Multifamily Valuation in the City of Richmond

Affordable vs Market Rate Approaches

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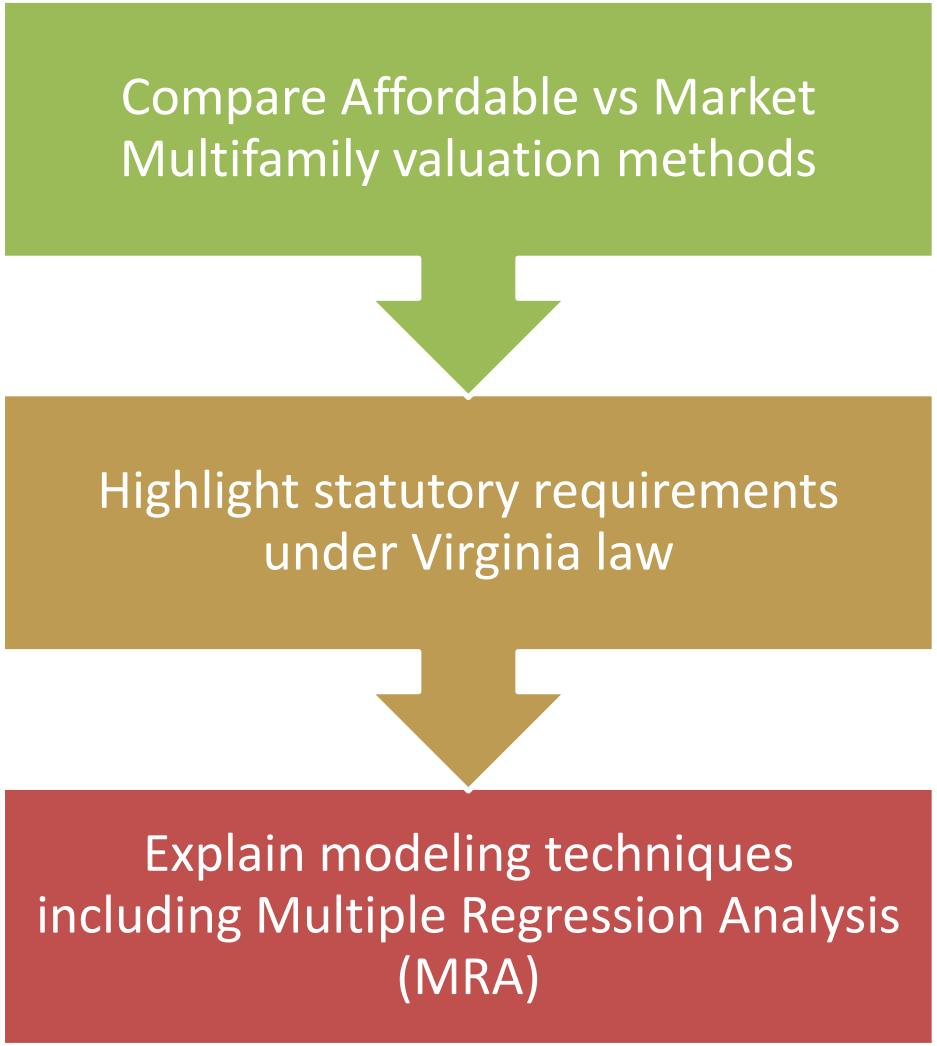
City of Richmond Assessor's Office

Objectives


Compare Affordable vs Market Multifamily valuation methods
Highlight statutory requirements under Virginia law
Explain modeling techniques including Multiple Regression Analysis (MRA)

What Is Multifamily Property?

DEFINED BY IAAO: 2+ LIVING UNITS ASSESSED AS ONE ENTITY

INCLUDES DUPLEXES, APARTMENT HOUSES, AND CO-OPS

EXCLUDES HOTELS AND MOTELS

MF Assignment for this presentation deals with investment-grade or larger unit multifamily properties (generally 50+ units)

Apartment Types

High-Rise: 12+ floors, urban areas, shared amenities

Mid-Rise: 5–12 floors, urban/suburban, some privacy

Garden-Style: ≤4 floors, suburban, multi bldgs., more green space

Low-Rise: ≤4 floors, urban, Generally one building (e.g., Warehouse conv.)

Apartment Types (Pros/Cons)

High-Rise Apartment

Pros:

- Great views (higher floors)
- Parking (if available) indoor/covered
- Top-notch amenities pools, fitness center
- Street and traffic noise is less likely

Cons:

- More communal/shared spaces, including elevators, hallways, stairwells, mail rooms, and trash and recycling areas.
- Must wait for an elevator/parking garage
- Limited personal outdoor space/balcony

Apartment Types (Pros/Cons)

Garden-Style Apartment

Pros:

- Smaller buildings/fewer residents.
- More living space at a lower price
- Pet-friendly/Easy access to outdoors
- Closer to parking areas.

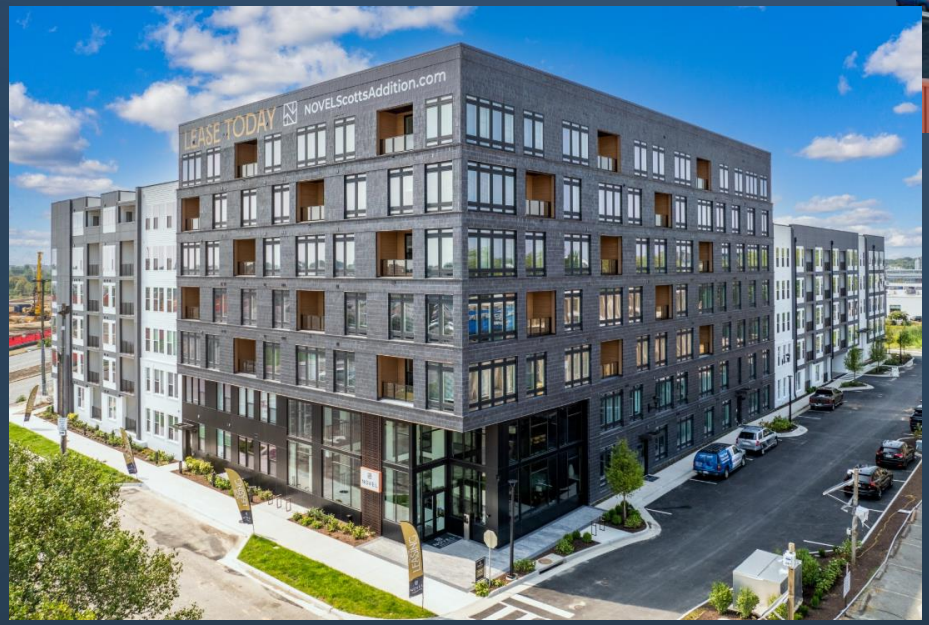
Cons:

- No elevator.
- Fewer amenities
- Outdoor parking is the standard

Mid-Rise Ex.
Ascend RVA

2023 (Downtown)

Built (recently) as Apartments (No Func.)



Mid-Rise Ex.
Novel Scott's Addition

2024 (Scott's Addition)

Garden-Style Ex.
The Point at Beaufont

1980 (Southside)

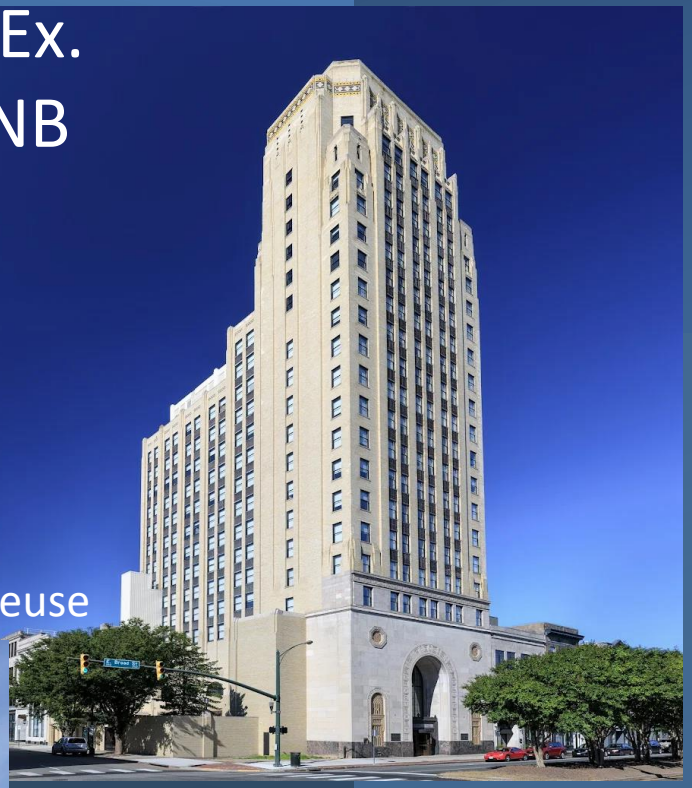
sprawling layout, multiple bldgs.
landscaped property, w/patios or balconies

Adaptive Reuse: 1 Scott's as a warehouse for the Sanitary Grocery Co.

Low-Rise Ex.
1 Scott's Addition

1935 (Scott's Addition)

High-Rise Ex.
Deco at CNB
23 Stories
Built in 1929
(Downtown)



More Examples of Adaptive Reuse

Mid-Rise Ex.
River Lofts
1897-1920 (Shockoe)

Rent Type Comparison

Market-Rate: No rent restrictions, Value Based on location, class/rating demand, amenities

Affordable: Rent-restricted, income-qualified tenants Supported by tax credits, nonprofits, or government

Market Rate Vs. Affordable Features

The primary differences:

Level of finishes, amenities, and location.

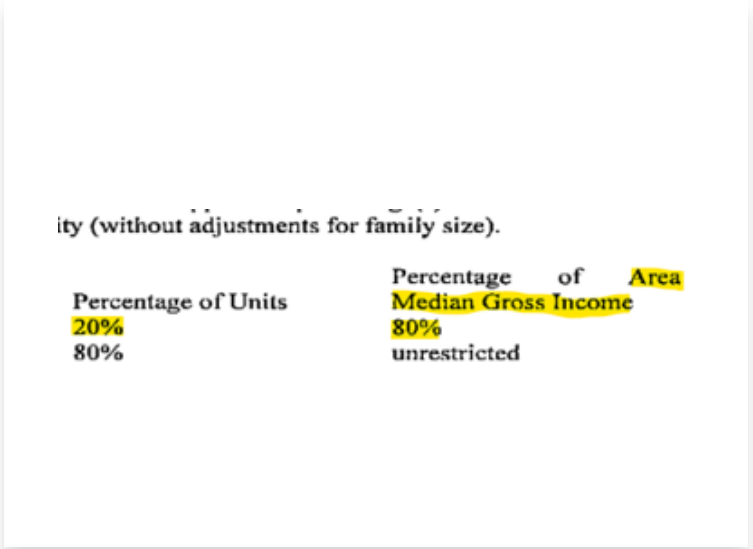
- Affordable housing-simpler finishes, fewer amenities, and may be in areas with less access to good schools/shopping, etc.
- Market-rate housing typically boasts higher-quality materials, more amenities, and is often located in more desirable area
- New Trend: There is some “blending” with lower Aff. Unit % projects appearing more like market-rate with design-e.g., 80% AMI

Ways to determine if Affordable Housing?

Use Agreements

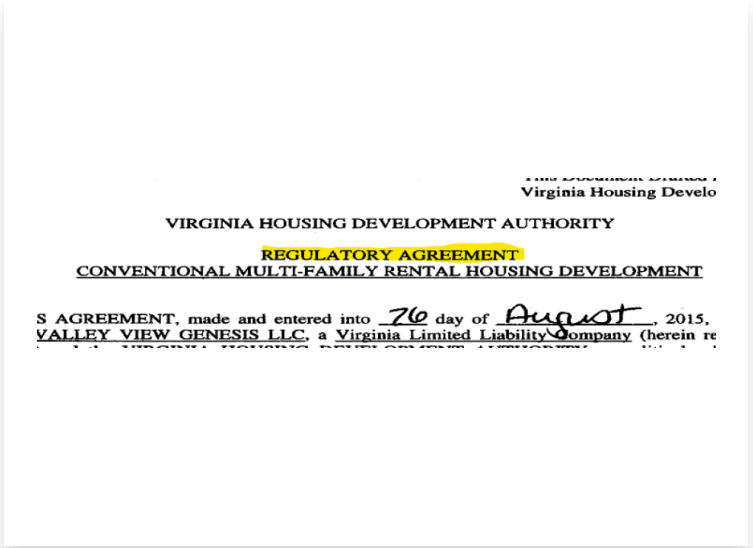
A legal document that restricts how a property can be used—specifically to **ensure long-term affordability** for housing developments that receive certain types of public funding, such as Low-Income Housing Tax Credits (LIHTC)

- **Low-Income Housing Tax Credit (LIHTC) – Federal Requirement**
- **After first 15 years, most properties** agree to a **15-year "Extended Use Period"**, for a **total of 30 years** of affordability.
- During this time, the property must comply with income and rent restrictions.



ity (without adjustments for family size).

Percentage of Units	Percentage of Area Median Gross Income
20%	80%
80%	unrestricted



Virginia Housing Develo

VIRGINIA HOUSING DEVELOPMENT AUTHORITY

REGULATORY AGREEMENT
CONVENTIONAL MULTI-FAMILY RENTAL HOUSING DEVELOPMENT

S AGREEMENT, made and entered into 26 day of August, 2015,
VALLEY VIEW GENESIS LLC, a Virginia Limited Liability Company (herein re

Ways to determine if Affordable Housing?

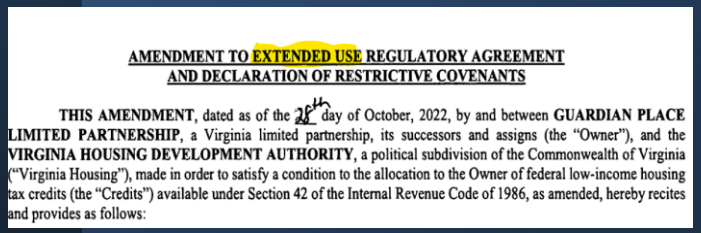
LIHTC Worksheet from HUD Database

HUD uses this data to understand the **scope and status of the affordable housing stock** in the U.S., even if it doesn't enforce LIHTC rules.

- It maintains the **LIHTC Database**, which includes:
- Property location, unit counts, rent levels
- Year allocated and year placed in service
- Program use (e.g., LIHTC-only or layered with other funding)

hud_id	project	proj_add	proj_cty	proj_st	yr_pis	yr_alloc
VAA19880	HILLTOP NORTH APTS	3510 E RICHMOND RD	RICHMONI	VA	1988	1988
VAA19890	NEWPORT MANOR	6701 CARNATION ST	RICHMONI	VA	1989	1988
VAA19890	SHOCKOE HILL II	200 HOSPITAL ST	RICHMONI	VA	1989	1988
VAA19920	CITY VENTURES	604 N 32ND ST	RICHMONI	VA	1992	1990
VAA19920	NEW CLAY HOUSE	1125 W CLAY ST	RICHMONI	VA	1992	1990
VAA19940	8 & 10 SOUTH 14TH STREET	8 S 14TH ST	RICHMONI	VA	1994	1992
VAA19940	CROWN SQUARE	4050A TANGLE DR	RICHMONI	VA	1994	1992
VAA19940	PARKWOOD PLACE	2024 PARKWOOD AVE	RICHMONI	VA	1994	1992
VAA19990	CARY 2000 I	2000 W CARY ST	RICHMONI	VA	1999	1992
VAA19940	GUARDIAN PLACE I	1620 N HAMILTON ST	RICHMONI	VA	1994	1993
VAA19950	LINCOLN MANOR	4101 N AVE	RICHMONI	VA	1995	1993
VAA19980	MARKET SLIP	2 S 17TH ST	RICHMONI	VA	1998	1993
VAA20020	CARY 2000 NORTH PHASE II	2009 W CARY ST	RICHMONI	VA	2002	1993
VAA19950	600 N 32ND ST	600 N 32ND ST	RICHMONI	VA	1995	1994
VAA19950	NORTH RIDGE	1121 DOVE ST	RICHMONI	VA	1995	1994

📊 IRS Implications of LIHTC Use Agreements (Summary)



AMENDMENT TO EXTENDED USE REGULATORY AGREEMENT
AND DECLARATION OF RESTRICTIVE COVENANTS

THIS AMENDMENT, dated as of the 25th day of October, 2022, by and between **GUARDIAN PLACE LIMITED PARTNERSHIP**, a Virginia limited partnership, its successors and assigns (the "Owner"), and the **VIRGINIA HOUSING DEVELOPMENT AUTHORITY**, a political subdivision of the Commonwealth of Virginia ("Virginia Housing"), made in order to satisfy a condition to the allocation to the Owner of federal low-income housing tax credits (the "Credits") available under Section 42 of the Internal Revenue Code of 1986, as amended, hereby recites and provides as follows:

Topic	Key Point	IRS Implication
Use Agreement	Required for all LIHTC properties	No agreement = No credits allowed
Compliance Period	First 15 years	Violations can trigger **credit recapture** + penalties
Extended Use Period	Years 16–30 (state-enforced)	IRS no longer enforces, but compliance still matters
Rent & Income Limits	Must follow federal AMI-based thresholds	Violations = **Loss of credits**, IRS Form 8823 filed
Annual Reporting	File IRS Forms 8609 & 8609-A; submit certifications	Missing reports = Audit risk or credit loss
Qualified Contract (Exit Option)	After Year 15, owner can request to exit program	Allowed under strict IRS rules but **rarely successful**

- LIHTC becomes hot-button issue (Council Meetings/Press)
- Misinformation and Misunderstandings abound
- Problem>Action>(Pre-Determined Solution)
- Various Affordable Housing agencies lobby for lower values
- Pressure on the Assessor (Use Actuals! Define Consider!)
- Appeals, Challenges, Court Cases, Questioning of Models…

Affordable Housing Politicized

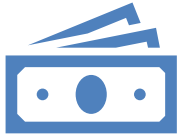
Our Response?

"What does not kill me makes me stronger."
-Friedrich Nietzsche and Kelly Clarkson

- High # of Appeals churned into data using actuals and for model (when no actuals)
- Encouraged participation (I&E submission), sit-downs, discussed points of contention
- Collaborated with peers/other jurisdictions, assessor friendly attorneys, continued to adhere to code
- Valuation accuracy and appeal success vastly improved over last four years

Virginia Code § 58.1-3295
Affordable Housing

Affordable housing must use income approach



Actual income and expense (I&E) must be considered

Model based on stratified I&E data if not submitted

There are exceptions to every rule, “Actuals” are given more than token consideration, but there are instances whereby submitted actuals (expenses) may be higher even for affordable housing (e.g., high utilities due to damaged water line or large capital expenditure, or include non allowable expenses, e.g., bond fees)

Consideration of Tax Credits disallowed

Tax Credits Disallowed in Valuation

- Federal or state income tax credits related to affordable rental housing property shall not be considered as real property or income attributable to real property for assessment purposes.
- This means that assessors are prohibited from including the value of LIHTCs when determining the fair market value of the property for real estate tax assessment purposes.
- This provision is found in Virginia Code § 58.1-3295. Assessment of real property; affordable rental housing property.

HUD Income Limits

HUD (U.S. Department of Housing and Urban Development) sets income limits/eligibility for various housing assistance programs.

Limits based on a % of the Area Median Income (AMI) for a specific location and household size.

$113,500 - Richmond, VA -2025 HUD Med Family Income

HUD defines "low-income" as 80% of AMI, "very low-income" as 50% of AMI, and "extremely low-income" as 30% of AMI

Calculating “Affordable” Rent

The 30% Rule:

The U.S. Department of Housing and Urban Development (HUD) defines "affordable housing" as housing on which the occupant is paying no more than **30 percent** of gross income for housing costs, including utilities. This principle ensures that households have sufficient funds remaining to cover other necessary expenses.

Example: If you are at the AMI ($113,500) or $9,400/month, your “low income” (80%) rent would be ($9,400 X 0.30)= $2,820 X 0.80 = $2,256/mo.

Affordable housing can consist of 20% of the units being at “low income” or 80% the AMI ($2,256/mo.)

Stratification in Affordable Housing

GROUPED BY STAR RATING: 2, 3, AND 4

SEPARATE MODELS FOR EACH CLASS USING ACTUAL I&E

HIGHER QUALITY (STAR 4) SHOWS HIGHER NOI/UNIT (E.G., LOW OR 80% AMI)

Neighborhoods were also consolidated as affordable housing generally gravitated in three main sections of the City (e.g., lower land values)

Affordable Housing Cap Rate Development per Code (FY26)

Derived from affordable sales (NOI ÷ Sale Price)

Lower cap = lower risk = higher value

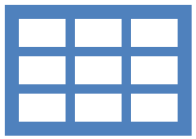
….affordable housing shall be assessed using the income approach based on the property's current use, income restrictions…*operating expense and* ***capitalization rate data from comparable affordable housing***

HOUSE BILL NO. 2245

Affordable Housing Example

NOI/Unit	Star Ra	Aff Unit %	NGBD 501
$6,637	3	100%	1

Class 3 affordable model using actual I&E data



NOI/unit calculated and applied to similar class properties

Cap rate used to finalize indicated value

Valuation using Actual I&E (Affordable Housing)

FY25 Income Valuation for Rent Restricted Properties		
Property Name (PID in column)		
Neighborhood Number		503
Star Class		4
Unit Count		42
Affordable Unit Count		13
Percentage of Affordable Housing		30%
Market Segment		LIHTC
Total Income		$788,169
Gross Potential Rent (Actual)	+	$751,464
Other income		$36,705
Vacancy & Collection Loss	6%	$47,290
Effective Gross Income	=	$740,879
Expenses W/O Taxes (OER % in adj. column)	32%	$239,520
Expenses w/ taxes	-	$239,520
Real Estate Taxes		$0
NOI (per unit in adj. column)	$11,637	$488,759
Reserves For Replacement	$300	$12,600
Cap Rate (loaded)		7.60%
Estimated Value (per unit in adj. column)	$153,119	$6,431,000
Land	+	$1,050,000
Building		$5,381,000
Total (Rounded)	=	**$6,431,000**

Property Name Key	parcel ID	NBHD	Units	% Affordable	Market Segment
Railyard Flats	S0000104004B	503	42	30%	LIHTC
Baker Senior Apartments	N0000126002B	504	50	100%	LIHTC
The Rosa	N0000065004B	503	72	100%	Senior
2001 East	E0000189001	504	75	100%	LIHTC
Colorado Manor	W0000792308	502	76	100%	LIHTC
Glenwood Ridge Apartments	E0001116035B	504	82	100%	LIHTC
Van De Vyver Apartment Homes	N0000065012B, -30B, -33B	503	82	44%	LIHTC
Shockoe Valley View Apartments 2	E0000251001B	503	87	20%	LIHTC
Randolph Village	434001; -435100; -515020; -	502	91	100%	LIHTC
Old Stone Row	E0000191001B	504	96	20%	LIHTC
Newman Village Apartments	N0180501008; -030; 502045	504	99	100%	LIHTC
Charnwood Forest Apartments	S0053340025B	501	100	100%	Senior
Spectrum	N0000627010	504	103	20%	LIHTC
CIRC	W0000614001B	502	106	20%	LIHTC
Norcroft Townhomes	S0053340001B	501	108	100%	LIHTC
Southgate Apartments	S0071164002B	501	112	100%	LIHTC
The Nest	N0001710009	502	118	20%	LIHTC

Actuals submitted during I&E survey period entered in, XLOOKUP pulls values into template-to value LIHTC (e.g., Aff. Housing)

Valuation using Actual I&E- Worksheet (Affordable Housing)

LIHTC Valuation (Model) Worksheet

Project Name	Search (PIN)
[redacted]	

Descriptor	Coefficient	Variables
Star Rating	2854.801641	2
Aff. Unit %	-2649.285583	100%
NGBD 501	863.2353349	1
Actual I&E Used in Valuation		

$3,924 *NOI/Unit*
$439,438 NOI
8.20% Cap Rate
~~$5,358,999~~ Ind. Value
~~*$5,359,000*~~ *Rounded*
~~$5,359,000~~ Per Unit

<-Model Value Not Used
Valued w/Actual I&E

Richmond City Council
The Voice of the People — Richmond, Virginia
Office of the Assessor of Real Estate

:=(SR COEF)*(SR VAR)+(Aff% COEF)*(Aff% VAR)+(NGBD COEF)*(NGBD VAR)

Working Paper Template *e.g., SR=Star Rating*

PIN	Project Name	AptUnits	YB	prop_street	I&E	LIHTC	NGBD Land$/Unit	Land Model Value
[redacted]	[redacted] Apartments	112	1960	[redacted]	Y	Y	$20,000	$2,240,000
Star Rating	**Aff Unit %**	**Func. (Hi-Rise,e.g.)**	**Model NGBD**	**Ind Model NOI Per Unit $**	**Indicated Model NOI**	**CapRate**	**% of Total Units**	**Apt Units (Econ Entirity)**
2	100%	0	NGBD 501	$2,785	$311,965	8.20%	50%	224
Land Values FY25	**Imp Values FY25**	**Tot Values FY25**	**Tot PerUnit Values FY25**	**App. Date**	**App. Value**	**sale_date**	**SP$**	**SP$/Unit**
$2,240,000	$1,564,000	**$3,804,000**	$33,964			4/26/2023	$6,000,000	$53,571

Cap Rate Matrix (LIHTC)			
Star Rating	NGBD 501	NGBD 502	NGBD 503
2	8.20%	7.80%	8.00%
3	8.00%	7.60%	7.80%
4	7.80%	7.40%	7.60%

Valuation using Model-Worksheet (Affordable Housing)

LIHTC Valuation (Model) Worksheet

Project Name	Search (PIN)
[redacted]	

Descriptor	Coefficient	Variables
Star Rating	2854.801641	2
Aff. Unit %	-2649.285583	100%
NGBD 501	863.2353349	1
Actual I&E Not Used		

$3,924	*NOI/Unit*
$400,202	NOI
8.20%	Cap Rate
$4,880,517	Ind. Value
$4,881,000	*Rounded*
$4,881,000	Per Unit

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Office of the Assessor of Real Estate

:=(SR COEF)*(SR VAR)+(Aff% COEF)*(Aff% VAR)+(NGBD COEF)*(NGBD VAR)

Working Paper Template *e.g., SR=Star Rating*

PIN	Project Name	AptUnits	YB	prop_street	I&E	LIHTC	NGBD Land$/Unit	Land Model Value
[redacted]		102	1948	[redacted]	N	Y	$15,000	$1,530,000
Star Rating	**Aff Unit %**	**Func. (Hi-Rise,e.g.)**	**Model NGBD**	**Ind Model NOI Per Unit $**	**Indicated Model NOI**	**CapRate**	**% of Total Units**	**Apt Units (Econ Entirity)**
2	100%	0	NGBD 501	$3,924	$400,202	8.20%	100%	102
Land Values FY25	**Imp Values FY25**	**Tot Values FY25**	**Tot PerUnit Values FY25**	**App. Date**	**App. Value**	**sale_date**	**SP$**	**SP$/Unit**
$1,530,000	$3,351,000	**$4,881,000**	$47,853			1/0/1900	$0	$0

Cap Rate Matrix (LIHTC)			
Star Rating	NGBD 501	NGBD 502	NGBD 503
2	8.20%	7.80%	8.00%
3	8.00%	7.60%	7.80%
4	7.80%	7.40%	7.60%

Affordable Housing Owner/Developer Response

Justin:

Thank you for taking the time to speak with me last week about our new affordable senior housing community in Richmond. I cannot emphasize enough how refreshing it was to talk to you. It was clear from our conversation that you have spent considerable time researching affordable housing and how programs like the Low-Income Housing Tax Credit work. Your familiarity with the initial 15-year compliance period, extended use agreements and IRS recapture risk demonstrated a knowledge base that few people have. As the barriers to creating affordable housing continue to increase, properly calculating assessments becomes even more important to successfully developing this type of housing.

As **a developer and owner of affordable housing** throughout the state of Virginia, I often encounter assessor offices that do not understand our properties' affordable status when calculating their assessments. Most are either unfamiliar with State code 58.1-3295 or do not know how to apply it properly. Thus, I was impressed that The City of Richmond has **a form for owners to register their affordable housing units**. This is just the start. To take it a step further, the City accounts for the impacts on value that are inherent to affordable housing operations. Again, I have not encountered other municipalities that are so thorough in their consideration of assessments for affordable housing.

There is an increasing shortage of affordable housing across Virginia. As we attempt to develop new affordable units, we struggle with rising costs. Communities like Richmond, where thought and understanding have gone into the assessment process, will be able to attract these needed housing units, while other municipalities that improperly assess affordable housing value will lose out on new development. I appreciate the approach that Richmond has taken and hope more localities follow your lead.

Best regards,

Brian L. Staub
President
Marlyn Development Corporation

What's Next for Affordable Housing?

- Effective January 1, 2026, Virginia law (HB 2245) requires that assessors use the income approach when valuing affordable rental housing properties that generate income, unless the property owner fails to provide the necessary income and expense information.
- Specifically, the income approach must consider:

  -The property's current use.

  -Contract rent and applicable income/rent restrictions.

  -Any restrictions on the transfer of title or other restraints on alienation of the property.

  -Actual operating expenses and capitalization rates from comparable affordable housing properties.

What's Next for Affordable Housing?

- To facilitate this new assessment method, the Department of Taxation is directed to develop a uniform income and expense reporting form by September 1, 2025, which assessors can use to collect data from affordable rental housing owners. The Department will also provide training for assessors on the assessment of affordable rental housing properties by November 1, 2025.

What's Next for Affordable Housing?

This legislation was part of a larger effort to address concerns about potentially inaccurate tax assessments on affordable housing properties.

The goal is to ensure that affordable housing is assessed fairly and consistently, preventing excessive property tax increases that could hinder the provision and development of affordable housing options.

The law specifies that if an affordable housing property was sold during the most recent taxable year, the assessor must utilize the income and expense information provided by both the prior and current owners for assessment purposes.

While the law mandates the income approach, concerns have been raised by some regarding its potential limitations, particularly for properties under construction where the income approach may not be appropriate.

Using Income Approach on New Construction Affordable Housing

- The bill would require assessors to use ONLY the income approach for property operated as affordable housing as part of certain federal affordable housing programs. Strictly prescribing the use of one methodology does not comport with generally accepted appraisal practices, which allow some flexibility to address circumstances where the income approach is not appropriate (for example, when property is under construction).

Affordable vs Market Modeling

AFFORDABLE: ADDITIVE MODEL, ACTUAL I&E OR STRATIFIED DATA

MARKET: MULTIPLICATIVE MODEL, REGRESSION-BASED

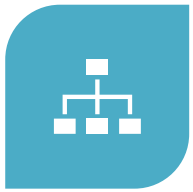
BOTH USE NOI/UNIT AND CAP RATE TO DETERMINE VALUE

Market-Rate Properties

DATA COLLECTION (I&E SURVEYS)

DATA ASSEMBLY & ANALYSIS

EXPLORATORY DATA ANALYSIS



MODEL STRUCTURES & MODEL BUILDING

TRANSFORMATIONS

Shifting from Single Property Valuation to Mass Appraisal Mindset (with Transparency)

- Multifamily Department created in 2021
- Due to Expanse of Multifamily (VCU & Market Growth) & Need for Equity
- Goals: Wrap arms around data, make sense of it, create a model, produce working papers and defend values

Column1	Colt Column3	Column4	Column5
Effective Date:	2022		
Parcel ID:	[redacted]		
Address:			
Unit Mix	Units		SF
1BR	97		8
2BR	125		9
3BR	3		12
Total	225		
Averages			
INCOME			
			Annualized
Gross Potential Income			$ 3,111,408.(
Vacancy & Collection Loss	6%		$ (186,684.4
ACTUAL 4.9			
Other Income			
Late fees, laundry etc	2%		$ 3,173,636.
EFFECTIVE GROSS INCOME			$ 2,986,951.(
EXPENSE			Annualized
Fixed Expenses			
Insurance			
Operating Expenses			
Utilities			
Maintenance & Repairs			
Security			
Management/Leasing Comm			
Payroll & Salary			
Advertising			
Office & Administrative			
Misc (Legal, Accounting, etc)			
Reserves for Replacement	2%		
Lump Sum	32%		
Total Expenses	36%		$ (1,075,3(
Capitalization			Annualized
NET OPERATING INCOME			$ 1,911,6
Capitalization Rate	6%		
Tax Rate	1%		
OAR	7%		
Value			$ 26,550,6(
Plus Excess Land			
ROUNDED PROPERTY VALUE			$ 26,551,0(
2022 updated rents and equalized land value. CAP RATE.			

Market Valuation (Model) Worksheet

Project Name	Search (PIN)
[redacted]	[redacted]

Pgs. 26, 45 & 46 MF Report

Ind. Variable	Coefficient	Variable		
Star Rating	0.364327598	4	**$14,846**	NOI/Unit
Apt Units (LN)	-0.028137522	173	$2,568,325	NOI
Func. (Hi-Rise,e.g	-0.171333708	0	6.40%	Cap Rate
NGBD 507	8.293163207	1	$40,130,072	Ind. Value
Star Rating (e.g.,Grade/Cond/Amnties), AptUnits(Econ. of Sc			**$40,130,000**	*Rounded*
Functional Utlty (Hi-Rise,e.g.), NBGD (Location)			$231,965	Per Unit

Working Paper Template

PIN	Project Name	AptUnits	YB	prop_street	I&E	LIHTC	NGBD Land$/Unit	Land Model Value
[redacted]	[redacted]	173	2022	[redacted]	N	N	$25,000	$4,325,000

Star Rating	Aff Unit %	Func. (Hi-Rise,e.g.)	Model NGBD	Ind Model NOI Per Unit $	Indicated Model NOI	CapRate	% of Total Units	Apt Units (Econ Entirity)
4	0%	0	NGBD 507	**$14,846**	$2,568,325	6.40%	100%	173

Land Values FY25	Imp Values FY25	Tot Values FY25	Tot PerUnit Values FY25	App. Date	App. Value	sale_date	SP$	SP$/Unit
$4,325,000	$35,805,000	**$40,130,000**	**$231,965**			1/0/1900	$0	$0

Pgs. 41 & 42 MF Report

Pgs. 36 & 37 MF Report

Cap Rate Matrix (Market)

Star Rating	NGBD 501	NGBD 502	NGBD 503	NGBD 504	NGBD 505	NGBD 506	NGBD 507
2	7.20%	6.80%	7.00%	7.20%	6.60%	6.40%	6.80%
3	7.00%	6.60%	6.80%	7.00%	6.40%	6.20%	6.60%
4	6.80%	6.40%	6.60%	6.80%	6.20%	6.00%	6.40%

Comp. $/Unit range (wSP)
$190-$234k ($225k SP)
Star Rating 4
NGBD 507
Subject Assd $/Unit
$231,965

NGBD Descriptors	
501	Southside
502	Westend
503	Downtown
504	Northside
505	Scott's Addition
506	Stony Point
507	Manchester

MARKET STATS	FY25							
	# of Units	GPR/Unit	GPR Monthly	Avg Ask Rent	Oth Inc. %	V&C %	OER	NOI/Unit (Mkt)
Four Star	174	$18,729	$1,561	$1,588	9.56%	6.30%	32%	$12,790
Three Star	286	$16,659	$1,388	$1,487	7.84%	7.88%	41%	$9,628
Two Star	236	$13,912	$1,159	$1,166	9.60%	5.23%	46%	$7,639
Market AVG	**232**	**$16,433**	**$1,369**	**$1,414**	**9.00%**	**6.47%**	**40%**	**$10,019**

Richmond City Council
The Voice of the People — Richmond, Virginia
Office of the Assessor of Real Estate

Multifamily Market Data Collection and Valuation

- Various types of data collected regarding multifamily properties
- Construction costs (permit data)
- Sales of property (CoStar, e.g.) and Appraisal values (Trepp, e.g.)
- Rental data (Gross potential rent and asking rent)
- Parking and other income (submitted income and expense reports, e.g.)
- Vacancy and Collection Losses
- Operating expenses
- Capitalization rates

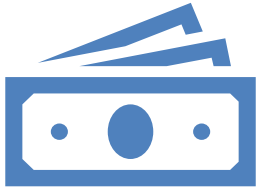
Income Approach Overview

Steps: PGI → V&C → EGI → OER → NOI

Divide NOI by Cap Rate to determine value

Used for both market and affordable valuation

The Income Approach & Mass Appraisal



The Income Approach

Income-producing properties, the income approach is the preferred valuation approach

Need reliable (and sufficient) income and expense data and overall rates

Requires the collection, maintenance, and careful analysis of I&E data.

Mass appraisal applications

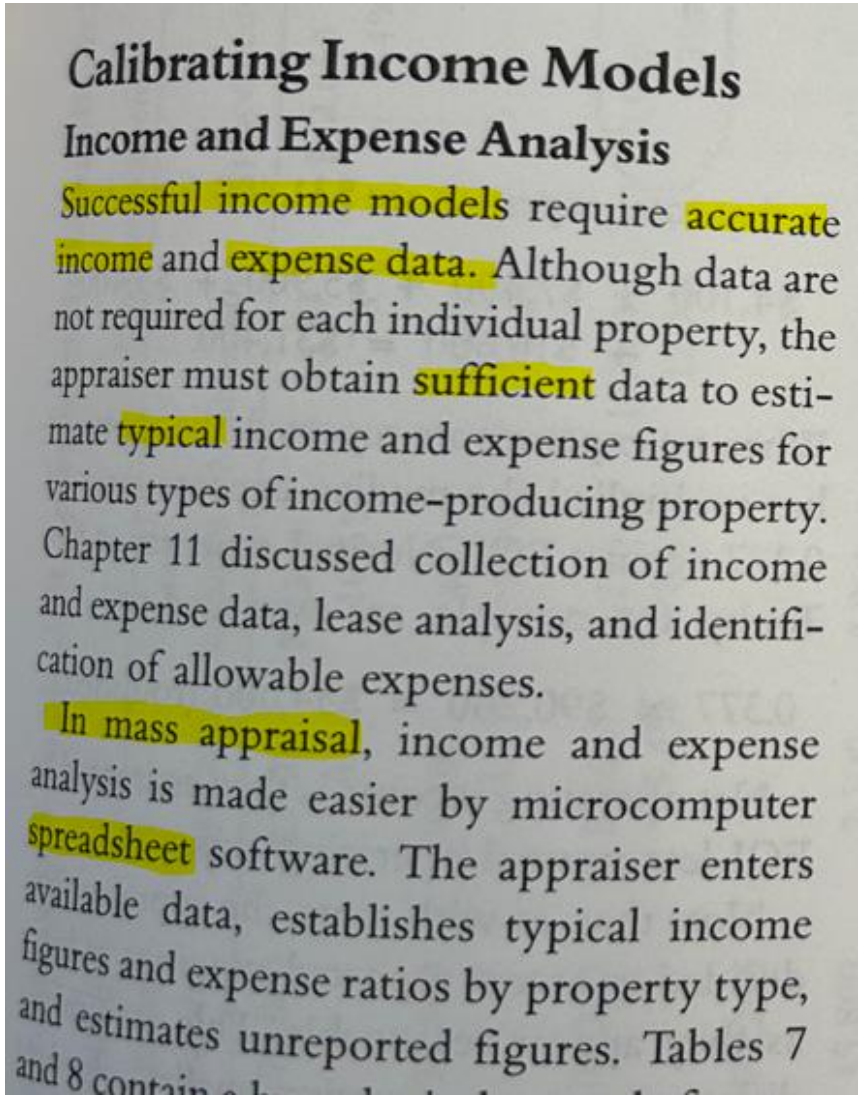
Collect/Process I&E data. (per-unit basis)

Compute normal or typical gross incomes, vacancy rates, net incomes, and expense ratios for various strata

Data can be used to judge reasonableness of reported data for individual parcels and to estimate I&E figures for parcels with unreported data.

What Secrets do these books hold?

- Property Appraisal and Assessment Administration (IAAO 1990 Eckert, Gloudemans, Almy)
- The older texts referenced models using ample and accurate I&E data
- Then compiling in a spreadsheet to analyze and stratify



Calibrating Income Models

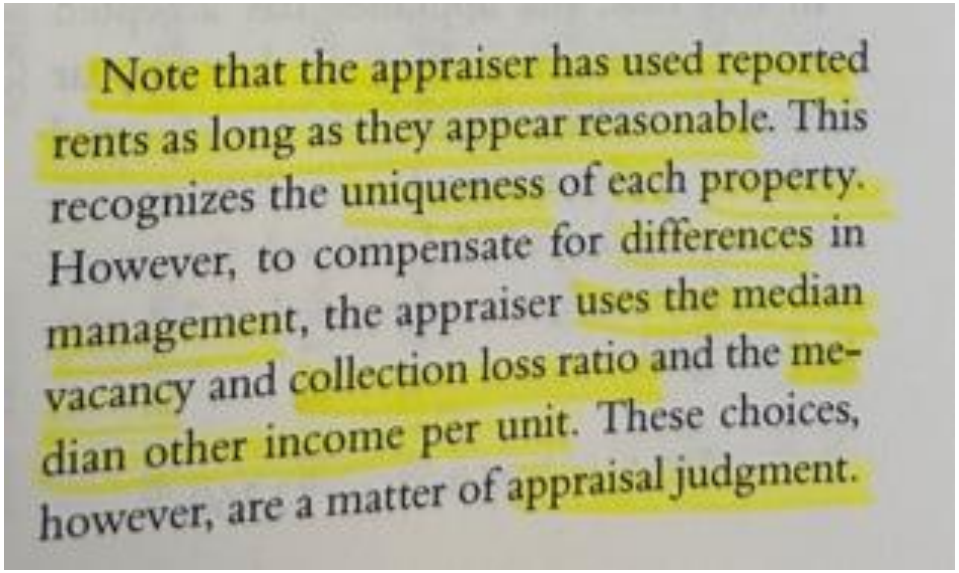
Income and Expense Analysis

Successful income models require accurate income and expense data. Although data are not required for each individual property, the appraiser must obtain sufficient data to estimate typical income and expense figures for various types of income-producing property. Chapter 11 discussed collection of income and expense data, lease analysis, and identification of allowable expenses.

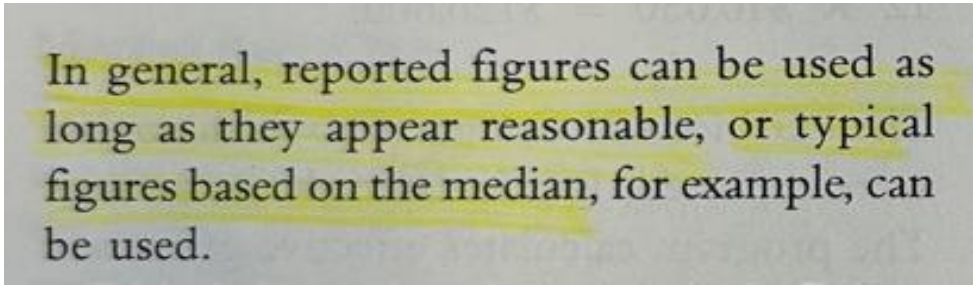
In mass appraisal, income and expense analysis is made easier by microcomputer spreadsheet software. The appraiser enters available data, establishes typical income figures and expense ratios by property type, and estimates unreported figures. Tables 7 and 8 contain

What Secrets do these books hold?

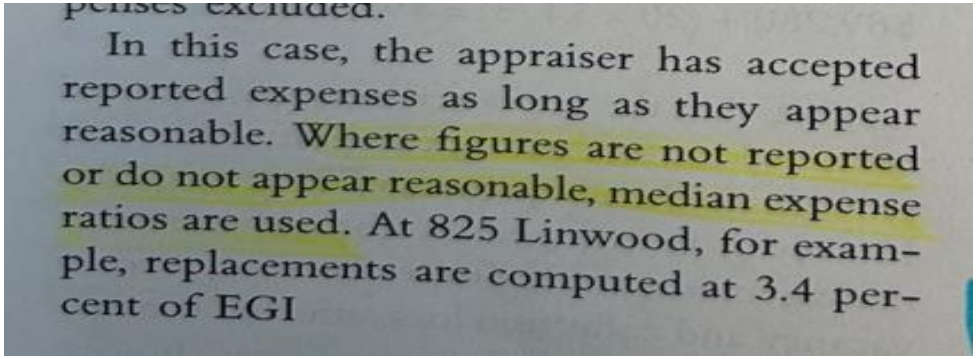
- Using actuals is perfectly fine, "uniqueness" think about how each LIHTC property is "unique", differing AMI aff. %, affordable unit counts, etc.
- In lieu of using actuals, typical or median expenses can be used for market rate property-think equity



Note that the appraiser has used reported rents as long as they appear reasonable. This recognizes the uniqueness of each property. However, to compensate for differences in management, the appraiser uses the median vacancy and collection loss ratio and the median other income per unit. These choices, however, are a matter of appraisal judgment.



In general, reported figures can be used as long as they appear reasonable, or typical figures based on the median, for example, can be used.



penses excluded.

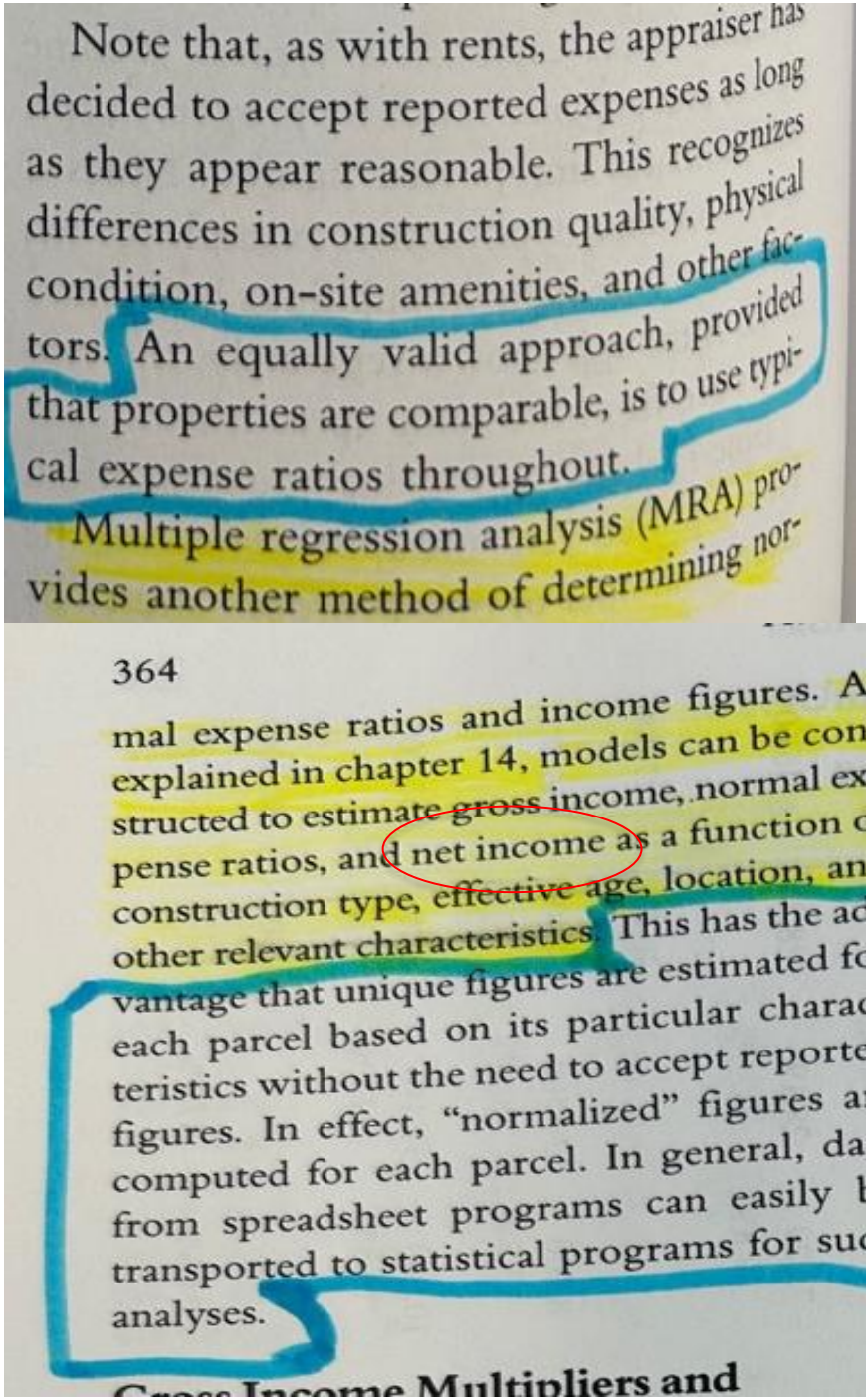
In this case, the appraiser has accepted reported expenses as long as they appear reasonable. Where figures are not reported or do not appear reasonable, median expense ratios are used. At 825 Linwood, for example, replacements are computed at 3.4 percent of EGI

What Secrets do these books hold?

- MRA is another accepted method
- Models can be created to estimate net operating income as a function of class, eff. age, location, etc.

Limits number of models (V&C, OER, e.g.)

- No need to accept reported figures for each property- ”Normalized” are computed



Note that, as with rents, the appraiser has decided to accept reported expenses as long as they appear reasonable. This recognizes differences in construction quality, physical condition, on-site amenities, and other factors. An equally valid approach, provided that properties are comparable, is to use typical expense ratios throughout.

Multiple regression analysis (MRA) provides another method of determining normal expense ratios and income figures. As explained in chapter 14, models can be constructed to estimate gross income, normal expense ratios, and net income as a function of construction type, effective age, location, and other relevant characteristics. This has the advantage that unique figures are estimated for each parcel based on its particular characteristics without the need to accept reported figures. In effect, “normalized” figures are computed for each parcel. In general, data from spreadsheet programs can easily be transported to statistical programs for such analyses.

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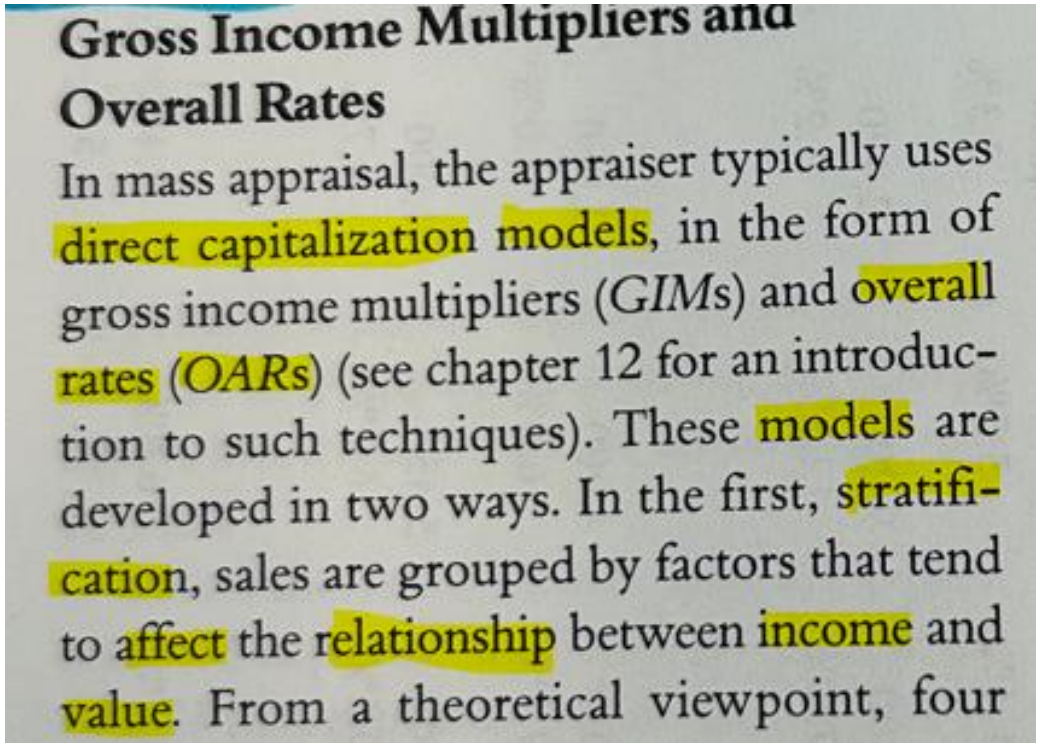
Gross Income Multipliers and

What Secrets do these books hold?

- NOI model in place> convert to value
- The Overall Rate Model is created by dividing NOI/Sales Price to determine the OAR for each sample
- Stratification is key to ensure accuracy, fairness and explanatory power



Gross Income Multipliers and Overall Rates

In mass appraisal, the appraiser typically uses direct capitalization models, in the form of gross income multipliers (*GIMs*) and overall rates (*OARs*) (see chapter 12 for an introduction to such techniques). These models are developed in two ways. In the first, stratification, sales are grouped by factors that tend to affect the relationship between income and value. From a theoretical viewpoint, four

More Transparent and Defensible
Especially important for **mass appraisal**, **assessment appeals**, or **valuation reports**.
Stratification will let you say:
"Here's how Class B properties in this part of town behave—your property fits this bucket."
That's way more defensible than a one-size-fits-all average.

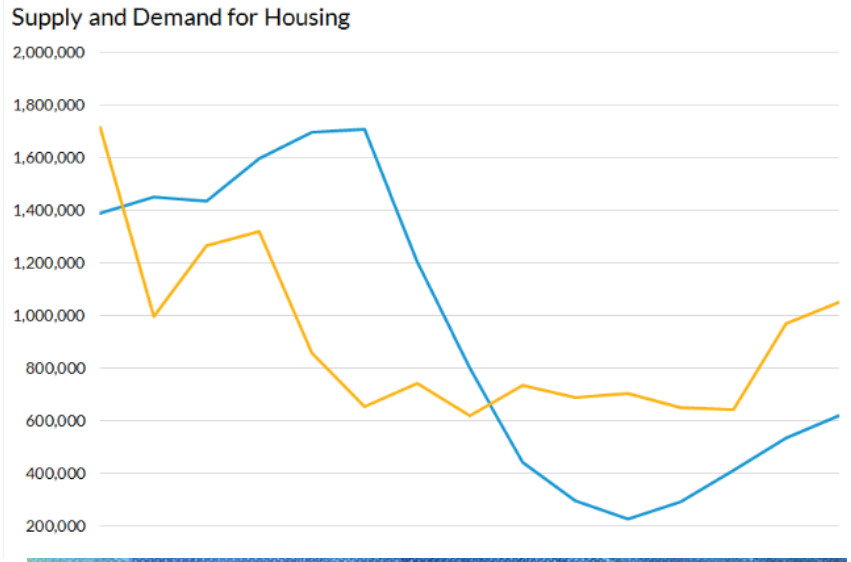
Supply and Demand

Since the economic bases of model building is ‘supply and demand’ correct and **relevant** data that such models need to accurately measure those forces.

No models completely capture the forces of supply and demand at work in the real estate market, **but all are rooted in market data**.

Income models use investor decisions (supply) e.g., building costs, interest rates and investor expectations (demand) e.g., lease rates, sales, and their inherent trends. (Mass Appraisal of Real Property 1999, 11)

For this Report Income: MV=NOI/OAR is the generalized model structure utilized



Modeling Process Overview

Data Assembly → Exploratory Analysis → Base Model

Test for outliers, missing fields, and variable transformations

Stratify by rent type, star rating, ngbds, unit mix

Steps in Modeling

The primary steps in building a mass appraisal model include:

1. Data assembly-Typically involves taking property record data and converting into a spreadsheet format for analysis
2. Exploratory Data Analysis-Running graphs and statistics to explore and 'clean up' the data, remove invalid sales, outliers, and fill in missing fields.
3. Base Model-Using the salient property characteristics to develop an ideal model
4. Full Model-With base model in place, testing for variables (secondary), location, leasing (star, e.g.) class, etc.
5. Sales Ratio Testing-Once full model is complete, modeler can examine sales ratios compared to the model predicted values to quality control and seek out trends and outliers in the ratio spread.
6. Model Refinement-Refining the data based on testing sales ratios includes revising data with additional variables where trends surface (Sales with high percentage of office space sell higher), *Commercial Space can be added as additional variable, e.g.*
7. Final Model-With no further room for significant improvement the modeler can determine final market condition adjustments, and rerun model a final time with time-adjusted values. Then final sales ratios compared to model value outputs.
8. Model Application-The final step is to take the model formula and apply to the population of properties. If model is done outside the CAMA system using a statistical software package or Excel, the model must be transported or reproduced in the CAMA software.

Data Assembly

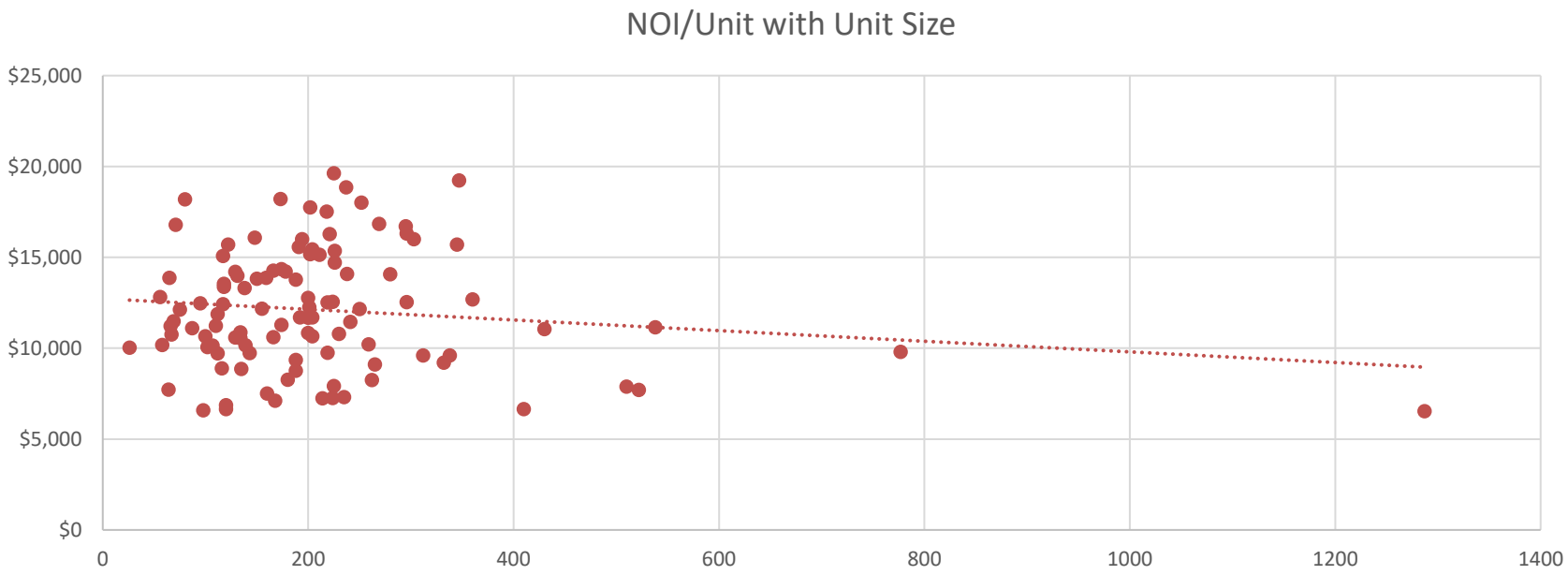
Data Assembly

parcel_id	Associated A/B Parcel?	Econ Unit Parcels?	Type	Ready to Send to DC	Project/Assoc. Name	AptUnits	prop_street	NGBD	Star Rating
S0000089001	N	N		Y	1200 SEMMES Apartments	129	416 W 12th St	503	3
N0000516008	N	N		Y	1200 West Marshall (VCU)	136	1200 W Marshall St	502	4
S0000363012	N	N		Y	2000 Riverside Apartments	220	2000 Riverside Dr	503	3
N0001782001	N	N		Y	3600 West Broad	191	3600 W Broad St	503	4
S0053315002	N	Y		Y	404 Rivertowne	228	462 Westover Hills Blvd	501	2
S0053315001	N	Y		Y	404 Rivertowne	294	449 Westover Hills Blvd	501	2
W0000101021	N	N		Y	8 1/2 Canal St (Student Property)	160	8 1/2 W Canal St	503	4
W0000293011	N	N		Y	805 W Lofts	103	805 W Cary St	502	3
W0000005012	N	Y		Y	8th and Main	169	7 N 8th St	503	4
W0000005024	N	Y		Y	8th and Main	27	800 E Main St	503	4
C0050371010	N	N		Y	Abbington Hills	230	5926 Westower Ct	501	3

- Compiling into spreadsheet format (filtered & sorted for better analysis)
- Determine salient property characteristics
- Helps build ‘Base Model’

Exploratory Data Analysis

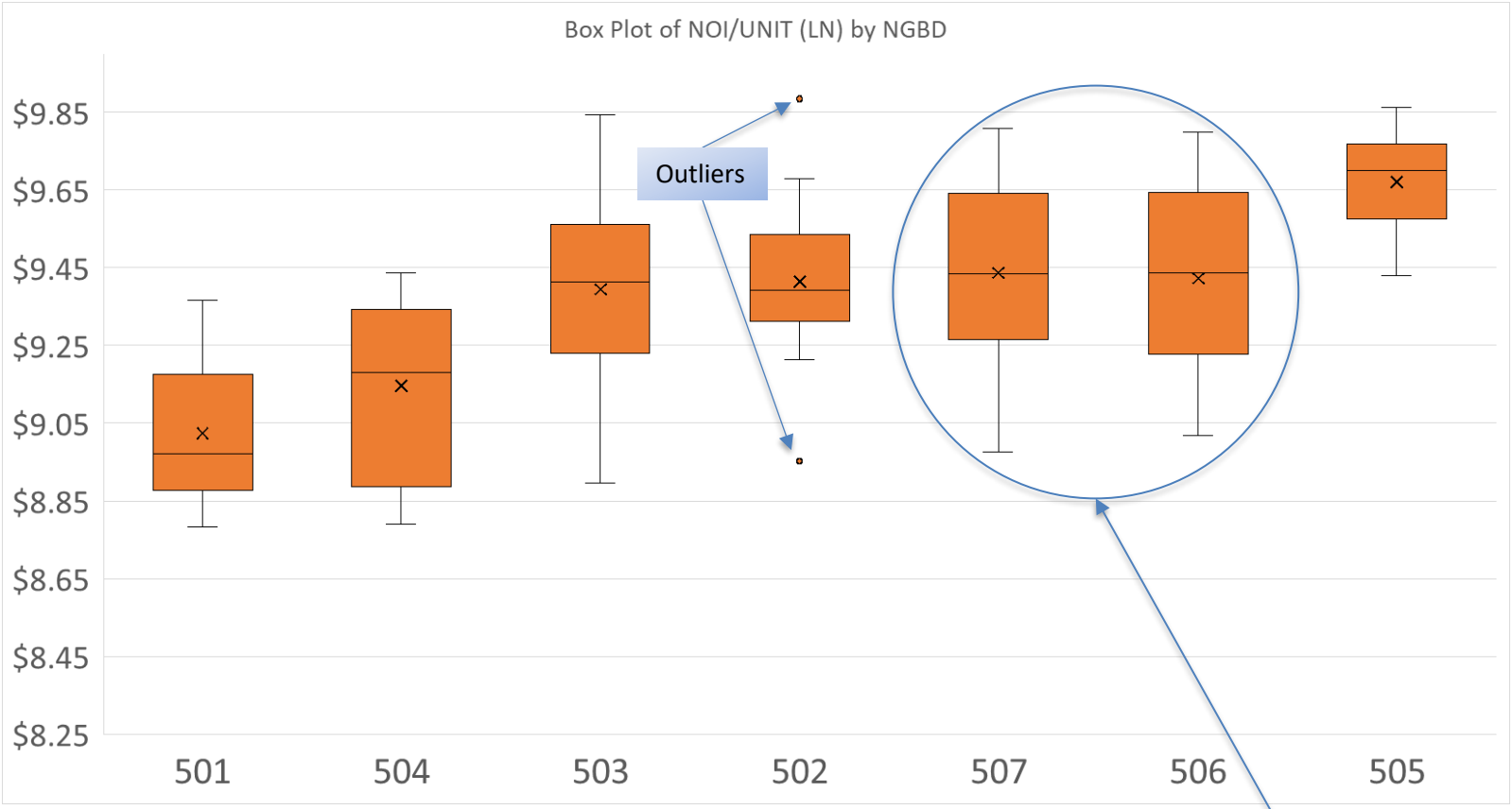
Scatter Plot NOI/Unit with Unit Size



- Downward-sloping *negative* relationship (Dep. Variable decreases as Ind. Var increases)
- High Variance (only one Ind. Variable) indicating need to add variables (class, ngbd, e.g.)

Exploratory Data Analysis

Box Plot of NOI/Unit (LN) by NGBD



This analysis clearing shows the relationship with NOI/unit and location (NGBD), we can also highlight outliers (502) as well as data distributions (combine ngbds?)

Dependent & Independent Variables

Project/Assoc. Name2	Apt	LN OF NC	ln of Apt U	Star Rat	Func. (	1BR%L	1BR	NGE 501	NGE 502	NGB 504	NGE 505	NGE 506	NGE 507	NGE 503
Century Flats	26	$12.47	$3.26	3	1	0	0	0	1	0	0	0	0	0
The Cooperage II	56	$13.47	$4.01	3	0	0	0	0	1	0	1	0	0	0
District Square	58	$13.29	$4.06	3	0	0	0	0	0	0	0	0	0	1
Viv at Scott's Addition	58	$13.82	$4.06	4	0	0	0	0	1	0	1	0	0	0
Liberty Circle Apartments	64	$13.11	$4.16	2	0	0	1	0	1	0	0	0	0	0
The Cove	65	$13.71	$4.17	4	0	0	1	1	0	0	0	0	1	0
The Argon	66	$13.51	$4.19	3	0	0	0	0	1	0	0	0	0	0
The Lofts at Franklin	67	$13.49	$4.20	3	0	0	0	0	0	0	0	0	0	1
The Mill at Manchester Lofts	69	$13.58	$4.23	3	1	0	0	1	0	0	0	0	1	0
Gem (Scott's Collection)	71	$13.99	$4.26	4	0	0	0	0	1	0	1	0	0	0
Chesterfield Apartments	75	$13.72	$4.32	3	0	0	0	0	1	0	0	0	0	0
Ink (Scott's Collection)	80	$14.19	$4.38	4	0	0	1	0	1	0	1	0	0	0
The Paper Company	87	$13.79	$4.48	3	0	0	0	1	0	0	0	0	1	0
Scott's Edge	95	$13.98	$4.55	3	0	0	0	0	1	0	1	0	0	0
The Birches	98	$13.38	$4.58	2	0	0	0	0	0	1	0	0	0	0
Todd Lofts	100	$13.88	$4.61	3	1	0	0	0	1	0	0	0	0	0
Port RVA	102	$13.84	$4.62	3	0	0	1	1	0	0	0	0	1	0
The Mezzo Lofts	107	$13.90	$4.67	3	0	0	0	0	0	0	0	0	0	1
Upper Lofts at Canal Walk	110	$14.03	$4.70	3	0	0	1	0	0	0	0	0	0	1
Atrium Lofts at Cold Storage III	112	$13.90	$4.72	3	0	0	0	0	0	1	0	0	0	0
Coliseum Lofts	112	$14.09	$4.71	3	0	0	0	0	1	0	0	0	0	0
Townhouses of Chesterfield I (Dutch	116	$13.85	$4.75	3	0	0	0	1	0	0	0	0	0	0
Kensington Court	117	$14.19	$4.76	3	0	0	0	0	1	0	0	0	0	0
The Nest	117	$14.39	$4.77	4	1	0	0	0	1	0	1	0	0	0

Sales Ratio Testing

Performance Tests

The primary tool used to measure mass appraisal performance is the ratio study. A ratio study compares appraised values to market values. In a ratio study, market values (value in exchange) are typically represented by sales prices (i.e., a sales ratio study). Independent, expert appraisals may also be used to represent market values in a ratio study (i.e., an appraisal ratio study). If there are not enough sales to provide necessary representativeness, independent appraisals can be used as indicators for market value. **This can be particularly useful for commercial, multifamily, or industrial real property for which sales are limited.** In addition, appraisal ratios studies can be used for

The Median (0.85) is below the IAAO standard for the level of appraisal (0.90 to 1.10). Also, the PRD was above the recommended range (0.98-1.03) at a 1.04, and indicative of a regressive assessment (lower priced properties with higher sales ratios compared to higher priced properties). The mean was also low; therefore, a revaluation and clean-up was deemed necessary for better overall equity and achievement of market value.

Statistics	Going In
Mean	0.77
SUMS of AV	$252,713,000
SUMS of SP	$340,025,500
Weighted Mean	0.74
PRD	1.04
Median	0.85
Sales	7
Sum Abs Dev	1.2289
Avg Abs Dev	0.18
COD	20.61

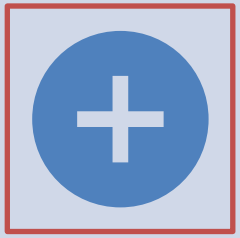
Sales Ratio Study

Certified COD = 20.61 (pre-model) → needs revaluation

Model-based predicted values tested against sales

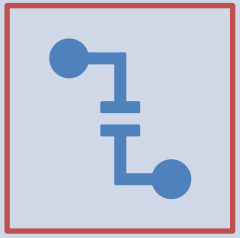
Target COD: 5–15 for commercial properties (IAAO)

Model Structures



Additive models, most common form-(basic) concepts of value and expectations of most market participants. Coefficients are understandable –explained in dollar terms, $ per unit or lot square foot. Easy to specify and calibrate!

$$Y = b_O + b_1X_1 + b_2X_2 + \ldots + b_pX_p$$



Multiplicative models, variables either raised to powers (exponents) or are themselves powers to which coefficients in the model are raised; the results are then multiplied. Multiplicative models allow for interaction between variables = more accurate and representative!

$$SP = b_0 \times X_1^{b1} \times X_2^{b2} \times b_3^{X3} \times b_4^{X4}$$

Multiplicative Models can prevent RDF usage

All grey houses get 13% RDF (but only this one)

- RDFs (Residential Desirability Factor) aka the Market Modifier
- Because the market is not always “additive”, the shortcomings of additive models resulted in gaps in the value; corrected with RDFs
- The market is very much interactive, requiring percentage adjustments (like the RDF) but applied systematically and not as a one off “band-aid” e.g., sale (ratio)

Multiplicative Models

108 samples collected (35% of the market population), (multiplicative) was deemed to be the more accurate and appropriate approach. Allowed for the capturing of economies of scale within the different unit sizes of apartment projects more efficiently.

As previously stated, multiplicative models capture nonlinear and interactive relationships present in real estate markets. They also tend to be a good choice for property types with a large range in sales prices (or net operating incomes, i.e., Apartments) where interactive effects are pervasive. (MARP-R. J. Gloudemans 1999)

This is interpreted as a 1% increase in X results in a b% increase in Y; where 'b' is the coefficient associated with X.

FY24 Example of Additive Model

- How to calculate and apply to population
- Example: 3 Star, 200 unit, 'Market' property, non-high-rise, in NGBD 501
- $Y = b_O + b_1X_1 + b_2X_2...$
- = (2504 * 3) + (-6.12 * 200) + (-398 * 0) + (2148 * 1)
- =(7512) + (-1224) + (0) + (2148)
- NOI/Unit **$8,436**
- (Mltpy) # units **$1,687,200 = NOI**
- Div./Cap Rate **$24,102,857** 7.00% Cap
- Ind. Value (Rounded) **$24,103,000**
- Per Unit Value $120,515
- Average Sales Price (3 Star in 501)=$132k/unit
- 0.91 Ratio (Room for improvement)

	Coefficients
Star Rating	2504
In of Apt Units	6.12
Hi-Rise	-398
NGBD 501	2148

Additive Looks fine to me?

- Example: 3 Star, 200 unit, 'Market' property, non-high-rise, in NGBD 501
- **$Y = b_O + b_1X_1 + b_2X_2...$**
- = (2504 * 3) + (-231.41 * 200ln) + (-398 * 0) + (2148 * 1)
- =(7512) + (-1223.91) + (0) + (2148)

- Generally, the model will work, but let's look at some of its weaknesses. First, the first term will always add to =(7512) for Star Rating

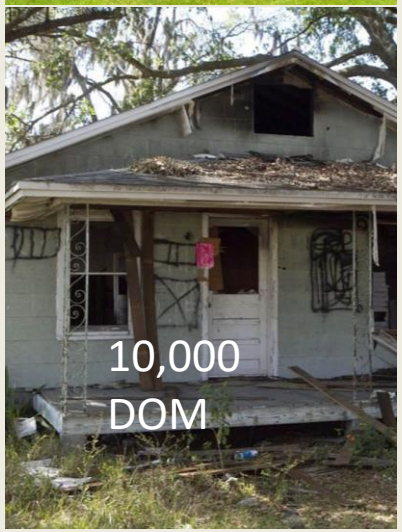
- That will be it's contribution to the NOI/unit regardless of location, but we know from sales that 3 star rating properties in Scott's Addition command much more than the set amount of $7,512/unit

- Second, variables like high-rise factor and unit count interact differently as star rating and location change also (e.g., higher unit sizes may have a more negative affect and high-rise may have a less negative affect in the Downtown ngbd)

Using sales or holdout samples will allow the modeler to isolate these inequities

So, the Real Estate Market is Interactive (Not additive)?

- In other words, doesn't class or condition compound (good or bad) with location?
- **Compounding effects**: As Class (Rating) and Location Improve, they don't just stack, they **amplify** each other.



Example: Predicting Theme Park Snack Sales

🎯 **Goal:**

- Estimate how many **snacks** (popcorn, ice cream, churros, etc.) are sold in a theme park based on:

- **Temperature** (🌡️): warmer weather makes people thirstier and hungrier

- **Number of Visitors** (👨‍👨‍👧‍👧): more people = more potential snack buyers

🔢 Modeling Options

1. Additive Model:

$$\text{Snack Sales} = \beta_0 + \beta_1 \cdot \text{Visitors} + \beta_2 \cdot \text{Temperature} + \epsilon$$

- Assumes temperature and visitor count each **add** a fixed number of snack sales.
- Problem: If you add 10°F to a day with *only 100 people*, it would predict the same boost in snack sales as adding 10°F on a day with *10,000 people*—which doesn't make sense.

2. Multiplicative Model (Better Fit):

$$\text{Snack Sales} = \beta_0 \cdot \text{Visitors}^{\beta_1} \cdot \text{Temperature}^{\beta_2} \cdot \epsilon$$

- A 10% increase in temperature causes a **10%+ proportional increase in snack sales, but only if people are there to buy them**!
- A hot day with few people = low sales.
  A hot day with lots of people = **snack explosion** 🍦🔥.

🧠 Why Multiplicative Wins Here?

- **Compounding effects**: Temperature and crowd size don't just stack, they **amplify** each other.
- **Elastic behavior**: Warmer weather makes each visitor *more likely* to buy snacks.
- **Better modeling of extremes**: Predicts big snack sales only when both conditions are favorable.

📊 Bonus Insight: Elasticity

Let's say:

- $\beta_1 = 0.9$: A 1% increase in visitors = 0.9% increase in sales
- $\beta_2 = 1.2$: A 1% increase in temperature = 1.2% increase in sales

Now you've got a fun, predictive **elasticity-based** snack-o-meter! 🎯

So, What is MRA? (Multiple Regression Analysis)

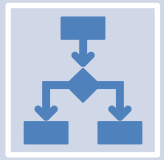
- **"Multiple regression is like figuring out how your backpack's weight changes based on how many books, notebooks, and pencils you put in it."**
- Each item adds a little to the total weight — just like each feature adds to a property's value in real estate.

Why Use MRA?

- Handles many variables simultaneously
- Captures nonlinear relationships (e.g., econ of scale)
- Allows for better market representation in mass appraisal
- Building Values Vary: $1.2M, $1.8M, $2.5M. That **difference in value** is variation.
- Goal in regression is to **explain that variation** using one or more variables- location, unit count, etc.

MRA Model Structure

Multiplicative Model: $Y = b0 * x1^{b1} * x2^{b2}...$



Dependent Variable: NOI/Unit (ln) or NOI (ln)

Independent Variables: Star Rating, Unit Count (ln), Hi-Rise, NGBD

MRA Steps

1

1. Select model structure and software (Excel, SPSS)

2

2. Evaluate variables, transformations (e.g., logs, NOI/Unit)

3

3. Calibrate model, validate against sales and holdouts

Variable Transformation

Logarithmic transformation applied to NOI and Unit Count (because MRA assumes normal distribution)

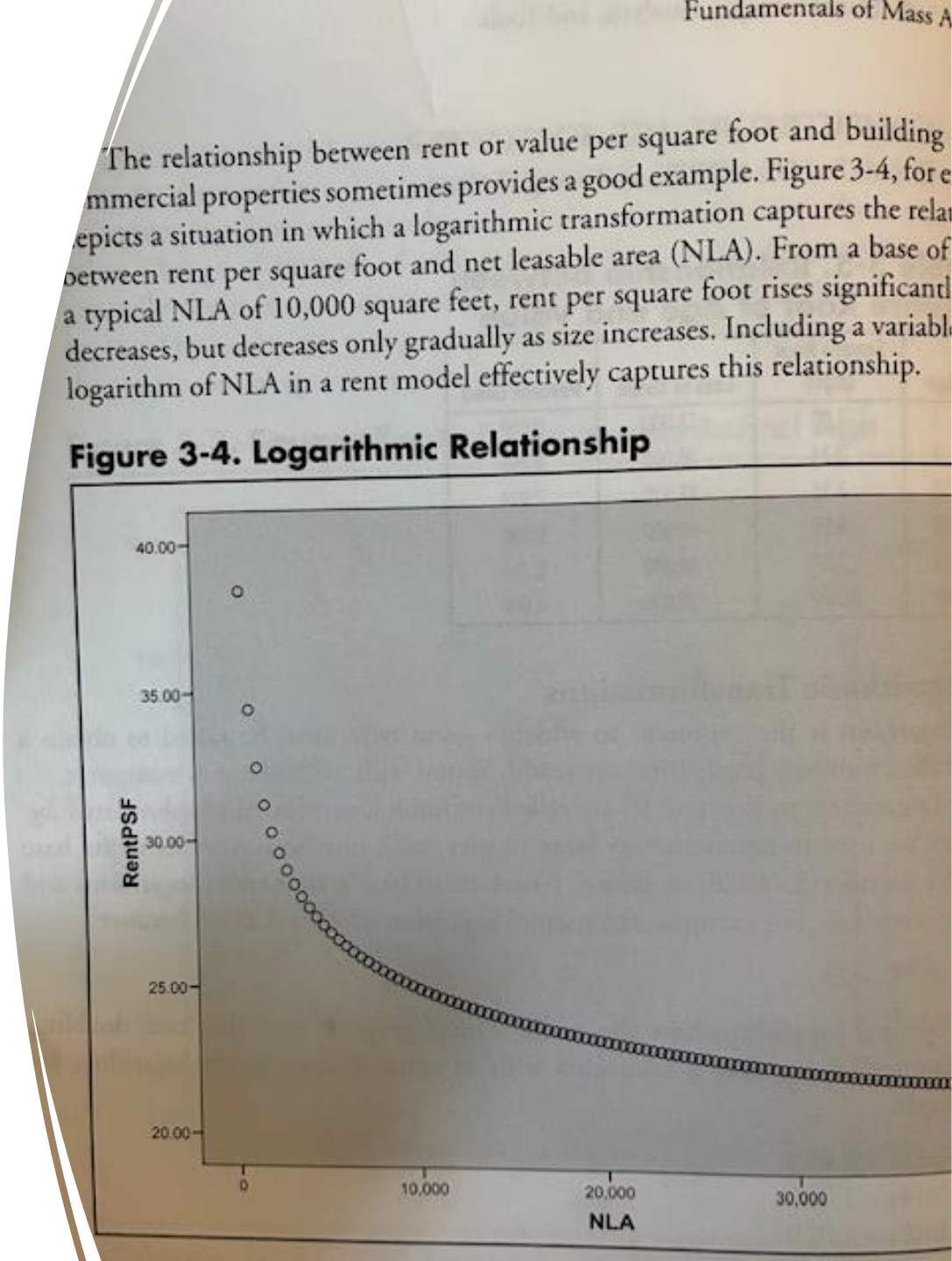
Binary variables: (e.g., 0/1) used for NGBDs 501–507 (Sub NGBDS)

Discrete variables: Star Rating: Numeric value (2–5) instead of qualitative

Transformations: Logarithmic

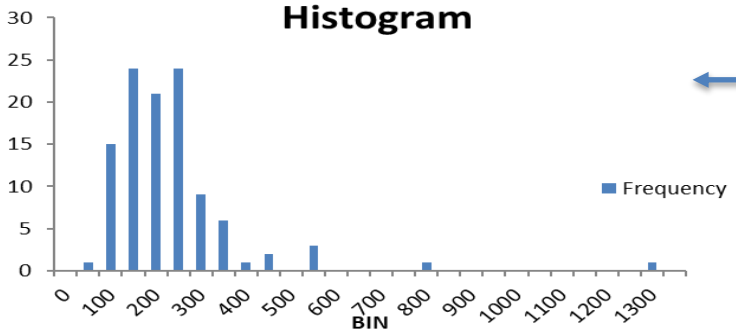
In modeling logarithms can be used to capture relationships in which the contribution of a variable to value is initially strong, then dissipates and ultimately flattens

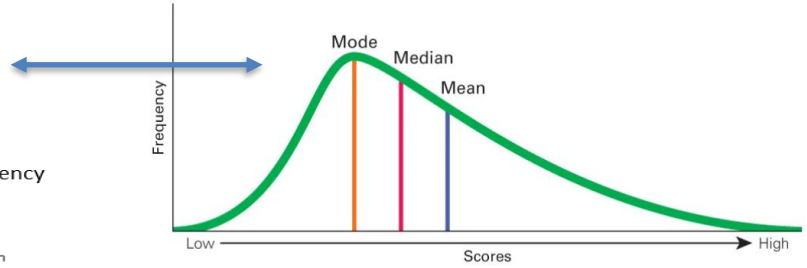
- ✅ **Benefits of log transformations in MRA**
- **Linearizes relationships** that are naturally exponential or multiplicative
- **Stabilizes variance** (reduces heteroscedasticity)
- Helps **interpret coefficients** in terms of **elasticity or percent change**
- Reduces skewness in variables that are heavily right-tailed (like price or income)

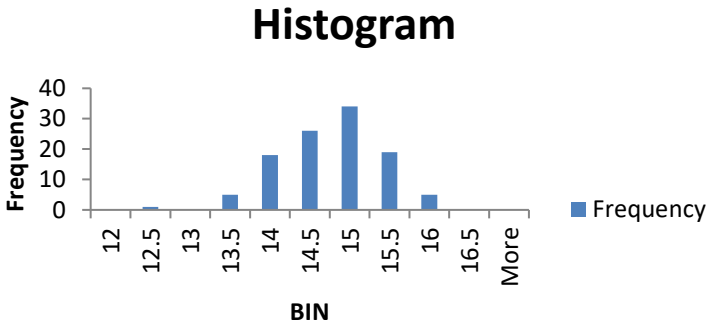


Transforming to Normalize Data

Because the larger outliers are influencing the average NOI, we must transform the data







After transforming NOI with natural log, we can see a more normal distribution appears adhering to the MRA assumption

In Excel simply type =LN(A2)

Breakdown of NOI/Unit formation (Multiply each product below together)		
Star Rating	*4.29439*	*EXP(SR Coeff)^(SR VAR)*
Apt Units (LN)	*0.86502*	*EXP(AptUn Coeff)^LN(AptUn VAR)*
Func. (Hi-Rise,e.g.)	*0.84254*	*EXP(Func Coeff)^(Func VAR)*
NGBD 507	*3996.46*	*EXP(NGBD Coeff)^(NGBD VAR)*
NOI/Unit =	$12,508.19	:=EXP(SR Coeff)^(SR VAR)*EXP(lnAptUn Coeff)^LN(AptUnit VAR)*EXP(Func Coeff)^(Func VAR)*EXP(NGBD
	e.g., SR=Star Rating	

Multiplicative Model in Action

Preview of the 'interactions' of the terms (variables/coefficients) above. Based on this mathematical formula; if star rating term increased it would have a higher impact with NGBD 507 or vice versa

Multiplicative Model in Action Contin.

Breakdown of NOI/Unit formation (Multiply each product below together)		
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	e.g., SR=Star Rating	

The calculations make appraisal sense:

-Star Rating value is higher as Star Rating (Cond/Grade, e.g.) moves up (e.g., 3 to 4)

-Apt Unit % factor (13.5%) declines as units increase. (econ of scale)

-Func. is a neg. factor (appx. 16%) if present ('1') and if absent ('0') (unaltering equation)

This mimics the market, e.g., Star Rating has more impact in higher value ngbd and vice versa. Func. has higher impact also as star rating/ngbd value increase or apt unit count decrease. This relationship is measured from the interactions of the 108 samples; like the model, they are market derived adjustments and can be tested with sales analysis also (% Changes to $/unit) Moreover, the adjustments/model was applied to the population

Model Fit Statistics (Market)

Adjusted $R^2 = 0.988$

Standard Error = 0.068

T-Stats > 2 and P-values < 0.05 for all variables

Regression Statistics	
Multiple R	0.994747497
R Square	0.989522582
Adjusted R Square	0.988322044
Standard Error	0.068075028
Observations	108

ANOVA

	df	*SS*	*MS*	*F*
Regression	11	42.01634954	3.81966814	824.2329637
Residual	96	0.444884101	0.004634209	
Total	107	42.46123364		

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	8.376429257	0.073587172	113.8300204	3.2043E-104
ln of Apt Units	1.010416119	0.013842527	72.99361727	6.52956E-86
Star Rating	0.289371338	0.010593189	27.3167346	4.61715E-47
Func. (Hi-Rise/AdpRU)	-0.082416609	0.019815333	-4.159234131	6.95079E-05
1BR%LOW	0.080167707	0.024815168	3.23059302	0.0016924
1BR%HI	-0.051815494	0.021045954	-2.46201686	0.015599405
NGBD 501	-0.121677192	0.027815994	-4.374360726	3.09356E-05
NGBD 502	0.06022653	0.023563673	2.555905907	0.012160398
NGBD 504	-0.150225673	0.02909459	-5.163354158	1.311E-06
SUB NGBD 505	0.092319298	0.025992313	3.551792374	0.000595
SUB NGBD 506	0.173300287	0.027169535	6.37847831	6.27096E-09
SUB NGBD 507	0.139247925	0.029984129	4.644054357	1.08465E-05

Model Interpretation

Higher Star Rating increases NOI/unit significantly

Location (NGBD) effects are substantial

High-Rise design slightly reduces NOI/unit

Neighborhood Influence

“Dummy variables“ (Binary Variable representing categorical data in numeric 0/1 form) capture location-based market effects

e.g., NGBD 505 (Scott’s Addition) shows high correlation with NOI Supports locational adjustments in valuation model

Land Value Modeling

Based on $/unit, density studies

Adjustments by NGBD:

501 = $25K/unit

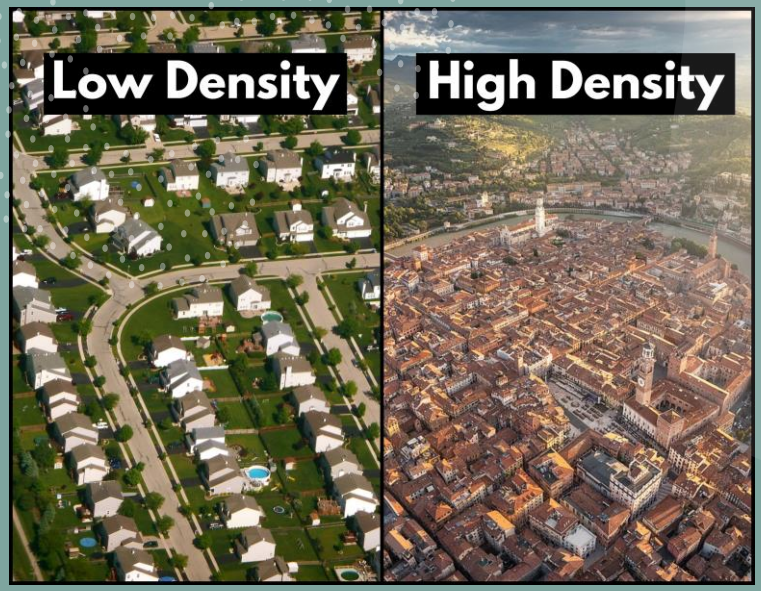
505 = $30K/unit

Vacant land valued in respective Comm. ngbd

Note: MRA cannot incorporate additive relationships or separate land and building components, requiring this separate model for the land

The land value does not "drive" the total value, as the income model explains and supports the total indication of value

A Tale of Two Parcels



Example

Imagine two parcels of land, both the same size.

Parcel A: zoned for low-density res., allowing for the construction of 10 units.

Parcel B: zoned for high-density res., allowing for the construction of 50 units.

While the square footage of the land might be the same, Parcel B would be significantly more valuable on a price-per-unit basis because it offers the potential for a much higher number of income-generating units.

In essence, multifamily land value is driven by the number of units that can be built and rented, thus the "price per unit" metric becomes a critical factor for developers and investors in their decision-making process.

Land Value Summary

- Multifamily: Land value is frequently assessed on a price-per-unit basis because the primary driver of its value is the potential number of dwelling units that can be built on the property

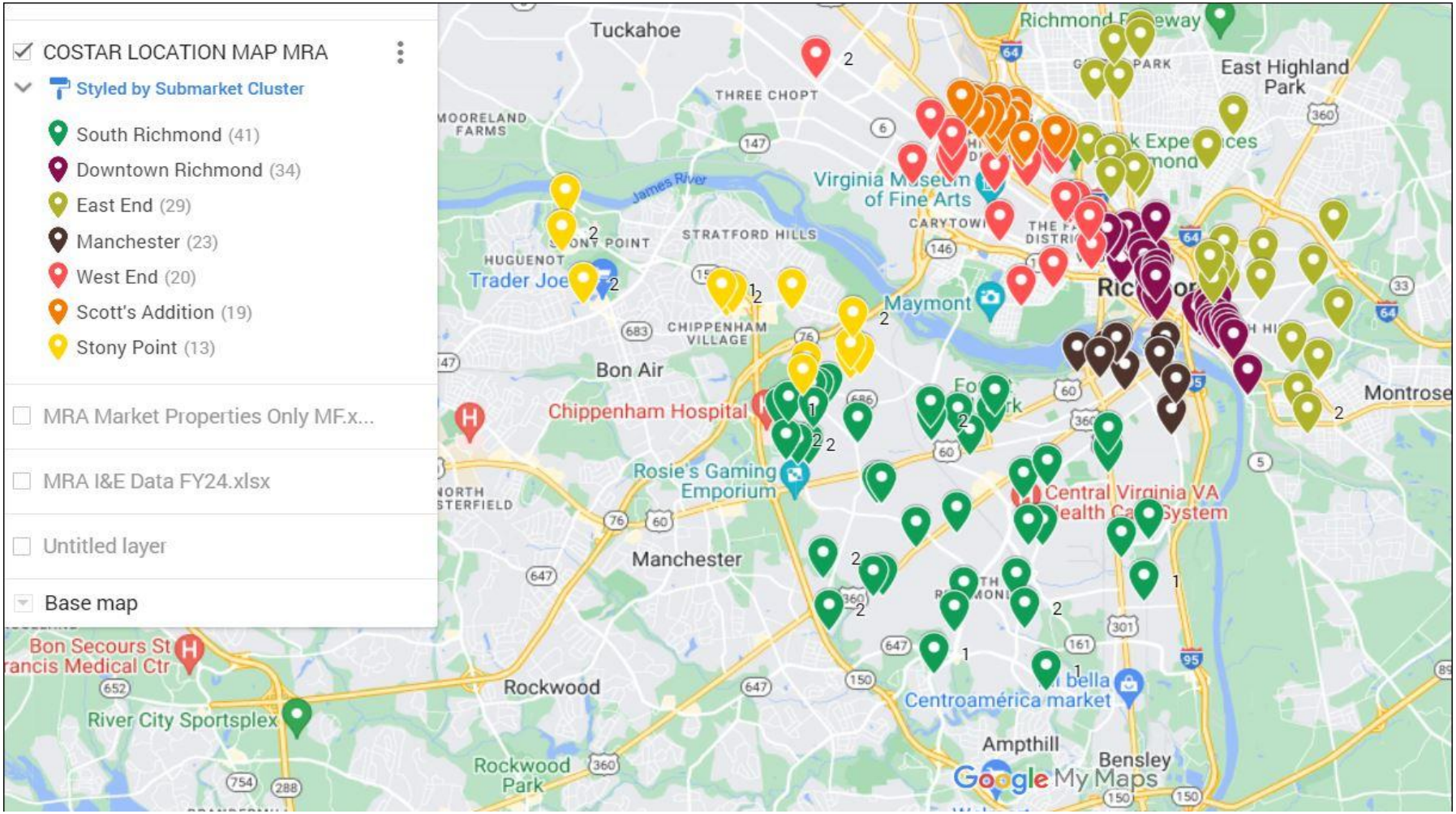
Suburban Areas (Lower Density):Garden apts, can fit between 19 to 25 units per acre. Therefore, on 16 acres, you could potentially build 300 to 400 garden apts (16 acres * 19-25 units/acre). You would never find 16 acres in Downtown CBD areas (An Acre +/-)

Adjustments and Findings

To accurately reflect current market conditions, the initial land value of $15,000 per unit was modified as follows:

501 (Southside): $15,000 to $20,000 per unit.
501B (Westover): $15,000 to $25,000 per unit
502 (West End): $15,000 to $25,000 per unit.
503 (Downtown): $15,000 to $25,000 per unit.
504 (Northside): $15,000 to $20,000 per unit.
505 (Scott's Add.): $15,000 to $30,000 per unit.
506 (Stony Point): $15,000 to $25,000 per unit.
507 (Manchester): $15,000 to $25,000 per unit.

Location Map (Color coded by NGBD)



Cap Rate Matrix

CAP RATES DERIVED FROM ACTUAL SALES

USED TO CONVERT NOI TO VALUE IN INCOME APPROACH

STRATIFIED BY NGBD AND STAR RATING

SUPPORTS BOTH MARKET AND AFFORDABLE MODELS

Cap Rate Matrix

Cap Rate Matrix

Market	Cap Rate Matrix						
Star Rating	NGBD 501	NGBD 502	NGBD 503	NGBD 504	NGBD 505	NGBD 506	NGBD 507
2	7.20%	6.80%	7.00%	7.20%	6.60%	6.80%	6.80%
3	7.00%	6.60%	6.80%	7.00%	6.40%	6.60%	6.60%
4	6.80%	6.40%	6.60%	6.80%	6.20%	6.40%	6.40%

Unloaded

Star Rating	*NGBD 501*	*NGBD 502*	*NGBD 503*	*NGBD 504*	*NGBD 505*	*NGBD 506*	*NGBD 507*
2	*6.00%*	*5.60%*	*5.80%*	*6.00%*	*5.40%*	*5.60%*	*5.60%*
3	*5.80%*	*5.40%*	*5.60%*	*5.80%*	*5.20%*	*5.40%*	*5.40%*
4	*5.60%*	*5.20%*	*5.40%*	*5.60%*	*5.00%*	*5.20%*	*5.20%*

Cap Rates for market properties (above) are based on the submarket analysis (prev. page) and local sales analysis using direct capitalization. The Assessor's assigned cap rate for NGBD 501, Star Rating 2 is 6.00% supported by a 5.76% direct cap rate from sale (Forest Ridge-2665 Granite Hill Cir); Also, The Assessor's cap rate for NGBD 507, Star Class 4 is at 5.20%, supported by a 5.21% direct cap rate from sale (River's Edge at Manchester-505 Porter St.), e.g. Other cap rates derived from sales range from 4.35-5.44%, further supporting the above cap rate matrix which ranges from 5.00-6.00%. This extracted market data also supports the previous submarket cap rate analysis.

LIHTC	Cap Rate Matrix		
Star Rating	NGBD 501	NGBD 502	NGBD 503
2	8.20%	7.80%	8.00%
3	8.00%	7.60%	7.80%
4	7.80%	7.40%	7.60%

Unloaded

Star Rating	*NGBD 501*	*NGBD 502*	*NGBD 503*
2	*7.00%*	*6.60%*	*6.80%*
3	*6.80%*	*6.40%*	*6.60%*
4	*6.60%*	*6.20%*	*6.40%*

LIHTC (affordable unit) multifamily neighborhoods were combined as follows (based on similar market appeal/limited data) for modeling purposes. 100 basis points were added to each respective class/ngbd in the matrix to account for inherently higher OER, restrictions, etc. with LIHTC property

501 Southside/Northside/East End
502 West End/Scotts
503 Downtown/Manchester

Sales Ratio Study

Certified COD = 6.51 (post-model) → within range; Median Ratio = 0.99

Model-based predicted values tested against sales

Target COD: 5–15 for commercial properties (IAAO)

Holdout Sample Testing

Sales not used in model were tested post-model

Holdouts provide external validation of accuracy

Key metric: Predicted vs actual ratio consistency

Holdout Samples-"Does the model really work — or does it just memorize the training data?"

Holdout samples (Sales from population not used in model)

American Heritage	E0000080001	Variables	1001 E Main St	
Star Rating	0.364328	4	$12,496.21	
ln of Apt Units	-0.02814	57	$712,284	
Func. (Hi-Rise, AdpRU,UMX)	-0.17133	1	$9,892,835	
NGBD 503	8.260966	1	**$9,893,000**	*Rounded*
			$173,561.40	Per Unit (Model)

Sold for $9,875,000
($173,246/Unit) 7/23

Belmont Hills*	771-69-15-46-100-000	Variables	4037 Lamplighter Dr	
Star Rating	0.364327598	3	$10,328.69	
ln of Apt Units	-0.028137522	651	$6,723,979	
Func. (Hi-Rise,AdpRU,UMX)	-0.171333708	0	$93,388,603	
NGBD 506	8.331987488	1	**$93,389,000**	*Rounded*
			$143,454.69	Per Unit (Model)

Sold for $102,779
($157,879/Unit) 12/23

**Note: Belmont Hills is in Chesterfield but appears to be in a similar market to NGBD 506*

Timbercreek Apts	C0080530016	Variables	2200 Chateau Dr	
Star Rating	0.364327598	2	$7,269.72	
ln of Apt Units	-0.028137522	160	$1,163,155	
Func. (Hi-Rise,AdpRU,UMX)	-0.171333708	0	$16,154,937	
NGBD 501	8.30562088	1	**$16,155,000**	*Rounded*
			$100,968.75	Per Unit (Model)

Sold for $16,500,000
($103,125/Unit) 6/24

- The modeled values were compared to their respective sales (not used in model) prices to verify the results and overall validity of the model.
- e.g., with Timbercreek Apts, the modeled per unit value is $100,969, compared to the sales price/unit of $103,125 (highly accurate). This highlights the model's ability to predict values (unbiased) based on measuring the historical data in the market.
- The key is to produce a model that can do this consistently across stratum (neighborhoods, classes, etc.).

📊 In Modeling Terms:

Type	What It Does	Performance
Underfitting	Too simple → misses patterns	Bad on training & test data
Good Fit	Learns real patterns	Good on both training & test data
Overfitting	Too complex → memorizes data	Great on training, bad on test data

Overfitting the Data

- **Real Estate Example:**
- Let’s say you're modeling property value using bedroom count, square footage, and age.
- A well-fit model finds general patterns (e.g., “each 100 sf adds $10,000”).
- An overfit model might start to think “houses built in 1987 are always $243,000” — which won’t hold up when predicting future sales.

Additional Tests of Reasonability

Assessed $/Unit NGBD/Class Matrix (w/Sale Price (SP) in parenthisis-highlighted for comparison)

Star Class	NGBD 501	NGBD 502	NGBD 503	NGBD 504	NGBD 505	NGBD 506	NGBD 507
2	$95-$105k ($103k SP)	N/A	$100k	$82-$85k ($83k SP)	N/A	$115k ($142k SP)	$115k ($115k SP)
3	$143-$149k ($142k SP)	$146-$181k ($173k SP)	$121-$150k ($151k SP)	$104-$149k	180k	$146-$171k ($178k SP)	$151-$170k ($187k SP)
4	$184-$220k	$247-$256k	$179-$231k ($258k SP)	$156-$202k	$227-$277k ($278k SP)	$254-$281k	$190-$234k ($225k SP)

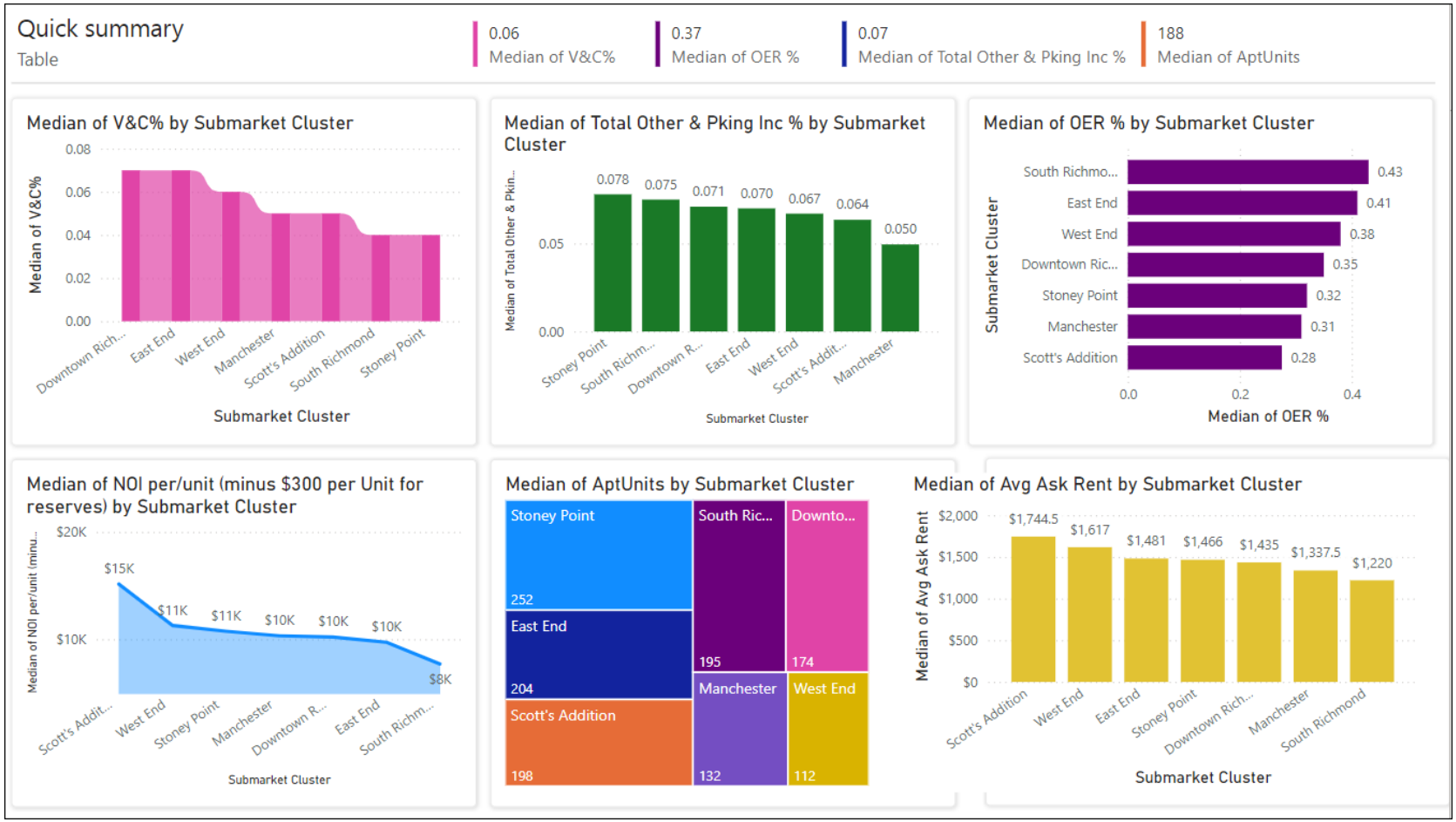
The above sales were used to support the indicated model values for FY23. Market Sales Price/Unit or SP/units ranged from appx. $75k to $275k ($143k median). Rent-restricted (affordable) SP/unit ranged from $60k to $180k with a median of around $100k.

Integral during Board hearings, MRA can be a lot to take in, but if the sales corroborate your model findings consistently-it's hard to dispute

Appellants have very rarely used to sales to defend their values in the past few years (as the sales are a bit higher)

Appraisal Data can be vital in defending valuations as well (Trepp is a good source)

Additional Stats PowerBI



Takeaways for Assessors

Use actual I&E when required by code

Apply regression techniques to improve accuracy

Stratify by key variables: class, type, location

Discussion & Q&A

ASK ABOUT MODEL CALIBRATION

SHARE APPROACHES IN YOUR LOCALITY

OPEN DISCUSSION ON I&E DATA COLLECTION AND MODELING