SERVICE PROVIDER UPDATE

SPEAKERS

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Associate Director, Fixed Income Pricing, IHS Markit
The Analytical Considerations of UMBS within BondEdge

Bill Burns
Director, Quantitative Analysis and Financial Engineering
ICE Data Analytics, LLC
Coverage in BondEdge

- Availability of Freddie Mac Gold and UMBS pools
  - Continued coverage of legacy fixed-rate Freddie Mac Gold pools
  - UMBS Mirror pools of eligible fixed-rate Freddie Mac Gold pools
  - New UMBS pools issued by Fannie Mae and Freddie Mac after June 3, 2019

- Access and updates
  - No product upgrade will be required to access new UMBS pools or Mirror pools
  - Follow-up communications about improvements related to UMBS will be made leading up to the June 3, 2019 UMBS go-live date
What does this mean for security analytics in BondEdge?

▪ UMBS change in Payment Delay will have a slight effect on the analytics of the security (yield, average life, duration)
  – 45-day Freddie Mac Gold pools pay on the 15th of the month (standard 30-day delay in the underlying mortgage loans and an additional 14-day delay)
  – 55-day Freddie Mac UMBS pools will pay on the 25th of the month (i.e. 24 day delay)

▪ BondEdge and analytic feeds will use the common collateral type of FN for all UMBS pools (both Fannie Mae and Freddie Mac Issues)

▪ Otherwise, there should be no analytical impact
  – Freddie Mac Gold and Freddie Mac UMBS pools will use the same prepayment model and model parameters
  – Mirror pools will have the same historical prepayment speeds and projected prepayment speeds as their corresponding Gold pools.
Considering impact to investment guidelines

- As noted earlier, within BondEdge and analytic feeds, UMBS will carry a collateral type of “FN”
  - Reports referencing this field will not immediately allow one to distinguish between UMBS backed by Fannie Mae vs. Freddie Mac
  - As a result, investment guidelines within compliance reporting may need to be reviewed in some cases

- In general, we recommend a review of reports created based on investment guidelines to ensure that the introduction of UMBS pools do not inadvertently impact results
Index support and generic mortgage cohorts

- Mortgage Indices are modeled based on generic mortgages (combinations of pools with a common issuer, vintage, coupon and amortization term)

- Index providers may approach the introduction of UMBS differently

- BondEdge is currently coordinating with supported mortgage index providers to ensure on-going coverage
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Aladdin Development to support Single Security

- Aladdin development across the entire lifecycle to support the new uniform mortgage-backed security and the associated workflows.

Aladdin’s Single Security Solution

**Analytics and Performance**
- **Green Package Reports** for Single Security reporting classifications
- Full Analytics support for UMBS, Mirrors and Supers
- Updates for Single Security loan level clusters, agency cohorts, risk models
- Support for new third party pricing, benchmark data with updates to Aladdin Pricing CUSIP

**Trading**
- Ability to enter orders and trades via Aladdin applications and Electronic Platforms (e.g., Tradeweb)
- Updates to Compliance rules
- Exchange Workflow - Ability to exchange Legacy 45-day Freddie PCs into 55-day PCs in the transaction workflow and associated cash movement

**Operations**
- Enhanced allocation process to allow both Fannie and Freddie issued Uniform MBS and exchanged Freddie mirror securities deliverable into Single TBA contract
- Enhancements to all TBA operational processes for UMBS TBA (Round Robin, Trade Assignments, Rolls)
- Support EPN and Novation workflows

**Reporting & Interfaces**
- Data Reporting for single security transactions, positions, security indicative data and many more
- Updated interfaces to reflect any new data points and extracts for downstream workflows
- Support for idiosyncratic client workflows

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Mortgage Data

- eMBS Data Feed Consumption and Conversion for –
  - Freddie and Fannie UMBS Pools, new Supers and Exchanged Freddie Mirrors
  - Security Ticker for UMBS TBA

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Single Security 2019 | COUNTDOWN TO GO-LIVE
Aladdin Client Engagement

- BlackRock has been actively engaged with both GSEs and the broader industry to ensure that Aladdin and our clients are prepared for this major initiative.

Timeline – Single Security Client Engagement

- **Q2 2018**
  - Analyze and Prepare for proposed Aladdin changes
  - Host a broad *Aladdin Community Forum* to educate all clients on Single Security and high level impacts – *July ’18*

- **Q3 2018**
  - Begin targeted outreach to clients on Aladdin impacts
  - Participate in *Table Top exercises* with Freddie Mac, other investors, custodians and brokers

- **Q4 2018**
  - Provide MBS *data samples* and proposed Aladdin MBS Product List to all clients – *Nov ’18*
  - Help clients identify elements such as compliance rules, reporting favorites and filters, that may be impacted.

- **Q1 2019**
  - Host a second *Aladdin Community Forum* to update clients on key Single Security rollout dates – *Feb ’19*
  - Provide clients with a *BPR document* to detail forthcoming workflow and data changes in Aladdin – *March ’19*
  - *UMBS Forward Trading Commences in March ’19*

- **June 2019**
  - UMBS Settlement and *New Issuance Go-Live*
Single Security in Aladdin

- All core functionality will be released by the end of March with exchange support in April.

### Aladdin Readiness Timeline

<table>
<thead>
<tr>
<th>Month</th>
<th>Tasks</th>
</tr>
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<tbody>
<tr>
<td>January</td>
<td>Data: UMBS TBA generic pricing CUSIPs, Data: Database changes to Support Mirror and Super CUSIPs, FICC: Aladdin Certification</td>
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<tr>
<td>February</td>
<td>Trading: Forward UMBS TBA Trading, Interfaces: Mirror CUSIPs and SUPERs</td>
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<tr>
<td>March</td>
<td>Compliance updates, Analytics, Risk and Green Package Updates, Remaining Data Loader changes, Reporting Tools, Inventory management, TBA Rolls and Operations</td>
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<td>April</td>
<td>Exchange Related Enhancements</td>
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<td>May 7, 2019</td>
<td>✦ Exchange Go-Live</td>
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<tr>
<td>June 3, 2019</td>
<td>✦ Single Security Go-Live</td>
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</table>
eMBS Changes Supporting the Single Security Initiative

Larry Gioia
President, eMBS
Changes to Support the Single Security Initiative:

- Support Freddie Mirror Securities (71,160 thus far through Feb 2019 issuance)
- Support Fannie’s move to aligned formats, including convert-back to current formats
- Modify eMBS Database to support UMBS, Supers and Commingled Supers (including aggregations)
eMBS Changes/Enhancement thus far:

✓ Populated 71,160 mirror securities beginning in August (CollType 'POOL") in the eMBS DB.
✓ New Mirror exchange tables (Cumulative (now available); Daily Activity, Level 1 Summary available June 3).
✓ Populate collateral (IssColl) rows for mirror securities and update daily once exchanges begin.
✓ Fannie aligned files and covert-back files available for clients to download and test.
✓ TBA Product Pool Map, new table, available for clients to download.
✓ UMBS aggregations will be made available starting June 3 for online and data clients.
✓ Summarize available supply of UMBS (Freddie and Fannie combined) into a new aggregation.
  for UMBS 10, 15, 20, and 30-year pools to show outstanding balance, issuance and prepayments.
✓ Modify TBA->Pool association for UMBS TBAs to reflect that Fannie and Freddie 55-day pools are eligible.
✓ SUPERS Summary: new table showing % Fannie and % Freddie by current balance.
  Will also display on eMBS screens.
✓ Commingled Supers Portfolio will be available for online clients starting June 3.
List of Fannie Convert-back files being created


- For Monthly we create multiple files:

(We will be producing test files with this data)
The TbaPoolProductMap will link from the TBA product to the underlying Pool products. Clients can request this table to use with their in-house database.

<table>
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<tr>
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</table>
There will be a new UMBS aggregation available at the Agency level. This will combine Fannie & Freddie UMBS pools that are TBA eligible into one cohort. You can drill down from Agency (UMBS) level to Product (UMB30, UMB20, UMB15, UMB10) and then to Coupon & Year.
Exchange Aggregation:
Top level with products down the side

Note: This is a subset of products that will be displayed.
Exchange Aggregation:
Product-specific level after you follow the link from one of the products on the previous screen.

Balances (MM) for FHLG15 by Coupon

<table>
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<tr>
<th>Coupon</th>
<th>Balance</th>
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<th>Exchanged via Locked Up</th>
<th>Totals including via Locked Up</th>
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<td></td>
<td>Exchanged</td>
<td>Locked Up</td>
<td>Eligible</td>
</tr>
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<td>2</td>
<td>894.72</td>
<td>0.00</td>
<td>178.94</td>
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<tr>
<td>2.5</td>
<td>6,852.96</td>
<td>0.17</td>
<td>1,370.59</td>
<td>5,482.38</td>
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<td>3</td>
<td>1,774.95</td>
<td>0.26</td>
<td>354.99</td>
<td>1,419.70</td>
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<td>3.5</td>
<td>218.86</td>
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<tr>
<td>4</td>
<td>8.82</td>
<td>0.01</td>
<td>1.76</td>
<td>7.05</td>
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<tr>
<td>Total</td>
<td>9,750.42</td>
<td>0.50</td>
<td>1,950.08</td>
<td>7,799.33</td>
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</table>

Note: This example is using test data
**List of Commingled Supers: portfolio COMMSUPERS**

a special-purpose portfolio available to all online clients.

<table>
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<tr>
<th>Id</th>
<th>Name</th>
<th>Last Updated</th>
<th>Count</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>COMMSUPERS Commingled Supers</td>
<td>2/13/2019 7:37:01 PM</td>
<td>0</td>
<td>All commingled supers issued 6/2019 or later</td>
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<tr>
<td>0</td>
<td>FEDHOLDING Federal Reserve Holdings</td>
<td>12/27/2018 11:18:23 PM</td>
<td>36785</td>
<td>As of Dec 26, 2018</td>
</tr>
<tr>
<td>0</td>
<td>FHL-DUPLIC FHLMC duplicate pool numbers</td>
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<td>Pool numbers that represent multiple CUSIPs</td>
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<td>0</td>
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<td>12/6/2017 1:08:43 PM</td>
<td>201</td>
<td>Freddie Mac Strips that are backed by single Giants</td>
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<tr>
<td>0</td>
<td>FNMASTRIP Strips backed by single Megas</td>
<td>10/8/2010 2:57:00 PM</td>
<td>292</td>
<td>Fannie Mae Strips that are backed by single Megas</td>
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<td>0</td>
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<td>8/6/2007 6:53:00 PM</td>
<td>556</td>
<td>Removed Four Months or More Delinquent Loans as of August 2007</td>
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<td>0</td>
<td>GNMAREVMTG GNMA Reverse Mortgages</td>
<td>5/17/2010 5:18:00 PM</td>
<td>8895</td>
<td>Fannie Mae Reverse Mortgage Pools</td>
</tr>
</tbody>
</table>

**Note:** The portfolio is empty, but this is where clients can find it, starting in June
We've added an option to the Special Request Lists to show all Supers by month, or optionally all Commingled Supers if no month is selected.
All Supers issued in a given month
(whether commingled or not), It will include all Freddies (including Mirrors) and Fannies in those 8 prefixes.

eMBS Inc

<table>
<thead>
<tr>
<th>SecMnemonic</th>
<th>Cusip</th>
<th>Product</th>
<th>Prefix</th>
<th>Coupon</th>
<th>Issue Date</th>
<th>Issue Amount</th>
<th>Fannie Pct</th>
<th>Freddie Pct</th>
<th>Fannie Balance</th>
<th>Freddie Balance</th>
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</table>
Clients who create a portfolio of securities on eMBS can view what proportion of the underlying pools are Fannie vs Freddie.

If there are commingled Supers in the portfolio, the lowest level pools will be used for this determination.
Clients who create a portfolio of securities on eMBS can view the pools in the Portfolio and how much each pool contributes to the overall balance of the portfolio.

If there are commingled Supers in the portfolio, the lowest level pools will be used for this determination.
February Summary

February-released factors indicated that January fixed-rate prepayments decreased another 5-7% for all 3 agencies, making it 4 decreases in the past 5 months. Fannie and Freddie 30yr and 15yr prepayments continued to track closely, differing by only 0.1CPR. ARM prepayments dropped except for COFI-indexed pools.

January combined fixed-rate issuance of 30yr and 15yr pools dropped by $2.5B from December at $7.5B - Fannie and Ginnie issuance increased but Freddie’s decrease was greater. Overall there have been 4 issuance decreases in the past 5 months, which followed 5 straight months of issuance prior to that. Freddie issuance decreased 54.4B to $18.4B, while Ginnie issuance edged up $0.3B to $27.8B and Fannie Mac issuance increased $1.3B to $30.9B.

Continuing the highlighting of Ginnie II 30yr Custom issuance within the Ginnie II numbers - January issuance decreased by $0.4B to $5.0B. Issuance for the past 10 months has been $3B/month or more, and 19 of the past 20 months have had issuance of $4B or more.

Freddie Mac 30yr Gold prepayments were down 0.4CPR to 6.3CPR (-0.6%). Fannie Mac 30yr prepayments were similarly down 0.5CPR to 6.6CPR (-0.7%). Freddie 15yr Gold prepayments were down 0.2CPR to 4.2CPR (-2.5%). Fannie 15yr were down 0.9CPR to 5.9CPR (-6%).

Ginnie I 30yr prepayments were down 1.4CPR to 9.0CPR (-13%). Ginnie I 15yr were up 0.6CPR to 11.2CPR (6%). Ginnie II Multi-Issuer 30yr were down 0.5CPR to 8.7CPR (-5%). 30yr Customs were down 0.5CPR to 6.8CPR (-7%). and 15yr Multi-Issuers were down 0.3CPR to 4.4CPR (-13%).

ARM prepayments decreased for all ARM products except Fannie and Freddie COF-indexed pools. Issuance increased for Freddie Mac, up $0.1B to $3.3B, but decreased $0.1B for Fannie Mac to $0.9B after having doubled in December. Issuance of Ginnie Mac Treasury-indexed ARMs increased a significant $0.25B to $10.3B.

Summary: Details

Welcome to eMBS

We provide reliable and cost-effective internet-based access to mortgage data and analytics. While other services end with the delivery of data, that’s where eMBS starts.

Delivering data, analytics and savings is only the beginning. With over one million securities outstanding in the mortgage markets, we’re confident that you’ll love us for a million reasons!

Latest Data Notices

- 02-06 Prepay Update - Fannie Mae UMBS Prefix Descriptions
- 02-06 Prefix Table Update - FHL Mini-PC TBA Elig Changes
- 01-14 Freddie Mac Jan. 4BD Loan Level File Redistributed Today
- 01-04 eMBS TBA Changes for UMBS Single Security
- 12-31 Fannie Mae Single Security Implementation
- 12-26 ARM/Macro Table Updates
- 12-26 Freddie Mac FHL SEC ZIP and FHL 3C ZIP Redistributed Today
- 12-13 Changes to eMBS Prefix Table - New Prefixes and TBA Elig Changes
- 12-11 Freddie Mac Monthly FHLBRK ZIP and FHL SEC ZIP Redistributed Today
- All Data Notices

eMBS Flash Prepayment Reports

- Fannie Mae Flash
- Freddie Mac Flash
- Ginnie Mac Flash

Available online the 4th business evening after each agency’s factor release, to allow market participants to get a quick read on prepayments.
1. How has eMBS prepared for the Single Security Initiative? What changes can we expect?

You can view our Single Security Tabletop Discussion deck - eMBS_SingleSecurityChangesOverview.pdf.

Implemented Changes:

- **Added 55-day Freddie Mac prefixes to our Prefix table.** Prefix table contains additional rows with new Freddie Mac Prefixes for 55-day pools including UMBS pools. By definition, only 8 of these new 55-day Prefixes are for UMBS pools, which are the same prefixes and Market Tickers that Fannie Mae currently uses. See Data Notice for more details: 05-31-18 Prefix Table Updates for FHL UMBS and Mirror Securities.

- **Support Freddie Mac Mirror pools.** The Mirror pools published by Freddie Mac (but not yet live on the Street) are in the database with pool number range ZA0000->ZA99999. eMBS SecMnem field FHLZA0000 -> FHLZ99999. Mirrors are simply 55-Day single-Gold-pool-backed Giants. They are not included in our summary issuance numbers nor in prepayments.

- **Add Mirrors to IssColl collateral table.** IssColl contains entries for each Mirror pool with a 1-1 mapping to the corresponding Gold pool. Note that the amount locked up (OrigFace field) shows 0 0 as no exchanges have taken place.

- **Support Mirror security lookups.** Subscribers to eMBS Online can look up a Mirror pool and see the underlying Gold pool and the amount exchanged (which is now 0 until June 2019).

- **Modify eMBS Database to support UMBS.** Added three Freddie Mac exchange tables. Added SupersSumm table for commingled Supers which shows percentage and balance of FHL and FNM collateral per Super. Added new column "LookupAdjMirror" to the Lookup SQL (for clients who run this SQL to populate their local Lookup table).

Changes Effective May/June 2019:

- Two FHL exchange tables go live (cumulative and Aggregate Level 1 Collateral).
- SupersSumm table goes live.
- Website - Collateral for commingled Supers can be drilled down to the lowest level to see summary and details of Fannie vs Freddie distribution.
- Website - The "Special Request List" page will allow showing Fannie vs Freddie distribution at the lowest level for a Portfolio that may contain commingled Supers.
- Website - A new Exchange detail page will show daily and Level 1 summary for Golds and Mirrors. [See slide 10 for preview.]
- Website and data files - Aggregations of UMBS pools from both Fannie and Freddie combined to show Issuance, Balance, and Prepayments.
### Bloomberg Support for UMBS

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pools</strong></td>
<td>Mirror pools available via MTGS@UMBS&lt;GO&gt;</td>
</tr>
<tr>
<td><strong>Generics</strong></td>
<td>TBA eligible Freddie issued 55 day Mirrors and New Issue Pools will migrate into existing Fannie Mae Generics (FNCL etc.) on the terminal.</td>
</tr>
<tr>
<td><strong>TBAs and Electronic Trading</strong></td>
<td>FNCL3 6/19 will represent UMBS TBAs for June settle and after, and BBTM&lt;GO&gt; will support UMBS</td>
</tr>
<tr>
<td><strong>Analytics</strong></td>
<td>BAM Prepayment Model Support and Float Comp analysis</td>
</tr>
<tr>
<td><strong>Excel API and Enterprise Products</strong></td>
<td>List &amp; Portfolio analysis</td>
</tr>
<tr>
<td><strong>AIMS &amp; OMS</strong></td>
<td>Exchange path via Tradeweb</td>
</tr>
<tr>
<td><strong>Bloomberg Valuation (BVAL)</strong></td>
<td>Mirror price support and Index pricing</td>
</tr>
<tr>
<td><strong>Bloomberg Barclays Indices</strong></td>
<td>Announcements, INP&lt;GO&gt;, see 1/22/19</td>
</tr>
</tbody>
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- UMBS Overview Documentation: DOCS UMBS<GO>
IHS Markit has been engaged with the GSEs, clients and market participants throughout 2018 in key discussions around the Single Security Initiative.

- Full testing of new data formats, cashflow models, feeds and nomenclature for Mirror securities, exchange information and UMBS TBA identifiers.
- Mirror security pricing to be available in standard pricing channels (SFTP feed, Portfolio Valuations, Price Viewer web front-end).
- Price Viewer to display additional features including Gold/Mirror pool linkage, screening, and exchange activity.