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Weekly Post Series Research 2024 #11

Weekly Post Series topics include Research, Strategies, Products

Pricing Engine: Valuing Balance Sheet Items

This week, I will describe a consistent and robust valuation model of balance sheet items in this Research Post. In the strategy post, I will then describe optimal advance funding for residential mortgage strategies. Finally, I will use these models to discuss the profitability of a product, illustrated by Home Improvement Loans, in the Product Post.

Regulators started focusing on the Economic Value of Equity (EVE) or Net Equity Value (NEV) after the collapse of Silicon Valley Bank (SVB). This new focus leads to the evaluation of valuing balance sheet items.

Challenges:

- Unlike bonds, many loan types have prices that are not widely available; how can loan values be determined with accuracy?
- How can the loan observed prices be validated as benchmarks for the balance sheet value since the loan market is inefficient?
- Can the model prices be helpful since the value is derived from many model assumptions?

This post will describe the Thomas Ho Company Pricing Engine, which follows a systematic pricing procedure to value balance sheets consistent with what has been discussed in academic literature.

A Numerical Example: Daily Inventory Residential Mortgage Loans indicative Prices

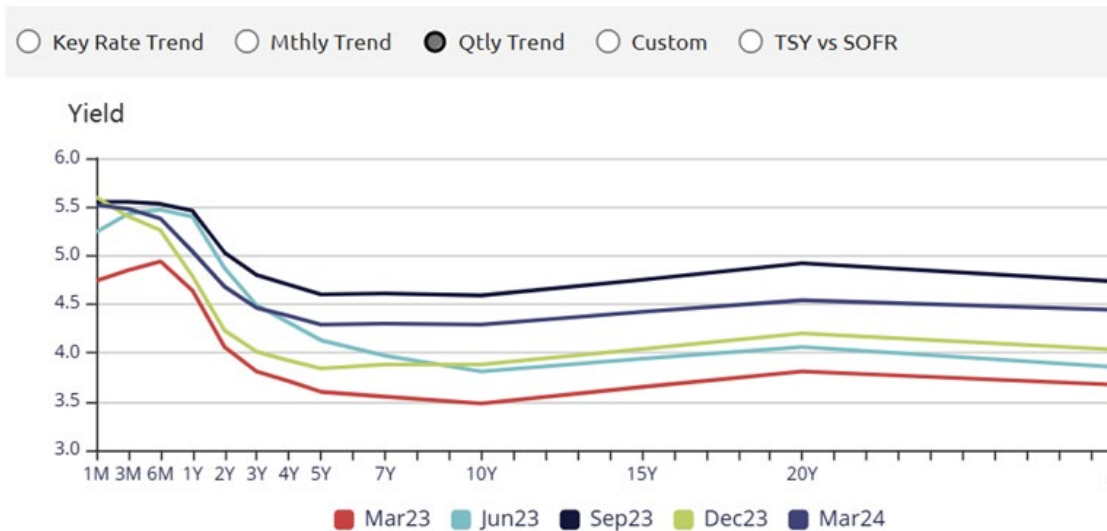
Futurewave Finance provides daily prices to Thomas Ho Company. The valuation process begins with these indicative prices. The table below presents the descriptive information of the loans and their prices over a sample period. The data provides the credit information so the model can take into account the loan types and pay up for specific characteristics (e.g., Owner Occupied versus Investment). The Prepayment-Default model captures all the attributes such as seasonality, vintage, burnout, high balance, and more. The THC research group regularly benchmarks the prepayment-default model analytics with other analytical systems. In addition to these residential loans, Loan Central has other loan types that offer prices for the Pricing Engine.

Daily Inventory prices	Original Balance	Hi Balance	Loan Program	Balance	Property	Purpose	Occupancy	FICO	LTV(%)	Int.Rate (%)	Released Price	Type	Index Rate	WAM
1/31/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	99.82	FRM30	Fixed	360	
2/2/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	99.62	FRM30	Fixed	360	
2/5/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.94	FRM30	Fixed	360	
2/6/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.97	FRM30	Fixed	360	
2/9/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.92	FRM30	Fixed	360	
2/16/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.31	FRM30	Fixed	360	
2/20/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.40	FRM30	Fixed	360	
2/21/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.46	FRM30	Fixed	360	
2/22/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.03	FRM30	Fixed	360	
2/23/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.14	FRM30	Fixed	360	
2/26/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.46	FRM30	Fixed	360	
2/27/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.22	FRM30	Fixed	360	
2/28/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	98.16	FRM30	Fixed	360	
2/29/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	99.63	FRM30	Fixed	360	
3/1/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	99.81	FRM30	Fixed	360	
3/4/2024	250,000	N	Conformin >=\$10K	SFR	Purchase	Prime	750	80	6.00	99.81	FRM30	Fixed	360	

Term Structure of Volatilities

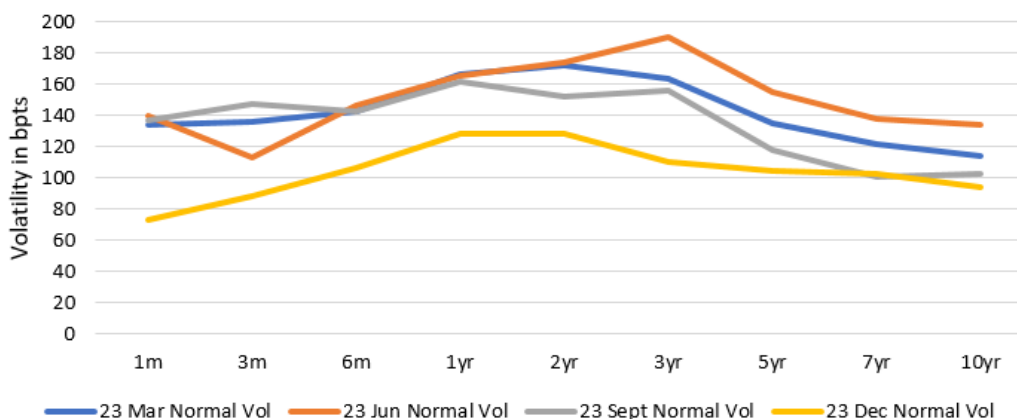
Residential mortgages offer mortgagors the option of prepaying the loan at par. The value of this option depends on the market's perceived interest rate uncertainty. The model has to be calibrated to the market's perceived uncertainty to value these and other embedded options on the balance sheet.

For example, Silicon Valley Bank (SVB) collapsed just before the end of Q1 2023. The banking uncertainty led to rising rates in subsequent periods.



The banking situation also led to perceived rate uncertainty. The rate uncertainty, measured by standard deviations, was implied by the market traded swaption prices in the active market. All 160 in-the-money and out-of-the-money swaption prices are used to calibrate the interest rate model, called the Arbitrage-Free Model. The calibration determines the "implied term structure of volatility," the Vol Curve. The figure depicts that the volatilities increased rapidly from Q1 to Q2. Since then, volatilities gradually fell back, particularly the long-term rates, as rising inflation concerns subsided in Q4, but the Fed rate vol remained high.

Term Structure of Volatilities



Yield Attribution

To maintain consistency, the structural pricing model is assumed to be the same across all loan types. This consistency enables the Pricing Engine to price loans relative to loans with offer prices. The method that allows the specification of the relative pricing is called yield attribution.

An Arbitrage-free valuation model determines the loan value based on the present value of its building blocks. That is, a loan's cash flow is attributed to its building blocks of value. Using the loan's cash flows, the values are then converted to yields. The Yield Attribution can be expressed below.

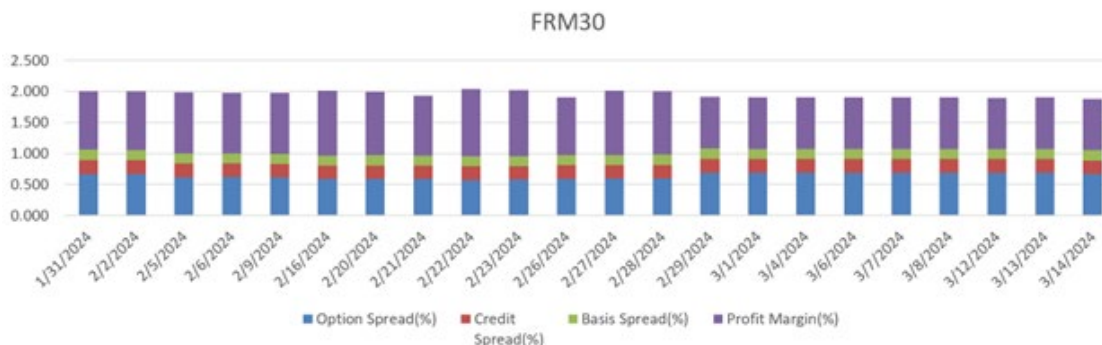
$$\text{Yield} = \text{Option Spread} + \text{Credit Spreads} + \text{Basis Spread} + \text{Profit Margin} + \text{Time Value}$$

The attributes are defined below.

Option spreads and Credit spreads amortize the option value and CECL, respectively. Basis Spread is the spread between the banks' funding curve or the additional credit provisions needed. Profit Margin is the Option-Adjusted Spread, sometimes called the Clean OAS, with OAS net of credit spreads. Time Value is the weighted average yield of each cash flow payment along the Treasury spot yield curve.

Daily Inventory prices	Yield(%)	Option Spread(%)	Credit Spread(%)	Basis Spread(%)	Profit Margin(%)
1/31/2024	6.113	0.672	0.223	0.165	0.940
2/2/2024	6.148	0.668	0.222	0.164	0.946
2/5/2024	6.266	0.618	0.220	0.162	0.983
2/6/2024	6.261	0.619	0.220	0.162	0.977
2/9/2024	6.270	0.611	0.220	0.162	0.986
2/16/2024	6.376	0.584	0.220	0.162	1.047
2/20/2024	6.361	0.587	0.220	0.162	1.029
2/21/2024	6.348	0.585	0.220	0.162	0.963
2/22/2024	6.426	0.571	0.220	0.162	1.083
2/23/2024	6.406	0.575	0.220	0.162	1.059
2/26/2024	6.348	0.590	0.221	0.163	0.933
2/27/2024	6.392	0.593	0.220	0.162	1.042
2/28/2024	6.404	0.595	0.221	0.163	1.027
2/29/2024	6.142	0.687	0.226	0.166	0.834
3/1/2024	6.109	0.687	0.222	0.164	0.831
3/4/2024	6.109	0.687	0.222	0.164	0.831

Attribution is a core valuation in the pricing engine, which determines a 30-year residential loan spread off the Treasury curve. Yield Attribution is a core valuation in the Pricing Engine, determining the market pricing of the option value, credit provisions, and clean OAS.



The Pricing Engine's extensive database of yield attribution provides the valuation of balance sheet items that can be estimated from the components of the market spread. Then, given the daily estimated Treasury curve, the model can assign value to each element of any balance sheet item, particularly the clean OAS. Given the resulting yield and the clean OAS, the model can determine the loan value.

Summary

- The Pricing Engine provides a systematic, consistent methodology for valuing balance sheet items. The yield attribution method is objective, independent of the trading desks' almost subjective decisions on the pay up or the Spread to the selected benchmark bonds.
- The valuation is calibrated to the market's inventory prices, actively traded Treasury Curve, and active swaptions. This approach is consistent with Level II fair value hedge accounting. The procedure is consistent and, therefore, transparent. The values can be validated by any third-party internal or external validators.
- The approach is consistent with Dynamic Hedging since market-actively traded instruments can reconstitute a balance sheet instrument. Note that any Arbitrage-Free Models allow for reconstitution with transaction costs minimized.

Call to action: Send us loan portfolio input data, perhaps downloaded from your core processor, and Thomas Ho Company can provide a sample pricing report.

If you would like to receive Thomas Ho Company's additional analysis, learn more about Thomas Ho Company analytics, or arrange a demo of the Thomas Ho Platform, please get in touch with Megan Trillet, Director of Marketing, at megan.trillet@thomasho.com or 330-687-0608.

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Functional Groups as Integral Parts of the Ishikawa Banking



Yield Attribution | Price Attribution | Income Attribution | Performance Attribution | EVE Attribution

IncomeRisk™ Model

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