



# SOLVE'S PROPRIETARY AI-DRIVEN MUNICIPAL BOND PREDICTIVE PRICING

## INTRODUCTION

In August 2024, SOLVE officially released SOLVE PX™, an artificial intelligence platform that accurately predicts the price of the next trade for over 900,000 municipal bonds. SOLVE Px is an effective data set for municipal fixed-income professionals that can assist in identifying arbitrage opportunities and address the common lack of price transparency, even for illiquid bonds.

SOLVE is committed to continually improving our industry-leading pricing accuracy through ongoing design and feature enhancements. This document outlines the comparative advancements of the new model, set to be released in early December 2024.

## COMPARISON OF MODEL ACCURACY

The SOLVE Px Prediction Model's primary goal is to minimize the absolute difference between the predicted price and the next trade level; this absolute difference is referred to as "error". We compare the original 15-month (16 million trades) back-testing results ("**Original**") alongside more recent current results over the past 5 months (5.6 million trades) from June 3 through November 1, 2024 ("**Recent**"), compared to enhanced model results for the same 5-month period to be released in December 2024 ("**Dec. 2024**"):

Model	Time Period	Ending	# Trades
<b>Original</b>	15 months	July 31, 2024	16 million
<b>Recent</b>	5 months	November 1, 2024	5.6 million
<b>Dec. 2024</b>	5 months	November 1, 2024	5.6 million

## MAE COMPARISON

A comparison of median absolute error between Recent results and our December 2024 model for the same 5-month period illustrates a prediction accuracy improvement of 10.3% in yield and 11.0% in price.

Model	Median of Absolute Yield Error	Median of Absolute Price Error
<b>Original</b>	6.9 bps	26.6 ¢
<b>Recent</b>	6.5 bps	24.6 ¢
<b>Dec. 2024</b>	5.9 bps	21.9 ¢



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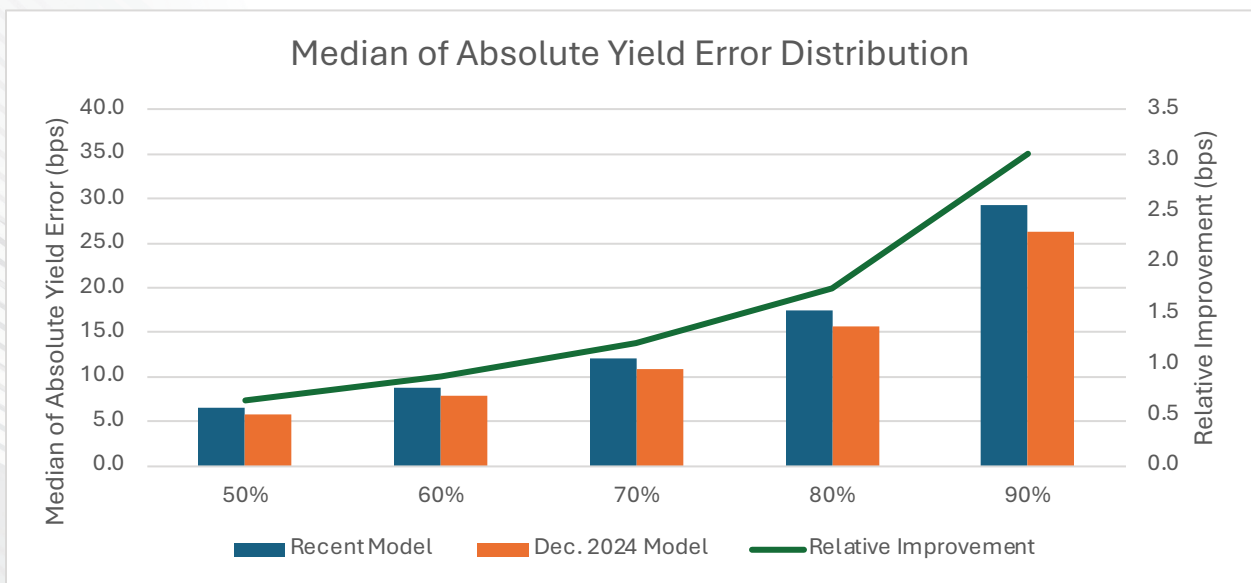
## LIQUID VS ILLIQUID PERFORMANCE

When looking at prediction/trade pairs that had a preceding trade or Quotes data within one day, the December 2024 model accuracy improved by 9.0%.

Liquidity Analysis				
Time	Median of Absolute Yield Error		Median of Absolute Price Error	
	Recent	Dec. 2024	Recent	Dec. 2024
≤ 1 Day	5.4 bps	4.9 bps	21.1 ¢	19.1 ¢
≤ 5 Days	6.8 bps	6.2 bps	26.4 ¢	24.1 ¢
All Days	6.5 bps	5.9 bps	24.6 ¢	21.9 ¢

## TAIL PERFORMANCE

The chart below illustrates the median of absolute yield error distribution for the bottom percentiles of the recent model versus the December 2024 model and the relative accuracy improvement.

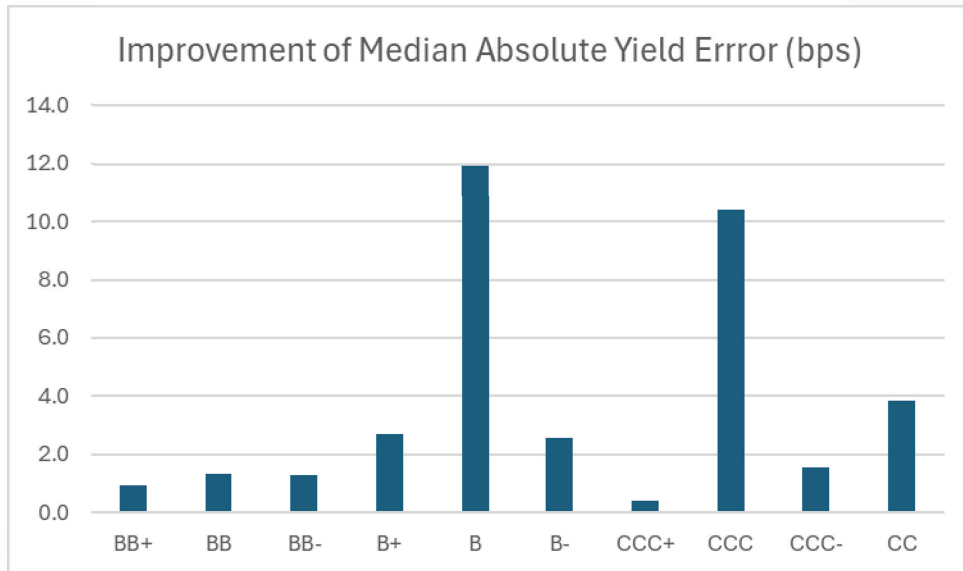




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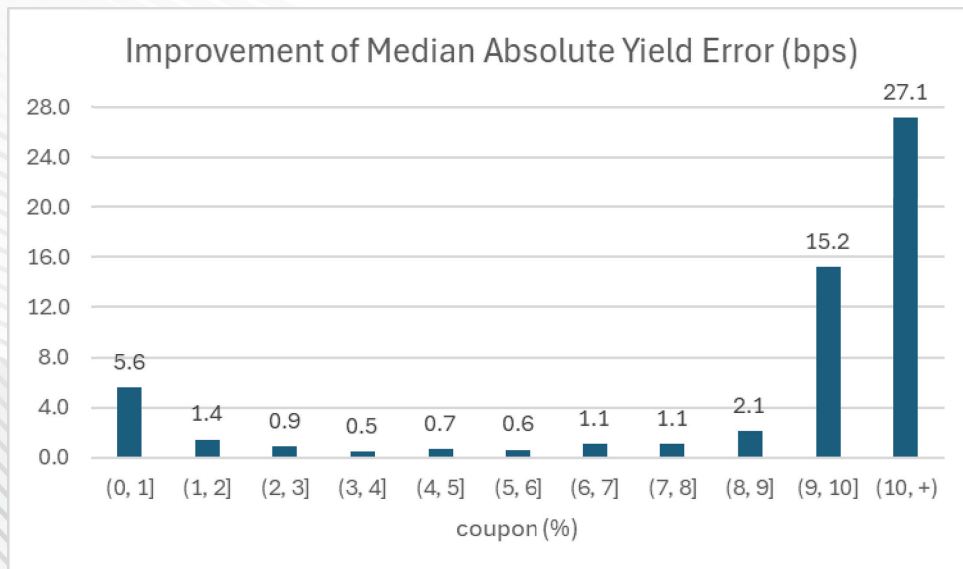
## HIGH YIELD MUNICIPAL BOND PERFORMANCE

When looking at high yield (HY) municipal bonds, and comparing the Recent model to the December 2024 model, each HY rating category witnessed pricing accuracy improvements as illustrated below:



## COUPON ANALYSIS

When looking at coupons for bonds traded during the 5-month backtesting period, and comparing the Recent model to the December 2024 model, each coupon category witnessed pricing accuracy improvements as illustrated below:





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## SUMMARY

- SOLVE remains dedicated to upholding our industry-leading accuracy of predictive pricing in SOLVE Px™. Our latest December 2024 enhancement underscores our commitment to model transparency and excellence.
- SOLVE's December 2024 model boosted accuracy performance by over 10%, as evidenced by the median of all absolute errors across nearly every category. This update notably improves high-yield bond pricing accuracy and significantly reduces tail errors.
- SOLVE Px provides an unbiased ML-driven price designed and calibrated to accurately predict the next trade price based on size and side, including several hundred feature inputs for over 900,000 Municipal bonds.
- SOLVE Px is unique in that it includes SOLVE's proprietary Quotes data in addition to trade data to drive predictions with low error rates.
- SOLVE takes into consideration trades of all sizes (institutional and retail) to extract and understand insightful data as part of our front-office pricing solution.



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