Surface (LS):
  - Expected transaction cost of an order of given size traded within given time horizon
- Point of view
  - Liquidity taker
  - Professional execution
  - Orders, not transactions
- ⇒ risk management rather than front-office perspective
- Comprehensive, universal representation of an asset's liquidity



# WHAT CAN WE GET OUT OF A LIQUIDITY SURFACE?





# PORTFOLIO APPLICATIONS

- Asset-level LSs enable a wide range of portfolio–level analytics
- Examples
  - Pre-trade analysis of potential liabilities or liquidations
  - Asset-level, position-level or portfolio-level liquidity scorings;
  - Time-to-liquidation measures (required by AIFMD, Form PF)
  - Fund capacity tests
  - Stress Test
    - What-if w.r.t. liabilities
    - What-if w.r.t. market liquidity conditions



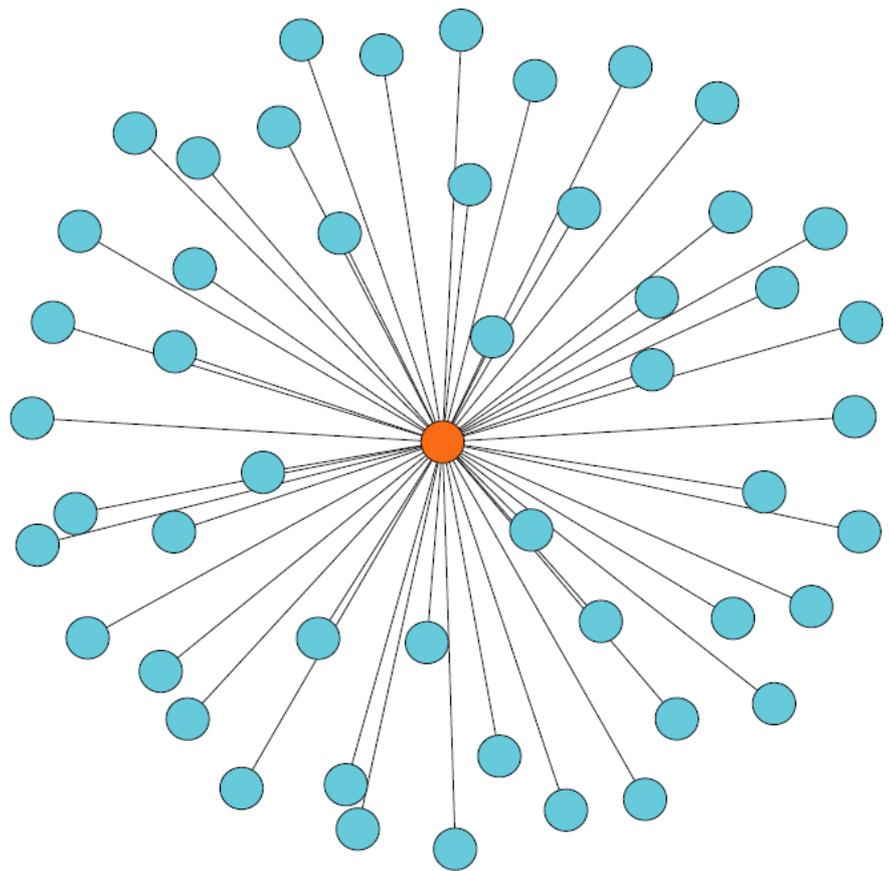
# DATA CHALLENGE

Rich Models, Scarce Data

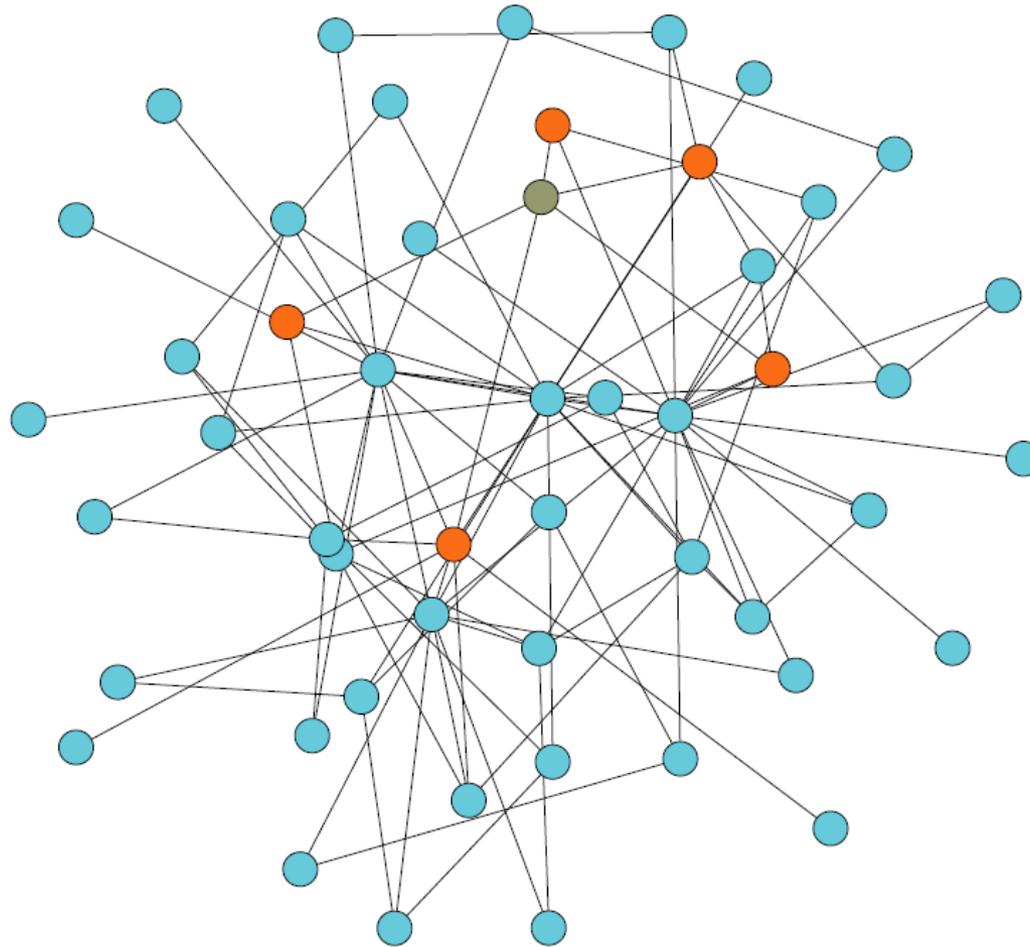
Market Structure



# EQUITY MARKETS



# BOND MARKETS (AND OTC DERIVATIVES)

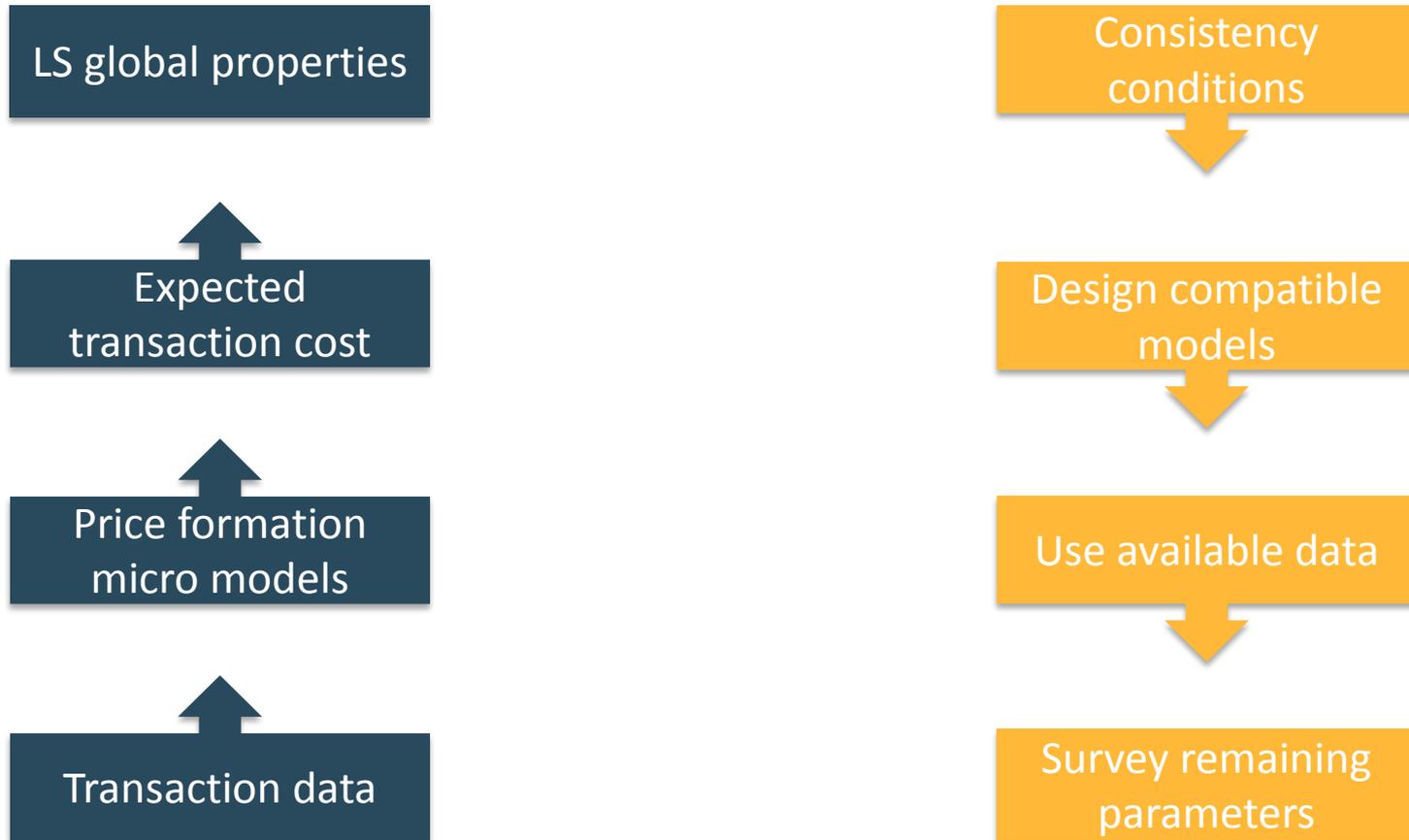


# BOND LIQUIDITY SURFACE MODELS

Top-Down Approach

MSCI Standard Models

# TOP-DOWN VS BOTTOM-UP



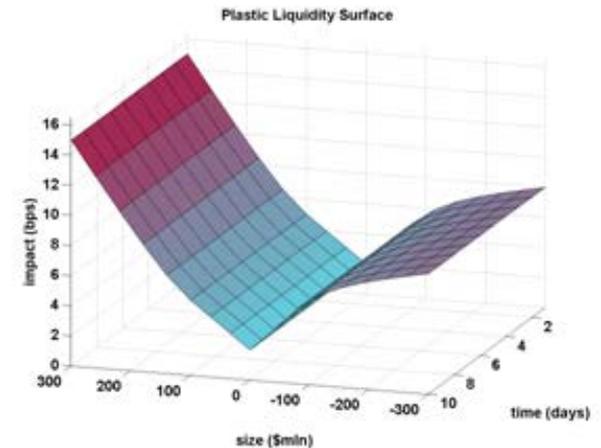
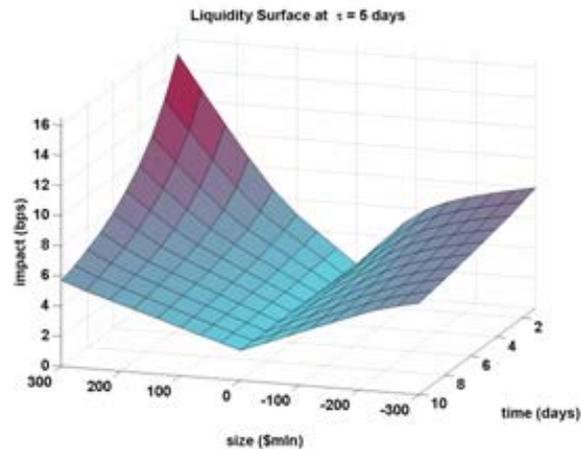
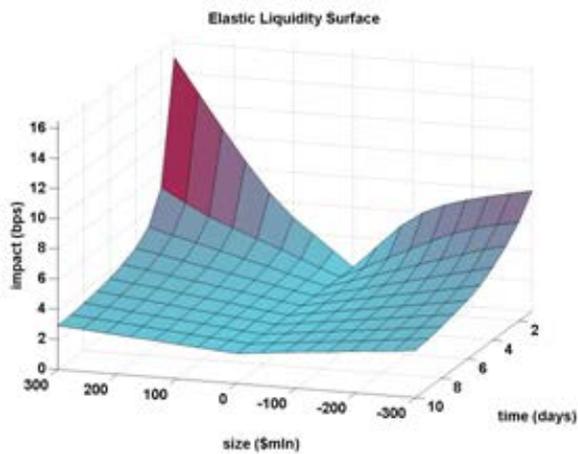
# CONSISTENCY CONDITIONS

- Axiomatic approach: consistency requirements
  - Immediate execution of small orders is always optimal
    - $\bar{\mu}(\mathbf{0}, T) = \Delta/2$  for all  $T$
  - Implied T- order book entails increasing costs with size (*'regular LS'*)
    - $\mu(s, T) = \frac{d}{ds} (s\bar{\mu}(s, T))$  increasing with  $|s|$
  - Longer available horizon only improves execution
    - $\bar{\mu}(s, T)$  decreasing with  $T$
  - No impact in the zero trading rate limit
    - $\bar{\mu}(s, T) \rightarrow \Delta/2$  when  $T \rightarrow \infty$ , for fixed  $s$
  - 'Elasticity bounds': the market can range from memoryless (*elastic* market) to inactive (*plastic*)
    - $\bar{\mu}(s/T, 1) \leq \bar{\mu}(s, T) < \bar{\mu}(s, 1)$  for all  $s$  and  $T > 1$

Notation:  $\bar{\mu}(\text{size}, \text{Time}) = \text{LS}$ ;  $\Delta = \text{bid/ask spread}$

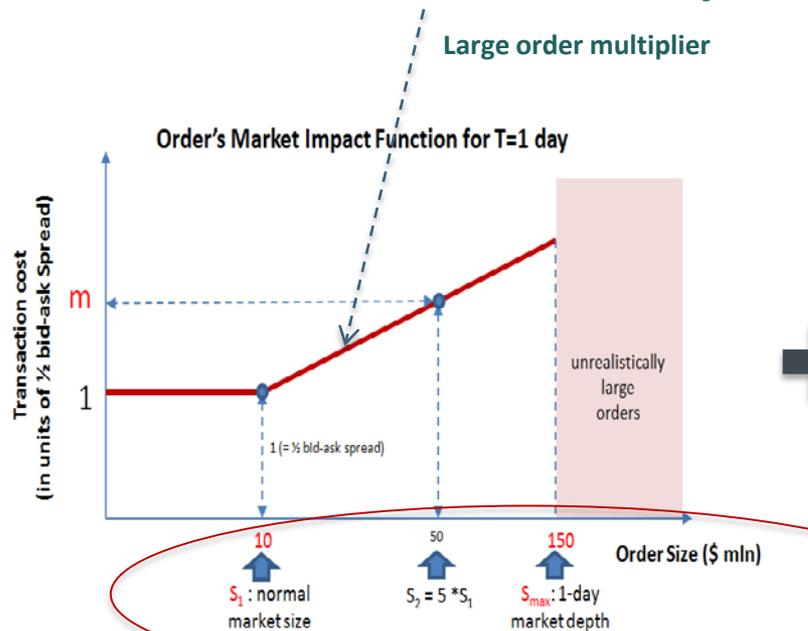
# THE ROLE OF RELAXATION TIME

- Relaxation time governs the time horizon dependence
- Single parameter (parsimony, intuition)
- Robust models



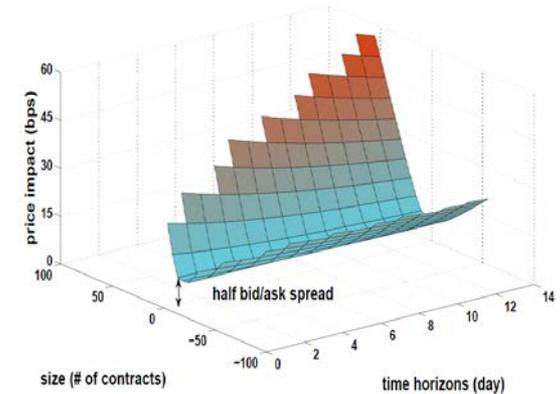
# CALIBRATION OF STANDARD LS MODELS

## Market Impact



+

$\tau$



## Market Elasticity

Relaxation time

## Market Depth

Normal market size, large order size, 1-day market depth

# LIQUIDITY OBSERVATORY

A New Data Class

Survey Structure

Bond Market Tree



# LIQUIDITY OBSERVATORY (LO)

- MSCI – Buy-Side Contributors partnerships
- Contributors' front office experts provide
  - LS parameters indications
  - Only for bond segments they actively trade
- Frequency: monthly + on-demand
- Legal agreement between parties
  - MSCI aggregates and redistributes data
  - MSCI owns and sells the aggregated data
  - Participants receive aggregated data for free
- May 2015: we begun redistributing aggregated contributions on a regular basis

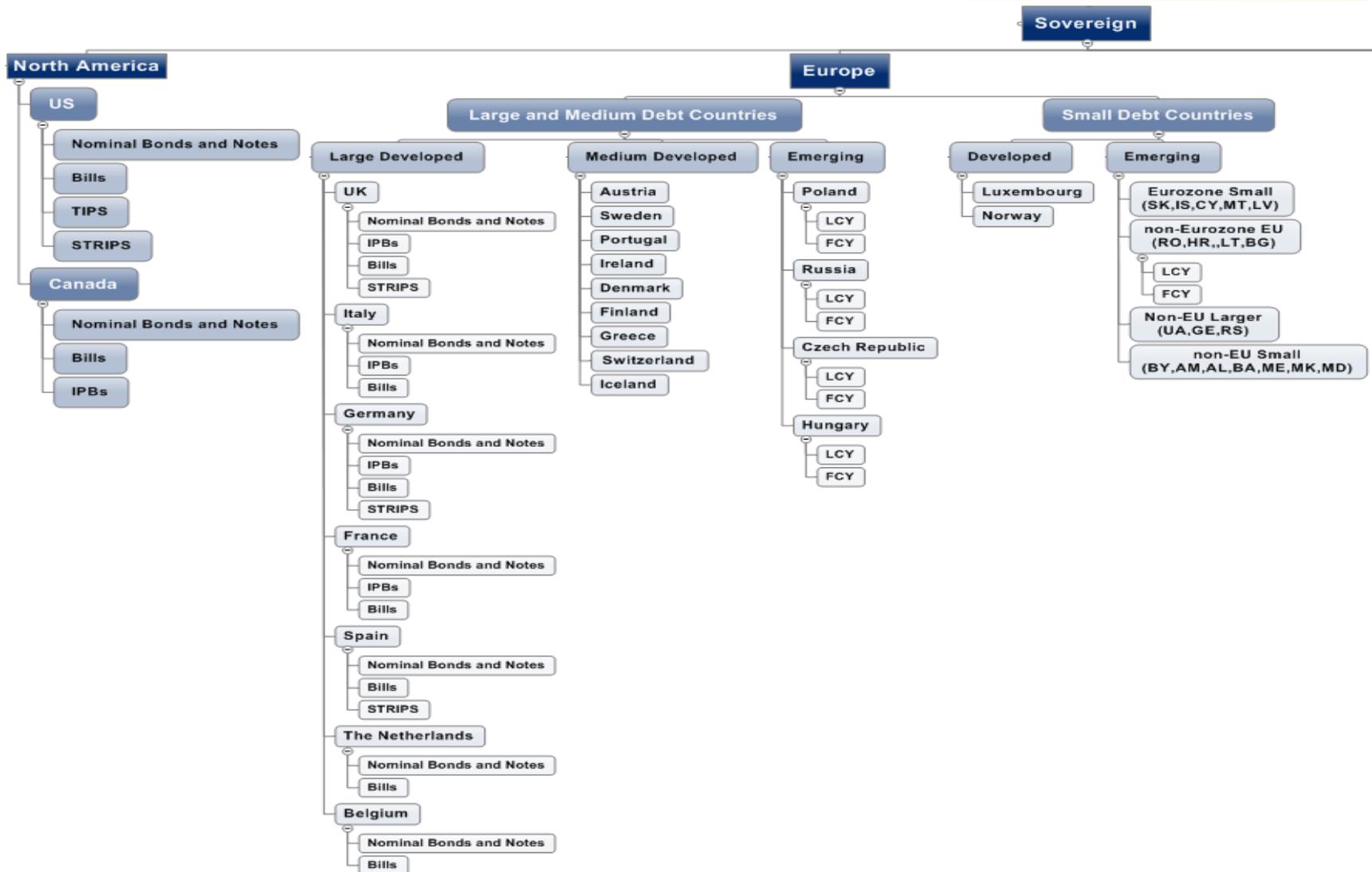
# LO QUESTIONNAIRE STRUCTURE

- Matrix of Standard Model parameters for any bond segment
  - 11 parameters; 5 for each market side (often symmetric) + 1 fallback Bid-Ask spread
    - 2 parameters are actually dummy variables
  - Around 170 bond segments, as defined by the LO bond market tree

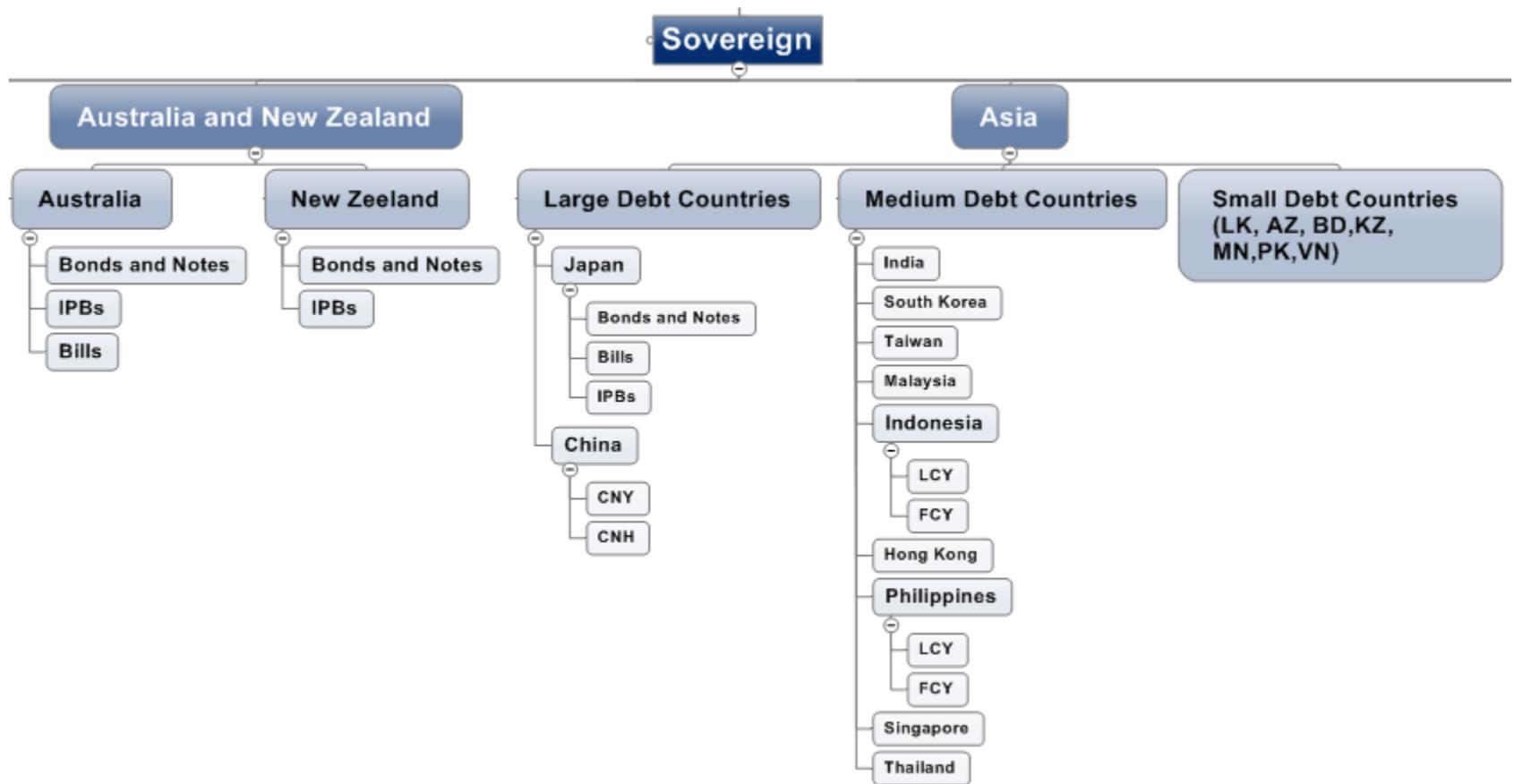
Descriptors				Avg Yield Bid/Ask Spread	Selling					Buying				
Region	Rating Class	Sector	Capital Structure		1-day curve				Relaxation time	1-day curve				Relaxation time
				Normal Market Size	Large Order Size	Bid/Ask Multiplier	Market Depth		Normal Market Size	Large Order Size	Bid/Ask Multiplier	Market Depth		
North America	IG	Financials	Senior											
North America	IG	Financials	Subordinated											
North America	IG	Non-Financials	Senior											
North America	IG	Non-Financials	Subordinated											
North America	HY	Financials												
North America	HY	Non-Financials												
UK	IG	Financials	Covered											
UK	IG	Financials	Senior											
UK	IG	Financials	Subordinated											
UK	IG	Non-Financials												
UK	HY	Financials												
UK	HY	Non-Financials												
Eurozone Core	IG	Financials	Covered											
Eurozone Core	IG	Financials	Senior											
Eurozone Core	IG	Financials	Subordinated											
Eurozone Core	IG	Non-Financials												
Eurozone Core	HY	Financials												
Eurozone Core	HY	Non-Financials												
Eurozone Periphery Large	IG	Financials	Senior											
Eurozone Periphery Large	IG	Financials	Subordinated											

Italy, Spain, Ireland, Portugal, Greece

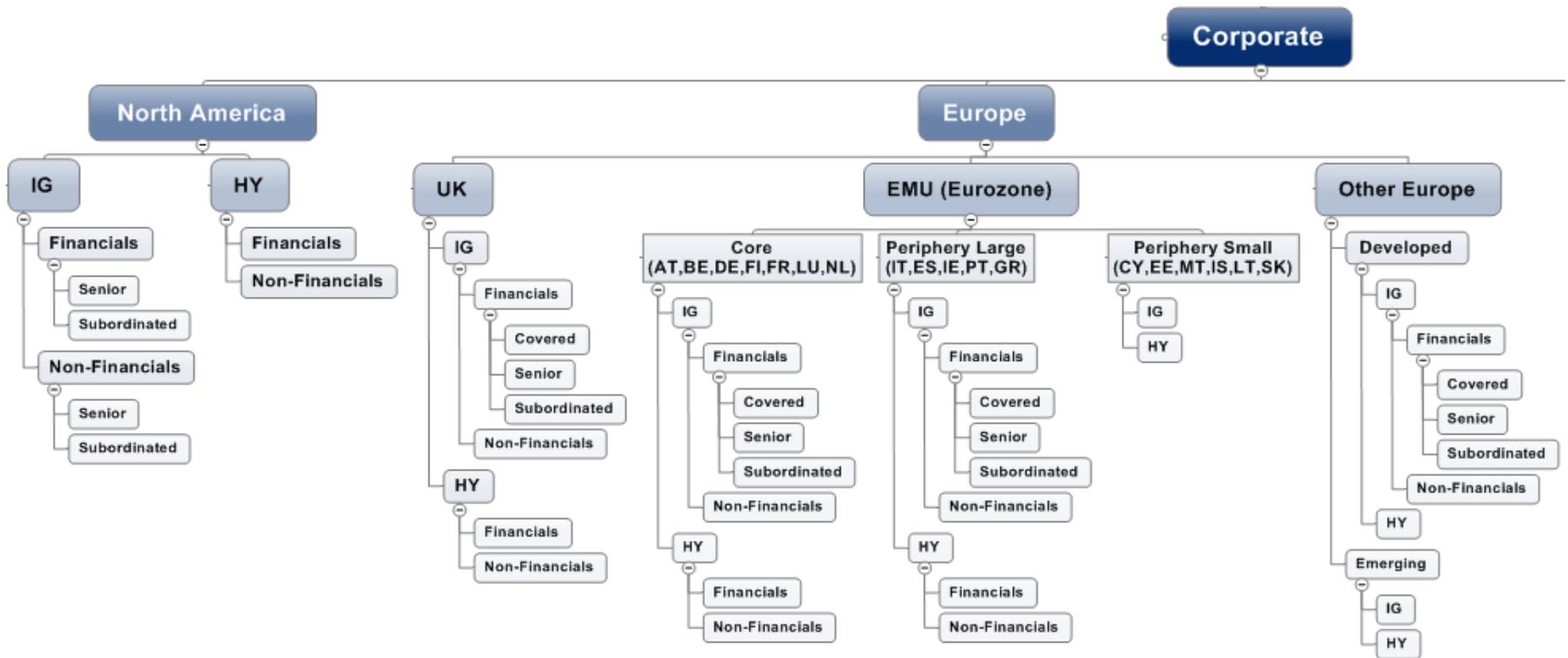
# BOND SEGMENTS - SOVEREIGNS



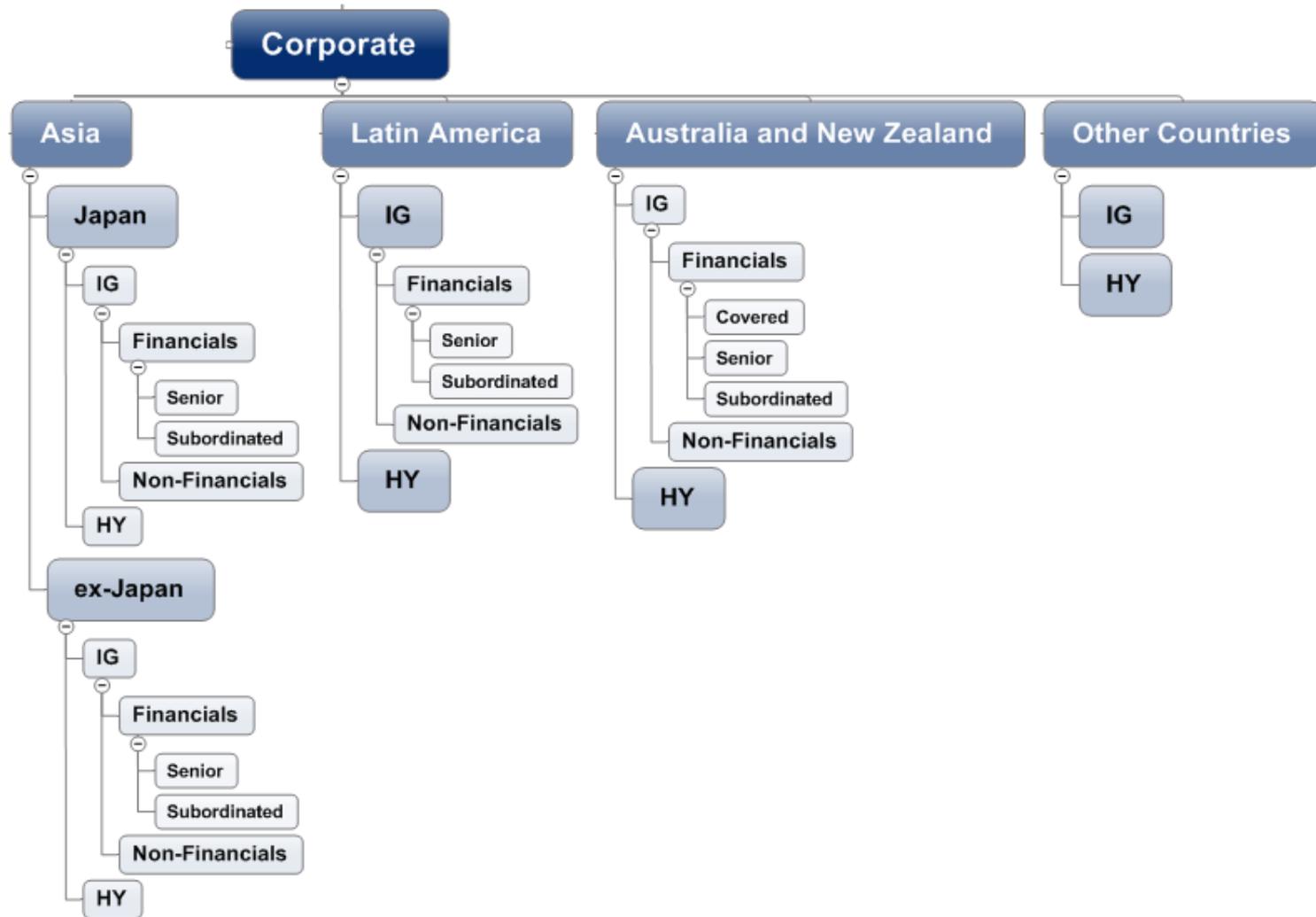
# BOND SEGMENTS - SOVEREIGNS



# BOND SEGMENTS – CORPORATE BONDS



# BOND SEGMENTS – CORPORATE BONDS





# STANDARD CALIBRATIONS

- MSCI will provide standard calibrations for a number of asset classes
  - Bank loans
  - CDS
  - Mutual funds
  - Interest Rate Swaps
  - Securitized products
  - Munis
  - Stock lending / bond repos
- Standard calibrations will be the synthesis of various data sources, varying from asset class to asset class
  - Vendor data (quotes, trades, volumes)
  - Public data
  - Market surveys
  - Expert judgment

# CONCLUSIONS

# CONCLUSIONS

- LiquidityMetrics is a suite of liquidity risk analytics based on asset-level liquidity description via Liquidity Surfaces
- Calibration of LS poses serious data challenges, especially for bonds which are mainly traded OTC and have not been the objective of post-trade transparency Dodd-Frank reforms
- We propose an axiomatic approach to bonds that proves powerful to limit the modeling space for consistent LS
- Natural models in this context can be calibrated via expert opinion on intuitive parameters
- The MSCI Liquidity Observatory is a systematic survey meant to collect parameters directly from traders and redistribute them in the form of aggregated statistics

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## AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
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[msci.com](https://www.msci.com)

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## EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100
Frankfurt	+ 49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
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## ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
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