The Future of Market Structure
Breakout Session

Ezra Nahum, Elizabeth Martin, Amy Hong

January 29, 2020
Panelist Overview

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WITH SUBJECT:
#gsmarkets
Market Structure Evolution: Catalysts and Secular Trends

1. Increased Regulation

2. Technology Development

3. Changing Landscape

Continuum of Market Structure Evolution
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Continuum of Market Structure Evolution
Increased Regulations

Dodd Frank

MM Reform

U.S. Stay Rule

Volcker Rule 2.0

Reg NMS

Brexit

MAR

MiFID II

Margin Rules

ESMA

U.S. Regulations

Global / Non-U.S. Regulations

Market Structure Evolution: Catalysts and Secular Trends
Market Structure Evolution: Catalysts and Secular Trends

Increasingly complex and dynamic regulatory environment...

...driving the need for global scale in technology and efficiencies in execution and downstream services

Example of a Vanilla Interest Rate Swap Trade

<table>
<thead>
<tr>
<th>Pre-Trade and Execution</th>
<th>Post-Trade and Position Management</th>
<th>Risk Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>HK-based Client</td>
<td>HK-based Client</td>
<td>CCP</td>
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<tr>
<td>Trading Venue (SEF)</td>
<td>CCP</td>
<td>Goldman Sachs Bank USA</td>
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<td>Goldman Sachs International</td>
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Increasingly complex and dynamic regulatory environment...:

- Increasingly complex and dynamic regulatory environment...
- Driving the need for global scale in technology and efficiencies in execution and downstream services
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**Technology Development**

1. **Data is Growing**
   - Data in zettabytes (ZB)
   - CAGR: 40%
   - 2009: 0.8 ZB
   - 2013: ~1,000 Micros
   - 2016: 175 Micros
   - 2019E: 2025E

2. **Execution Speed is Increasing**
   - ~1,000 Micros
   - ~3,000x Faster
   - 2009: 10 Micros
   - 2015: 0.35 Micros
   - 2019
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Changing Market Participant Landscape

Significant Growth in Passive AUM

- $10.7tn in passive funds globally
- $19.1tn in active funds globally

Key Facts:

- Passive Equity AUM ($bn)
- Passive Fixed Income AUM ($bn)
- Passive % of Global Equity AUM (RHS)
- Passive % of Global Fixed Income (RHS)

Graph showing growth from 2007 to 2019 with +17% CAGR 2013-2019.
Evolving Our Business for the Future

Secular Forces

- Regulatory Changes
- Technological Innovation

Impact

- Lower Market Liquidity
- Higher Capital Consumption
- Active to Passive Shift
- Changing Competitive Dynamics
Leveling the playing field with a best in class technology foundation centered on delivering value to clients
Pioneering a New Market Structure in Credit

Goldman Sachs Ecosystem

**Pricing Capabilities**
- Bond Pricing Engine
  - >6 million price updates daily across 32,000 CUSIPs

**Execution and Risk Management**
- Trading Talent
- Algo
- Marquee

**Services**
- Single Bond Execution
- Portfolio Trades
- Bond ETFs
  - GS liquidity in over 15,000 CUSIPs
  - Pricing over 10,000 inquiries daily

**Clients**
- Pre-trade transparency
- Ease of execution
- Workflow benefits

- Order/Execution Management Systems
- Multilateral Venues
- Bilateral APIs
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Secular Forces

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Opportunities

- Expand Risk Intermediation Advantage
- Increase Client Financing Activities
- Enhance Client Experience

Growing Share and Returns
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End Notes

These notes refer to the financial metrics and/or defined term presented on:

Slide 8:
1. Source: IDC, “The Digital Universe in 2020” and “Data Age 2025”
2. Reflects internal execution speed for a vanilla US Cash Equity

Slide 10:
1. Source: Morningstar; Based on worldwide retail funds across Open-Ended and ETF investment types as of November 2019

Slide 12:
1. Source: Coalition institutional client analytics. Wallet includes cash execution and cash and synthetic financing wallet for leading systematic clients
Cautionary Note on Forward-Looking Statements

Statements about the firm’s target metrics, including its target ROE, ROTE, efficiency ratio and CET1 capital ratios, and how they can be achieved, and statements about future operating expense (including future litigation expense), amount and composition of future Assets under Supervision, planned debt issuances, growth of deposits and associated interest expense savings, future geographic location of its employees, and the timing and profitability of its business initiatives, including its launch of new businesses or new activities, its ability to increase its market share in incumbent businesses and its ability to achieve more durable revenues and higher returns from these initiatives, are forward-looking statements, and it is possible that the firm’s actual results may differ, possibly materially, from the targeted results indicated in these statements.

Forward looking statements, including those about the firm’s target ROE, ROTE, efficiency ratio, and expense savings, and how they can be achieved, are based on the firm’s current expectations regarding its business prospects and are subject to the risk that the firm may be unable to achieve its targets due to, among other things, changes in the firm’s business mix, lower profitability of new business initiatives, increases in technology and other costs to launch and bring new business initiatives to scale, and increases in liquidity requirements. Statements about the firm’s target ROE, ROTE and CET1 capital ratios, and how they can be achieved, are based on the firm’s current expectations regarding the capital requirements applicable to the firm and are subject to the risk that the firm’s actual capital requirements may be higher than currently anticipated because of, among other factors, changes in the regulatory capital requirements applicable to the firm resulting from changes in regulations or the interpretation or application of existing regulations or changes in the nature and composition of the firm’s activities. Statements about the timing and benefits of business and expense savings initiatives, the level and composition of more durable revenues and increases in market share are based on the firm’s current expectations regarding its ability to implement these initiatives and may change, possibly materially, from what is currently expected. Due to the inherent uncertainty in these forward-looking statements, investors should not place undue reliance on the firm’s ability to achieve these results.

For a discussion of some of the risks and important factors that could affect the firm’s future business, results and financial condition, see “Risk Factors” in our Annual Report on Form 10-K for the year ended December 31, 2018. You should also read the cautionary notes on forward-looking statements in our Form 10-Q for the period ended September 30, 2019 and Earnings Results Presentation for the Full Year and Fourth Quarter 2019. For more information regarding non-GAAP financial measures such as ROTE, refer to the footnotes in the Earnings Release and Earnings Presentation for the Full Year and Fourth Quarter 2019 and information on the calculation of non-GAAP financial measures that is posted on the Investor Relations portion of our website: www.goldmansachs.com.

The statements in the presentation are current only as of January 29, 2020 and the firm does not undertake to update forward-looking statements to reflect the impact of subsequent events or circumstances.