# Workshop on Bond Pricing and Evaluation in ASEAN+3

Conference Room BC, Asian Development Bank Institute (ADBI)  
Tokyo, Japan / 6 June 2016

<table>
<thead>
<tr>
<th>TIME</th>
<th>PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 09:30</td>
<td>Registration</td>
</tr>
</tbody>
</table>
| 09:30 – 09:35 | Welcome remarks by Mr. Noritaka Akamatsu, Senior Advisor, ADB  
|              | - Objective of the workshop and desirable outcome                       |
| 09:35 – 10:30 | Session 1: Stylized facts of bond pricing practices: theme of the workshop by ADB  
|              | - Data collection from actual transactions and pricing based on modeling  
|              | - Q&A                                                                  |
| 10:30 – 10:45 | Coffee Break (Conference Room A)                                       |
| 10:45 – 12:45 | Session 2: Presentation by bond pricing agencies in ASEAN+3 on their methodologies and practices  
|              | 10:45-11:05 JSDA  
|              | 11:05-11:25 Thai BMA  
|              | 11:25-11:45 Indonesia BPA  
|              | 11:45- 12:05 CCDC  
|              | 12:05-12:25 PDS  
|              | 12:25-12:45 Q&A                                                      |
| 12:45 – 13:45 | Lunch (Conference Room A)                                              |
| 13:45 – 15:45 | Session 3: International practices and performance of pricing model  
|              | 13:45-14:05 Bloomberg  
|              | 14.05-14:35 Case study by KIS Pricing  
|              | 14:35-15:05 Case study by BPAM  
|              | 15:05-15:45 Panel discussion and Questions and comments from the floor.  
|              | - Discussant: R&I  
|              | - Discussant: ADB  
|              | - Moderator: ADB Satoru Yamadera                                       |
| 15:45 – 16:00 | Concluding remark by ADB  
|              | - desirable practices in Asia  
|              | - Enhancement of ABO website                                           |
SESSION 1

STYLIZED FACTS OF BOND PRICING PRACTICES: THEME OF THE WORKSHOP BY ADB
Workshop on Bond Pricing and Evaluation in ASEAN+3

Session 1: Stylized facts of bond pricing practices: theme of the workshop by ADB

6 June 2016
Tokyo, Japan

Noritaka Akamatsu
Senior Advisor
Asian Development Bank

09:45 – 10:30
Session 1: Stylized facts of bond pricing practices: theme of the workshop by ADB
- Data collection from actual transactions and pricing based on modeling
- Q&A

10:30 – 10:45 Coffee Break (Conference Room A)

10:45 – 12:45
Session 2: Presentation by bond pricing agencies on their methodologies and practices
10:45-11:05 JSDA
11:05-11:25 Thai BMA
11:25-11:45 Indonesia BPA
11:45-12:05 CCDC
12:05-12:25 PDS
12:25-12:45 Q&A

12:45 – 14:00 Lunch (Conference Room A)

14:00 – 15:45
Session 3: Performance of pricing model
14:00-14:30 Case study by BPAM
14:30-15:00 Case study by Korean pricing agency (tbc)
15:00-15:45 Panel discussion and Questions and comments from the floor.
- Discussant: R&I
- Discussant: ADBI
- Moderator: ADB Satoru Yamadera

15:45 – 16:00 Concluding remark by ADB - desirable practices in Asia
Importance of bond price information

1) US SEC has enforced more than 100 cases during 2010-2013, most of which involved fraudulent valuation (DLA Piper)

2) Aberrational Performance Inquiry’ (API) – a computer-based system was introduced in 2011 to identify hedge fund managers whose reported results seem “too good to be true” (Financier Worldwide Magazine)

3) IOSCO introduced Principles for the Valuation of Collective Investment Schemes in 2013 to emphasize the needs for proper valuation of instruments for which market quotations are not readily available

“Valuation of CIS assets potentially presents conflicts between the interests of those who value the assets and the CIS investors”
Importance of bond price information

4) IOSCO further issued Principles for Financial Benchmarks in 2013 to articulate policy guidance that will address conflicts of interest in the Benchmark-setting process

5) US SEC proposed rules on “Investment Company Reporting Modernization” in 2015 requiring funds to identify illiquid investments

Without proper and accurate bond pricing:

- fund managers cannot comply with regulations, further dampening market integrity, transparency, liquidity etc.
- investors and regulators cannot analyze impact to bond market, particularly in times of market stress and potential policy change
- market data is restricted among participants (dealers), putting investors at disadvantage (information asymmetry)

Development in major markets

1. Trade Reporting and Compliance Engine®

2. Markets in Financial Instruments Directive (MiFid II)
Trade Reporting and Compliance Engine®

1) Prior to the World War II – trading of corporate bonds were active on NYSE

2) Mid-1940s – liquidity in corporate bonds dropped dramatically and were later migrated to OTC due to:
   o retail investors became more attracted to higher returns on equities
   o institutional investors increased their ownership of bonds, trading was clustered among institutions

3) In the 1990s – calls for greater transparency in the debt markets led to the development of TRACE, which began operations in July 2002.


Trade Reporting and Compliance Engine®

"In order to make informed decisions, investors must know the prices recently paid for debt instruments generally, as well as for the specific bonds they hold or that are being offered in the market. Comprehensive price transparency is therefore critical to informed investment decisions. Informed investors, armed with accurate information, ensure that market prices represent fair values. And fair market prices, in turn, ensure that the markets perform their economic function of efficiently allocating capital resources. This participation (in TRACE) means more trading, more market liquidity, and perhaps even new business for bond dealers. Thus, we believe that a sound and sensible approach to bond market transparency will benefit almost everyone -- investors, dealers, and the economy as a whole."

Trade Reporting and Compliance Engine®

1) Introduced by FINRA* in 2002 covering corporate and government bonds
2) Real-time dissemination of time of execution, price, yield, and volume
3) Mandatory post-trade disclosure system for secondary market transactions
4) Implemented on a phased-approach
   - Securities coverage
   - Reporting time after execution

* Financial Industry Regulatory Authority, Inc. (FINRA) is a private corporation that acts as a self-regulatory organization (SRO). FINRA is the successor to the National Association of Securities Dealers, Inc. (NASD) and the member regulation, enforcement and arbitration operations of the New York Stock Exchange. FINRA regulates member brokerage firms and exchange markets.

“TRACE ensures equal access to reliable corporate, agency and structured products bond information—enhancing the integrity of the market.....TRACE helps regulators to better monitor the market, pricing and execution quality – FINRA”
Trade Reporting and Compliance Engine®

- Investment grade issues with ≥ $1 billion in original issuance and;
- 50 representative high yield bonds

- Investment grade issues rated ≥ A with ≥ $100m in original issuance;
- 120 selected BBB rated bonds and
- 50 high yield bonds

- Immediate dissemination for 99% of transactions with 1% subject to dissemination delays

Trade Reporting and Compliance Engine®

Reporting Time after execution

- 2002: 75 minutes
- 2003: 45 minutes
- 2004: 30 minutes
- 2005: 15 minutes (current)
Markets in Financial Instruments Directive (MiFid II)

1) Promotes greater transparency through the use of pre-trade and post-trade transparency regime

2) Allows delayed disclosure of post-trade information for large-in-scale transactions, illiquid financial instruments and transactions above a specified size

3) Disclosure must be made available on a reasonable commercial basis & free after 15 mins (reduces to 5 mins in 2020)

4) Transposes into national law of Members States by June 2016 and implemented in January 2017

Source: European Securities and Markets Authority (ESMA)

Vicious cycle of bond trading

- **Low participation**: Investors prefer buy and hold strategy, low participation in secondary market

- **Large number of bond issues by a single issuer**: Unlike equity, issuers can issue many series of bond, thus not all will be liquid, potential for mispricing

- **Low liquidity and limited information disclosure**: Given low liquidity, information is only available to limited dealers, alleviating information asymmetries

- **Dealers’ Market**: Limited information among limited group of dealers (Dealers’ Market), who may act as principal and agent will further discourage investors
Development of Bond Pricing Agency in Asia

1) About BPA?
   independent agency that provides fair and objective bond valuation
   established with the support of government / securities regulator

2) Benefits of BPA?
   - valuation based on data collection from various reliable sources
   - disclose reference rate on a daily basis (particularly illiquid
     instruments) based on transparent valuation methodologies
   - reduce information asymmetries among different group of investors
   - support calculation of mutual fund’s NAV to determine appropriate
     investment and risk management strategies

3) Examples of valuation methodologies:
   1) yield curves
   2) bond indices
   3) mark-to-market valuation

4) Similarities of BPA in Asia:
   1) government-led initiative
   2) established after the Asia financial crisis
      in 1997, with common goal of developing
      domestic bond market
   3) subsidiary of / supported by existing domestic CRAs or
      infrastructure providers
Development of Bond Pricing Agency in Asia

Case studies in Asia

<table>
<thead>
<tr>
<th>Name</th>
<th>China</th>
<th>Korea</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1994</td>
<td>1996</td>
</tr>
<tr>
<td></td>
<td>China Foreign Exchange Trade System</td>
<td>Shanghai Clearing House</td>
</tr>
<tr>
<td></td>
<td>China Central Depository &amp; Clearing</td>
<td>KIS Pricing</td>
</tr>
<tr>
<td></td>
<td>CSI Bond Pricing</td>
<td>Korea Asset Pricing</td>
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<tr>
<td></td>
<td></td>
<td>NICE Pricing Services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fn Pricing</td>
</tr>
<tr>
<td><strong>Largest S' holders / Parent Institution</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>People's Bank of China (PBOC)</td>
<td>State-owned</td>
</tr>
<tr>
<td></td>
<td>Shanghai Stock Exchange</td>
<td>China Foreign Exchange Trade Center</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Korea Investors Service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Korea Ratings Corp.</td>
</tr>
<tr>
<td></td>
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<td>National Information &amp; Credit Evaluation</td>
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<tr>
<td></td>
<td></td>
<td>Fn Guide</td>
</tr>
<tr>
<td><strong>Policy Support</strong></td>
<td>Sub-institution of the PBOC</td>
<td>Proposed by PBOC and MOF</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Government (Financial Investment Services and Capital Markets Act)</td>
</tr>
</tbody>
</table>

Philippines: The Philippine Dealing & Exchange Corp.

Malaysia: The Thai Bond Market Association

Thailand: Indonesia Bond Pricing Agency

Indonesia: Government

Launched: 2003

Name: The Philippine Dealing & Exchange Corp.

Largest S' holders: Banker Association and its members, PSE¹, SGX²

Policy Support: SEC³, SRO approved by the Philippine SEC

1 – Philippine Stock Exchange
2 – Singapore Exchange
3 – Securities and Exchange Commission
4 – Securities Commission, Malaysia
5 – Indonesia Stock Exchange
6 – Indonesian Clearing and Guarantee Corporation
7 – Indonesian Central Securities Depository
8 – Financial Services Authority

Guidelines on the Registration of BPA

Self-regulatory organization under SEC Act B.E. 2535

Presidential Instruction & OJK⁶ Regulation

IDX⁵, KPEP⁷, KSEI⁷

SEC³, SC Malaysia⁴

Philippines

Malaysia

Thailand

Indonesia

Launched: 2004

Name: Bond Pricing Agency Malaysia

Largest S' holders: RAM Holdings Berhad

Policy Support: Guidelines on the Registration of BPA

Development of Bond Pricing Agency in Asia

Case studies in Asia

<table>
<thead>
<tr>
<th>Name</th>
<th>Philippines</th>
<th>Malaysia</th>
<th>Thailand</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2004</td>
<td>2005</td>
<td>2008</td>
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<tr>
<td><strong>Name</strong></td>
<td>The Philippine Dealing &amp; Exchange Corp.</td>
<td>Bond Pricing Agency Malaysia</td>
<td>The Thai Bond Market Association</td>
<td>Indonesia Bond Pricing Agency</td>
</tr>
<tr>
<td><strong>Largest S' holders</strong></td>
<td>Banker Association and its members, PSE¹, SGX²</td>
<td>RAM Holdings Berhad</td>
<td>-</td>
<td>IDX⁵, KPEP⁷, KSEI⁷</td>
</tr>
<tr>
<td><strong>Policy Support</strong></td>
<td>SEC³, SRO approved by the Philippine SEC</td>
<td>Guidelines on the Registration of BPA</td>
<td>Self-regulatory organization under SEC Act B.E. 2535</td>
<td>Government</td>
</tr>
</tbody>
</table>

1 – Philippine Stock Exchange
2 – Singapore Exchange
3 – Securities and Exchange Commission
4 – Securities Commission, Malaysia
5 – Indonesia Stock Exchange
6 – Indonesian Clearing and Guarantee Corporation
7 – Indonesian Central Securities Depository
8 – Financial Services Authority
1) Highlighted the vulnerability of benchmarks and its potential to undermine market confidence

2) Focused on the responsibility of administrators to have appropriate governance arrangements in place in order to protect the integrity of the Benchmark determination process and to address conflicts of interest.

Factors to consider when assessing the risk of a Benchmark

- Submissions to Benchmarks
- Content and transparency of Methodologies
- Risks of Benchmark
- Governance processes

IOSCO Principles for Financial Benchmarks

Administrators have appropriate governance arrangements to protect the integrity of the Benchmark determination process and to address conflicts of interest.

Promote quality and integrity of Benchmark determinations through the application of design factors that result in a Benchmark that reflects a credible market for an Interest measured by that Benchmark.
IOSCO Principles for Financial Benchmarks

Principles for Financial Benchmarks

Quality of Methodology

Promote quality and integrity of Methodologies by setting out minimum information that should be addressed and made available so that stakeholders may understand and make their own judgments concerning credibility of a Benchmark.

Accountability

Establish complaints processes, documentation standards and audit reviews that are intended to provide evidence of compliance by the Administrator.

IOSCO Principles for Service Providers

Principles for Financial Benchmarks

Governance

Promote quality and integrity of Benchmark determinations through the application of design factors that result in a Benchmark that reflects a credible market for an Interest measured by that Benchmark.

Quality of Benchmark

Administrators have appropriate governance arrangements to protect the integrity of the Benchmark determination process and to address conflicts of interest.

Quality of Methodology

Promote quality and integrity of Methodologies by setting out minimum information that should be addressed and made available so that stakeholders may understand and make their own judgments concerning credibility of a Benchmark.

Accountability

Establish complaints processes, documentation standards and audit reviews that are intended to provide evidence of compliance by the Administrator.
Targets of the workshop

1) Greater understanding on bond pricing methodologies and market practices of participating jurisdictions

2) Possible re-calibration of bond pricing methodologies and practices to further enhance bond pricing models of participating jurisdictions

3) Development of best practices in bond pricing in Asian+3, considering IOSCO’s Principles for Financial Benchmarks

Thank You

Nortaka Akamatsu
Senior Advisor
Sustainable Development and Climate Change
Asian Development Bank
E-mail nakamatsu@adb.org
SESSION 2

PRESENTATION BY BOND PRICING AGENCIES IN ASEAN+3 ON THEIR METHODOLOGIES AND PRACTICES
Price Publication System in the Japanese Bond Market

June 6, 2016

Daiki Kadowaki
Bonds & Financial Products Division
Japan Securities Dealers Association

Contents

1. Background to the Inception of the Corporate Bond Transaction Information Reporting and Publication System
2. Overview of the Corporate Bond Transaction Information Reporting and Publication System
3. Trends in the Japanese Bond Market
4. Publication Status of Corporate Bond Transaction Information
5. Future Prospects
7. Appendix
Preliminary Statement

JSDA publishes bond price information as a self-regulatory organization (SRO) in Japan, but is not a so-called bond pricing agency.

JSDA receives reports every day on price quotations that are assessed independently by each member firm. Based on these reports, JSDA calculates and then publishes the average prices, etc.

In short, JSDA does not have its own bond pricing models.

1. Background to the Inception of the Corporate Bond Transaction Information Reporting and Publication System

(1) Recommendation from the Report of the Deliberation Forum for the Corporate Bond Market

- "Initiative for the Vitalization of the Corporate Bond Market" (Report of the Study Group for Vitalizing the Corporate Bond Market) issued on July 2012
- To vitalize the secondary market of corporate bonds, it is important to ensure reliability by increasing the transparency of the price information on corporate bonds. The Report has recommended that securities companies be required to report on the transaction information of corporate bonds, and that JSDA publish this information.

(2) Deliberation of the Working Group for the Transaction Information Reporting and Publication System for Corporate Bonds

- JSDA has established the Working Group on Development, Etc. of Price Information Infrastructure for Corporate Bonds. (Convener: Professor Shuya Nomura, Chuo University Law School)
- In preparation for the implementation of the recommendations of the Report of the Study Group to Vitalize the Corporate Bond Market, since September 2013 practical discussions have been held regarding the daily reporting and publication of corporate bonds trade information. The amendment draft for the rules and guidelines that are needed for these implementations was also compiled.

Inception of the Corporate Bond Transaction Information Reporting and Publication System on November 2, 2015
2. Overview of the Corporate Bond Transaction Information Reporting and Publication System (1)

Transactions to be reported
- In principle, all bond transactions
- Can omit reports on transactions of less than 10 million yen

Transactions to be published
- Of the corporate bonds to be published, transactions exceeding 100 million yen

Corporate bonds to be published
- Select bonds which satisfy the two following items on the 15th of previous month.
  1) AA or better credit rating for the issue
  2) Two or more credit ratings for issues or issuers
- Excluding corporate bonds redeemable by the end of the month
- Bonds with rapidly increasing yields or other sharp changes are not published

[9:00 every business day] Publish issue list of this month
[20th of each month] Publish transaction information reported on the previous day

Transaction Information Publication Display (Sample)

Publication page: “Transaction Information of Corporate Bonds” (JSDA’s website)
The publication of price shall be suspended for corporate bonds that fall under the publication suspension criteria.

Formula of criteria for suspending publication

\[(A-B)-(a-b) \geq X\]

- A: Reference price of the day for said corporate bonds
- B: Reference price of the prior business day for said corporate bonds
- a: Reference price of the day for referenced JGBs
- b: Reference price of the prior business day for referenced JGBs
- X: Fixed figure

For corporate bonds that do not fall under the criteria but for which the suspension of publication is considered to be truly necessary, JSDA can determine whether to suspend publication by examining the application for suspension submitted by Association Members.

Measure for cancelling publication

- Cancel publication of trade information of corporate bond if the rating of issues is not AA or higher.

3. Trends in the Japanese Bond Market (1)-1 Bond Trading Volume

(Source) JSDA “Trading Volume of Over-the-Counter Bonds” excluding Gensaki-repos and T-Bills
3. Trends in the Japanese Bond Market

(1) Bond Trading Volume

Bond Trading Volume (2014.11～2016.3 monthly basis)

(Source) JSDA “Trading Volume of Over-the-Counter Bonds” excluding Gensaki-repos and T-Bills

(Trillion yen)

(2) Bond Trading Turnover Ratio

Bond Trading Turnover Ratio (calendar basis)

4. Publication Status of Corporate Bond Transaction Information (1)

Number of Transactions Subject to Publication and the Number of Issues

(Unit: No. Issue) : Bar Graph
(Unit: No. Issue) : Line Graph

- Number of transactions (left axis)
- Number of issues (left axis)
- Daily average Number of transactions (right axis)
- Daily average Number of issues (right axis)

(Source) JSDA “Transaction Information of Corporate Bonds”

4. Publication Status of Corporate Bond Transaction Information (2)

Breakdown of Transaction Volume per Size (¥500 mil or more / Less than ¥500 mil) of Corporate Bonds Subject to Publication (%)

- Transactions of ¥ 500 million or more
- Transactions of less than ¥ 500 million

(Source) JSDA “Transaction Information of Corporate Bonds”
4. Publication Status of Corporate Bond Transaction Information (3)-1

Transactions of Publicly Offered Corporate Bonds (per type; subject or not subject to publication)

(Number) Number of Transactions Basis

- Transactions subject to publication
- Transactions not subject to publication

(100 mil Yen) Transaction Volume Basis

- Transactions subject to publication
- Transactions not subject to publication

(Note) Excluding transactions with face value less than 10 mil yen.
(Source) Compiled based on data from JSDA and JASDEC.

4. Publication Status of Corporate Bond Transaction Information (3)-2

Transactions of Publicly Offered Corporate Bonds (per credit rating)

(Number) Number of Transactions Basis

- AA or above
- A
- BBB
- BB or below

(100 mil Yen) Transaction Volume Basis

- AA or above
- A
- BBB
- BB or below

(Note1) Excludes transactions with a face value of less than 10 million yen.
(Note2) If multiple credit ratings are attached, the better rating is adopted.
(Source) Compiled based on data from JSDA and JASDEC.
### 4. Publication Status of Corporate Bond Transaction Information (4)

#### Positive (Trade Price > Reference Price)

<table>
<thead>
<tr>
<th>Date</th>
<th>2015.11</th>
<th>2015.12</th>
<th>2016.01</th>
<th>2016.02</th>
<th>2016.03</th>
<th>2016.04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>0.168</td>
<td>0.179</td>
<td>0.163</td>
<td>0.207</td>
<td>0.282</td>
<td>0.189</td>
</tr>
<tr>
<td>Median</td>
<td>0.061</td>
<td>0.066</td>
<td>0.073</td>
<td>0.105</td>
<td>0.126</td>
<td>0.075</td>
</tr>
<tr>
<td>Highest</td>
<td>4.314</td>
<td>5.080</td>
<td>4.811</td>
<td>4.637</td>
<td>4.702</td>
<td>5.081</td>
</tr>
<tr>
<td>Lowest</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

#### Negative (Reference Price > Trade Price)

<table>
<thead>
<tr>
<th>Date</th>
<th>2015.11</th>
<th>2015.12</th>
<th>2016.01</th>
<th>2016.02</th>
<th>2016.03</th>
<th>2016.04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>0.217</td>
<td>0.265</td>
<td>0.299</td>
<td>0.341</td>
<td>0.566</td>
<td>-0.421</td>
</tr>
<tr>
<td>Median</td>
<td>0.095</td>
<td>0.111</td>
<td>0.148</td>
<td>0.158</td>
<td>0.183</td>
<td>-0.107</td>
</tr>
<tr>
<td>Highest</td>
<td>3.099</td>
<td>5.542</td>
<td>4.407</td>
<td>7.750</td>
<td>11.620</td>
<td>-5.693</td>
</tr>
<tr>
<td>Lowest</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>-0.001</td>
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#### Absolute Value

<table>
<thead>
<tr>
<th>Date</th>
<th>2015.11</th>
<th>2015.12</th>
<th>2016.01</th>
<th>2016.02</th>
<th>2016.03</th>
<th>2016.04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>0.192</td>
<td>0.225</td>
<td>0.227</td>
<td>0.292</td>
<td>0.393</td>
<td>0.262</td>
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<tr>
<td>Median</td>
<td>0.076</td>
<td>0.088</td>
<td>0.095</td>
<td>0.131</td>
<td>0.154</td>
<td>0.085</td>
</tr>
<tr>
<td>Highest</td>
<td>4.314</td>
<td>5.542</td>
<td>4.811</td>
<td>7.750</td>
<td>11.620</td>
<td>5.693</td>
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<tr>
<td>Lowest</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
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</tr>
</tbody>
</table>

(Source) Calculated on the basis of JSDA “Trade Information of Corporate Bonds”

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### 4. Publication Status of Corporate Bond Transaction Information (5)-1

#### Number of Transactions with Negative Yields

<table>
<thead>
<tr>
<th>(No. of Transactions)</th>
<th>*Day of BOJ Market Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Transactions (aggregated)</td>
</tr>
<tr>
<td></td>
<td>(In which) Number of Transactions with negative yield (simple yield basis)</td>
</tr>
</tbody>
</table>

(Source) JSDA “Transaction Information of Corporate Bonds”

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4. Publication Status of Corporate Bond Transaction Information (5)-2

<table>
<thead>
<tr>
<th>Contract Day</th>
<th>Number of Issues Traded with Negative Yields</th>
<th>Day of BOJ Market Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of traded issues</td>
<td>In which Number of traded issues with negative yield (simple yield basis)</td>
</tr>
<tr>
<td></td>
<td>50</td>
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<tr>
<td>1</td>
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<td>60</td>
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<tr>
<td>9</td>
<td>43</td>
<td>43</td>
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<tr>
<td>10</td>
<td>82</td>
<td>82</td>
</tr>
</tbody>
</table>

(Source) JSDA “Transaction Information of Corporate Bonds”

5. Future Prospects

Analyzing impact on liquidity

• Guideline “Handling the Publication of Corporate Bond Transaction Information”
  → After publishing corporate bond transaction information, JSDA shall examine on a regular basis (at least once a year) the impact of publication on the liquidity of corporate bonds, and if necessary conduct a review of issues subject to publication, such as the items to be published and the method and timeframe for publication.
No. of issues which reference statistical prices are published;

8,554 (As of May 19, 2016)
7. Appendix (1) Bond Issuance Amounts

<table>
<thead>
<tr>
<th>Year</th>
<th>JGB</th>
<th>JGB(TB)</th>
<th>Corporate</th>
<th>Other Public</th>
<th>Bank Debenture</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>98.2</td>
<td>18.8</td>
<td>14.7</td>
<td>9.3</td>
<td>6.5</td>
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<tr>
<td>2008</td>
<td>91.5</td>
<td>23.1</td>
<td>14.8</td>
<td>9.3</td>
<td>6.5</td>
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<tr>
<td>2009</td>
<td>106.6</td>
<td>28.4</td>
<td>17.0</td>
<td>11.7</td>
<td>5.9</td>
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<tr>
<td>2010</td>
<td>120.9</td>
<td>35.0</td>
<td>17.1</td>
<td>9.8</td>
<td>4.4</td>
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<tr>
<td>2011</td>
<td>123.7</td>
<td>30.0</td>
<td>15.5</td>
<td>8.5</td>
<td>3.9</td>
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<tr>
<td>2012</td>
<td>128.2</td>
<td>30.0</td>
<td>16.9</td>
<td>8.4</td>
<td>3.5</td>
</tr>
<tr>
<td>2013</td>
<td>136.3</td>
<td>30.0</td>
<td>16.8</td>
<td>8.8</td>
<td>3.2</td>
</tr>
<tr>
<td>2014</td>
<td>138.3</td>
<td>28.1</td>
<td>15.6</td>
<td>8.5</td>
<td>2.6</td>
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<tr>
<td>2015</td>
<td>137.4</td>
<td>25.7</td>
<td>14.3</td>
<td>7.1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

*1 Total of Municipality Bonds, Gov.-guaranteed Bonds and FLIP Agency Bonds
*2 Total of Straight Bonds, ABS and CB

(Source) JSDA
## Appendix (2) Bond Outstanding Amounts

<table>
<thead>
<tr>
<th>Year</th>
<th>JGB</th>
<th>JGB(TB)</th>
<th>Other Public</th>
<th>Corporate</th>
<th>Non-resident</th>
<th>Total</th>
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<tbody>
<tr>
<td>2007</td>
<td>520.1</td>
<td>16.8</td>
<td>92.7</td>
<td>56.8</td>
<td>7.6</td>
<td>716.0</td>
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<tr>
<td>2008</td>
<td>551.7</td>
<td>17.1</td>
<td>97.8</td>
<td>56.9</td>
<td>9.1</td>
<td>753.9</td>
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<tr>
<td>2009</td>
<td>587.3</td>
<td>25.4</td>
<td>104.3</td>
<td>61.4</td>
<td>19.4</td>
<td>806.7</td>
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<tr>
<td>2010</td>
<td>638.6</td>
<td>30.0</td>
<td>110.8</td>
<td>63.8</td>
<td>17.2</td>
<td>869.6</td>
</tr>
<tr>
<td>2011</td>
<td>676.9</td>
<td>30.0</td>
<td>115.3</td>
<td>63.6</td>
<td>15.2</td>
<td>910.8</td>
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<tr>
<td>2012</td>
<td>715.3</td>
<td>30.0</td>
<td>121.1</td>
<td>62.4</td>
<td>14.0</td>
<td>960.0</td>
</tr>
<tr>
<td>2013</td>
<td>760.7</td>
<td>28.1</td>
<td>128.0</td>
<td>61.5</td>
<td>12.5</td>
<td>1012.5</td>
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<tr>
<td>2014</td>
<td>802.7</td>
<td>25.7</td>
<td>127.8</td>
<td>60.4</td>
<td>11.8</td>
<td>1060.0</td>
</tr>
<tr>
<td>2015</td>
<td>841.2</td>
<td>25.7</td>
<td>128.0</td>
<td>58.4</td>
<td>11.4</td>
<td>1073.8</td>
</tr>
</tbody>
</table>

(Source) JSDA

*1 Total of Municipality Bonds, Gov.-guaranteed Bonds and FLIP Agency Bonds
*2 Total of Straight Bonds, ABS and CB

## Appendix (3) Outstanding Corporate Bonds by Rating

- **AAA**: 6,300 (1.3%)
- **AA**: 278,768 (57.5%)
- **A**: 181,674 (37.5%)
- **BBB**: 16,787 (3.5%)
- **BB or less**: 900 (0.2%)

(Note) Estimation of JSDA (as of March 31, 2016)
END
Overview of Thai Bond Market & Roles of ThaiBMA as Pricing Agency

PRESENT AT

ASEAN+3 BOND MARKET FORUM
TOKYO, JAPAN
6TH JUNE 2016

Agenda

- Introduction
  - Evolution of ThaiBMA
  - Our Members
  - ThaiBMA’s Roles & Functions
- Overview of Thai Bond Market
- ThaiBMA’s Pricing Services
- Key Products & Services
- ThaiBMA Mark-to-Market Price
The Evolution of ThaiBMA:

- Sep. 1994: Bond Dealers’ Club
- Apr. 1998: Thai Bond Dealing Centre
- Sep 2005: Thai Bond Market Association

Our Members:

As of April 2016 = 53 companies

- **Ordinary member** (Dealer)
  - Financial institutions with securities trading license or debt trading license
- **Extraordinary member** (IDB)
  - Financial institutions with securities business license for Inter-dealer broker
- **Associate member** (Inactive dealer)
  - Dealers having average outright trading value < 100 THB Mln./month

- **Ordinary member** (Dealer): 47 companies
- **Extraordinary member** (IDB): 4 companies
- **Associate member** (Inactive dealer): 2 companies
Roles & Functions

**Bond Market SRO**
- Surveillance
- Regulation/inspection
- Trader license
- Convention
- Enforcement

**Bond Information Center**
- Center of Bond market information & dissemination
- Product Development
- Bond Literacy

**Trading Association**
- Members’ Collective Voice to Authorities
- Market Development
- HR Development for Bond Market

**Bond Pricing Agency**
- Pricing model for all bonds
- Product development
- Yield curve
- Index
- Credit Spread
- MTM prices
- Etc.

Overview of Thai Bond Market
Outstanding value of Thai bond market is now approximately **THB 10.23 trillion** increasing by 2.05% from year 2015.

Thai bond market has gained its significance and growth continuously over time.
As of March 2016, average trading value in secondary market is approximately THB 97 billion per day.
More than 94% of this is contributed to gov’t and central bank bonds.

Outstanding value of corporate bond as of March 31, 2016 was THB 2.6 Trillion.
Increasing by 3.2% (THB 80 billion) from end of year 2015.

Remark: Corporate bond is classified as long-term if its time-to-maturity is greater than 1 years.
Issuance of Long-Term Corp. Bond

Long-term Corporate Bond Issuance Amount

As of Q1 Y2016, issuance of long-term corporate bond was THB 130 billion.

Remark: Foreign bonds are excluded.

Average Trading Value of Corp. Bond

For corporate bond, average trading value per day is THB 4.9 billion, increasing by 47% from year 2015.
ThaiBMA’s Pricing Services

Key Products & Services

- Quotation Reports
- Daily Trading Report
- Yield Curves
- Bond Calculator
- Mark-to-Market Prices
- Bond Indices
- Other Financial Tools
### Key Products & Services

#### Key Products and Services

<table>
<thead>
<tr>
<th>Topics</th>
<th>Service Provided</th>
<th>Updated Frequency*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quotation Report</strong></td>
<td>Treasury Bill</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Gov't Bond</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Central Bank (Bank of Thailand : BoT) Bond</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>State-Owned Enterprise Bond</td>
<td>Weekly</td>
</tr>
<tr>
<td></td>
<td>Corporate Bond</td>
<td>Semimonthly</td>
</tr>
<tr>
<td><strong>Daily Trading Report</strong></td>
<td>Closing price report of today traded bonds</td>
<td>Daily</td>
</tr>
<tr>
<td><strong>Yield Curves</strong></td>
<td>Gov’t Bond Yield Curve</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Zero Coupon Bond Yield Curve</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Par Bond Yield Curve</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Corporate Bond Yield Curve</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Implied 6-Mth Forwards Yield Curve</td>
<td>Daily</td>
</tr>
<tr>
<td><strong>Bond Calculation</strong></td>
<td>Provide calculation engine which is in line with Thai bond market convention</td>
<td>24-Hr available</td>
</tr>
</tbody>
</table>

* updated on business day

#### Key Products and Services (con’t)

<table>
<thead>
<tr>
<th>Topics</th>
<th>Service Provided</th>
<th>Updated Frequency*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mark-to-Market (MTM) Prices</strong></td>
<td>For all registered bonds in ThaiBMA (≈ 3,400 issues)</td>
<td>Daily</td>
</tr>
<tr>
<td><strong>Bond Indices</strong></td>
<td>Gov’t Bond Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Composite Bond Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>T-Bill Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Zero Rate Return Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>State Owned Enterprises Zero Rate Return Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Corporate Zero Rate Return Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Commercial Paper Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Short-term Gov’t Bond Index</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>MTM Corporate Bond Index</td>
<td>Daily</td>
</tr>
<tr>
<td><strong>Other Tools &amp; Analysis</strong></td>
<td>Credit Spread Curves (by credit rating)</td>
<td>Semimonthly</td>
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<td></td>
<td>Rich/Cheap Analysis</td>
<td>Semimonthly</td>
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<td></td>
<td>Portfolio Duration and Convexity</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Portfolio Key Rate Duration (KRD) &amp; Convexity</td>
<td>Daily</td>
</tr>
</tbody>
</table>

* updated on business day
ThaiBMA has provided Mark-to-Market (MTM) Service since 2006.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Maturity</th>
<th>Last Trade Date</th>
<th>Last Exec Yield</th>
<th>Market Yield</th>
<th>Clean Price</th>
<th>Al %</th>
<th>Currency</th>
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<td>KTZ1632A</td>
<td>24-Mar-2016</td>
<td>25-Sep-2015</td>
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<td>1.736052</td>
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<td>KTZ16510A</td>
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<td>08-Nov-2015</td>
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<td>99.235035</td>
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<td>-</td>
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<td>LALIN16330A</td>
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<td>LALIN171A</td>
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<td>LALIN1770A</td>
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<td>-</td>
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<td>LALIN181A</td>
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<td>16-Nov-2015</td>
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<td>1.5</td>
<td>102.503688</td>
<td>0.145918</td>
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</table>

More than 3,000 number of bonds will be priced.
ThaiBMA Mark-to-Market Prices

Prioritization of Mark-to-Market Yield

Mark-to-Market Yield

ThaiBMA Mark-to-Market Prices

Daily Mark-to-Market Process for Gov't Bond

Trade Transactions

Mark to Market Priority

Quotations (Daily Basis)

Verifying Process

Trade Info.
- Counterparty
- Trade Frequency
- Related trading information from other issues

Executed Yield

Quoted Yield

Mark-to-Market Yield

Note: Based on mandatory, all gov’t bond yield are either at least quoted or quoted synthetic.
ThaiBMA Mark-to-Market Prices

Daily Mark-to-Market Process for Corp. Bond

- Trade Transactions
- Verifying Process
- Mark to Market Priority
  - Executed Yield
  - Quoted Yield
  - Model Yield
  - Mark-to-Market Yield
- Quotations (Semi-monthly basis)
- Outliers Elimination

Note: Based on voluntary basis, for a corp. bond, there must be at least 3 quoted yields from each bond dealers in order to be used as Mark-to-Market yield.

Model Yield for Corporate Bond

In the case that corporate bonds are neither actively traded nor quoted by dealers, Model Yield is necessary.

- Corporate registers the bond with ThaiBMA
- The spread would be revised when there is
  - Transaction
  - Quotation
  - Mid and End of Month
- Model Yield
  - Zero Coupon Yield Curve
  - Corporate Spread (Spread Over Gov’t Curve)
- Mark-to-Market System

Update every working day
Thank You for your attention
For a Better Indonesia FI Market

Newly Investment Grade with Big Potential for Growth

- Indonesia Sovereign Rating:
  - Fitch Ratings: BBB-/Stable
  - Moody’s: Baa3/Stable
  - Standard & Poor’s: BB+/Positive

- Fast Growing Primary & Secondary Market

- Safer & Better Bond Market, Backed by Indonesia Macroeconomic Condition
Historical Background

• Modern era of Indonesian bond market started in the year of 2000 – (Recap Bond)

• Bond market were fastly growing, when the Bond crashed in 2005.

• Central Bank and MOF Joint Decree, 5 July 2006, Policy Package – Financial Sector 2006:
  “... to strengthen capital market industry, bonds market in particular.....through the establishment securities pricing institution that provide fair valuation for all bonds ...

• Presidential Decree No. 6 Year 2007 – Stabilization of Indonesia bond market through the enhancement of price discovery mechanism.
  “... instructing the capital market authority to issue rules regarding the establishment of an institution that performs valuation and price fixing for bonds ...”

• In 2007 Bapepam-LK issued rule No. V.C.3 regarding Securities Pricing Agency

• August 10th 2009, IBPA acquired license from the Capital Market & Financial Institution Supervisor Agency (BAPEPAM-LK) as Indonesia :
  First Securities Pricing Agency
**Company Profile**

- **IBPA Shareholders:**

  ![IBPA Shareholders](image)

- **IBPA Financial Situation:**

  ![IBPA Financial Situation](image)

**IBPA Pricing Processes & Methodology**

1. **Price Database**
   - Data Sources Hierarchy
   - Filtering Criteria
   - Historical Data
   - Statistical / Mathematical Models Library
   - Statistical / Mathematical Models’ Parameters
   - Etc.

2. **Valuation Process (Yield Curve Fitting)**
   - GB Yield Curve Fitting
   - CB Spread Calculations
   - CB Yield Curve by Rating - Fitting
   - CB Yield Curve Specifics (Type of Company; Sectors,) - Fitting

3. **Individual Bond Series Price Fixing**
   - Fixing GB Prices:
     - (1) MTM for liquid & (2) YC for illiquid
     - Fixing CB Prices: (1) MTM for liquid & (2) YC for illiquid
     - Fixing CB Prices by Issuers

4. **Quality Assurance**
   - Abnormalities Checks

5. **Others:** Ratings News Indicators
**Objective**
- Independent
- Credible
- Transparent

The First and Only Licensed Securities Pricing Agency in Indonesia
Challenges Ahead

- Availability of Methodologies
- Mandatory Usage – A Paradox
- In case of error in valuation, How to Handle
- Saturated and Shrinking Market

Terima Kasih
(Thank You)
Insight into CCDC Pricing Data Service

Presented by Yurui Niu
Deputy General Manager, ChinaBond Pricing Center, CCDC

Contents

1. Overview of China Bond Market
2. CCDC Pricing Data Service
3. Performance of Pricing Methodologies
4. Asia Bond Pricing Seminar
Overview of China Fixed-income Market 中国固定收益市场概况

Bond Market 债券市场

Non-standard Assets 非标资产

Preferred Stock 优先股

The Architecture of China Bond Market 中国债券市场结构

OTC Market

Exchange Market

Participants

Pricing

Markets of Transaction

Custodian

Market type

Individuals Non-financial Institutions

Commercial banks Counter market

CCDC (General Custodian)

Institutional Institutions

Bid-Asking Negotiation

Inter-bank Market CFETS Money Broking Company

Shanghai Clearing House

Individuals Non-bank Institutions

Matching

Exchange Market

ChinaClear (sub-custodian)
The Scale of China Bond Market 中国债券市场规模

Amounts Outstanding of China Bond Market

Data Source: CCDC, CSDC, SHCH

Depository Balance Structure (Bond Type) 中国债券市场品种

Structure of Depository Balance by Bond Type (2015)

Data Source: CCDC, CSDC, SHCH
**Issuance of China Bond Market in 2015 中国债券发行品种统计**

**Issuance of China Bond Market by Bond Type (2015)**

- 国债 Treasury Bond
- 地方政府债 Local Government Bond
- 政策性银行债 Policy Bank Bond
- 商业银行债 Commercial Bank Bond
- 金融债 Corporate Bond
- 短期融资券 CP
- 中期票据 MTN
- 定向工具 PPN
- 公司债 Company Bond
- 资产支持证券 ABS/MBS
- 资本工具 Instruments
- 政府支持机构债 Government Support Institutions Bond
- 非银行金融机构 Non-banking Financial Institutions Bond

Data Source: CCDC, CSDC, SHCH

---

**Structure of Bond Investors Holdings 债券投资者结构**

**Structure of Bond Investors Holdings (2015)**

- 特殊结算成员 Special Settlement Members
- 商业银行 Commercial Banks
- 信用社 Credit Cooperatives
- 非银行金融机构 Non-Banking Financial Institutions
- 证券公司 Security Companies
- 保险公司 Insurance Companies
- 基金类 Funds
- 非金融机构 Non-Financial Institutions
- 个人投资者 Individuals
- 交易所 Exchanges
- 海外机构 Overseas Institutions
- 其它 Others

Data Source: CCDC
**Introduction of CCDC 中央结算公司介绍**

**Core Infrastructure Platform for the Bond Market**
- CSD in the interbank bond market
- Register 72.5 trillion Yuan of financial assets, including bonds, bank wealth management products, and trust products, of which bonds accounted for 35 trillion Yuan

**Platform for the Implementation of Monetary and Fiscal Policy**
- Supported Open Market Operation of 80 trillion Yuan and PBOC bills issuance of 27 trillion Yuan
- Supported Treasury bond issuance of 17 trillion Yuan and local government financing of 4 trillion Yuan

**Introduction of CCDC 中央结算公司介绍**

**Platform for Bond Market Opening-up**
- Supported panda bonds issuance by ADB and so on
- 305 foreign institutions open accounts with CCDC
- Signed MOU with more than 10 international peers including DTCC and Euroclear
- Hosted the 18th ACG General Conference in 2014 and published Xi’an Initiative

**Key Benchmark Pricing Platform for the Financial Market**
- In 1999, CCDC launched the first Treasury bond yield curve in China
- Established a whole set of ChinaBond pricing system
- Over 90% of bonds held by domestic financial institutions are managed according to ChinaBond Pricing System
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   2.4 ChinaBond Indices
   2.5 ChinaBond VaR/CVaR
   2.6 Data Delivery Channel

3. Performance of Pricing Methodologies

4. Asia Bond Pricing Seminar

History of ChinaBond Pricing Data 发展历史
**ChinaBond Pricing Data 中债价格指标概况**

- ChinaBond Pricing Data contains 6 categories of data. The published data volumes have reached 4 million daily[1].

<table>
<thead>
<tr>
<th>Category</th>
<th>Data Volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChinaBond Yield Curves</td>
<td>1300+</td>
</tr>
<tr>
<td>ChinaBond Valuations</td>
<td>49000+</td>
</tr>
<tr>
<td>ChinaBond Indices</td>
<td>58 sub indices</td>
</tr>
<tr>
<td>ChinaBond Value at Risk</td>
<td>25000+ 400+ accounts</td>
</tr>
<tr>
<td>ChinaBond Market Implied Credit Rate</td>
<td>20000+</td>
</tr>
<tr>
<td>My Data</td>
<td>9000+ accounts</td>
</tr>
</tbody>
</table>

[1] The step length of ChinaBond Yield can be accurate to 0.1y. CCDC provides curves of Yield to Maturity, curves of Spot rate of 0.1y step length and curves of Forward Yield of standard maturities. At the meantime, the curves of Forward Yield of 0.1y step length can by queried and downloaded through the publishing channel.

---

**Features of ChinaBond Pricing Data 特点**

- Comprehensive pricing data framework
- Deep application in the market
- Highly efficient computer system
- Complete programming model
- Omni-directional quality monitoring system
Daily Working Procedure 工作流程

Market Information & Market Prices
Macro environment, Fundamentals, Prices, Industries, Financial status, etc.

Regular Meeting
Twice a day

Yield Curves
Bond Valuations
Bond Indices
Equity Assets Valuations
Bond VaR

Internal Multi-Verification System
Daily verification by pricing staff, quality control department observes data production weekly, monthly and annually

MOF
PBOC
Data Vendors
Bloomberg, Reuters, etc

CCDC Data Delivery
Data Stream
Clients’ Terminal

Mutual Funds (Example)
Use ChinaBond Valuations to calculate Net Asset Value of fund

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ChinaBond Yield Curves 中债收益率曲线

Spot Rate
Yield to Maturity
Forward Rate

Data Source 价格源

Market participants’ evaluation 成员估值
CIBM’s quotation 银行间市场报价

Brokers’ quotation 经纪价格
CIBM’s settlements 银行间市场成交价

Exchange markets’ prices 交易所价格
Over the counter prices 柜台价格
Applications in Chinabond Yield Curves 中债曲线的应用

**Market Research 市场研究**
Since 2004, PBOC and MOF have used Chinabond yield curves to analysis the onshore RMB bond market trend.

**Risk Measurement 风险计量**
Since 2007, CBRC has recommended commercial banks to use Chinabond yield curves as benchmark in measuring market risk.

**Bidding Reference 发行参考**
MOF uses Chinabond treasury yield curve to calculate bidding range of local government bonds and treasury bond with issuance term of 30 years and 50 years.

---

Application in Market Research 在市场研究中的应用

- The PBOC Research Report finds that the 10Y-2Y Chinabond Treasury yield curve has 12 months lead time in forecasting economic growth. 央行调查司研究发现，中债银行间固定利率国债10年-2年期期限利差可以作为宏观经济波动的先行指标，并且具有12个月的领先性。
Since November 2014, Ministry of Finance’s official website has released key term treasury yield curve, which is provided by CCDC. 自2014年11月起，财政部网站发布由中央结算公司提供的关键期限国债收益率曲线。

On December 1, 2015 (BJ Time), the Executive Board of the IMF decided that effective October 1, 2016 the RMB will be included in the SDR basket as a fifth currency. Moreover, the Board adopted the three-month benchmark yield for China Treasury bonds in the SDR interest rate basket. 北京时间2015年12月1日，国际货币基金组织(IMF)召开执董会，决定从2016年10月1日起，中国的人民币将作为除美元、欧元、日元和英镑之外的第五种货币纳入特别提款权（SDR）货币篮子。与此同时，中国国债3个月基准利率将纳入特别提款权利率篮子。

IMF released a policy paper on Review of the Method of Valuation of the SDR. The report shows that “Staff considers that the three-month benchmark yield for Treasury bonds is the most suitable rate for inclusion in the SDR interest rate basket. This rate is observable daily from the China Central Depository and Clearing Co., Ltd. ……Moreover, developments in the CCDC three-month benchmark Treasury yield in recent years suggested that it is broadly responsive to changes in underlying credit conditions in the onshore market.” IMF正式发布《特别提款权定价方法评估报告》。报告称，IMF经过长期评估认为“三个月国债收益率曲线利率最适合纳入特别提款权利率篮子。该利率由中央国债登记结算有限责任公司（CCDC）每日发布。近几年的数据显示，CCDC编制的三个月国债收益率曲线较好的反映在岸人民币债券市场的信用水平。”
1. Overview of China Bond Market

2. CCDC Pricing Data Service
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ChinaBond Valuations 中债估值

The valuations cover all types of onshore RMB bonds, more than 14000 bonds are released daily. Since 2014, CCDC has launched preferred stock valuations, which means the valuation coverage has been expanded into equity asset.
ChinaBond Valuation

- **Time:** 17:30pm at working day
- **Frequency:** Once a day

### Bond Valuation Indicators

<table>
<thead>
<tr>
<th>Price Indicators</th>
<th>Yield Indicators</th>
<th>Risk Indicators</th>
<th>Liquidity Indicators</th>
<th>Credit Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirty Price</td>
<td>Valuated yield</td>
<td>Modified duration</td>
<td>Absolute liquidity coefficient</td>
<td>Market Implied Credit Rating</td>
</tr>
<tr>
<td>Clean Price</td>
<td></td>
<td>Convexity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accrued Interest</td>
<td>Valuated spread yield</td>
<td>Price value of a basic point</td>
<td>Relative liquidity coefficient</td>
<td></td>
</tr>
<tr>
<td>Reliability (for bonds with options)</td>
<td>Price value of a basic point</td>
<td>Price value of a basic point</td>
<td>Spread duration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Spread convexity</td>
<td></td>
</tr>
</tbody>
</table>

### ChinaBond Market Implied Credit Rating

- According to the market prices and financial statement analysis, we observed each bond’s credit spread given by the investors and calculated the Market Implied Credit Rating.
- Market隐含评级：通过对发行利率、市场成交价格和财务报表等信息进行分析，观察到市场投资者给予每只债券的平均信用点差，从而抽取出“市场隐含评级”。

- As of 2014, about 2196 bonds’ market implied credit rating is under rating company’s credit grade, which is about 38% of credit bonds with ratings.
- 2014年12月31日存量债为例，当日有2196只债券市场隐含评级与评级公司评级不同，约占有债项评级债券的38%
**ChinaBond Market Implied Credit Rating** 中债市场隐含评级

Several companies also started to provide market implied credit rating.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Started to provide</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCDC</td>
<td>2008</td>
</tr>
<tr>
<td>Bond Pricing Agency Malaysia</td>
<td>2012</td>
</tr>
<tr>
<td>China Bond Rating Co., Ltd.</td>
<td>2012</td>
</tr>
<tr>
<td>China Securities Index Co., Ltd</td>
<td>2014</td>
</tr>
<tr>
<td>China Lianhe Credit Rating Co., Ltd.</td>
<td>2015</td>
</tr>
<tr>
<td>Thomson Reuters</td>
<td>2015</td>
</tr>
</tbody>
</table>

**Applications in Bond Valuations** 中债估值的应用

2007
- Fund companies began to use ChinaBond yield curve and valuation to appraise fixed-income securities of China Interbank Market.
  - 基金公司依据中债估值对银行间市场的固定收益品种估值。

2008
- Listed banks started to use ChinaBond valuation as a measurement of bond fair value.
  - 上市银行在定期披露的财务报告中采用中债估值作为投资银行间债券公允价值的依据。
- Accounting firms began to adopt ChinaBond valuation as a standard in auditing.
  - 会计师事务所开始采用中债估值作为审计标准。

2009
- ChinaBond valuation become the reference indicator to monitor abnormal trading of China Interbank Market.
  - 中债估值作为监测银行间债券市场异常交易的参考指标。

2012
  - 银监会发布《商业银行债券公允价值估值操作指南》，推荐中债估值作为权威、有公信力的第三方机构的估值结果作为境内债券公允价值的基础。
- Applications of ChinaBond valuation extended to collateral management.
  - 中债估值的应用扩展到担保品管理。

2013
- ChinaBond started to provide non-standard assets valuation.
  - 中债估值扩展至非标资产。

2014
- AMA of China requires all fixed-income securities trading at Stock Exchange to use third-party valuation.
  - 中国证券投资基金业协会要求基金对固定收益品种估值时，可使用中债估值等第三方估值。中债估值的应用范围从银行间市场扩展到交易所市场。
Innovations 中债曲线和估值的创新

Methodology 创新方法
- Data inputs must be cleaned: CCDC employs a number of procedures to eliminate abnormal prices.
- Market Implied Credit Ratings: CCDC’s bond valuations are based on market implied credit ratings instead of direct using rating companies’ ratings.

Regulating Innovation 监管创新
- Market regulators recommend financial institutions to use unified yield curve and bond valuations in order to compare with each other
- For example, CBRC recommends commercial banks to use Chinabond yield curves as benchmark of measuring market risk.

Application Innovation 应用创新
- MOF uses a unified Chinabond treasury yield curve to calculate bidding range of local government bonds and treasury bond with issuance term of 50 years.
- Asset Management Association of China recommends mutual fund to calculate NAV based on Chinabond valuation.

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4. Asia Bond Pricing Seminar
ChinaBond Index Overview 中债指数概览

Every day CCDC publicly release 58 indices, 400+ sub indices and also calculates position index for 1200+ accounts. 中央结算公司每日公开发布58支债券指数和400+派生子指数，并为1000余个托管账户计算持仓指数

Except Total Return Index, Full Price Index and Net Price Index, 14 other indicators are calculated: 除每日发布财富指数、全价指数和净价指数，另外还发布其他14个指数指标，包括平均市值法久期、平均到期收益率等

ChinaBond Index General Methodology 一般方法论

- **Pricing Rule** 价格源
  Taking the Chinabond valuation as a reference, the market maker price is used to be a priority source. If there is no market maker price, settlement price in the interbank market or closing price in the exchange stock market will be selected as price sources. 以中债估值为参考，优先选取合理的最优双边报价中间价，若无则取合理的银行间市场加权平均结算价或交易所市场收盘价

- **Bond Rating** 评级
  Corporate bond rating and facility rating used by Chinabond Index are selected by rating companies in mainland China. When a bond has two distinct ratings, i.e. when it is rated differently by two or more rating companies, its rating should be determined on the principle of “lower of the new rating”. It means, generally, the latest rating would be adopted; unless there are distinct ratings in the recent month, the lowest rating should be adopted. 中债指数采用的债券主体评级和债项评级为中国境内评级公司的评级。当一债券具有双评级时，即有两家及以上的评级公司将同一支债券给出不同评级，则采取“孰新孰低”的原则进行判定，所谓孰新孰低原则就是，当同一支债券具有多个不同评级时采用最新的评级，若相邻一个月内有多个评级则采取最低的信用评级。
ChinaBond Index and Bond Investment  中债指数与债券投资

Investors who follow China bond market rely on ChinaBond Index for:

中债指数在债券投资的应用：

<table>
<thead>
<tr>
<th>Investment Analysis</th>
<th>Benchmarking Portfolios</th>
<th>Performance Measurement</th>
<th>Index tracing funds</th>
<th>Structured Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>投资分析</td>
<td>组合基准</td>
<td>业绩评估</td>
<td>跟踪标的</td>
<td>结构化产品</td>
</tr>
</tbody>
</table>

As comparison benchmarks for investment performance:

Utilization of Bond Indices as comparison benchmarks for investment performance in China

(以中债指数为业绩基准的基金产品情况（按只数，截至2014年底）)

<table>
<thead>
<tr>
<th>Number of funds</th>
<th>Use bond index</th>
<th>ChinaBond</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond Fund 债券型基金</td>
<td>354</td>
<td>235</td>
<td>66.38%</td>
</tr>
<tr>
<td>Hybrid Fund 混合型基金</td>
<td>278</td>
<td>68</td>
<td>24.46%</td>
</tr>
<tr>
<td>Stock Fund 股票型基金</td>
<td>385</td>
<td>92</td>
<td>23.90%</td>
</tr>
<tr>
<td>Total (excluding stock fund)</td>
<td>632</td>
<td>383</td>
<td>47.94%</td>
</tr>
</tbody>
</table>

Utilization of Bond Indices as comparison benchmarks for investment performance in China

(以中债指数为业绩基准的基金产品情况（按规模，截至2014年底）)

<table>
<thead>
<tr>
<th>Number of funds (in 100 million Yuan)</th>
<th>Use bond index</th>
<th>ChinaBond</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond Fund 债券型基金</td>
<td>2,887</td>
<td>2,830</td>
<td>70.32%</td>
</tr>
<tr>
<td>Hybrid Fund 混合型基金</td>
<td>4,935</td>
<td>1,058</td>
<td>21.44%</td>
</tr>
<tr>
<td>Stock Fund 股票型基金</td>
<td>7,635</td>
<td>2,111</td>
<td>27.65%</td>
</tr>
<tr>
<td>Total (excluding stock fund)</td>
<td>15,457</td>
<td>5,198</td>
<td>33.63%</td>
</tr>
</tbody>
</table>

Source: Wind
Case 1: Pictet-Chinese Local Currency Debt 案例1: Pictet-中国人民币债务

ISIN: LU1164802982
Administrator: Pictet Asset Management
Benchmark Index: ChinaBond Composite Index
Commencement: 2015-3-3
Country of Registration: AT, CY, DE, FI, FR, GB, GR, LI, LU, PT, SE

<table>
<thead>
<tr>
<th></th>
<th>Average Coupon (%)</th>
<th>Average Yield (%)</th>
<th>Modified Duration (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pictet-Chinese Local</td>
<td>4.52</td>
<td>4.36</td>
<td>4.4</td>
</tr>
<tr>
<td>Currency Debt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benchmark</td>
<td>4.41</td>
<td>3.61</td>
<td>3.81</td>
</tr>
</tbody>
</table>

Case 2: ChinaAMC China Bond ETF 案例2: 中国AMC债券ETF

Exchange: NYSE
Fund Ticker: CBON
Administrator: Van Eck Associates
Underlying Index: ChinaBond China High Quality Bond Index
Commencement: 2014-11-10

<table>
<thead>
<tr>
<th></th>
<th>ChinaBond China High Quality Bond - Total Return Index</th>
<th>ChinaBond New Composite - Total Return Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1Y</td>
<td>9.75%</td>
<td>8.72%</td>
</tr>
<tr>
<td>3Y</td>
<td>15.42%</td>
<td>14.89%</td>
</tr>
<tr>
<td>5Y</td>
<td>26.62%</td>
<td>24.13%</td>
</tr>
</tbody>
</table>

Source: www.chinabond.com.cn
**Case 3: CSOP China 5 Year Treasury Bond ETF**

**Exchange:** HKEx  
**Fund Ticker:** 3199/83199  
**Administrator:** CSOP Asset Management  
**Underlying Index:** ChinaBond 5-year Treasury Bond Index  
**Commencement:** 2014-2-19

<table>
<thead>
<tr>
<th></th>
<th>1M (%)</th>
<th>3M (%)</th>
<th>6M (%)</th>
<th>YTD (%)</th>
<th>Since Inception (%)</th>
<th>2014 (%)</th>
<th>1Y (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETF(83199)</td>
<td>0.65</td>
<td>1.89</td>
<td>1.45</td>
<td>3.50</td>
<td>11.22</td>
<td>7.46</td>
<td>7.66</td>
</tr>
<tr>
<td>Index</td>
<td>0.59</td>
<td>1.78</td>
<td>1.82</td>
<td>4.06</td>
<td>12.27</td>
<td>7.89</td>
<td>8.31</td>
</tr>
</tbody>
</table>

**ChinaBond Index and Bond Investment**

**As underlying index for passive investment:** 6 fund companies have issued 6 funds adopting ChinaBond Index as underlying index by the end of September 2015.  
截至2015年9月，共有6支基金产品使用中债指数作为跟踪标的

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Underlying Index</th>
<th>Domicile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Vectors ChinaAMC China Bond ETF</td>
<td>ChinaBond China High Quality Bond Index</td>
<td>America</td>
</tr>
<tr>
<td>CSOP China 5-Year Treasury Bond ETF</td>
<td>ChinaBond 5-Year Treasury Bond Index</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>E Fund ChinaBond New Composite Index Fund</td>
<td>ChinaBond New Composite Index</td>
<td>Mainland China</td>
</tr>
<tr>
<td>GTIA Alliance ChinaBond Credit Bond Index Fund</td>
<td>ChinaBond Credit Bond 3-5 Yr Index</td>
<td>Mainland China</td>
</tr>
<tr>
<td>China Southern ChinaBond MTN Index Fund</td>
<td>ChinaBond New Medium Term Note Index</td>
<td>Mainland China</td>
</tr>
<tr>
<td>E Fund ChinaBond 3-5-Year Treasury Bond Index Fund</td>
<td>Fund ChinaBond 3-5-Year Treasury Bond Index</td>
<td>Mainland China</td>
</tr>
</tbody>
</table>

**Source:** Wind
<table>
<thead>
<tr>
<th>Index Name</th>
<th>ChinaBond Green Bond Index</th>
<th>ChinaBond Green Bond Select Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Bond</strong></td>
<td>Green bonds in Financial bonds, enterprise bonds, corporate bonds, Medium term notes, etc</td>
<td></td>
</tr>
<tr>
<td><strong>Rebalancing Frequency</strong></td>
<td>Monthly</td>
<td></td>
</tr>
<tr>
<td><strong>Base Date</strong></td>
<td>2009/12/31</td>
<td></td>
</tr>
<tr>
<td><strong>Maturity</strong></td>
<td>Longer than one month</td>
<td></td>
</tr>
<tr>
<td><strong>Calculation Frequency</strong></td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td><strong>Partner</strong></td>
<td>CECEP Consulting Co., Ltd</td>
<td></td>
</tr>
<tr>
<td><strong>Constituent Bond Principle</strong></td>
<td>Conform to one of the following principles</td>
<td>Conform to all of the following principles</td>
</tr>
<tr>
<td></td>
<td>Green Bond Principle(2015)</td>
<td>ICMA</td>
</tr>
<tr>
<td></td>
<td>Climate Bond Standard</td>
<td>CBI</td>
</tr>
<tr>
<td></td>
<td>Green Bond Issuance Guideline</td>
<td>NDRC</td>
</tr>
</tbody>
</table>

- The first green bond indices in China
- Published in 2016/4/15

1. Overview of China Bond Market

2. CCDC Pricing Data Service
   2.1 Overview of ChinaBond Pricing Data
   2.2 ChinaBond Yield Curves
   2.3 ChinaBond Valuations and Market Implied Credit Rating
   2.4 ChinaBond Indices
   2.5 ChinaBond VaR/CVaR
   2.6 Data Delivery Channel

3. Performance of Pricing Methodologies

4. Asia Bond Pricing Seminar
**Chinabond Var/CVaR**

- **Definition**
  - VaR---Value at Risk
  - CVaR---Conditional Value at Risk
  - Chinabond VaR/CVaR consist of bonds' VaR/CVaR and bond portfolios' VaR/CVaR

**ChinaBond VaR/CVaR**

- **Principles**
  - Parameters of Confidence Level and Time Horizon
    - Confidence level: 99%, 95%
    - Time horizon: 1 day, 5 days, 10 days
  - Method
    - Historical simulation method
  - Market Risk Factors
    - Based on the yield to maturity in the ChinaBond Valuation models.
  - Data Length
    - 250 days

- **Scale**
  - The number of bonds' VaR/CVaR is more than 25,000.
  - The number of bond portfolios' VaR/CVaR is more than 400.
1. Overview of China Bond Market

2. CCDC Pricing Data Service
   2.1 Overview of ChinaBond Pricing Data
   2.2 ChinaBond Yield Curves
   2.3 ChinaBond Valuations and Market Implied Credit Rating
   2.4 ChinaBond Indices
   2.5 ChinaBond VaR/CVaR
   2.6 Data Delivery Channel

3. Performance of Pricing Methodologies

4. Asia Bond Pricing Seminar

**CCDC Data Delivery Channel**

- **ChinaBond Website**: Key terms of yield curve, Index data query, market statistics
- **Client Terminal**: Public data & Confidential data such as account index
- **Data Download Stream**: Excel/DBF/XML file to download
- **Data Vendors**: e.g. Bloomberg
CCDC’s Official Website 中国债券信息网

- CCDC’s Official Website provides market data and bond market analysis report in both Chinese and English.
- 中国债券信息网主要提供中英文的数据查询及市场分析报告服务。

- Visit this website to inquire data of ChinaBond Yield Curve, ChinaBond Indices and etc. CCDC’s website publishes English version of Onshore RMB Bond Market Daily Report, ChinaBond Index Monthly Review, and Annual Review of China’s Bond Market in Chinese and English. The official website address is www.chinabond.com.cn (Chinese version); or www.chinabond.cn (English version).

Authorized Data Vendors 授权信息商

- ChinaBond pricing data is available to access by 19 authorized data vendors, such as Reuters, Bloomberg.
- 中债价格指标数据可通过路透、彭博等19家授权信息商获取。

- Overseas central banks, the RMB clearing banks, RMB cross-border trade settlement banks, International financial institutions, and Sovereign wealth fund should email us your bank name and Bloomberg ID.
- 境外央行等机构需将自己的英文名称和彭博码（若使用彭博访问）邮件发送至我司。彭博码包括Firm ID, UU ID和CUST ID.
CCDC’s Client Terminal 中债综合业务平台

- CCDC’s Client Terminal is aimed to provide custody and clearing data to customers, which is the main data delivery channel of CCDC. 中债综合业务平台是中央结算公司主打的数据传输通道。

- The data formats are available in EXCEL, DBF, XML and CSV. 包括EXCEL、DBF、XML和CSV四种文件格式。CCDC’s Client Terminal can also push data to users’ terminal. 中债综合业务平台也可提供数据主动推送服务。

- The installation program is available at CCDC’s official website: CCDC will provide Chinabond Key, user names, passwords and other security certifications. Download link: www.chinabond.com.cn/Channel/11255992

CCDC’s Data Stream 中债数据下载通道

- This platform provides clients with data download service. The data format is available in EXCEL, DBF or XML. 该平台可向用户提供数据下载服务并提供EXCEL、DBF和XML三种文件格式

- Apply for this service through email. Installation program is available at CCDC’s official website, i.e. www.chinabond.com.cn/Info/189908980

向中央结算公司申请使用该数据平台，需从中央结算公司官方网站下载安装中债数据下载通道，下载地址: www.chinabond.com.cn/Info/189908980
Performance of Pricing Methodologies

Hermite Interpolating Model

- The same model with treasury yield curve published by United States Department of Treasury
- Has a relatively better adaptability in China bond market
- Advantages: Smoothness, Flexibility, Stability (Comparison with NS, NSS and NSM Model, Empirical analysis of the China bond market data in December of 2008 and 2012)

Flexibility: Average absolute errors between appraised value and real price under each model in Dec 2012

Stability: the mean value of the interest rate changes from the previous day in all terms in Dec 2012
**Performance of Pricing Methodologies**

- The yield curve rate and the primary market issuing interest rate have a good consistency.
- In terms of deviation, about 60% of issuances are below 5BP.

**Treasury bond issuing interest rate VS curve interest rate in last working day**

**Policy bank bond issuing interest rate VS curve interest rate in last working day**

**Performance of Pricing Methodologies**

- The deviation between ChinaBond valuation and the market price is stable.
- In 2015, about 50% of the bond deviated price is controlled in the range from -0.2 Yuan to 0.2 Yuan. About 99% is controlled in the range from -0.5 Yuan to 0.5 Yuan.

**Deviation between ChinaBond valuation and secondary market price between 15:30-16:30 in 2015**

**Note:**
1. Deviation value = the net of ChinaBond valuation - the medium price of bilateral quote;
2. The different color regions from the dark region to shallow region show 50%, 60%, 70%, 80%, 90% of core region in boxplot, representing 50%, 60%, 70%, 80%, 90% of bond samples in that day respectively.
Asia Bond Pricing Seminar

- **14th-15th January 2016, China, initiated by CCDC**

- **Aims**
  - Promote understanding of bond markets among Asian area, pave the way for information cooperation
  - Spread third-party pricing concept
  - Discuss principles and standards of third-party pricing to promote normalization
  - Exchanges of experiences to enhance products and service level
**Asia Bond Pricing Seminar**

- **Participants**

- **Asia Bond Pricing Seminar**

- **2015.8**
  - 19th AMBF
  - Proposed the seminar

- **2015.9**
  - Warmly responded by pricing agencies in WG-IP

- **2016.1**
  - Expert from ADB attended the seminar and made keynote addressing
Content of Asia Bond Pricing Seminar

- **Theme**
  
  *Positioning and Development of Third-Party Pricing in the Financial Market*

- **Discussions**
  
  - Impacts of the Third-Party Pricing on Financial Stability
  - Development Environment for Third-Party Pricing
  - Principles and Quality Control of Third-Party Pricing

---

Common Practice of Third-party pricing agencies

- **Emphasis on Neutrality**
  
  ✓ Company governance
  ✓ Partners: clear responsibilities through, strict behavior constraint
  ✓ Unified charging rule
  ✓ Firewall between valuation team and clients

- **Emphasis on Transparency**
  
  ✓ Methodology
  ✓ Process rule

- **Emphasis on Quality Control**
  
  ✓ Internal control
  ✓ External oversight
Consensus of Asia Bond Pricing Seminar

- Third-party pricing plays an important role in financial stability
  - Improve the transparency of market price, and reduce the asymmetry of make information
  - Reduce the costs of investment management
  - Improve the efficiency of asset management

- Bond pricing power should be controlled by local agencies

- Support and promotion of government are essential to the developments of third-party pricing in emerging markets

Consensus of Asia Bond Pricing Seminar

- Competition
  - Competition is a developing trend
  - Benefits from competition
    - Pricing from different agencies could be compared among each other, which is good for price discovery process
    - Share pressure from market
    - Stimulate quality improvement, innovation, and clients’ feedback
    - Widely using of third-party pricing application
  - Diversifying products in competition
    - Bond yield curve, valuation, index
    - Valuation for other assets
    - Other product
Outcome of Asia Bond Pricing Seminar

- Highly appreciation by relevant parties
- Held regularly in future
- Cooperation intention between Asian third-party pricing agencies

Thanks for your Time

YURUI NIU, Dr., CFA
Deputy General Manager, ChinaBond Pricing Center, CCDC
Tel: 0086-10-88170610
Email: Niuyr@chinabond.com.cn
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REGULATORY AGENCIES & FRAMEWORK

**SEcurities & EXchange COMmission**
- Securities Regulation Code 2000
- SEC Implementing Rules and Regulations for the OTC Markets 2006
- SRC Implementing Rules and Regulations 2015

**Bangko Sentral Ng Pilipinas**
- BSP Manual of Regulations for Banks (MORB)
- BSP Circulars

**Bureau of the Treasury**
- Department of Finance Orders
- Bureau of the Treasury and Department of Finance Circulars

**Bureau of Internal Revenue**
- National Internal Revenue Code 1997

The Philippine Dealing System Holdings Corp. (PDS Group) is the holding company of four (4) operating subsidiaries providing market infrastructure for the Philippine financial markets.

- Price Discovery
- Trade execution
- Market Access
- SRO
- Payment System
- Transfer System
- Multi-currency Facilities
- Electronic Safekeeping
- Value Preservation
- Guardianship
- Learning Facilities
- Professionalism

Integrated & Diversified Products/Services

*Designed to seamlessly link market activities from trading, clearing & settlement up to post-settlement disposition*
The Philippine Dealing & Exchange Corp. (PDEx) is a Securities and Exchange Commission (SEC)-regulated institution that operates an SEC-registered Fixed Income Securities Market. It has a range of market services delivered with an underlying commitment to price discovery, transparency, and investor protection. PDEx also provides foreign exchange market infrastructure for the Bankers Association of the Philippines (BAP).

**Philippine Local Currency Bond Market**

**Annual Amounts of Outstanding LCY Bonds**

**Outstanding Government Bonds**

<table>
<thead>
<tr>
<th>Year</th>
<th>PhP Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>'05</td>
<td>1,500</td>
</tr>
<tr>
<td>'06</td>
<td>1,500</td>
</tr>
<tr>
<td>'07</td>
<td>1,500</td>
</tr>
<tr>
<td>'08</td>
<td>1,500</td>
</tr>
<tr>
<td>'09</td>
<td>1,500</td>
</tr>
<tr>
<td>'10</td>
<td>1,500</td>
</tr>
<tr>
<td>'11</td>
<td>1,500</td>
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<td>'12</td>
<td>1,500</td>
</tr>
<tr>
<td>'13</td>
<td>1,500</td>
</tr>
<tr>
<td>'14</td>
<td>1,500</td>
</tr>
<tr>
<td>'15</td>
<td>1,500</td>
</tr>
</tbody>
</table>

**Outstanding Corporate Bonds**

<table>
<thead>
<tr>
<th>Year</th>
<th>PhP Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>'05</td>
<td>100</td>
</tr>
<tr>
<td>'06</td>
<td>200</td>
</tr>
<tr>
<td>'07</td>
<td>300</td>
</tr>
<tr>
<td>'08</td>
<td>400</td>
</tr>
<tr>
<td>'09</td>
<td>500</td>
</tr>
<tr>
<td>'10</td>
<td>600</td>
</tr>
<tr>
<td>'11</td>
<td>700</td>
</tr>
<tr>
<td>'12</td>
<td>800</td>
</tr>
<tr>
<td>'13</td>
<td>900</td>
</tr>
<tr>
<td>'14</td>
<td>1,000</td>
</tr>
<tr>
<td>'15</td>
<td>1,100</td>
</tr>
</tbody>
</table>

Source: Asian Bonds Online
As of December 2015

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LISTED GOVERNMENT & CORPORATE SECURITIES

Outstanding Listed Government Securities
89 Securities; PhP 3,428.69 B

Outstanding Listed Corporate Securities
36 Issuers; 104 Securities; PhP 555.81 B

- 72 Treasury Bonds
- 17 Treasury Bills
- 93 Corporate Bonds
- 11 Bank-Issued Notes

Distribution of GS Volume
- Top 5: 21.35%
- Next 15 GS: 70.88%
- Rest of 69 GS: 7.77%

Distribution of Outstanding Volume of Listed Securities
- 87% Public Sector
- 13% Private Sector

- Corporate Bonds
- Bank-Issued Notes

BOND MARKET PROFILE: INTERMEDIARIES & INVESTORS

DEALERS

BROKERS

Member Profile

40 DEALERS
30 BROKERS

TOTAL FIRMS: 52
BSP & SEC Regulated: 47
SEC Regulated: 5

QUALIFIED INVESTORS
Trusts, Insurance Cos., Pension Funds, Large Corporations

RETAIL INVESTORS
Individuals, small/medium scale corporations

GS Investor Profile
- 10%
- 90%

CS Investor Profile
- 38%
- 62%

*As of May 2016
INTERACTION: TRADING and DATA SERVICES

TRADING
MARKET GOVERNANCE
✓ SEC Registered Fixed Income Market
✓ Self-Regulatory Organization for Rule Creation / Enforcement

DATA
PRICE DISCOVERY
✓ Members: Access to live bids / offers, done trades real time

PRICE TRANSPARENCY
✓ Public: Access to full price & trade data (15-min delayed)

PRICE BENCHMARKS
✓ Reference Rates for Market Valuation

INTEGRATED MARKET
Single Electronic System
Multiple Execution Modes

Consolidated Price & Transaction Data
Calculation & Publication System

01 Centralized Data Capture from Trading Systems
• All transactions included in the Trade Blotter
• Daily Price and Dealing Statistics displayed in real time or delayed basis

Real Time Publication
Local Publication: PDS “MarketPage”

Global Publication: Thomson Reuters
Reuters Page “PDSTSY”

Delayed Publication
PDS Website

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DATA SERVICES

02 Daily Calculation & Publication of Key Benchmark Rates
- PDS is responsible for timely and accurate publication of Interest Rate Benchmarks

<table>
<thead>
<tr>
<th>Issue</th>
<th>CRR</th>
<th>Top</th>
<th>Bottom</th>
<th>Entry</th>
<th>YLD</th>
<th>Prevase</th>
<th>Change</th>
</tr>
</thead>
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<tr>
<td>IS</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>IS</td>
<td>0.02</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>IS</td>
<td>0.03</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
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<tr>
<td>IS</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>IS</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

PDST Rates for Benchmark Tenors

PDST Rates for Gov. Securities

For Market Valuation of Government Securities

Calculation of Bond Reference Rates
Entities and Roles for PDST Reference Rates

**BANGKO SENTRAL NG PILIPINAS**
- Regulatory Oversight – Market Valuation of Securities by Supervised Financial Institutions
- BSP Circulars

**BANKERS ASSOCIATION OF THE PHILIPPINES**
- “Benchmark Administrator”
- Defines, reviews and upgrades benchmark setting methodology, including documentation and publication
- Appoints Contributor Banks
- Sets parameters to define quality of data contribution
- Appoints, reviews performance of Calculation Agency

**PHILIPPINE DEALING & EXCHANGE CORP.**
- “SRO Calculating Agent”
- Monitors fulfillment of the commitments of PDST Fixing Banks for PDST Calculations
- Operates PDS Treasury Reference Rate Calculation System daily and ensure orderly and timely publication of PDS Treasury Reference Rates

---

**PDS Treasury Reference Rates**

Yield Curve for Benchmark Tenors

Set of interest rates to be used as a reference rates for daily market valuation of Philippine Treasury instruments, and/or other interest rate sensitive instruments.
BENCHMARK TENORS RATES ARE CALCULATED THROUGH A TIERED SYSTEM:

**DONE ("D") YIELDS**
Input rate is the Weighted Average Yield (WAY) of actual traded deals totaling PHP 50MM or more for securities within a benchmark tenor, for Benchmark Securities, or the WAY of actual deals totaling PHP 50MM or more for a Non-Benchmark Security.

**BID ("B") YIELDS**
Input rate is the Simple Average of firm Bid Yields for securities within a benchmark tenor, for Benchmark Securities, or Simple Average of firm Bid Yields for Non-Benchmark Security. Only firm Bid Yields of at least PHP 50MM from PDST Banks are eligible.

**INTERPOLATED ("I") YIELDS**
Yield is calculated using straight-line interpolation from designated done yield points or benchmark tenors, due to lack of traded volume and bids or no securities are available for benchmark tenors.
Calculation Process for PDST Rates

Gather data from trades and orders
- PDST R1 – Transaction and Price Data up to 11:15:00AM
- PDST R2 – Transaction and Price Data up to 4:15:00PM

Classify if data is part of computation of:
1. Benchmark Tenors
2. Benchmark Securities
3. Non Benchmark Securities

Apply the hierarchy of choice for calculation:
1. Use weighted average of done rates if volume is sufficient ("DONE")
2. Use simple average bid rate if qualified bids exist ("BID")
3. Otherwise, use straight-line interpolation ("INTERPOLATION")

For Benchmark Tenors/Securities
- Use two most adjacent reference rates based on Weighted Average Yield

For Non-Benchmark Securities
- Use adjacent benchmark Tenor Reference Rates if both are available; otherwise, use two most adjacent reference rates based on Weighted Average Yield

Publication
- PDST R1 – 11:16AM
- PDST R2 – 4:16PM
Challenges

• Government Bonds
  – Need to Improve Treasury Yield Curve
  – Ongoing effort for Constant Maturity Curve and Zero Yield Curve

• Corporate Bonds
  – Credit Spreads are not standardized
  – Not enough observed historical data to establish appropriate spread over Treasury

• Governance of “Pricing”
  – More formal regulatory framework
  – Independent pricing agency
SESSION 3

INTERNATIONAL PRACTICES AND PERFORMANCE OF PRICING MODEL
Agenda

1. Malaysian Bond Market Overview
2. BPA Regulations in Malaysia
2. BPAM Pricing Methodology
2. BPAM Pricing Performance
Malaysia Bond Market Overview

- MYR bond issuances for the past 10 years

**MYR Bond Outstanding Yr 2006-2015 (in MYR bil)**

- As of Dec 2015, Malaysia total bond outstanding stands at MYR 1126 billion (approx USD 281.5bil)
- 4th largest bond market in the region
- Largest local currency sukuk market at MYR 609 billion of total outstanding

**Institution**

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Islamic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>54%</td>
<td>46%</td>
</tr>
<tr>
<td>2014</td>
<td>52%</td>
<td>48%</td>
</tr>
<tr>
<td>2013</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>2012</td>
<td>47%</td>
<td>53%</td>
</tr>
<tr>
<td>2011</td>
<td>42%</td>
<td>58%</td>
</tr>
<tr>
<td>2010</td>
<td>38%</td>
<td>61%</td>
</tr>
<tr>
<td>2009</td>
<td>36%</td>
<td>62%</td>
</tr>
<tr>
<td>2008</td>
<td>36%</td>
<td>64%</td>
</tr>
<tr>
<td>2007</td>
<td>38%</td>
<td>64%</td>
</tr>
<tr>
<td>2006</td>
<td>37%</td>
<td>68%</td>
</tr>
</tbody>
</table>

**Conventional**

- 2006: 307 bil
- 2007: 358 bil
- 2008: 373 bil
- 2009: 401 bil
- 2010: 470 bil
- 2011: 494 bil
- 2012: 533 bil
- 2013: 522 bil
- 2014: 534 bil
- 2015: 518 bil

**Islamic**

- 2006: 147 bil
- 2007: 199 bil
- 2008: 211 bil
- 2009: 250 bil
- 2010: 352 bil
- 2011: 478 bil
- 2012: 516 bil
- 2013: 579 bil
- 2014: 609 bil
- 2015: 609 bil

**Source:** BPA Malaysia

- Sukuk issuance popular among Corporate issuers
- Sukuk issuance dominates the market at 54% of the total outstanding

**Malaysia Bond Market Overview**

- MYR bond issuances for the past 10 years – by Issuer Sector

<table>
<thead>
<tr>
<th>Issuer</th>
<th>Sukuk 'Bil</th>
<th>Bonds 'Bil</th>
<th>MYR 'Bil</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>4.2</td>
<td>8.2</td>
<td>176.5</td>
</tr>
<tr>
<td>Corporate</td>
<td>47.5</td>
<td>134.7</td>
<td></td>
</tr>
<tr>
<td>Corporate Guaranteed</td>
<td>14.8</td>
<td>18.2</td>
<td>63.8</td>
</tr>
<tr>
<td>Financial</td>
<td>24</td>
<td></td>
<td>131.3</td>
</tr>
<tr>
<td>BNM</td>
<td>0.5</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Quasi-Gov't</td>
<td>16.3</td>
<td></td>
<td>244.1</td>
</tr>
<tr>
<td>Government</td>
<td>343</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** BPA Malaysia
Malaysia Bond Market Overview

- Secondary market and market liquidity for the past 10 years

Since 2013, trading activities dwindled as investors shied away from local bond market amid global liquidity tightening initiated by the US Fed and plunge in global oil price.

The most liquid Corporate bond is class AA.
Malaysia Bond Market Overview

As of 31 March 2016, the index consisted of 1126 bonds with a total market capitalization of MYR 958.16 billion (approx USD 239).

<table>
<thead>
<tr>
<th>Period</th>
<th>All Bond</th>
<th>Conventional</th>
<th>Islamic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Month</td>
<td>0.82%</td>
<td>0.83%</td>
<td>0.81%</td>
</tr>
<tr>
<td>3 Months</td>
<td>2.37%</td>
<td>2.34%</td>
<td>2.46%</td>
</tr>
<tr>
<td>6 Months</td>
<td>3.98%</td>
<td>3.89%</td>
<td>4.03%</td>
</tr>
<tr>
<td>12 Months</td>
<td>4.60%</td>
<td>4.56%</td>
<td>4.65%</td>
</tr>
</tbody>
</table>

Simple Average Returns (As of 31-Mar-2016)

**Agenda**

1. Malaysian Bond Market Overview
2. BPA Regulations in Malaysia
3. BPAM Pricing Methodology
4. BPAM Pricing Performance
**Bond Pricing Agency Regulations in Malaysia**

- **Stringent requirements for accreditation as a BPA**
  - **Methodology and Process**
    - Audited
  - **Pricing performance**
    - Using all publicly available information
  - **Expertise**
    - Fit and proper persons
  - **System**
    - Adequate security and backup
  - **Shareholders**
    - No controlling party
  - **Minimum paid up capital**
    - RM 10 million
  - **Professional indemnity insurance**
    - RM 10 million

- **BPA guidelines issued in Year 2006 by the Securities Commission Malaysia**
- **BPA set-up based on Korean model**
- **Currently one (1) registered BPA in Malaysia**

---

**Guidelines on the use of BPA Prices**

- **Mandatory guidelines to use BPA prices**

<table>
<thead>
<tr>
<th>Unit Trust Funds</th>
<th>Exchange Traded Funds</th>
<th>Private Retirement Schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 January 2007: “Unit Trust Funds investing in Unlisted bonds denominated in Ringgit Malaysia shall value bond portfolios using prices quoted by a Bond Pricing Agency (BPA) registered with the SC.” (Schedule B: Valuation, PB-1 of the Guidelines on Unit Trust Funds)</td>
<td>11 June 2009: “Exchange Traded Funds investing in Unlisted bonds denominated in Ringgit Malaysia shall value bond portfolios using prices quoted by a Bond Pricing Agency (BPA) registered with the SC.” (Schedule C: Valuation, SC-1 of the Guidelines on Exchange Traded Funds)</td>
<td>5 April 2012: “Private Retirement Schemes investing in Unlisted bonds denominated in Ringgit Malaysia shall value bond portfolios using prices quoted by a Bond Pricing Agency (BPA) registered with the SC.” (Schedule B: Valuation, pg 92 of the Guidelines on Private Retirement Schemes)</td>
</tr>
</tbody>
</table>
About Bond Pricing Agency Malaysia

10th years of being a Bond Pricing Agency in Malaysia

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Bondweb Malaysia Established</td>
</tr>
<tr>
<td>2005</td>
<td>Bondweb Website launched MTM process goes live Commercial deployment</td>
</tr>
<tr>
<td>2006</td>
<td>Appointed Malaysia’s 1st Bond Pricing Agency</td>
</tr>
<tr>
<td>2007</td>
<td>GN 15: Mandatory use of BPA prices for Unit Trust Funds</td>
</tr>
<tr>
<td>2008</td>
<td>Renamed BOND PRICING AGENCY MALAYSIA Fix All Bond Index</td>
</tr>
<tr>
<td>2009</td>
<td>BPAM data on BFM Radio BPAM League Table Fix Liquid Index MFRS Support Pack</td>
</tr>
<tr>
<td>2010</td>
<td>BPAM data on Thomson Reuters Islamic gateway Short Term Instrument Pricing Service BGAM Released</td>
</tr>
<tr>
<td>2011</td>
<td>E-BPAM Launched Partnership with Interactive Data Corporation (IDC) Co-brand Index series with Thomson Reuters Nominated as ABMF national member</td>
</tr>
<tr>
<td>2012</td>
<td>BPAM Market Implied Rating (BIR) BPAM app launch Tri-partite collaboration with IBPA &amp; ThaiBMA</td>
</tr>
<tr>
<td>2013</td>
<td>BONDWEB - Retail Bond website launched BPAM Data on TR-DSS</td>
</tr>
<tr>
<td>2014</td>
<td>Launch of BPAM’s Almanac Partnership with GFI Fenics Market Data BPAM Transparency Tool (BTT)</td>
</tr>
<tr>
<td>2015</td>
<td>Unrated Bond Pricing DaRT Reports Collaboration with PDEx Member of ABMF WG-IP</td>
</tr>
</tbody>
</table>

Agenda

1. Malaysian Bond Market Overview
2. BPA Regulations in Malaysia
3. BPAM Pricing Methodology
4. BPAM Pricing Performance
Current industry practice and the assumptions

- Four common market practices are used in conducting bond pricing.
- BPAM employs the hybrid approach.

<table>
<thead>
<tr>
<th>Approach Type</th>
<th>Pricing Method</th>
<th>Granularity</th>
</tr>
</thead>
<tbody>
<tr>
<td>YTM Matrix / Curve Pricing</td>
<td>Quote Driven</td>
<td>Curve Pricing</td>
</tr>
<tr>
<td>Individual Quotation Approach</td>
<td>Quote Driven</td>
<td>Individual Bond</td>
</tr>
<tr>
<td>Model Approach (Mark to Model)</td>
<td>Theoretical</td>
<td>Individual Bond</td>
</tr>
<tr>
<td>Hybrid Approach</td>
<td>Hybrid</td>
<td>Individual Bond</td>
</tr>
</tbody>
</table>

BPAM Pricing Methodology
BPAM Pricing Methodology

Current industry practice and the assumptions

YTM Matrix / Curve Pricing

Individual Quotation Approach

Model Approach (Mark to Model)

Hybrid Approach

Quoted Bonds

Marking to market

Assumptions:

1. Market Liquidity / Efficiency
   - Contributed quotations are assumed to be an unbiased market representation.
   - Market is liquid without seasonal effects.

2. Homogeneity
   - Bonds belonging to the same segment are assumed identical.

BPAM Pricing Methodology

Current industry practice and the assumptions

YTM Matrix / Curve Pricing

Individual Quotation Approach

Model Approach (Mark to Model)

Hybrid Approach

Quoted Bonds

Traded Bonds

Marking to market

Assumptions:

1. Market Liquidity / Efficiency
   - Contributed quotations are assumed to be an unbiased market representation.
   - Selective group of contributors monitor individual bond value on an on-going basis.
   - Individual bonds are assumed to be liquid, where the value of individual bonds are observable.
## BPAM Pricing Methodology

### Current industry practice and the assumptions

<table>
<thead>
<tr>
<th>YTM Matrix / Curve Pricing</th>
<th>Individual Quotation Approach</th>
<th>Model Approach (Mark to Model)</th>
<th>Hybrid Approach</th>
</tr>
</thead>
</table>

#### Assumptions:

1. **Model is Winner**
   - Computerised mathematical model generates price.
   - Underlying information is accurate and timely.
   - Minimal human intervention.

- **In 2004**, back-test representation of market value by marking to model demonstrated inaccuracies with actual market trades.
- **Market is winner, not model.**
BPAM Pricing Methodology

Current industry practice and the assumptions

1. Market Liquidity / Efficiency
   - Market is not liquid, trade frequency is low. Still, trade prices (if properly monitored) can provide information for pricing.

2. Homogeneity
   - Mathematical model does not provide market price.
   - Mathematical model provides the framework to derive the risk premium/spread in the market. A team of pricing specialists monitor individual bond value on an on-going basis.

BPAM Pricing Methodology

BPAM's Pricing Methodology – An Overview

Bond Price = f (Benchmark rates + Credit Spread)

- Primary issuance yield
- Credit risk analysis
- Liquidity risk (from historical trade / quote data)
- Structural risk (terms and conditions of the bond)

Risk assessment

Derivation of benchmark rates

Segmentation cube

Individual bonds

Individual bond valuation

Measuring the market price of risk

Quotations

Trades
BPAM Pricing Methodology

A daily process is conducted to price all bonds:

- Define Matrix
- Segment Classes
- Populate Info Into Segments
- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

Segmentation Analysis:
- Apply filtering and watch list rules
- Any trading data
- Trade data aggregation

Derivation of individual spread for Corp bonds via:
- Primary issuance yields
- Application of credit analysis
- Structure
- Industry
- Observation from past trades

Feedback and verification with market

BPAM uses the prices of observed trades & quotations in the market to derive the prices of non-traded bonds, taking into account the differences between different issuers and structures.

EVERY bond has its own individual spread relative to its risk status.

BPAM Pricing Methodology

Bonds are segmented and ranked according to credit quality, tenure and structure:

Macro Segmentation:
- Credit Rating / Issuer Type
- Industry
- Product Structure Characteristics
- Time to Maturity

Micro Segmentation:
- Individual Bonds
- Issuer Ranking

Evaluating Risk at Individual Bond Level

Ranking bonds based on:
- Market perception (derived from trades / quotes / primary issuance yields)
- Application of credit analysis
BPAM Pricing Methodology

- Data is extracted and mapped to the proper segments

**Background Study**
- Define Matrix Segment Classes
- Populate Info Into Segments

**Daily Process**
- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

**Official Sources**
- Term Sheet
- FAST
- Bursa
- ETF
- Ratings

**Market Network**
- Term Sheet Validation
- Pricing Convention
- Broker Quotes
- Swap Yields

**BPAM Internal Process**
- Term Sheet Enhancement
- Model Selection
- Trade Data Enhancement

**Data Population**
- Macro Segment
- Micro Segment

Key challenges in data aggregation are:
1. To collect accurate post and pre trading data.
2. To enhance and update securities information on-going basis.

---

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BPAM Pricing Methodology

- Data filtering will identify currently non-representative market level trades and quotes

### Background Study
- Define Matrix
- Segment Classes

### Daily Process
- Populate Info Into Segments
- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

#### Outliers from normal trade band

### Filtration Rules
- Out of credit rule
- Liquidity rule
- Out of quote rule
- Erroneous trade detail
- Significant divergence from market interest rate trend

BPAM Pricing Methodology

- Constructing yield curves for Government bonds

### Background Study
- Define Matrix
- Segment Classes
- Government Curves
- Gather Required Info

### Market Info
- Post-trade info from ETP
- Pre-trade info
  - Money brokers
  - Bank contributions
### BPAM Pricing Methodology

#### Constructing yield curves for Government bonds

<table>
<thead>
<tr>
<th>Background Study</th>
<th>Daily Process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Government Curves

**Gather Required Info**
- Market Info
  - Post-trade info from ETP
  - Pre-trade info
    - money brokers
    - bank contributions

**Exclude Unusual Trades**
- Odd Lots
- Off Market
- Outliers

**Build Yield Curves**
- Generate YTM Curve
  - Mark curve to benchmark trades and quotes

**Assign Individual Spread**

**Price All Bonds**

---

**Background Study**

- Define Matrix
- Segment Classes
- Populate Info into Segments

**Daily Process**

- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

---

**First Filtering**

- Generate YTM Curve

---

**Generation of YTM Curve**

- Constructing yield curves for Government bonds

---

**BPAM Pricing Methodology**

- Constructing yield curves for Government bonds

---

**Daily Process**

- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

**Price All Bonds**

---

**Generation of YTM Curve**

- Constructing yield curves for Government bonds

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**First Filtering**

- Generate YTM Curve

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**BPAM Pricing Methodology**

- Constructing yield curves for Government bonds

---

**Daily Process**

- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

---

**Price All Bonds**

---

**Generation of YTM Curve**

- Constructing yield curves for Government bonds
BPAM Pricing Methodology

Constructing yield curves for Government bonds

Background Study
- Define Matrix
- Segment Classes
- Populate Info into Segments
- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

Daily Process
- Government Curves

Gather Required Info
- Market Info
  - Post-trade info from ETP
  - Pre-trade info
    - money brokers
    - bank contributions

First Filtering
- Exclude Unusual Trades
  - Odd Lots
  - Off Market
  - Outliers

Generation of YTM Curve
- Generate YTM Curve
  - Mark curve to benchmark trades and quotes

Generation of Spot Yield Curve
- Obtain Zero Rate From YTM Rate
  - Zero curve is not directly observable from the market, hence bootstrap

Validation of Result
- Loop Back Test
  - Calibrate YTM / Zero curve to ensure MTM values are market relevant

Daily Process
- Background Study
- Define Matrix
- Segment Classes
- Populate Info into Segments
- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

Government Curves
- Gather Required Info
- First Filtering
- Generate YTM Curve
- Obtain Zero Rate From YTM Rate
  - Zero curve is not directly observable from the market, hence bootstrap

Yield Curves
- Daily Process
- Background Study
- Define Matrix
- Segment Classes
- Populate Info into Segments
- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

Validation of Result
- Loop Back Test
  - Calibrate YTM / Zero curve to ensure MTM values are market relevant
BPAM Pricing Methodology

 GTX Constructing yield curves for Corporate bonds

<table>
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<tr>
<td>Define Matrix Segment Classes</td>
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<tr>
<td>Build Yield Curves</td>
<td>Assign Individual Spread</td>
</tr>
<tr>
<td>Price All Bonds</td>
<td></td>
</tr>
</tbody>
</table>

Corporate Curves

Data Population into Segment

Market Info
- OTC trading
- Money brokers

First Filtering

Exclude Unusual Trades
- Odd Lots
- Off Market
- Outliers

Segmentation Cube
BPAM Pricing Methodology

➢ Constructing yield curves for Corporate bonds

### Background Study

<table>
<thead>
<tr>
<th>Define Matrix Segment Classes</th>
<th>Populate Info into Segments</th>
<th>Build Yield Curves</th>
<th>Assign Individual Spread</th>
<th>Price All Bonds</th>
</tr>
</thead>
</table>

### Corporate Curves

#### Data Population into Segment

- **Market Info**
  - OTC trading
  - Money brokers

#### First Filtering

- **Exclude Unusual Trades**
  - Odd Lots
  - Off Market
  - Outliers

#### Credit Spread Curve Generation

- **Credit Curve**
  - Derive from OTC trading prices in segment
  - Risk free yield from the MGS curve

#### Validation of Result

- **Credit Spread Rule**
  - Spread along maturity bucket
  - Spread by the size of risk

---

Credit Spread Curve

1. Segmentation Cube

2. Term to Maturity

3. Term to Maturity

4. Term to Maturity

---

Risk Free Curve

1. Segmentation Cube

2. Term to Maturity

3. Term to Maturity

4. Term to Maturity

---
BPAM Pricing Methodology

- Assign individual spread reflecting the bond's appropriate risk obtained from ranking model

### Background Study
- Define Matrix
- Segment Classes

### Daily Process
- Populate Info Into Segments
- Build Yield Curves
- Assign Individual Spread
- Price All Bonds

### Bond Price

\[ \text{Bond Price} = f(\text{Risk Free Interest Rate, Risk Spread}) \]

\[ \text{Risk Spread} = f(\text{Credit, Individual}) \]

### Pricing for un-traded or rarely traded bonds

- Obtain a base spread from the past real transaction
- Track the change of spread over time
- Estimate the spread of the bond relative to changes in the yield curves and other peer group

### Real Transaction

**Evaluation Yield**

Yield curve (AA)
Spread (AA)

**Base yield curve (AAA)**

**Spread of specific bond**

**Evaluation Date**

**Term to Maturity**
BPAM Pricing Methodology

**Apply relevant bond type price formula**

**Background Study**
- Define Matrix Segment Classes
- Populate Info into Segments
- Build Yield Curves
- Assign Individual Spread

**Daily Process**
- Price All Bonds

---

**Example 1: Fixed coupon bonds with regular period**

$$\sum_{t=1}^{n} \frac{c}{100} \cdot \frac{F}{1 + \frac{r}{100} \cdot \frac{1}{t}} + F \cdot \left(1 + \frac{r}{100} \cdot \frac{1}{t}\right)^{-D} = AI$$

**Example 2: Fixed coupon bonds with short first coupon**

$$\sum_{t=1}^{n} \frac{c}{100} \cdot \frac{F}{1 + \frac{r}{100} \cdot \frac{1}{t}} + \sum_{t=1}^{n} \frac{c}{100} \cdot \frac{F}{1 + \frac{r}{100} \cdot \frac{1}{t}} + F \cdot \left(1 + \frac{r}{100} \cdot \frac{1}{t}\right)^{-D} = AI$$

**Example 3: Fixed coupon bonds long first coupon**

$$\sum_{t=1}^{n} \frac{c}{100} \cdot \frac{F}{1 + \frac{r}{100} \cdot \frac{1}{t}} + \sum_{t=1}^{n} \frac{c}{100} \cdot \frac{F}{1 + \frac{r}{100} \cdot \frac{1}{t}} + F \cdot \left(1 + \frac{r}{100} \cdot \frac{1}{t}\right)^{-D} = AI$$

*Price computed using yield derived from (credit spot rate at discount period $t$) + individual spread.*

---

**Feedback Process**

In monitoring pricing performance, BPAM provides feedback channels to encourage interaction with market participants. Key issues are announced to pricing customers and through the website.

---

**Public Announcements**
- BPAM shares the pricing process and models with clients
- BPAM publishes its findings and studies (available through Web)
- Outcome of pricing disagreement resolution is shared with all customers
BPAM Pricing Methodology

Feedback process via e-mail or BondStream’s Online Help

Snapshot of BPAM’s hybrid approach

- Client feedback process
- Benchmark curves
- New issues
- Accurate terms & conditions
- YTM matrix/curve pricing
- Credit risk analysis
- Relative pricing
- Live dealing quotes
- Accurate trade data via ETP
- Rating updates
- Financial mathematics
- Market interaction

BPAM’s Approach
BPAM Pricing Performance

Two statistical approaches were utilised to assess BPAM’s pricing performance

**Scatter Plot Analysis**

**Purpose:**
Test of relevance of BPAM’s evaluated prices (MTM prices) and the actual traded price (yield basis).

**Target Result:**
The higher the degree of relevance a more positive relationship between BPAM’s MTM levels and traded yields.

**Distribution Diagram Study**

**Purpose:**
Test of accuracy between BPAM’s evaluated prices against actual traded price.

**Target Result:**
The assumption of any good predictor is a bell curve normally distributed around zero.

*Outliers are excluded from the analysis such as non-standard lot trades and off-market level prices among others.*
Scatter Plot Analysis : 1 Jan 2011 to 31 Dec 2015

The relationship between BPAM’s MTM levels and the traded yields is represented by the straight line with the following equation:

\[ Y = 0.9994X \quad R^2 = 0.9922 \]

The R-squared \((R^2)\) measures how well the resulting line matches the data point. With \(R^2 = 0.9922\), it shows that most of BPAM MTM are market to the trade.

Hence, our prices have a high level of relevance to the secondary market trading.

<table>
<thead>
<tr>
<th>Range</th>
<th>Interpretation of (R^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ (R^2) &lt; 0.5</td>
<td>More often than not, BPAM’s MTM is not marked to the traded yield</td>
</tr>
<tr>
<td>0.5 ≤ (R^2) &lt; 1.0</td>
<td>Most of BPAM’s MTM are marked to the traded yield</td>
</tr>
<tr>
<td>(R^2) = 1.0</td>
<td>All of BPAM’s MTM are marked to the traded yield</td>
</tr>
</tbody>
</table>

Distribution Diagram Study : 1 Jan 2011 to 31 Dec 2015

Based on trade sample size of 34648 recorded transactions, 79.50% of the trades were accurately marked.

For the ±20bp target band, BPAM was able to correctly place the pricing 98.73% of the time during the period under review.
BPAM has placed 97.41% of evaluated corporate bonds MTM levels within ±1bp of the traded yield levels.

Only 0.19% of evaluated corporate bonds MTM levels were placed more than 20bp from the traded yield levels.

BPAM’s lower pricing accuracy for the government bonds in which only 52.32% of evaluated MTM levels within ±1bp of the traded yield levels.

This is attributed by the off-the-run government bonds, where the yield levels of the off-the-run government bonds are generally affected by factors such as liquidity risk premium as well as interest rate speculation.

- continued -
BPAM Pricing Performance

Distribution Diagram Study: 1 Jan 2011 to 31 Dec 2015

Mark-to-Market spread against trade (Government bonds only)

Sovereign Bond = Risk-Free

Current practice, BPAM price government bonds according to the maturity bucket with no additional risk premium.

All government bonds are priced using the risk-free curve regardless of On-the-run or Off-the-run government bonds.

The secondary market transacted levels of Off-the-run government bonds may not equate to our valuation levels where 62% of the government bonds are Off-the-run.

Hence, the lower pricing accuracy of the pricing performance level.
Summary

- 10 years in operation as a Bond Pricing Agency
- Market standard & reference for MYR bonds
- On-going enhancement and development of new products to meet evolving needs
- Strict compliance, corporate governance & internal controls
- Strong track record on quality and relevance to market trades with on-going monitoring
- Active role in building cross-border networks in line with ABMF WG-IP

Cross Boarder Initiative - AMBIF Information Network

BPAM IS COMMITTED TO BUILD INFORMATION NETWORK BETWEEN THE ASEAN+3 MEMBERS
THANK YOU
The role of bond pricing agency and the proper pricing process

June 6 2016, KIS PRICING, Inc.

Senior Analyst
Jung Hwan Min
E-mail: junghwanmin@kispricing.com

1. Introduction – Information Asymmetry example

The Lemons Market – Adverse selection

Suppose that ½ the cars are good and ½ are bad
What happens if buyers can’t tell which are good?
• Buyers expect that all the cars (both good and bad) will get sold

SOLD     SOLD
1. Introduction – Information Asymmetry example

◈ The Lemons Market – Downward Spiral by Adverse selection

- Reduces Market Price
- Lemons exists in the Market
- Pushes out Higher Quality Products
- Reduces perceived average quality
- Increases Proportion of Lemons in the Market

1. Introduction – Information Asymmetry example

◈ The Lemons Market – Solution
1. Introduction – Information Asymmetry example

This concept could be applied to the Financial Market

We believe we are the “car mechanics” that could solve the adverse selection issue in the Financial Market.

1. Introduction – KIS Pricing as the “car mechanic”

Interaction between Treasury Spot Market and Treasury Futures Market

- Increased trading volumes in the treasury spot market will provide sufficient liquidity, which will lead to increased demand for interest rate hedging, and further invigorating the treasury futures market.
- Rich in liquidity, the treasury spot market will contribute to increased accuracy of pricing treasury futures, further devoting to the efficiency of arbitrage trading on spot-futures.
2. Historical timeline – Korean Market

- **Historical Background in implementing third-party evaluation**
  - As a part of the effort in enhancing international competence of Korea’s financial firms, the Korean government has designed in implementing a real-time market price evaluation system.
  - In order to promote liquidity in the market, the government has designed the policy in two directions.
    1. The government has incentivized the private sector in founding a private professional bond evaluation firm.
    2. The government has mandatorized every indirect investment asset to receive an evaluation on a daily basis.

- **Implementation Process**
  - Nov. 1998
    - Common understanding of a real-time market price evaluation system
  - Jun. 2000
    - State-owned & State-run Bond Evaluation Firm
  - Jul. 2000
    - Private Bond Evaluation Firm
  - Sept. 2001
    - Investment Trusts’ Portfolios
  - Apr. 2003
    - Insurance firms & Securities firms Portfolios

- **Historical timeline in Evaluation coverage**
  - May 2002
    - KRW Denominated Bonds
  - Jun. 2003
    - Foreign Bonds
  - Jun. 2005
    - Derivative Products
  - Feb. 2006
    - Money Market Funds
  - Feb. 2009
    - Non-Listed Stocks

3. Usage of the Real time Market Price

“Real-time market price evaluation is an evaluating methodology that provides a proper “today’s price”, by collecting the market data from the primary and secondary markets and statistically truncating the outliers.”

1. **Evaluation Purpose**
   - The price becomes the base data for Risk Management Analysis.
   - The price functions as the “norm” in the market, when market participants participate in various types of transactions, (i.e. Repo transaction, Short-selling, Futures transaction, etc)
   - Other services are provided, such as Spot Curve, Yield Curve, Forward Rate etc

2. **Evaluation Rule**
   - The price functions as a benchmark in the primary and secondary market as a tradable price on the following business day.

3. **Input factors**
   - The price functions as the benchmark for financial institutions when evaluating their daily Net Asset Value.

4. **Necessity**
   - The price functions as a benchmark for financial institutions when trading indirect investment assets.
4. How it impact the Korean Market

- Bond Outstanding Trend – by different bond series

(Jan 1, 2001 – Dec 31, 2014, Unit: Trillion KRW)

The aggregate bond outstanding amount shows a strong upward trend, approximately 10% increase per year.
Corporate issuance is the fastest increasing sector.

5. KIS Pricing’s Role in the Market

- Settled as the Core Infrastructure in the Financial Market
  - All financial institutions adopt the mark-to-market system to display transparency and objectivity.
  - Functions as the "norm" in the market -> benchmark price
  - Price Discovery Mechanism -> Improves transparency & liquidity
  - Facilitating investors' access to accurate information on fair asset values -> Reducing information asymmetry between investors and trustees

- Contribute in securing credibility for Financial Institutions
  - Increasing credibility of financial statements by enhancing accuracy of asset-liability evaluation
  - Enhancing risk control capability by using various risk-hedge instruments such as Futures, SWAPs, etc

- Promote Liquidity in the market
  - Experiencing higher profits for Financial Institution due to improved credibility of the financial instrument.
  - Enhancing transparency & liquidity for structured financial instruments
  - Activating secondary market and inducing foreign investment through enhancing clarity of price information

Enhancing Liquidity And Utility in the market
5. KIS Pricing’s Role in the Market

Role of Bond Rating Agencies

- **Credit Rating Agency**
- **Market Participants**
- **KIS Pricing**
- **Bond Price**
- **Transfer Agent**
- **Securities Transfer Agent**
- **Fund Accounting**
- **Fund Rating Agency**
- **Performance Evaluation**
- **Financial Institutions**

---

### Corporate Overview

<table>
<thead>
<tr>
<th>Company</th>
<th>KIS Pricing, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment Date</td>
<td>June 20th, 2000</td>
</tr>
<tr>
<td>CEO</td>
<td>Kim Sun Dae (Appointment Date: March 18th, 2011)</td>
</tr>
<tr>
<td>Paid in Capital</td>
<td>3 bn KRW (as of end of 2013)</td>
</tr>
<tr>
<td>The number of Employees</td>
<td>95 (as of end of April 2014)</td>
</tr>
<tr>
<td>Major Shareholders</td>
<td>KIS Rating 52.5%, Moody’s 16% (as of Dec. 2015)</td>
</tr>
<tr>
<td>Business Lines</td>
<td>Marking-to-Market Pricing of Fixed Income Securities, List/Unlisted Securities Valuation, Bond Index related service, Fund performance evaluation system and consulting, Data Providing, IFRS support services</td>
</tr>
</tbody>
</table>
| Contact Point | Senior Executive Director: Jeong, Won Chang Tel: +822-3215-1412, Email: jeongwc@kispricing.com  
Senior Managing Director of Pricing: Ki, Ho Sam Tel: +822-3215-1460, Email: kihs@kispricing.com  
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| Homepage | URL: http://www.bond.co.kr/ |
**Business model focusing on pricing**

- Strong Financials → Highly qualified professionals & Reinvestment of infrastructure
- Pre-investment for asset pricing → increasing in number of contracts → Financial Stability
- Since 2009, number one in operating profit in the Pricing Industry

**Balance Sheet**

<table>
<thead>
<tr>
<th>Category</th>
<th>FY 13</th>
<th>FY 12</th>
<th>FY 11</th>
<th>FY 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Asset</td>
<td>9,127</td>
<td>9,515</td>
<td>7,804</td>
<td>8,327</td>
</tr>
<tr>
<td>Total Liabilities</td>
<td>1,611</td>
<td>1,497</td>
<td>871</td>
<td>1,439</td>
</tr>
<tr>
<td>Total Capital</td>
<td>7,515</td>
<td>8,017</td>
<td>6,933</td>
<td>6,888</td>
</tr>
<tr>
<td>Sales</td>
<td>11,878</td>
<td>10,573</td>
<td>8,984</td>
<td>9,056</td>
</tr>
<tr>
<td>Operating Profit</td>
<td>3,057</td>
<td>2,696</td>
<td>2,131</td>
<td>2,322</td>
</tr>
<tr>
<td>Net Income</td>
<td>2,498</td>
<td>2,284</td>
<td>1,545</td>
<td>1,985</td>
</tr>
<tr>
<td>Net Income Per Capita</td>
<td>32</td>
<td>29</td>
<td>25</td>
<td>28</td>
</tr>
</tbody>
</table>

Rate of Operating Profit: 25.7% 25.4% 23.7% 25.6%
Current Ratio: 476.3% 516.6% 790.9% 672.2%
ROE: 33.2% 28.5% 22.3% 28.8%

**Financial Status of Peer Group (5yr Average)**

Source: (DART) 2012

---

**Completely concentrate on asset pricing business**

- Number one in the ratio of asset pricing sales in total sales: 92% in 2013
- Growth of sales in asset pricing: 15.5% in 2013 (5yr CAGR: 13.0%)
- Stable rate of Operating Profits in the pricing industry

**Business Status**

<table>
<thead>
<tr>
<th>KIS PRICING Sales Amount</th>
<th>Market Share in Asset Pricing Industry(Sales)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit: KRW million</td>
<td>Unit: %</td>
</tr>
<tr>
<td>1264  1392  1310  1042  873</td>
<td>12.9  14.1  12.7  13.4  15.0</td>
</tr>
<tr>
<td>6749  7484  8074  8531  11085</td>
<td>7.2  4.4  4.3  4.1  7.1</td>
</tr>
</tbody>
</table>

Source: Annual Report 2008-2012(DART)
KIS PRICING recognized in the Market

I. Corporate Overview

I-3. Contracts

- No. 1 in contracts outstanding in the pricing industry
- Pricing DB Provider of Public Institution – BOK, FSS, KSD, Koscom, etc.
- Result in clients reliance: Unique position in OTC Derivatives Pricing – 18 Module

- Outstanding Contract
  - No. 1 position in NPS & TP MtoM Pricing Contract (Differential Fee rate)
  - No. 1 in contracts outstanding in KRW and off-shore bond in the pricing industry
  - Provide pricing data to all financial industry (Bank, Asset Management, Insurance, Securities firms, etc.)
  - Unique position in OTC Derivatives Pricing
  - DB contract with BOK and 18 financial institutions

- Client Coverage

6. Pricing Methodology – General Concept

- Collecting Real-time Market Data – 4pm Seoul local time

Primary & Secondary Market
- KRX, KOSF
- KOREA Messenger Y, IDB
- Bloomberg, Reuters, Market Point, FINRA, MSRB
- KSD KOSCOM

Daily Update
- KIS PRICING DB

Broker House Network
- Foreign IB
- JPM, Goldman, UBS, SG, CS

Fund Manager Network
- Alliance
- Moody’s

Investor’s Service
- VCON Ticket

Client Coverage

Total No. of Clients: 154

Total Coverage Ratio: 93.3% (154/165)

Asst. Mgmt. Bank Trusts Banks Insurance Securities Firms

Client Non-Client

54 46 16 1 32 32 6 6
6. Pricing Methodology – General Concept

- Step 1: Create the Cash Flow of the Instrument
- Step 2: Create the proper Benchmark Curve (Zero Curve) using Cubic Spline Method
- Step 3: Estimate the Credit Spread of the Instrument
- Step 4: Discount the Cash Flow of the Instrument

7. Valuation Methodology – General Concept

- Things to consider when evaluating an instrument
  1. Consider any corporate events (Macroeconomics perspective)
  2. Recent Market data would have a higher explanatory power
  3. Larger Trade Size for an independent Transaction would have a higher explanatory power
  4. When considering market quotations (Brokerage House quotations), the quotation that has the smaller Bid-Ask spread would have a higher explanatory power
  5. When considering the Market data, having the similar movement with the Benchmark Curve would have a higher explanatory power
  6. Smaller difference with KISP’s previous price would be have a higher explanatory power

- Fixed income bonds do usually have smaller volatility than other financial products
### 8. Pricing Example – Market Quotations

<table>
<thead>
<tr>
<th>KISP's Previous Price</th>
<th>Benchmark (Zero Curve)</th>
<th>Market Quotation</th>
<th>Comments</th>
<th>KISP's Current Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.11 (2.73)</td>
<td>Price rises (Benchmark curve decreases by 3 bps)</td>
<td><strong>Quote A</strong></td>
<td>Bid: 98.56</td>
<td>Ask: 101.23</td>
</tr>
<tr>
<td>100.11 (2.73)</td>
<td>Price rises (Benchmark curve decreases by 3 bps)</td>
<td><strong>Quote B</strong></td>
<td>Bid: 99.61</td>
<td>Ask: 101.13</td>
</tr>
<tr>
<td>100.11 (2.73)</td>
<td>Price rises (Benchmark curve decreases by 3 bps)</td>
<td><strong>Quote C</strong></td>
<td>Bid: 97.58</td>
<td>Ask: 99.23</td>
</tr>
</tbody>
</table>

### 8. Pricing Example – Executed Trade Price

<table>
<thead>
<tr>
<th>KISP's Previous Price</th>
<th>Benchmark (Zero Curve)</th>
<th>Executed Information</th>
<th>Comments</th>
<th>KISP's Current Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.11 (2.73)</td>
<td>Price rises (Benchmark curve decreases by 3 bps)</td>
<td><strong>EX Price 1</strong></td>
<td>Date: 20160519</td>
<td>99.23 (500)</td>
</tr>
<tr>
<td>100.11 (2.73)</td>
<td>Price rises (Benchmark curve decreases by 3 bps)</td>
<td><strong>EX Price 2</strong></td>
<td>Date: 20160525</td>
<td>100.238 (1000+)</td>
</tr>
<tr>
<td>100.11 (2.73)</td>
<td>Price rises (Benchmark curve decreases by 3 bps)</td>
<td><strong>EX Price 3</strong></td>
<td>Date: 20160525</td>
<td>102.00 (10)</td>
</tr>
</tbody>
</table>
9. Why Macroeconomic event is the first factor to consider?

- Things to consider when evaluating an instrument
  1. Consider any corporate events (Macroeconomics perspective)
  2. Recent Market data would have a higher explanatory power
  3. Larger Trade Size for an independent Transaction would have a higher explanatory power
  4. When considering market quotations (Brokerage House quotations), the quotation that has the smaller Bid-Ask spread would have a higher explanatory power
  5. When considering the Market data, having the similar movement with the Benchmark Curve would have a higher explanatory power
  6. Smaller difference with KISP’s previous price would be a higher explanatory power

- Fixed income bonds do usually have smaller volatility than other financial products

10. Macroeconomic event

- Macroeconomic event could outwash the “usual” pricing methodology

Source: Bloomberg
10. Macroeconomic event

<table>
<thead>
<tr>
<th>Payment Date</th>
<th>Interest</th>
<th>Principal</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/15/2016</td>
<td>3.82</td>
<td>0</td>
</tr>
<tr>
<td>12/15/2016</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>06/15/2017</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12/15/2017</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>06/15/2018</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12/15/2018</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>06/15/2019</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12/15/2019</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>06/15/2020</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12/15/2020</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>06/15/2021</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12/15/2021</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>06/15/2022</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12/15/2022</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

Issuer: 
Refinery Corporate Rating BBB+

Situation: 
Had Issued this Debt on 2015.Dec.23

Comment: 
The Price was traded at 54.56 as the crude oil price plummeted

Source: KIS Pricing, Bloomberg
11. In Conclusion

“The general pricing methodology would work just fine. However, when market conditions becomes volatile, considering the Macroeconomic factor per security is a must!”
Thank You
How do you promote the bond market?

6 June 2016 Tokyo
Fujio Nakatsuka
Chief researcher/Head of Financial Market Research Division
Rating and Investment Information, Inc. (R&I)

We are on the same path and heading in the same direction

Share the experience and knowledge for making transparent market
Pricing procedures and methods are established and in common
These enable us to integrate Asian Bond Market
We all recognize the importance of transparency
Transparency and innovative products/services enhance freedom of choice
Issuers and Investors get round-trip tickets around Asia

For streamlining the discussion

- **entity**
  - Who compile existing data sources
    - Public Officials / Financial information Vendors

- **data**
  - What data is available
    - bid-ask rate / quote price / reported price/trade price

- **investor**
  - Which investors have access to the data
    - Institutional / Retail

- **time**
  - How quickly
    - real time / daily / interval

- **cost**
  - at What cost
    - subscriber-pay / free of charge

*Quotation from “Implications for Price Transparency in the European Bond Market” (April 2005, The Bond Market Association/European Primary Dealers Association)*
Comments & Questions

- Classifications and Groupings of Corporate Bonds
- Tendency of Spreads by Ratings

<table>
<thead>
<tr>
<th>Credit rating</th>
<th>Remaining years</th>
<th>Compound Yield</th>
<th>Standard deviation</th>
<th>Number of issues</th>
<th>Compound Yield</th>
<th>Standard deviation</th>
<th>Number of issues</th>
<th>Compound Yield</th>
<th>Standard deviation</th>
<th>Number of issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>1</td>
<td>0.049</td>
<td>0.065</td>
<td>148</td>
<td>0.067</td>
<td>0.08</td>
<td>364</td>
<td>0.438</td>
<td>0.564</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.06</td>
<td>0.08</td>
<td>78</td>
<td>0.108</td>
<td>0.069</td>
<td>154</td>
<td>0.428</td>
<td>0.538</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.063</td>
<td>0.146</td>
<td>76</td>
<td>0.144</td>
<td>0.06</td>
<td>142</td>
<td>0.443</td>
<td>0.65</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.091</td>
<td>0.168</td>
<td>64</td>
<td>0.188</td>
<td>0.07</td>
<td>138</td>
<td>0.476</td>
<td>0.607</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.13</td>
<td>0.22</td>
<td>48</td>
<td>0.28</td>
<td>0.08</td>
<td>78</td>
<td>0.74</td>
<td>0.888</td>
<td>64</td>
</tr>
</tbody>
</table>

Reference Statistical Prices [Yields] for OTC Bond Transactions / Rating Matrix

Disseminated by JSDA every business day

Further Information about Price Data Services in Japan

- “JS Price”: Quoted prices by Nomura Securities Co.
- “Bloomberg JP Yen Bond Fix Prices ”: average price of 4 major Dealers
- “QUICK Price ” : JDAS’s “Reference Price” + Computed price(relative valuation method)

Source: Instruction of each vendor , translated by Nakatsuka
JS Price

- Covers 12,000 of Yen denominated bonds
- Quoted by dealers of Nomura Securities
- Put adequate “T-” or “Swap-” Spread by Category
- For precise and efficient pricing, bonds are classified by certain rules
- Nomura Institute Co., Nikkei Inc., FTRI Inc. cooperate in the verification
- Data is distributed by Nikkei Inc.

Bloomberg Yen Bond Fixing Price

- Average of quote price (at least 2 contributed price required)
QUICK Price

- 6,000 of JSDA’s “Reference Price” and 2,500 of Computed Price (Relative Value Method)
- Making yield curve by credit rating with cubic spline interpolation method

* In this case, JSDA is the data developer.

Function of Pricing Service

- Reference for trading, verification, and Fair Value Accounting
- “Practical Guideline of Fair Value Accounting” (by JICPA) nominates JSDA’s “Reference Price” at first
- The guideline benefits local banks and medium & small investors in terms of cost
- For strengthening trading function, the contribution of market maker is required
Why are they continuing discussion?

- The EU Commission requires the amendment of RTS(Regulatory Technical Standard) for non-equity transparency
  (At first ESMA proposed “Categories Approach” and next “bond to bond Approach”)
- Currently the commission requires “Phase in regime” to ESMA
- The backdrop: “Investors check out of Europe...Fractious politics, economic malaise, negative rates” (May 22 2016:WSJ)

*The charts will be placed next page.
(Net euro-zone bond flows / Trading volume of corporate bonds in Japan)

Thank you for your Participation
Fujio Nakatsuka

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The views, opinions, findings, and conclusions expressed in this presentation/material and discussion are strictly those of the discussant. They do not necessarily reflect the views of the organizations (R&I, The Securities Analysts Association of Japan) that the discussant belong to.