



**MARKERR**

**Unlock the Power  
of RealRent  
Multi-Family  
Forecast**

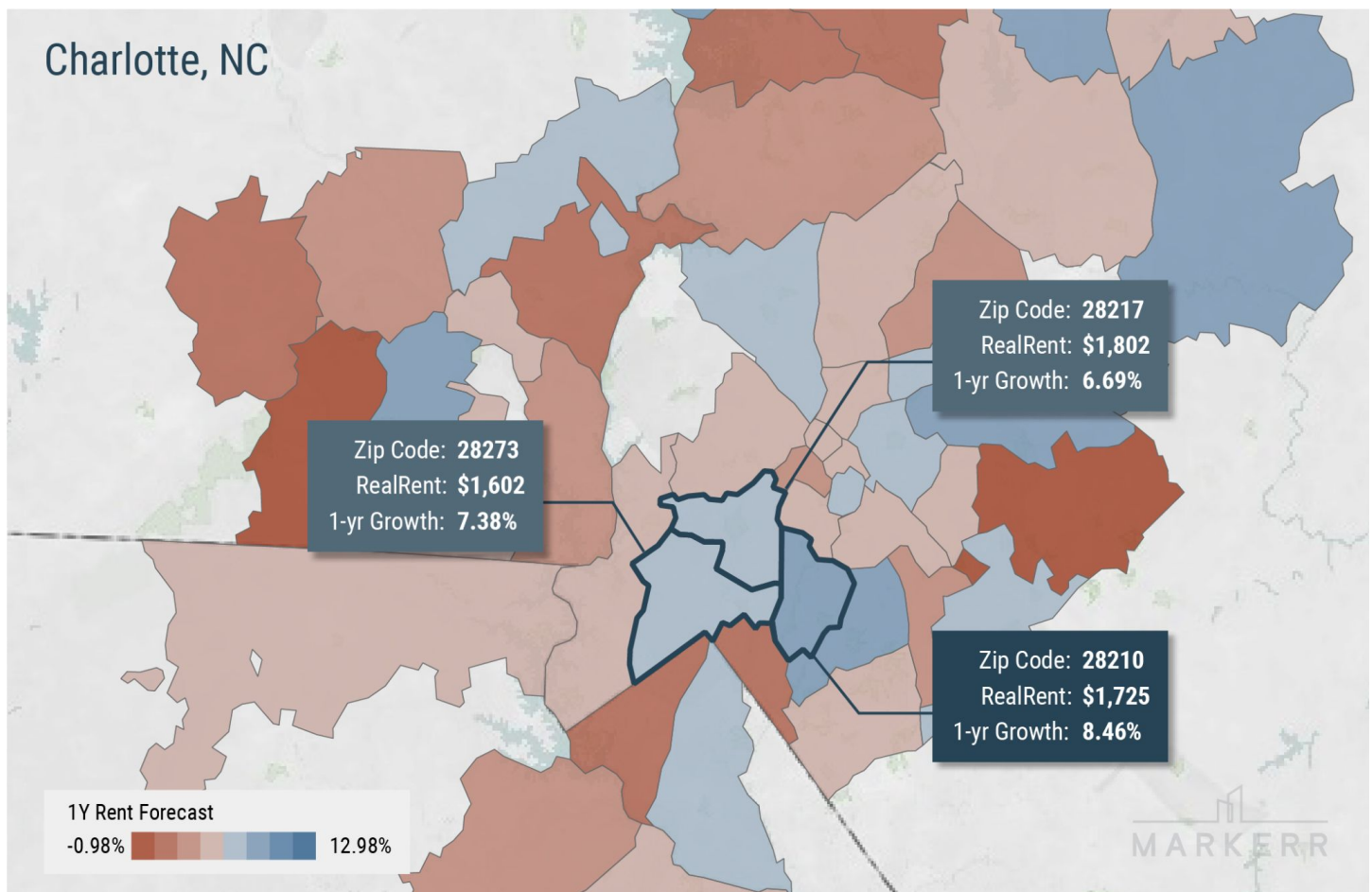
**April 2023**

## The Advantages of Markerr's Quantitative Approach to Rent Forecasting

A major benefit of working with machine learning models is their ability to process a significant number of inputs at scale, allowing for the validation of key drivers across multiple geographic granularities. Markerr's RealRent Multi-Family Forecast leverages a sophisticated machine learning model that takes advantage of these benefits while delivering unparalleled transparency across the forecast history, including a full backtest. Most importantly, Markerr's superior forecast precision ultimately leads to higher ROI for commercial real estate investors.

Many existing rent forecast models follow an econometric approach where the relationships between supply and demand variables are rigidly pre-specified, preventing the model from learning anything new. Markerr follows a very different approach using machine learning to let the hidden relationships within the data determine the structure of the model. All of these relationships are validated using historical data and sophisticated statistical techniques so that the forecasts will outperform legacy approaches. This approach is applied across both MSA level and ZIP code level forecast models and lets the differences in supply and demand dictate the outcome for each respective geographic granularity.

## Markerr's RealRent Forecast Highlights Opportunities at Low Granularities

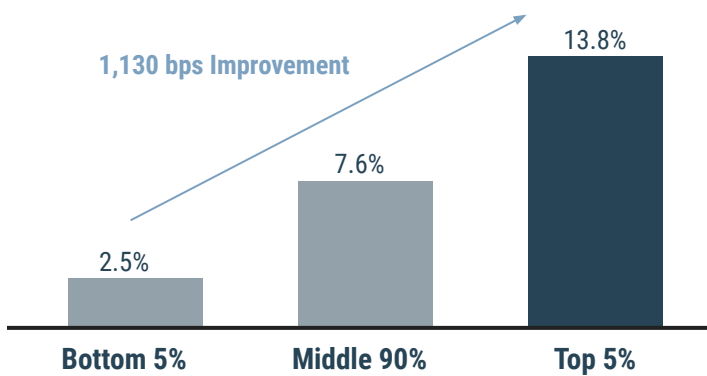


# Markerr RealRent Forecast Leads to Significantly Higher ROI

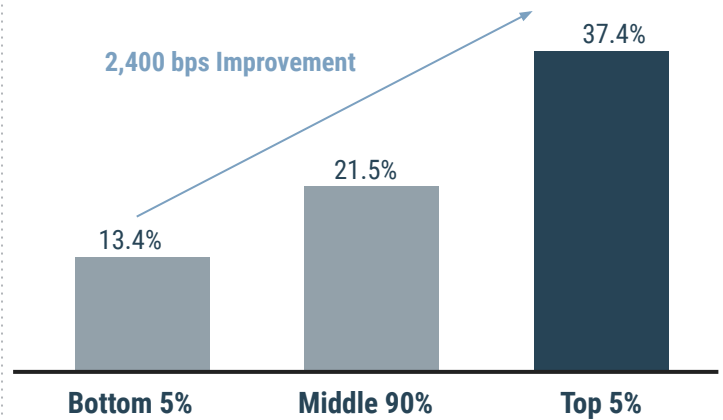
Using the Markerr RealRent forecast to select investment areas can produce an additional ~\$9 million in profit in year one and ~\$19 million in profit by year five on a \$78 million purchase. This equates to a 11.4% ROI delta in year one and 24.0% delta in year five. Said another way, the \$11 million one-year profit from investing in the top 5% of markets is about 5.6-times larger than the \$2 million profit from investing in the bottom 5% of markets on an unlevered basis.

Results for this come from a historical backtest where the forward performance of the top, middle, and bottom quantiles of ZIP codes is tracked based on the historical rent-growth forecasts. Markerr ordered the forecasts from highest to lowest (in terms of rent forecast) and used the top 5% (150 ZIP codes), middle 90% (2,700), and bottom 5% (150) as the subject groupings. This methodology is explained in full in the Appendix Methodology section.

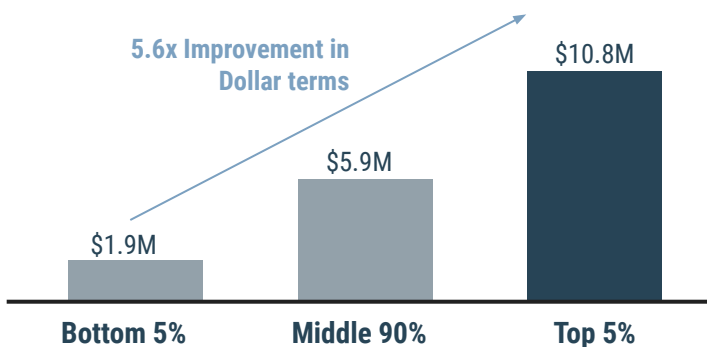
**Investing in Markerr's Top 5% forecasted ZIP codes yields a 1,130 bps 1-YR ROI improvement over Bottom 5%**



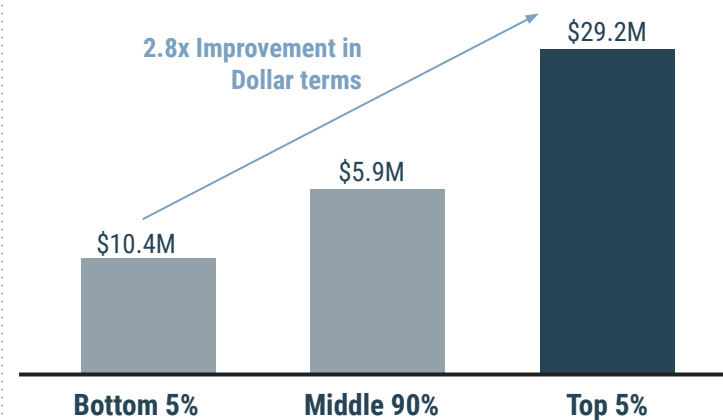
**Over a 5-YR investment horizon, Top 5% forecasted ZIP codes return more than 2,400 bps**



**Top 5% forecasted ZIP codes result in a 5.6x 1-YR ROI improvement in dollar terms over Bottom 5%**



**Top 5% forecasted ZIP codes would see a 2.8x 5-YR ROI improvement in dollar terms over Bottom 5%**



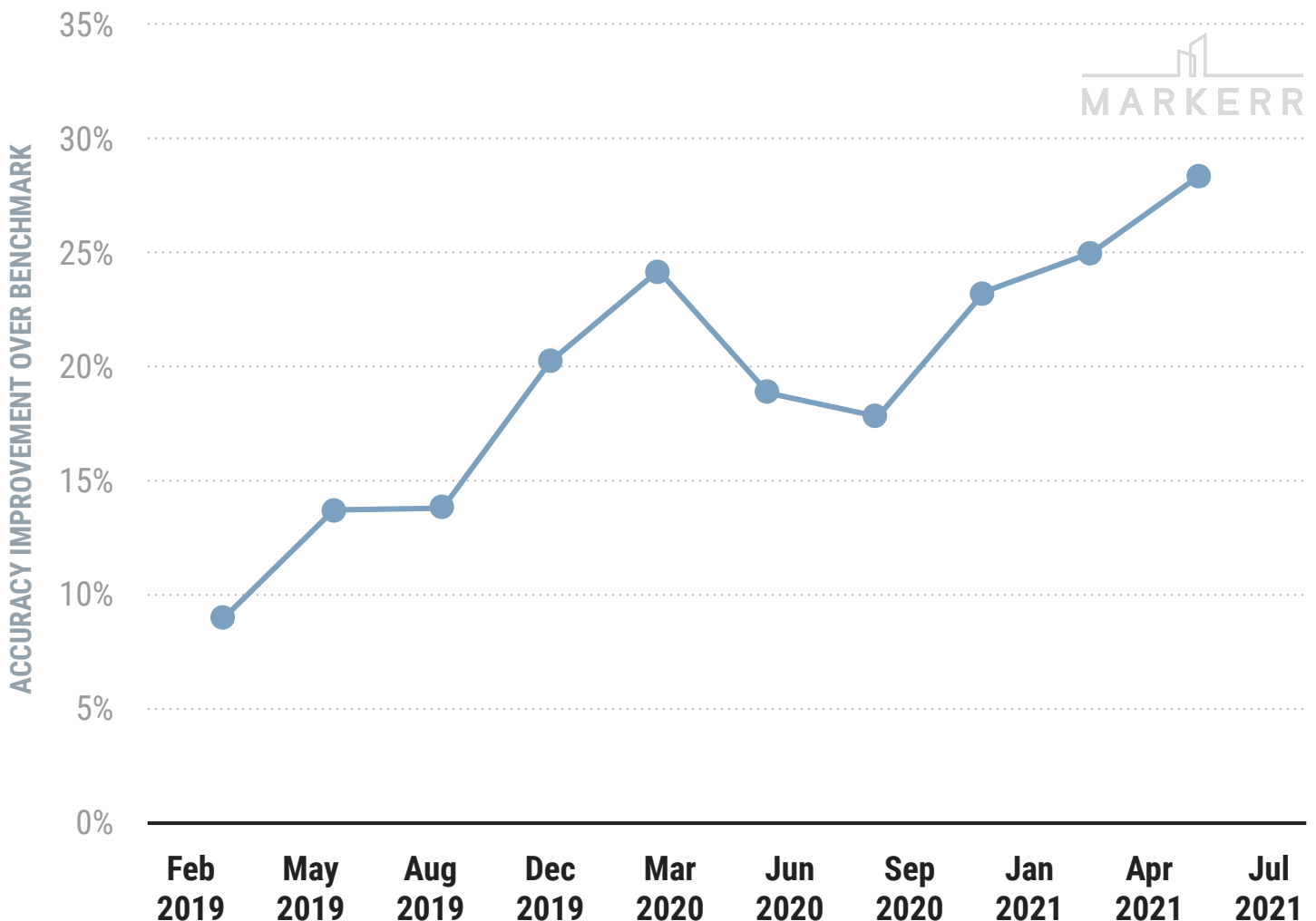
The assumptions and methodology of this analysis are discussed in greater detail in the Methodology section of the Appendix.

# The Power of the RealRent Forecast: Precision, Accuracy and Transparency

A common way to create a ZIP code level rent forecast is to look at the past year of growth in the ZIP code and simply assume the same amount of growth will occur in the future. Because it is so easy to implement this is widely used in the industry. Markerr's RealRent forecast is ~30% more accurate than this industry benchmark in 2022, as measured by a backtest over the last three years. As illustrated in the previous section, this additional accuracy leads to a substantially larger return over the course of a 5-year investment.

The chart below shows the quarter-by-quarter accuracy of the Markerr forecast versus the benchmark over the last three years. During this time, that contained multiple macro-economic backdrops (pre-Covid normalcy, Covid, and the current high inflation period), the RealRent forecast was always better than the benchmark. Additionally, the amount of outperformance has been increasing over time, and the current over-performance at the right-hand end of the plot is ~30%.

## Markerr's Forecast Accuracy versus Industry Benchmark Continues To Improve



# Markerr Forecast Leverages a Unique Variety of Data Inputs Combined with the Power of Machine Learning to Generate Alpha

Markerr is the only data platform that has integrated comprehensive multi-family rental data and proprietary market drivers with advanced machine learning to deliver accurate real-time insights and transparent forecasts.

RealRent provides the most reliable current and historical data for over 250 Metropolitan Statistical Areas (MSAs) and more than 3,000 ZIP codes across the United States. The platform is fueled by current and historical rent data derived from a diverse network including:



**Historical Market Rents**



**Deed and Title**



**Listings**



**New Permits**



**Surveys**



**Construction Activity**



**Transactions**

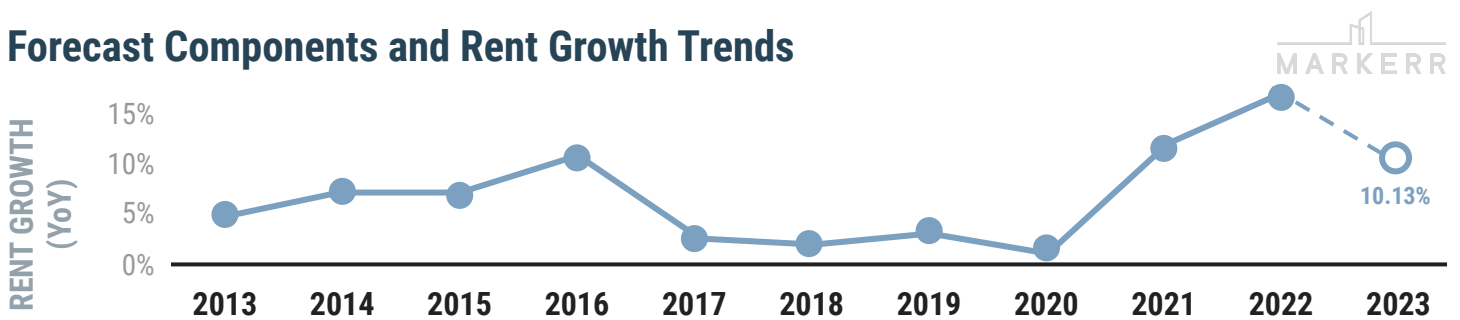
# Forecasting Rent Growth With Transparent Data Science

Markerr provides the highest level of performance transparency, consistently measuring performance and benchmarking against multiple forecasting methodologies. Critical data inputs that impact each forecast and are unique for every ZIP code are shared with clients. This data has been sourced, cleaned, and validated over time.

The output of the Markerr forecast model is more than a single estimate of the future rent growth for a ZIP code or market. A detailed decomposition of the forecast against all of the individual types of supply and demand data is shared. This allows a user to understand all of the detailed drivers for a market, instead of being presented with a black box spitting out an answer.

For example, in the screenshot below from the Markerr RealRent dashboard, the forecast for ZIP code 37013 in the Nashville MSA is 10.13%. The forecast predicts that the Southeast area of Nashville will continue to perform well due to strong home price appreciation, a high occupancy rate over all of the last three years, and employment trends.

## Forecast Components and Rent Growth Trends



Category	Forecast Feature	Feature Value	Value Rank	Effect	Forecast Percent
Employees	1Y Growth 12 month Lag	12.69%	568	-0.61%	1.38%
	1Y Growth 24 month Lag	-13.57%	3,544	0.24%	0.54%
	1Y Growth 24 month Rolling Std Dev	9.45%	757	3.72%	8.48%
	Employees 1Y Growth Current	11.80%	231	-0.14%	0.31%
	Employees 1Y Growth Current vs Historical	10.45%	350	0.09%	0.20%
Home Prices	Home Prices Real 1Y Growth	21.41%	270	13.63%	31.04%
	Home Prices Real 1Y Growth 12 Month Lag	8.54%	1,167	-1.18%	2.70%
	Home Prices Real 1Y Growth 24 Month Lag	4.39%	1,022	0.14%	0.33%
Median Gross Income	Median Gross Income 1Y Growth 12 Month Lag	2.52%	1,664	0.02%	0.05%
	Median Gross Income 1Y Growth 24 Month Lag	5.52%	3,149	-0.19%	0.44%
	Median Gross Income 1Y Growth 24 Month Lag Rolling Std Dev	2.89%	2,938	0.19%	0.42%
	Median Gross Income 1Y Growth Current	8.14%	1,261	0.09%	0.20%
	Median Gross Income 1Y Growth Short Term vs Long Term	3.82%	867	0.11%	0.25%

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## Forecast Components and Rent Growth Trends (Cont'd)



Category	Forecast Feature	Feature Value	Value Rank	Effect	Forecast Percent
<b>Occupancy Rates</b>	Occupancy Rate 12 Month Lag	95.18%	3,549	2.43%	5.53%
	Occupancy Rate 24 Month Lag	95.13%	3,262	2.34%	5.33%
	Occupancy Rate 24 Month Rolling Std Dev	1.00%	1,037	-0.03%	0.07%
	Occupancy Rate Current	96.87%	3,135	13.86%	31.58%
	Occupancy Rate Short Term vs Long Term	2.00%	510	0.05%	0.11%
<b>Permit Multifamily</b>	Permit Multifamily Units 1Y Growth 12 Month Lag	65.64%	683	0.00%	0.00%
	Permit Multifamily Units 1Y Growth 24 Month Lag	53.12%	935	0.00%	0.01%
	Permit Multifamily Units 1Y Growth 24 Month Rolling Std Dev	29.25%	3,073	0.00%	0.00%
	Permit Multifamily Units 1Y Growth Current	-43.31%	4,280	0.00%	0.01%
	Permit Multifamily Units 1Y Growth Short Term vs Long Term	-53.42%	4,022	0.00%	0.01%
<b>Permit Single Family</b>	Permit Single Family Units 1Y Growth 12 Month Lag	5.18%	3,290	-0.01%	0.01%
	Permit Single Family Units 1Y Growth 24 Month Lag	9.96%	1,085	0.03%	0.06%
	Permit Single Family Units 1Y Growth 24 Month Rolling Std Dev	10.44%	3,385	0.01%	0.03%
	Permit Single Family Units 1Y Growth Current	1.63%	1,551	0.03%	0.07%
	Permit Single Family Units 1Y Growth Short Term vs Long Term	6.08%	1,429	0.00%	0.01%
<b>Population</b>	Population 1Y Growth Current	2.22%	675	-0.04%	0.10%
	Population 1Y Growth vs 12 Month Lag	0.96%	398	-0.04%	0.09%
	Population Current	101,369 People	17	1.31%	2.98%
<b>Rent</b>	Rent Mean 1Y Growth 12 Month Lag	3.32%	2,867	-0.20%	0.46%
	Rent Mean 1Y Growth 24 Month Lag	5.99%	635	0.06%	0.14%
	Rent Mean 1Y Growth 24 Month Rolling Std Dev	4.56%	3,494	-0.18%	0.41%
	Rent Mean 1Y Growth 1Y Growth Current	11.27%	2,403	-2.28%	5.18%
	Rent Mean 1Y Growth Short Term vs Long Term	7.16%	1,661	-0.64%	1.46%

Detailed insights like this provide an unrivaled level of understanding at a very granular level and offer answers investment committees demand.

## Methodology Appendix

Markerr's RealRent Forecast leads to significantly higher ROI in years 1-5, as discussed above. The below assumptions can be changed and the percent returns will remain the same, but the dollar values will vary based upon the respective investment strategy utilized. The assumptions are monthly rent of \$1,500, 300 units, 65% NOI margin, and a 4.5% cap rate. The revenue, expense, NOI, and purchase price are calculated based on the following assumptions:

Markerr Assumptions	Top 5%	Middle 90%	Bottom 5%
Monthly Rent	\$1,500	\$1,500	\$1,500
Units	300	300	300
NOI Margin	65.00%	65.00%	65.00%
Revenue	\$5.40M	\$5.40M	\$5.40M
Expenses	\$1.89M	\$1.89M	\$1.89M
NOI	\$3.51M	\$3.51M	\$3.51M
Cap Rate	4.50%	4.50%	4.50%
Asset Value	\$78M	\$78M	\$78M

*Blue colored fonts are Markerr assumptions*

To test the impact of investing in subject groups (i.e. Top 5%) of Markerr's Forecasted ZIP codes, the rent forecast is the only variable in this experiment, while rents, units, cap rates and NOI margins are held constant. The full set of forecast assumptions for revenue, expense, and NOI growth are included as well.

Operating Fundamentals Forecast		Top 5%	Middle 90%	Bottom 5%
Rent Growth	– T+1	11.9%	7.7%	4.3%
	– T+2	9.1%	6.3%	5.1%
	– T+3	7.1%	4.9%	4.5%
	– T+4	3.5%	3.5%	3.5%
	– T+5	3.5%	3.5%	3.5%
Expense Growth	– T+1	3.5%	3.5%	3.5%
	– T+2	3.3%	3.3%	3.3%
	– T+3	3.0%	3.0%	3.0%
	– T+4	3.0%	3.0%	3.0%
	– T+5	3.0%	3.0%	3.0%
NOI Growth	– T+1	16.4%	10.0%	4.7%
	– T+2	12.0%	7.8%	6.1%
	– T+3	8.9%	5.8%	5.3%
	– T+4	3.7%	3.7%	3.8%
	– T+5	3.7%	3.7%	3.8%

*Blue colored fonts are Markerr rent growth forecasts*



The ROI calculation is ultimately based on asset value changes. In multi-family real estate, asset values are determined by NOI/cap rate. The going-in cap rate is assumed to be 4.5% and will widen conservatively by 10 bps in each year during the holding period. With the projected NOI and the assumed cap rate for each year, it is possible to determine the delta between subject groups.

Asset Value Calculations	Top 5%	Middle 90%	Bottom 5%
<b>Current</b>			
NOI	\$3.51M	\$3.51M	\$3.51M
Cap Rate	4.50%	4.50%	4.50%
Asset Value	\$78M	\$78M	\$78M
<b>T+1</b>			
NOI	\$4.08M	\$3.86M	\$3.68M
Cap Rate	4.60%	4.60%	4.60%
Asset Value	\$88.80M	\$83.91M	\$79.93M
<b>T+2</b>			
NOI	\$4.57M	\$4.16M	\$3.90M
Cap Rate	4.70%	4.70%	4.70%
Asset Value	\$97.31M	\$88.56M	\$83.01M
<b>T+3</b>			
NOI	\$4.98M	\$4.40M	\$4.11M
Cap Rate	4.80%	4.80%	4.80%
Asset Value	\$103.80M	\$91.77M	\$85.56M
<b>T+4</b>			
NOI	\$5.17M	\$4.57M	\$4.26M
Cap Rate	4.90%	4.90%	4.90%
Asset Value	\$105.46M	\$93.25M	\$86.96M
<b>T+5</b>			
NOI	\$5.36M	\$4.74M	\$4.42M
Cap Rate	5.00%	5.00%	5.00%
Asset Value	\$107.18M	\$94.80M	\$88.42M