Guide to the Morningstar Single-Family Rental Quantitative Analysis and Subordination Model

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Introduction
This guide is intended to introduce the Morningstar Single-Family Rental ("SF Rental") Subordination Model. It begins with a description of the basic concepts underlying the model and then details its primary features.

As with any model, the Morningstar SF Rental Subordination Model utilizes a number of assumptions. We will base these assumptions on empirical data whenever robust data is available, but we will default to industry experience and intuition when it is not. This paper will further discuss the rationale behind these assumptions.

While this paper is intended to address the key quantitative aspects of SF Rental transactions, due to the evolving and hybrid nature of such transactions, deal-by-deal adjustments may be necessary.

Section 1 - Basic Concept
The SF Rental product is a hybrid of multifamily and single family concepts. Since the cash flows of SF Rental Securities are in large part dependent on the monetization of the property values of the underlying rental properties held by the securitization vehicle, Morningstar anticipates that these securitizations will include a feature ("Monetization Feature") designed to result in such a monetization during the scheduled term of the related securitization. As such, the rental income cash flow from single-family residential homes supports periodic payments on the SF Rental Securities, while the sale of the underlying residential property is the main source of funds to pay off the Monetization Feature or realize recoveries in the event of a default. Therefore, the analysis of a SF Rental pool relies on valuation techniques used both in the analysis of securities backed by mortgages on multifamily and residential properties.

The SF Rental Subordination Model generates indicative credit support levels at each rating category for a portfolio of SF Rental properties that back the SF Rental Securities. Credit support levels are driven by the net cash flow ("NCF") generated by the monthly rental income for each property until the Monetization Feature maturity date. Upon maturity, the property liquidation values must be sufficient to cover the unpaid portion of the SF Rental Securities, thereby paying off all securitized tranches.

The analysis is divided into two key processes. The first step of the modeling process is to underwrite the base case NCF at the property level based on various data and assumptions. The primary determining factors of the property level NCF include the actual rent, market rent information for similar properties, concessions, vacancy rates, time to rent the property, the rent roll, operating expenses, and capital expenditures. See Section 2 for more details on Morningstar's underwriting approach. The property level NCF is then aggregated to the pool level NCF net of applicable fees, such as servicing fees or other fees for each monthly period.

Since SF Rental Securities may not be fully amortized by the maturity date, the second step in the SF Rental Subordination Model is to assess the Pay-Off Ratio. The Pay-Off Ratio is Morningstar's value of the SF Rental properties divided by the unpaid balance of the securities. Morningstar's SF Rental property value is determined based on two valuation methods. The first method is to apply Morningstar's regional single family House Price Index ("HPI") decline to the value of the property. The second method is to determine the property's investment value.
using Morningstar's income capitalization rate ("cap rate") approach for multifamily properties. The SF Rental Subordination Model uses the higher of these values for each property analyzed by the model to determine if the amount available is sufficient to pay off all securitized tranches.

After the Morningstar base case NCF and Pay-Off Ratios are determined, they are then subjected to a set of stresses at each required rating category.

Each set of stresses include:

1. NCF declines during the term of the securities and at the maturity date of the Monetization Feature that reflect worsening economic conditions;
2. Cap rate increases that reflect deteriorating demand for SF Rental investment properties;
3. HPI declines to reflect the regional severity of a housing downturn; and
4. Interest rate stress on the interest due on the securities.

During the term of the securities, the SF Rental Subordination Model evaluates whether there is sufficient NCF to make the required debt service payments associated with the securitization. In other words, the debt service coverage ratio ("DSCR") needs to be adequate for each forecasted period at each required rating scenario for the related security to "pass" that rating scenario. The Pay-Off Ratio also needs to be deemed sufficient at the maturity date of the Monetization Feature at each required rating scenario for the related security to "pass" that rating scenario.

Section 2 - Details on the Model Assumptions

In this section, we cover each of the SF Rental Subordination Model's primary concepts and features. These are:

- NCF Underwriting
- NCF Reduction Stress
- Valuation

NCF Underwriting

NCF is driven by the gross rent assessment, vacancy rates, operating expenses, and capital expenditures. Morningstar first determines the NCF at the base case from available data and assumptions. In addition to SF Rental data, empirical data on multifamily rental units is considered. The level of granularity varies based on data availability. At a minimum the analysis is conducted at the Metropolitan Statistical Area ("MSA") level; however, it may reach the sub-market or ZIP code level. SF Rental data is currently limited and generally dates back to 2009. Multifamily rental vacancy data dates back to 2005; and in some MSAs, dates back to the 1990s. Since SF Rental data is currently limited, multifamily data may be used as a proxy.

For the base case underwriting, Morningstar compares the actual current rent to market rents and/or third-party data. Additionally, Morningstar evaluates the full mortgage payment plus the assumed maintenance costs and capital expenditures for each property as a comparison data point to rental information. The rationale for including the mortgage payment in the analysis is that if the rental payment is significantly higher than the full mortgage obligation plus
maintenance costs and capital expenditures, then the renter may be incentivized to be a property owner instead of a property renter. Using a combination of market rent data compared to the calculated mortgage obligation, Morningstar decides whether to use the actual rents or to make adjustments. Other income is considered on a case-by-case basis, depending on the nature and stability of the sources of other income. Sources of other income may include, but are not limited to, fees related to pets, parking, and late payments. Morningstar also reviews available rent concession data and may reduce the rent utilized in its NCF analysis based on this information when appropriate.

In determining the vacancy assumptions to be utilized in the SF Rental Subordination Model, Morningstar evaluates both issuer-provided and publicly available information. This information may include:

- Property Manager overall portfolio vacancy
- Property Manager time to rent (in months)
- Property level actual vacancy and time to rent (in months)
- Issuer underwriting vacancy assumptions
- Regional historical rental vacancy

Morningstar reviews the operating expenses associated with SF Rental properties. These expenses typically include: taxes and insurance, repair/maintenance costs, management fees, leasing/marketing expenses, and capital expenditures. Because the reported history on SF Rental properties may be limited, Morningstar typically applies an upward adjustment of the NCF stress for expenses, such as, repair/maintenance costs, leasing/marketing expenses, and capital expenditures. Morningstar may review NCF adjustments as more SF Rental data becomes available.

**NCF Reduction Stress**

The purpose of NCF stresses is to provide rental cash flow stability at each required rating level. The stresses are developed based on available empirical and issuer data of SF Rental properties and Morningstar multifamily NCF stress assumptions.

After the base case NCF stress analysis is complete, additional NCF stresses are applied at each required rating level. The NCF decline percentage is the highest at the 'AAA' level, followed by 'AA', 'A', 'BBB', 'BB' and 'B'.

**Valuation**

Valuation of each SF Rental property is critical since the liquidation value of the property is the primary source of funds available to satisfy the Monetization Feature or to realize recoveries in the event of a default. Morningstar values each SF Rental property utilizing two different valuation methods. One valuation method utilizes Morningstar's HPI stress to the value of the property. The second approach utilizes Morningstar's income cap rate valuation approach for multifamily properties to determine the investment value of the property.

Under the Morningstar HPI valuation approach, an HPI stress is applied to discount the provided property value. This value represents the amount that a typical homeowner is willing to pay under the stress scenario. Morningstar HPI stresses are developed based on historical regional
HPI data, which typically dates back to the 1970s at the MSA level. Rather than looking at national HPI, applying the discount at the MSA level results in a so-called “bottom-up” approach that reflects the regional variability of HPI volatility. For example, at an ‘A’ rating stress, the worst historical regional HPI decline is applied. The worst historical regional HPI decline is measured by the steepest peak to trough HPI percentage decline experienced during any housing cycle in the available data set. The HPI declines are generally the most severe at the ‘AAA’ level, followed by ‘AA’, ‘A’, ‘BBB’, ‘BB’ and ‘B’.

Morningstar’s income capitalization valuation is the result of Morningstar’s NCF divided by the cap rate. The resulted value reflects the intrinsic value an investor is willing to pay for the property. The cap rate is determined by a corresponding regional, MSA or submarket multifamily rental cap rate. Multifamily data is used as a proxy, because cap rate data may be limited for SF Rental assets. Typically, an additional cap rate adjustment may be applied at the base case level because SF Rental assets are a newer asset type compared to multifamily rental assets. Then additional cap rate stresses are applied at each required rating category. ‘AAA’ requires the highest assumed cap rate.

Morningstar utilizes the higher of these two values for its analysis in the SF Rental Subordination Model. The rationale for using the higher value is that the value of the property as an investment is considered to be the floor for the price of a property. If the net cash flow generated from a renter is sufficient to support the price of a property, then generally the property makes economic sense as a financial investment. However, in our view, if prospective homeowners bid the price higher than the value supported by rental income, then investors will step aside and the homeowner bid will prevail.

Section 3 - Other Considerations

► Interest Rate Stress
► Servicer Advances and Special Servicing

Interest Rate Stress
Morningstar applies the market forward interest rate in the SF Rental Subordination Model. Additional interest rate paths are applied as appropriate. If an interest rate derivative is included in the transaction, and the derivative counterparty is a market acceptable counterparty, Morningstar may assume credit to cash flow from the derivative contract, as appropriate.

Servicer Advances and Special Servicing
The servicing practices for the transaction are another consideration of the SF Rental Subordination Model. Subject to a recoverability standard, the servicer is required to advance on delinquent monthly interest and principal payments due on the securities. The Morningstar SF Rental Subordination Model uses the stressed NCF as the amount of funds available to cover the payment to the securities. Morningstar assesses whether the stressed NCF is sufficient to pay the securities and corresponding certificate obligation at each rating level. The servicing fee and/or other applicable fees would be modeled according to the transaction document.
The special servicer for the transaction services the Monetization Feature upon a servicing transfer event such as an event of default. The Pay-Off Ratio upon maturity of the Monetization Feature is evaluated to determine if the securities could be paid off.