Skyline Capital Partners: Market Selection & Unit Mix Recommendation

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Project Mandate

Skyline Investment Partners aims to optimize investment decisions for its new multifamily development by evaluating historical property performance across markets and applying simulation-based techniques to determine the optimal unit mix. This analysis focuses on:

- **Market Performance Assessment:** Evaluating historical data on Net Operating Income, Vacancy Rates, Rent Growth, Operating Expenses, and Equity Value Growth across potential markets.

- **Risk-Return Analysis**: Identifying and quantifying risk factors that influence profitability using statistical techniques such as standard deviation and coefficient of variation.

- **Simulation-Based Unit Mix Optimization:** Applying Monte Carlo Simulation and linear optimization to determine the ideal mix of Studio and 1-Bedroom units for the selected market, balancing profitability and feasibility.

This initiative will enable data-driven investment decisions that maximize returns while effectively managing risk, ensuring Skyline's project aligns with both market demand and internal financial goals.

Overview

Market Selection Analysis
Recommended Market: New Hope

- Offers **highest profitability** across NOI, rent growth, and equity value.
- Although risk is highest, the **return potential outweighs the volatility**, aligning with Skyline's investment goals.

Optimal Unit Mix (New Hope)

Total Units: 85
Optimal Mix: 55 Studios / 30 One-Bedrooms

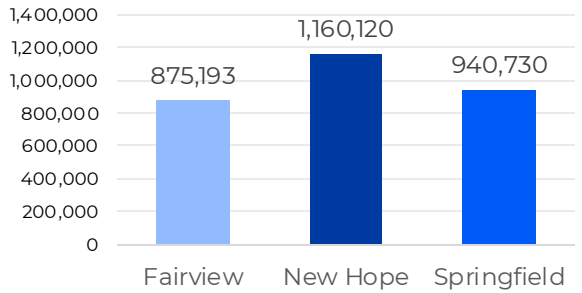
- Studios drive higher revenue per sq. ft.
- 1-Bedrooms add diversity to attract broader tenant base.

Invest in New Hope with a 55 Studio / 30 One-Bedroom mix to maximize profitability while managing operational risk.

Market Selection Analysis

Profitability Comparison of Class B Properties Across Markets

Net Operating Income (NOI)

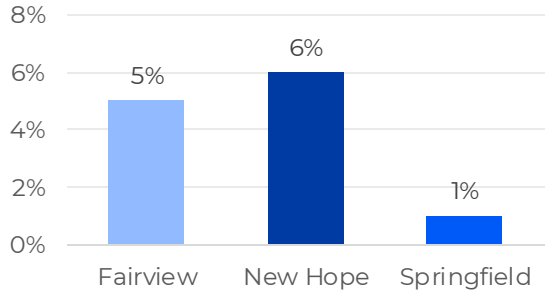


Fairview: Lags behind with relatively lower profitability.

New Hope: Strongest NOI performance across all three markets.

Springfield: Performs better than Fairview but still below New Hope.

Rent Growth

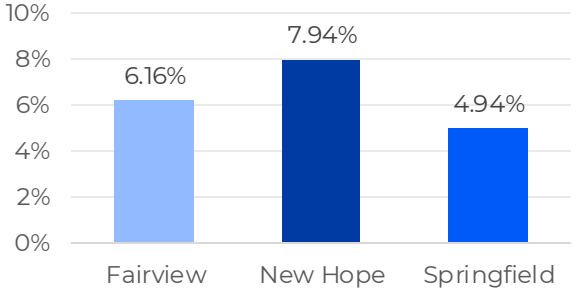


Fairview: Consistent rent growth, but not market-leading.

New Hope: Best rent growth, indicating strong demand.

Springfield: Extremely low rent growth, signaling demand concerns.

Equity Growth



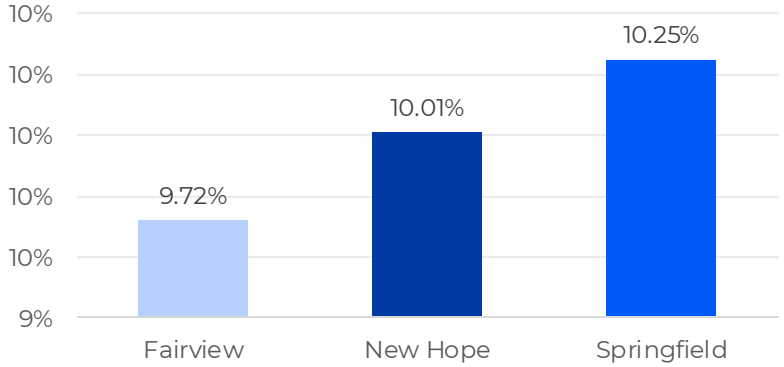
Fairview: Moderate equity growth, aligned with rent performance.

New Hope: Highest equity growth, reflecting strong asset appreciation.

Springfield: Lowest equity growth, indicating weaker investment returns.

Risk Comparison of Class B Properties Across Markets

Vacancy Rate

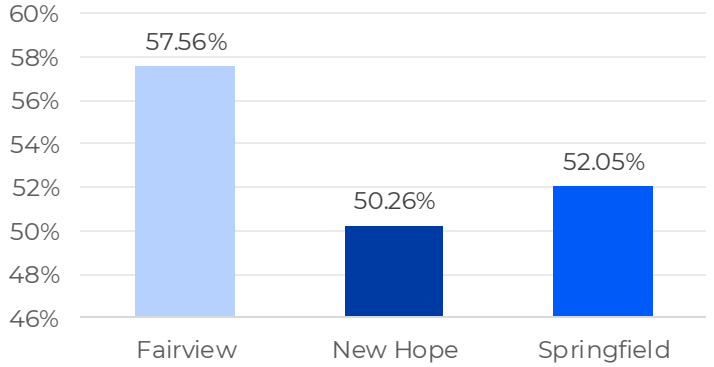


Fairview: Lowest vacancy rate (9.72%), indicating stable tenant demand.

New Hope: Slightly higher vacancy (10.01%) than Fairview but still reasonable.

Springfield: Highest vacancy rate (10.25%), signalling potential leasing challenges.

Operating Expense Ratio



Fairview: Highest expense ratio (57.56%), suggesting operational inefficiency.

New Hope: Lowest expense ratio (50.26%), indicating better cost control.

Springfield: Moderate expenses (52.06%), but still higher than New Hope.

Risk factors affecting Profitability

Vacancy Rate Risk	Higher vacancy means lost rent and less stable income. Measured using Coefficient of Variation (CV)* to capture volatility relative to average vacancy rate.
Operating Expense Risk	Unpredictable expenses reduce profitability and create operational uncertainty. Measured using CV to show volatility relative to average expenses.
Equity Value Growth Risk	Fluctuations in property appreciation make long-term returns less reliable. Measured using CV to capture volatility relative to average equity growth.
Net Operating Income Volatility	Even with strong average NOI, unpredictable year-to-year swings make cash flow management harder. Measured using Standard Deviation (SD) to show absolute fluctuation in dollars across buildings.

*CV measures risk relative to average performance (higher = riskier).

Risk Analysis: Volatility and Uncertainty

City	Vacancy Rate Coefficient of Variance	Operating Expense Ratio Coefficient of Variance	Equity Value Growth Coefficient of Variance	Net Operating Income Standard Deviation
Fairview	30.38%	6.58%	11.89%	254275.1614
New Hope	31.51%	9.12%	14.44%	318842.7553
Springfield	29.85%	8.82%	13.45%	260746.9409

Fairview

- **Moderate vacancy risk:** some fluctuation in demand.
  Lowest expense risk: costs are most stable.
- **Moderate equity growth risk:** balanced property appreciation.
- **Lowest NOI volatility:** most predictable income stream.

New Hope

- **Highest vacancy risk:** demand is very unpredictable.
- **Highest expense risk:** costs fluctuate the most.
- **Highest equity growth risk:** asset values are volatile.
- **Highest NOI volatility:** profitability is hardest to predict.

Springfield

- **Lowest vacancy risk:** most stable occupancy.
- **Moderate expense risk:** better than New Hope, worse than Fairview.
- **Moderate equity growth risk;** middle of the pack.
- **Moderate NOI volatility:** balanced risk and predictability.

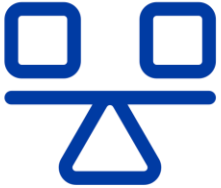
Risk and Return: Market Comparison

Higher Returns Come with Higher Volatility: New Hope

New Hope offers the strongest upside in NOI, rent growth, and equity appreciation, but also experiences the highest vacancy volatility, expense swings, and NOI fluctuations.

Lower Risk Markets Limit Future Returns: Springfield

Springfield offers the most stable performance with low vacancy and expense volatility, but rent growth and equity appreciation are weak, limiting upside.



Balanced Option: Fairview

Fairview falls between New Hope and Springfield it offers moderate returns with moderate expense risk. However, high operating expenses erode profitability, making it less attractive than New Hope.

Should Invest in New Hope

Markets	Expected Return	Risk (Volatility)	Recommendation for Skyline
New Hope	**High** (NOI: $1.16M, Rent Growth: 6%, Equity Growth: 7.94%)	**High** (Vacancy CV: 31.51%, Expense CV: 9.12%, NOI SD: $318K)	**Recommended**
Fairview	**Moderate** (NOI: $875K, Rent Growth: 5%, Equity Growth: 6.16%)	**Moderate** (Vacancy CV: 30.38%, Expense CV: 6.58%, NOI SD: $254K)	**Possible**
Springfield	**Low** (NOI: $940K, Rent Growth: 1%, Equity Growth: 4.94%)	**Low** (Vacancy CV: 29.85%, Expense CV: 8.82%, NOI SD: $260K)	**Not recommended**

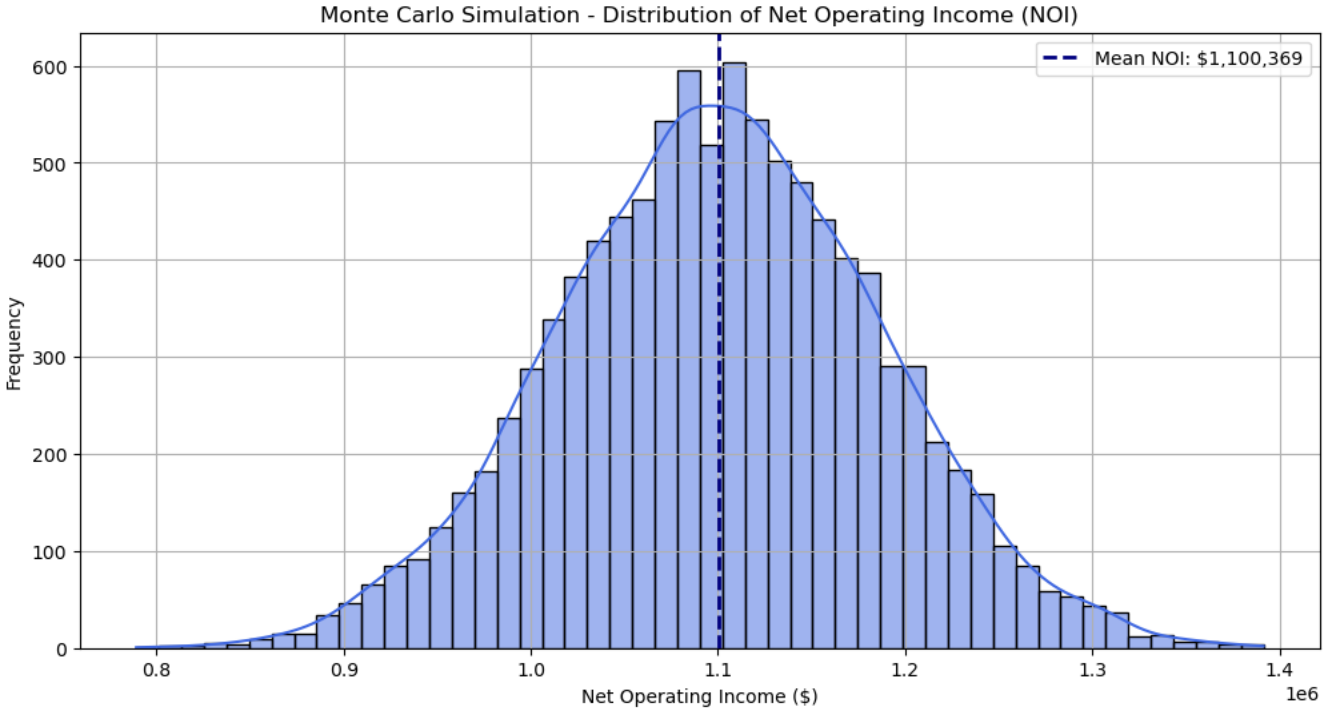
Simulation-Based Unit Mix Optimization

Optimal Unit Mix in New Hope for Class B apartment

Total Units: 85

Optimal Studios: 55

Optimal One Bedrooms: 30



Simulation Results: Profitability & Risk Insights

55 Studios & 30 One-Bedrooms deliver the highest expected profit.

Expected Annual Profit (NOI): $1.1M, balancing strong revenue with realistic costs.

Profit Volatility (Std Dev): $86K, showing manageable risk under uncertain rents & costs. Studios drive higher revenue per sq. ft., while one bedrooms diversify tenant mix.

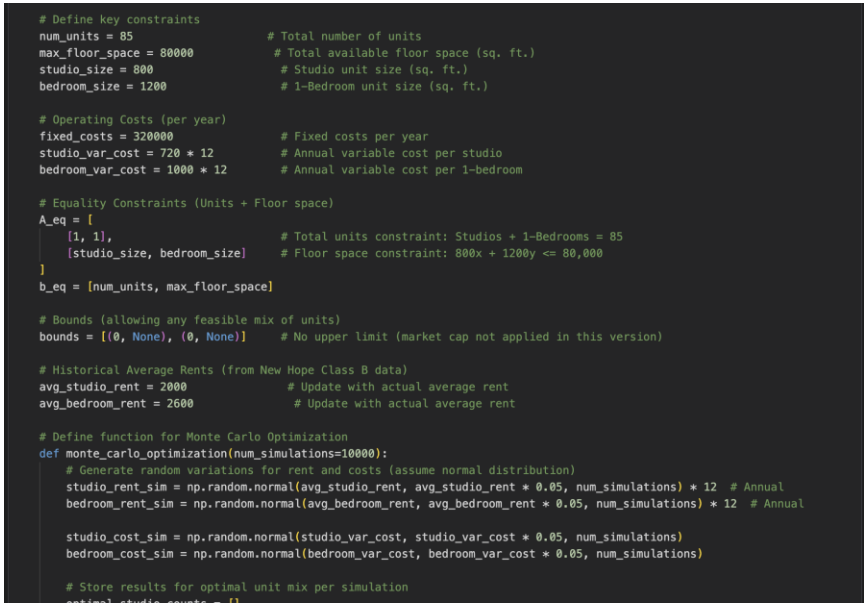
This mix maximizes profit while maintaining operational stability: making it the recommended choice for Skyline Capital.

Thanks

Appendix: Use of Generative AI

Data Processing & Python Scripting

- Assisted in writing **Python scripts** for Monte Carlo simulation for unit mix optimization and to draw the plot distribution.
- Took help to troubleshoot errors and refine **data analysis techniques** in Pandas and NumPy.
- Example:



```
# Define key constraints
num_units = 85                  # Total number of units
max_floor_space = 80000          # Total available floor space (sq. ft.)
studio_size = 800                # Studio unit size (sq. ft.)
bedroom_size = 1200              # 1-Bedroom unit size (sq. ft.)

# Operating Costs (per year)
fixed_costs = 320000             # Fixed costs per year
studio_var_cost = 720 * 12       # Annual variable cost per studio
bedroom_var_cost = 1000 * 12     # Annual variable cost per 1-bedroom

# Equality Constraints (Units + Floor space)
A_eq = [
    [1, 1],                      # Total units constraint: Studios + 1-Bedrooms = 85
    [studio_size, bedroom_size]  # Floor space constraint: 800x + 1200y <= 80,000
]
b_eq = [num_units, max_floor_space]

# Bounds (allowing any feasible mix of units)
bounds = [(0, None), (0, None)]  # No upper limit (market cap not applied in this version)

# Historical Average Rents (from New Hope Class B data)
avg_studio_rent = 2000           # Update with actual average rent
avg_bedroom_rent = 2600          # Update with actual average rent

# Define function for Monte Carlo Optimization
def monte_carlo_optimization(num_simulations=10000):
    # Generate random variations for rent and costs (assume normal distribution)
    studio_rent_sim = np.random.normal(avg_studio_rent, avg_studio_rent * 0.05, num_simulations) * 12  # Annual
    bedroom_rent_sim = np.random.normal(avg_bedroom_rent, avg_bedroom_rent * 0.05, num_simulations) * 12  # Annual

    studio_cost_sim = np.random.normal(studio_var_cost, studio_var_cost * 0.05, num_simulations)
    bedroom_cost_sim = np.random.normal(bedroom_var_cost, bedroom_var_cost * 0.05, num_simulations)

    # Store results for optimal unit mix per simulation
```