Digital Disruption Meets Fixed Income
Streamlining the Investment Process and Managing Liquidity Needs

Peter J. Cornax Senior Insurance Investment Strategist - Portfolio Manager Credit
INVESTING IN TODAY’S MACRO ENVIRONMENT
What Should The Policy Response Look Like?

<table>
<thead>
<tr>
<th>POLICY INSTRUMENT</th>
<th>EXECUTED?</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Flattening the Curve”, Pt. 1: Containment &amp; Health Funding</td>
<td>Yes</td>
</tr>
<tr>
<td>“Flattening the Curve”, Pt. 2: Underwriting Incomes &amp; Preventing Business Failures</td>
<td>Getting There</td>
</tr>
<tr>
<td>Financial System Support: The GFC Toolkit, Redux</td>
<td>Yes</td>
</tr>
<tr>
<td>Monetary Policy Stimulus: All-In On Unconventional Policies/Joined At the Hip</td>
<td>Almost</td>
</tr>
<tr>
<td>Post-Crisis Fiscal Stimulus</td>
<td>?</td>
</tr>
</tbody>
</table>
### Forecast Summary: Preliminary

**Global Economy Set To Contract**

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>2.3</td>
<td>-1.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Euro Area</td>
<td>1.2</td>
<td>-3.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Japan</td>
<td>0.8</td>
<td>-2.9</td>
<td>2.1</td>
</tr>
<tr>
<td>G3</td>
<td>1.7</td>
<td>-2.4</td>
<td>3.0</td>
</tr>
<tr>
<td>China</td>
<td>6.1</td>
<td>4.5</td>
<td>5.5</td>
</tr>
<tr>
<td>G3 + China</td>
<td>2.9</td>
<td>-0.5</td>
<td>3.7</td>
</tr>
</tbody>
</table>

**G7 Real GDP Growth**

As of March 18, 2020
Source: Haver Analytics and AB
Summary

- The near-term hit to global growth will be very big – possibly unprecedented
- In most plausible scenarios there’s likely to be a recovery in the second half of the year – but some output isn’t coming back
- If bond yields rise, governments won’t be able to prevent an even bigger and more protracted downturn
- Central banks will do whatever it takes to make sure they don’t (aggressive QE, QE with YCC, yield caps etc: #joined.at.the.hip)
HOW TO OPERATE IN TODAY’S MARKET STRUCTURE
The Challenges for Bond Managers Are Greater than Ever

LIQUIDITY
+ Doubling of bond market size
+ Shrinking dealer balance sheets
+ Highly fragmented trading

SCARCE ALPHA
+ Low prospective returns
+ Limited dispersion
+ Suppressed volatility
The Typical Fixed Income Investment Process…

Managers Generally Depict Their Processes as Disciplined, Linear and Efficient

- Traders Source Bonds
- Review Client Objectives and Guidelines
- PMs Select Bonds
- Investment Committee Review
- Research Analysts Generate Investment Ideas from Investable Universe

Client Portfolio
…Is Impossible in Today’s Fragmented Bond Market
The Realities of the Fixed-Income Market Requires a New Approach to Active Management
Successful Fixed Income Investing is Increasingly About Conquering the “Big Numbers” Challenge

<table>
<thead>
<tr>
<th></th>
<th>US HY Corp</th>
<th>US IG Corp</th>
<th>Municipals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Size</td>
<td>$1.2 Trillion</td>
<td>$5.0 Trillion</td>
<td>$3.9 Trillion</td>
</tr>
<tr>
<td>CUSIPS</td>
<td>~2,000</td>
<td>~6,000</td>
<td>&gt;1,000,000</td>
</tr>
<tr>
<td>Avg. Trades Per Day</td>
<td>~20,000</td>
<td>~42,000</td>
<td>~40,000</td>
</tr>
<tr>
<td>% of Trades &lt;$1M</td>
<td>85%</td>
<td>90%</td>
<td>96%</td>
</tr>
</tbody>
</table>

As of December 31, 2018
Municipals data references all outstanding bonds in the market. Average daily trade data uses last 3 months of 2018 calendar year.
Source: MSRB, FINRA, Bloomberg Barclays US Corporate Credit Index, Bloomberg Barclays US High Yield 2% Cap Index
ALFA provides a comprehensive, aggregated overview of the entire bond market. In order to bring ALFA to the broader market and to develop its ability to support all-to-all trading, we have partnered with ALGOMI, which will develop, support and market the platform on an ongoing basis. Algomi was founded in 2012, and through its Honeycomb, Synchronicity and Algomi ALFA technology, creates the bond information network that enables all market participants to securely and intelligently harness data to make valuable financial trading connections. Algomi has 120 employees with offices in New York, London and Hong Kong.
ALFA Collects More Than Four Million Data Feeds Per Day

Our Investment Teams Are Constantly Finding New Ways To Utilize This Treasure Trove of Data

- Proprietary Trading Tools
- Advanced Algorithmic Pricing Models
- Digital Feeds to Portfolio Optimization Engine (Abbie)
DIGITIZED RESEARCH: IMPROVED CONSISTENCY AND EFFICACY IN PORTFOLIO CONSTRUCTION
Quantitative Research Gives an Important Edge with Technology

Quantify Risk, Return and Correlations Across 70,000 Fixed-Income Securities Globally

**Beta: Market Cycle Indicator**
- Identifies phases in market cycle
- Informs risk-budgeting decisions

**Optimizer**
- Recommends transactions that move portfolios toward optimal positioning
- Maximizes information ratio
- Incorporates transaction costs and portfolio-specific constraints

**Alpha: Expected Return Models**
- Sovereigns/Agencies
- Credit
- Securitized Assets
- Currency
Prism: Digitizing and Centralizing Fundamental Research

Proprietary Research Platform for Data Analytics, Risk Factor Scoring and Credit Ratings

- Designed around proven credit research framework
- Consistent global scoring enables cross-asset valuation
- Digitized research product feeds Abbie
- Dynamic learning potential as database grows

The company’s mining activities have an adverse impact on the environment. NEM has made efforts to improve its compliance standards by selling off several controversial assets, including Itaburi in Indonesia where it faced issues related to disposal of mine tailings. It also recorded a $325m impairment related to its Yanacocha mine reflecting increasing asset retirement costs. NEM is yet to fix its issues with Compa mine (Peru) which has been suspended since 2011 due to local protests over land rights and environmental concerns.

Majority of board members are independent and the CEO/Chairman roles are not combined.
REIMAGINING THE INVESTMENT PROCESS:
LEVERAGING TECHNOLOGY TO CAPTURE "SPEED ALPHA"
Key Takeaway: Technology Platforms are an Increasingly Important Source of Investment Alpha

**Security Selection**
- Deep fundamental credit research
- Traditional quant research mean variance models
- Relationship-based trading for liquidity sourcing and execution

**Portfolio Structure**
- Innovative portfolio structures that capture persistent market inefficiencies
- Dynamic beta management based on macro research
- Active portfolio factor and sector tilts to express thematic views

**Technology Platform**
- Automated market surveillance and trade execution
- System interoperability to leverage data and speed decision making
- Advanced robotic process automation to maximize human capital

**Traditional Alpha Sources**

**Tech-Powered Alpha Sources**
THE FUTURE OF FIXED INCOME
HOW TECHNOLOGY WILL REVOLUTIONIZE ASSET MANAGEMENT

Gershon M. Grinterfield
Co-Head - Fixed Income Director - Credit

Scott DiAmiglio
Co-Head - High Income
Education - Global Fixed Income

Jeff Singlund
Chief Operating Officer - Fixed Income

James Switzer
Co-Head - Credit Trading

OCTOBER 2018

IN THIS PAPER:
Fixed income investing hasn’t kept up with the rapid pace of technological innovation in the rest of the financial industry. But that’s about to change. Machines will empower humans to achieve unique insights and act faster in a market where speed and alpha are inherently linked.

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Unique Core Competencies Developed Over Two Decades
Applying Expertise and Tech-Enabled Solutions to Solve Investment Challenges

**Leveraging Data**
- 15+ years of integrating quantitative research into our investment process
- Using ALFA to scrape 4 million market-data feeds per day and utilizing them in pricing algorithms and portfolio optimizers

**Market Structure Expertise**
- Pioneer in tech-driven fixed-income portfolio trading
- All-to-all trading with next-gen O/EMS (launched January 2020)
- Industry’s first bot-to-bot trade with Abbie in August 2019

**Robotic Process Automation**
- Abbie virtual assistant chatbot introduced January 2018
- Abbie builds over 70% of orders and uses sophisticated algorithms to suggest trades to PMs
- Abbie optimizer: the “brains” of AB’s next-generation Fixed Income investment platform
Engineering AB Fixed Income’s Next-Generation Investment Platform
Leveraging Our Accumulated Learning to Move Beyond Basic Automation

ALFA (2015)
- Digitized FI market data
- Sold technology to Algomi in 2017
- AB ALFA remains a focus of proprietary R&D

Prism (Launched 2015, Fully Populated 2017)
- Standardized credit scoring and ratings
- ESG ratings introduced and linked to credit walk
- Digitized research feeds portfolio optimizers

Abbie 1.0 (2018)
- Automated order building globally

Abbie 2.0 (2019-2020)
- Curated trade suggestion
- Operational in US HY and IG

Abbie Optimizer/OEMS (2020)
- Automated front-to-back portfolio manufacturing across 12,000+ SMAs

Muni and Taxable SMA Products (2021E/2022E)
- Highly-customized, mass produced SMAs

Systematic Strategies (2020E-2022E)
- Factor-based solutions in ETF or SMA wrappers
- Alternative risk premia income products

Execution Services (2020-2021E)
- Market AB’s advanced trading capabilities and post-trade process as outsourced service

White-Label Solutions (2021E/2022E)
- Market AB’s advanced portfolio construction and implementation capabilities
Portfolio Construction Powered by Abbie
New Technology Platform Features Front-to-Back RPA for Operating Efficiency and Alpha Generation

ALFA Market Surveillance → Abbie Portfolio Optimizer → O/EMS → Allocation Engine → Institutional Accounts

Low-Touch Trading

High-Touch Trading
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