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Estimating Property Holding Period Returns

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September 12-14, 2017

ESTIMATING PROPERTY HOLDING PERIOD RETURNS -- OVERVIEW

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Research Purpose:

Using NCREIF Data:

Determine holding period returns for commercial real estate

Explain ex-post holding period returns using ex-ante attributes

DETERMINE HOLDING PERIOD RETURNS (I.E. TOTAL PROPERTY RETURNS).

.across the five major property types,

. after adjusting for risk,

. across geographic area, and

. across market employment size/growth

... USING THE BEST DATA IN THE INDUSTRY ...

The NCREIF, NPI Data

- Quarterly data
- Revalued quarterly
- Income and appreciation components
- Maintained by property type (office, industrial, retail, hotel and apartment)
- Maintained by regions of the U.S. and at the MSA
- 2016Q4 market value of over half a trillion dollars and over 10,000 properties
- Limited to institutional property owners and mainly core assets

.... USING THE APPROPRIATE DATA TIME HORIZON FOR THE ANALYSIS.

1987-2016 NCREIF data (not the entire 1978-2016 NCREIF data range), why?

- 1980-1986 apartments made up less than 3% (\$216 million in market value) of the NPI Index
 - Inadequate data for analyzing U.S. sub-regions, MSAs, and other analysis subdivisions
- Since 1986 apartments made up an average 17% (\$36 billion in market value) of the NPI Index
- At year end 2016, the portion of apartments was 24.3% and \$128 billion in market value
- 7-year holding period returns presented (also look at 3-year, 5-year, 10-year, and 15-year returns)

.... AND WE FIND APARTMENTS DOMINATE HOLDING PERIOD RETURNS AND RISK-ADJUSTED RETURNS FOR 3, 5, 7, 10, AND 15-YEAR HOLDING PERIODS

7-year Holding Period Returns
(1987-2016)

Property Type	Mean	S.D.	Sharpe Ratio
All	7.87%	3.56%	0.62
Apartment	9.05%	2.81%	1.21
Industrial	8.27%	3.75%	0.70
Office	6.99%	4.76%	0.28
Retail	8.68%	3.54%	0.85
Hotel	8.63%	4.43%	0.67

.... APARTMENT RETURNS ALSO BEST OTHER PROPERTY TYPES ACROSS REGIONS OF THE U.S WITH LOW V

EAST

7-year Holding Period Returns

Property Type	Mean	S.D.	Sharpe Ratio
Apartment	9.15%	3.84%	0.91
Industrial	8.15%	3.97%	0.63
Office	7.90%	4.87%	0.46
Retail	8.54%	3.61%	0.80

SOUTH

7-year Holding Period Returns

Property Type	Mean	S.D.	Sharpe Ratio
Apartment	8.69%	2.32%	1.31
Industrial	6.51%	2.80%	0.30
Office	6.07%	4.62%	0.09
Retail	8.44%	3.30%	0.84

MIDWEST

7-year Holding Period Returns

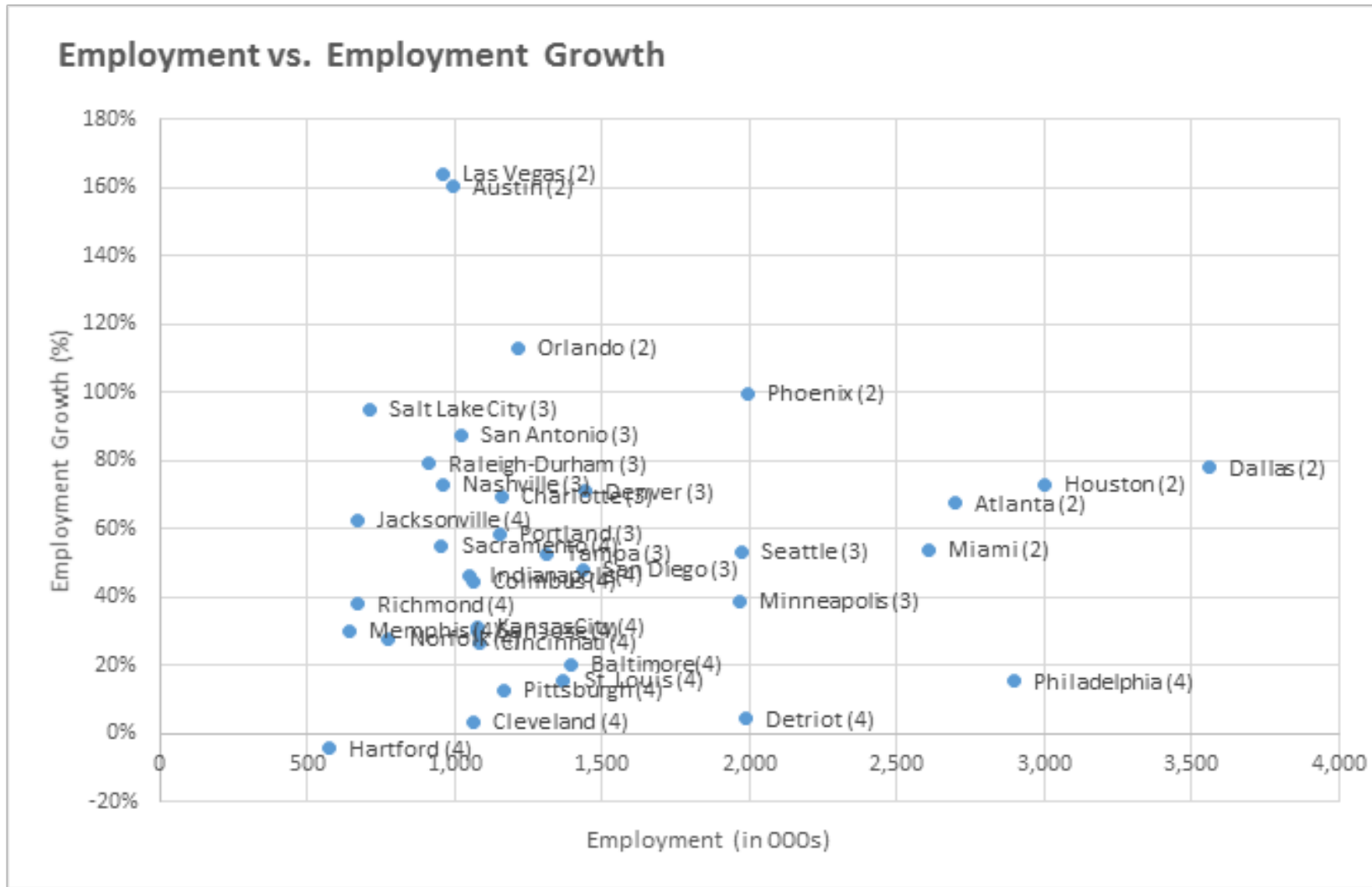
Property Type	Mean	S.D.	Sharpe Ratio
Apartment	8.77%	2.54%	1.22
Industrial	6.88%	2.85%	0.43
Office	5.03%	3.79%	-0.17
Retail	7.95%	2.53%	0.91

WEST

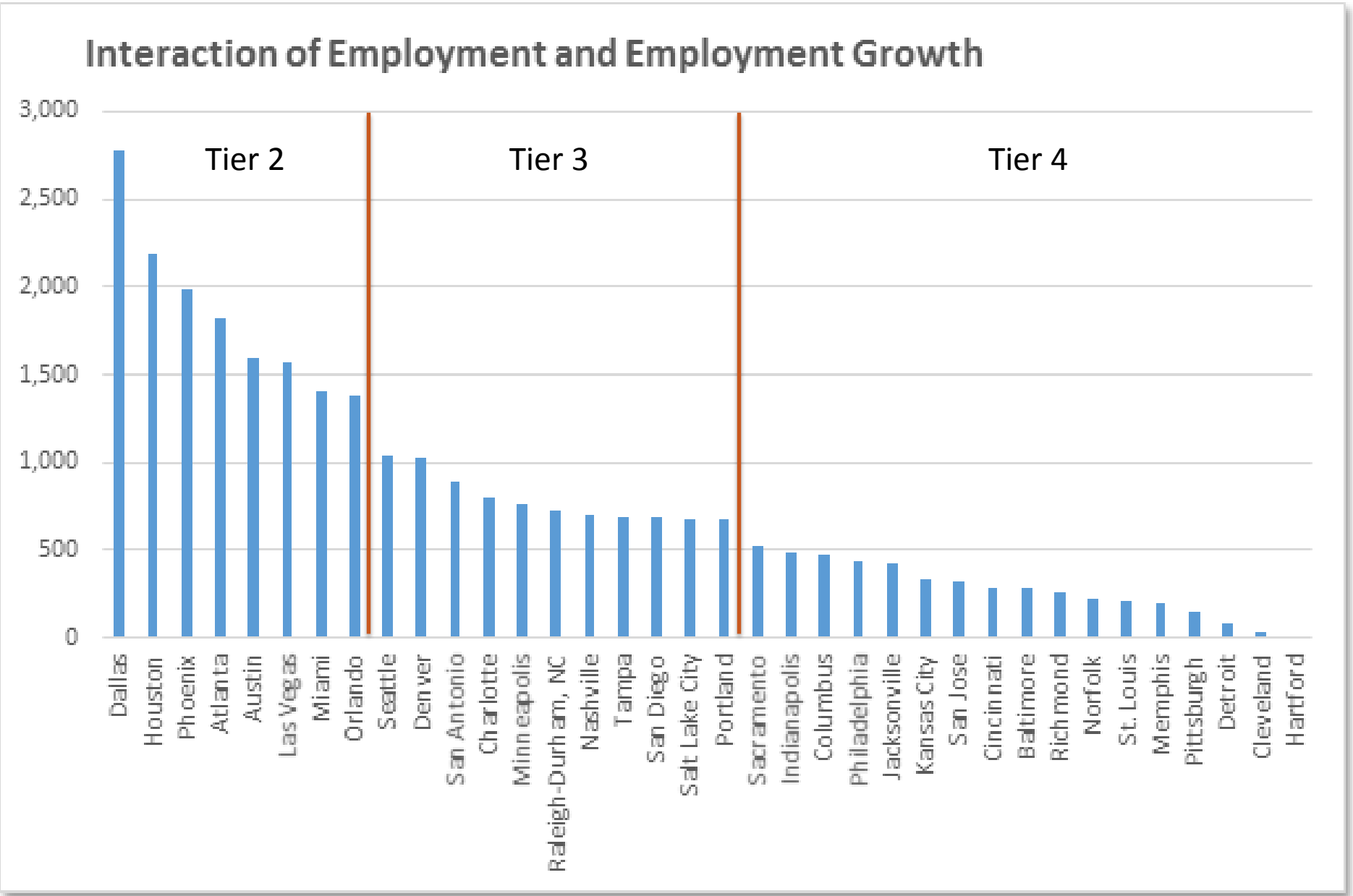
7-year Holding Period Returns

Property Type	Mean	S.D.	Sharpe Ratio
Apartment	9.93%	3.12%	1.37
Industrial	9.27%	4.47%	0.81
Office	7.20%	5.40%	0.29
Retail	9.24%	4.32%	0.83

.... DETERMINING CITY TIERS



.....
INTERACTION OF
EMPLOYMENT AND
EMPLOYMENT GROWTH
TO
DETERMINE
CITY TIER...
..



..... ACROSS CITY TIERS APARTMENT RETURNS, AGAIN, ARE CONSISTENT AND DOMINANT.....

Tier 1

7-year Holding Period Returns			
Property Type	Mean	S.D.	Sharpe Ratio
Apartment	9.63%	4.36%	0.91
Industrial	8.54%	4.26%	0.68
Office	7.57%	5.05%	0.38
Retail	9.14%	3.92%	0.89

Tier 2

7-year Holding Period Returns			
Property Type	Mean	S.D.	Sharpe Ratio
Apartment	8.70%	2.29%	1.33
Industrial	7.51%	3.42%	0.54
Office	6.07%	4.70%	0.09
Retail	8.61%	3.69%	0.80

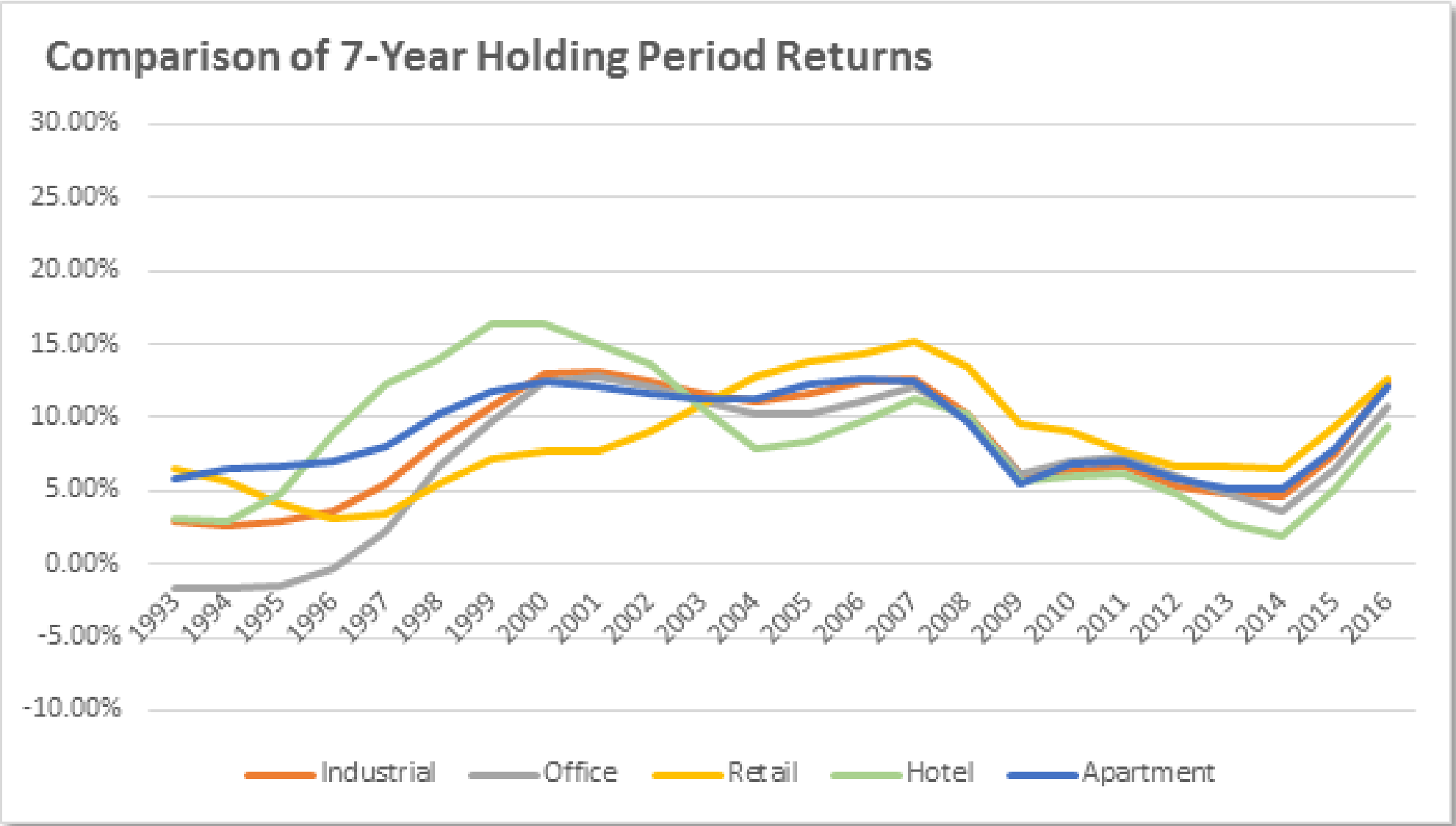
Tier 3

7-year Holding Period Returns			
Property Type	Mean	S.D.	Sharpe Ratio
Apartment	9.62%	2.39%	1.66
Industrial	8.74%	3.24%	0.95
Office	6.43%	4.85%	0.16
Retail	9.00%	3.62%	0.92

Tier 4

7-year Holding Period			
Property Type	Mean	S.D.	Sharpe Ratio
Apartment	8.91%	2.81%	1.16
Industrial	7.80%	3.54%	0.60
Office	5.76%	3.88%	0.03
Retail	8.45%	3.11%	0.90

.....
APARTMENT
RETURNS
ARE ALSO
CONSISTENT
ACROSS
TIME



AUDIENCE QUESTION

What do you think the breakdown is between income and appreciation for the seven year holding period analysis for all NCREIF NPI properties:

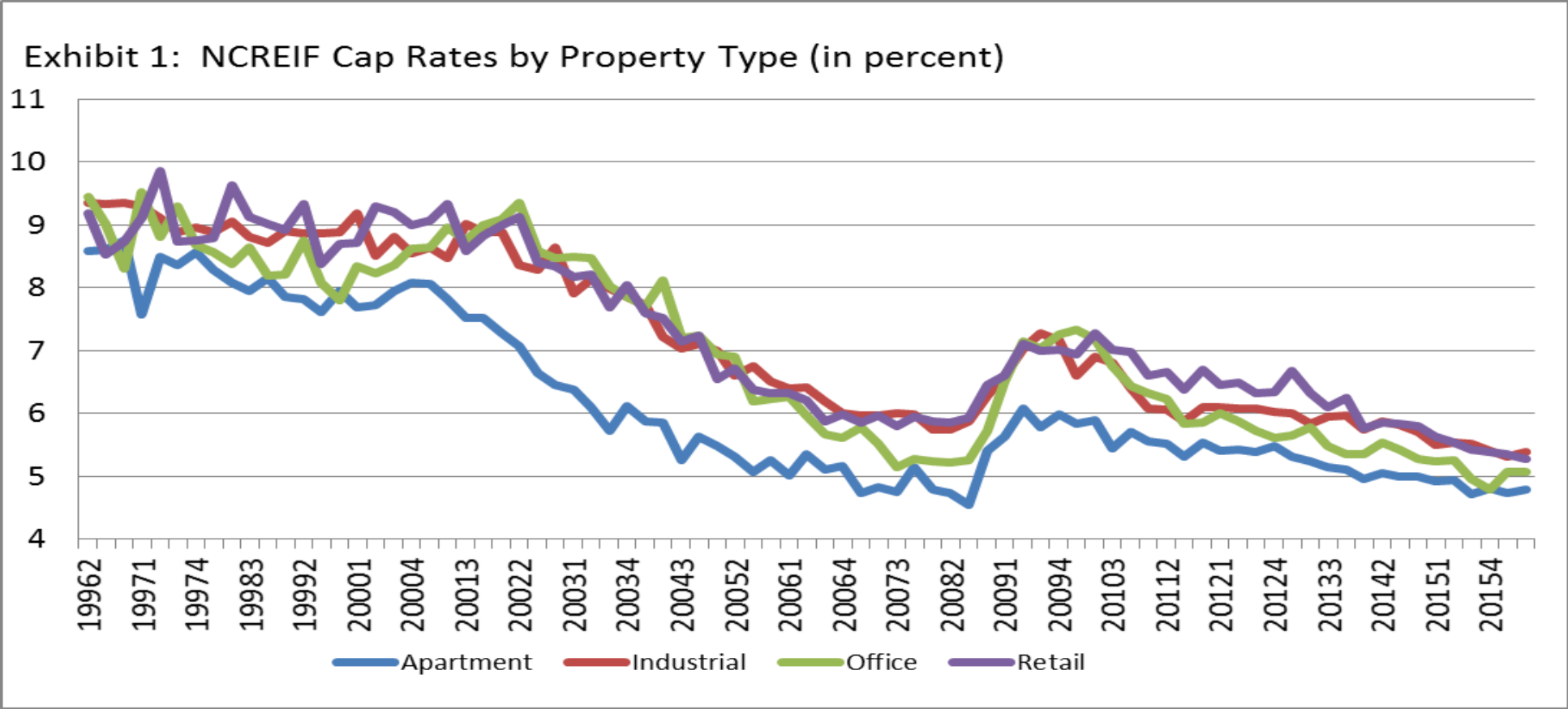
- A. 7% income and 1% appreciation
- B. 6% income and 2% appreciation
- C. 5% income and 3% appreciation
- D. 4% income and 4% appreciation

..... APARTMENT RETURNS ARE ANECDOTALLY THE BEST INFLATION HEDGE WITH INFLATION AVERAGING 2.7% DURING THE ANALYSIS TIME PERIOD

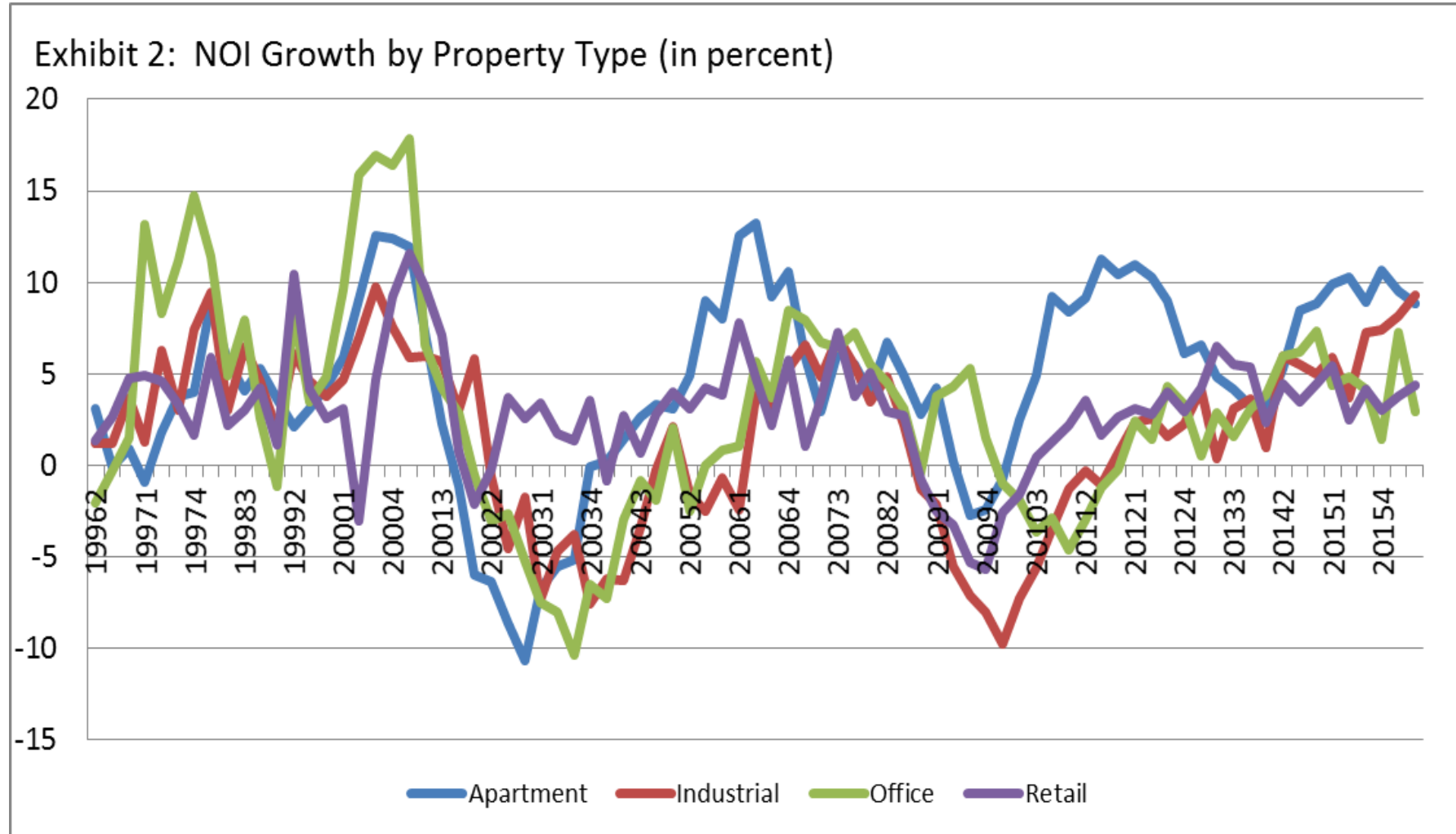
7-year Holding Period Returns by Income and Capital Appreciation Returns

Property Type	Capital		Total
	Income	Appreciation	
Apartment	6.98%	1.97%	9.05%
Industrial	7.96%	0.30%	8.27%
Office	7.44%	-0.43%	6.99%
Retail	7.29%	1.33%	8.68%
Hotel	8.95%	-0.31%	8.63%

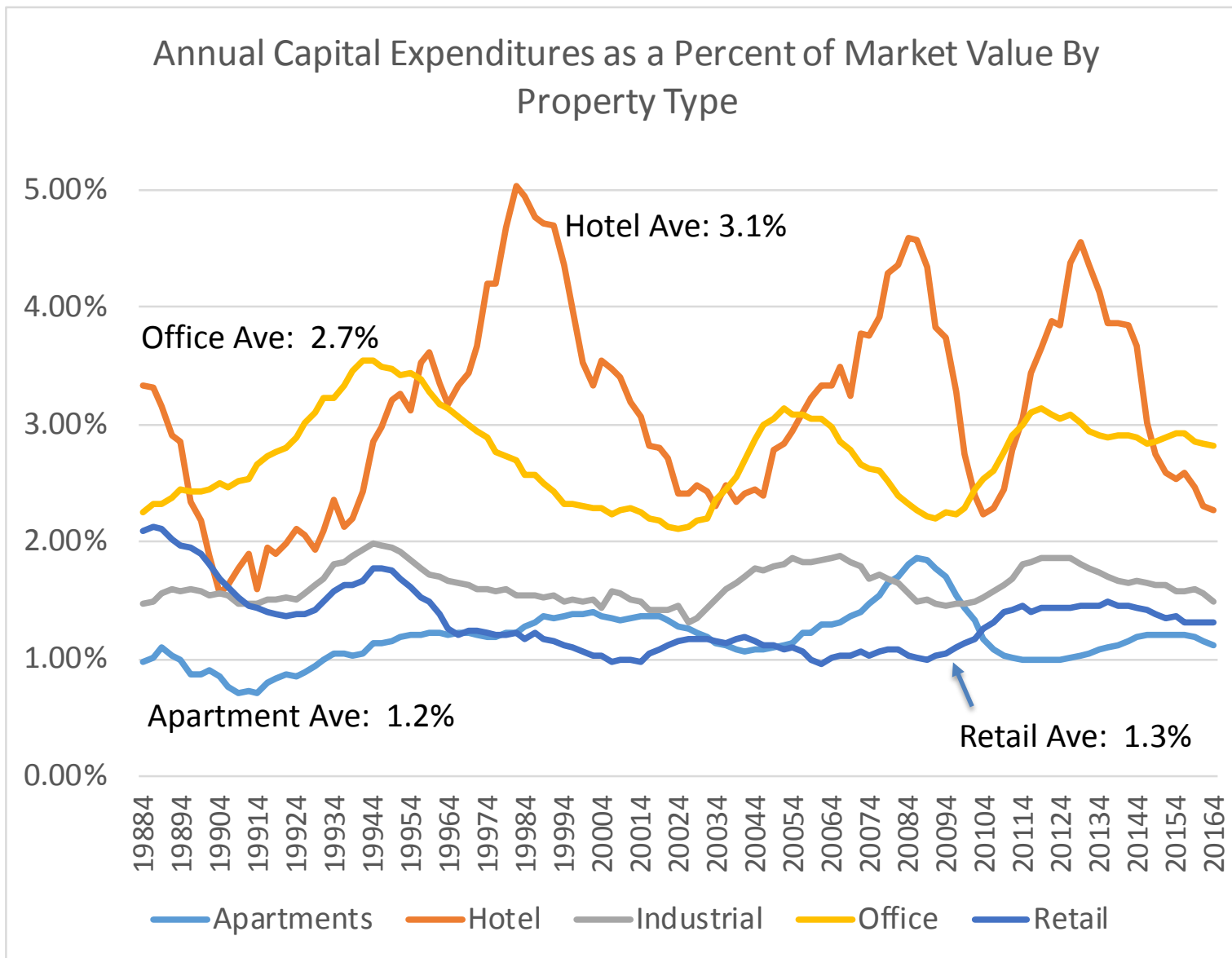
.... HOW CAN INDUSTRIAL, OFFICE, AND HOTEL APPRECIATION RATES BE NEAR ZERO OR NEGATIVE DURING A PERIOD OF CAP RATE COMPRESSION?



.... AND WITH GENERALLY POSITIVE NOI GROWTH?



.... ANNUAL CAPITAL EXPENDITURES ARE CONSUMING PROPERTY APPRECIATION FOR HOTEL, OFFICE AND INDUSTRIAL PROPERTIES.



Source: NCREIF data used in “New NCREIF Value Index and Operations Measures,” Michael S. Young, Jeffrey D. Fisher, and Joseph D’Alessandro, *Journal of Real Estate Literature*, 25:1 (2017), 221-235.

7-YEAR HOLDING PERIOD RETURNS INCLUDING AND EXCLUDING CAP EX

7-year Holding Period Returns with and without Capital Expenditures

Property Type	Returns Excluding Cap Ex	Capital Expenditures	Holding Period Returns Including Cap Ex
All	9.86%	1.99%	7.87%
Apartment	10.22%	1.18%	9.05%
Industrial	9.89%	1.62%	8.27%
Office	9.71%	2.72%	6.99%
Retail	10.02%	1.34%	8.68%
Hotel	11.71%	3.10%	8.63%

EXPLAINING EX-POST HOLDING PERIOD RETURNS USING EX-ANTE ATTRIBUTES

$$IRR = Cap Rate + Growth Rate \quad (1)$$

$$E(HPR) = Cap Rate + Growth Rate + \varepsilon \quad (2)$$

$$E(Cap Rate) = f(Real Return, Property Risk Premium, Liquidity Premium) + \varepsilon \quad (3)$$

$$E(Growth Rate) = f(Occupancy Rate, Rent Growth, Job Growth, Inflation) + \varepsilon \quad (4)$$

$$E(HPR) = f(Real Return, Property Risk Premium, Liquidity Premium, \\ Occupancy Rate, Rent Growth, Job Growth, Inflation) + \varepsilon \quad (5)$$

.... LINEAR
REGRESSION
RESULTS PROVIDE
GOOD
EXPLANATORY
POWER, CORRECT
VARIABLE SIGNS
AND
SIGNIFICANCE,
WITH REASONABLE
PARAMETER
ESTIMATE

Estimating Apartment Holding Period Returns (1987-2016)

Variable	Estimate	t-statistic
Intercept	-0.3183	-8.26
Real Return	0.0101	10.23
Inflation	0.0153	9.79
Risk Premium	0.0144	10.54
Feb Survey	-0.0002	-5.94
Debt Growth	-0.2977	-16.37
Occupancy	0.3631	8.55
Tier 2	-0.0144	-4.01
Tier 3	-0.0043	-1.88
Tier 4	0.0041	1.88
Midwest	-0.0063	-2.83
South	0.0168	5.28
West	0.0154	7.82
R2	40.2%	

KEY TAKEAWAYS

- Apartment returns dominate the other property types when measuring
 - Unadjusted returns
 - Risk-adjusted returns
 - Across geographic regions
 - Across city tiers
- Apartment provide anecdotal hedge for inflation (i.e. positive property appreciation)
- Apartments have the lowest ratio of Annual Cap Ex to Property Value of the property types
- Early explanatory results (regression) reveal that apartment returns can be estimated with robust results



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