Pricing of Cashflow Certainty
Evidence from Private Commercial Real Estate Transactions

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Introduction: Motivation

Recent market volatility again highlights **importance of security** of income streams on the value of commercial property.

Value investment being represented by the present value of its expected income discounted at a rate that reflects the **risk**.

Perception of investors towards riskiness of the cashflows that individual property potentially generate are paramount in pricing.

All well known within practice, however, contribution of risk (certainty) **factors at property level** have limited academic coverage...

$$\text{Risk} \Longleftrightarrow \text{Return}$$

Introduction: Example

Table: Expected price effects

		Temporal dynamics		Spatial dynamics	
	Overall	**Upward**	**Downward**	**Center**	**Periphery**
Occupancy					
Long- vs short leases	+	0	++	0	++
Occupancy vs vacancy	+	0	++	0	++
Covenant strength					
Tenant quality	+	0	++	0	++
Reversionary potential	+	0	++	0	++

Introduction: Aim and hypotheses

The **aim** of this study is to empirically *investigate the impact of cashflow related certainty factors on the pricing of commercial real estate*.

We **hypothesize** that differences in these 'lease' characteristics relate to some kind of cashflow risk which in turn significantly affects the value of individual assets. These effect vary significantly over space and time.

Expectations are that, all other things considered equal, investors are willing to pay a premium for assets that have more certainty in obtaining the expected income over the holding period.

Or perhaps investors are not that well-informed and/or rational...

Introduction: Contributions

This study adds to the literature in three important aspects:

1. Contribution of asset-level certainty factors to the pricing of CRE does not have a major coverage in the academic literature
2. First paper found to investigate the dynamics/stability of such parameters over space and time
3. Majority of the studies focus on prime markets in the US/UK while other countries do not have major coverage

Introduction: Outline

1. Motivation and Research Design
2. Theoretical Framework
   - The real estate market
   - Asset pricing
   - Hedonic price model
   - Asymmetric risk profile
3. Data and Descriptives
   - Data sources
   - Descriptive statistics
4. Preliminary Results
   - General results
   - Temporal dynamics
   - Spatial dynamics
5. Conclusion and Discussion

Theoretical Framework: Real Estate Market

Within real estate we typically identify two main markets where prices are formed (DiPasquale et al., 1992; Geltner et al., 2013).

Space Market

- Interaction usage demand (tenants), current stock supply (brokers)
- Results in current operating cashflows
- Market highly **segmented**; tenants have specific needs
- Rental prices can differ greatly over space even for similar properties

Asset Market

- Market where prices are formed via investors on both buy/sell side
- Results in required rate of return
- Market highly **integrated**; investors don't care where cash is from
- Two properties perceived similar risk could have similar rates

Theoretical Framework: Asset Pricing

Asset pricing model (Baum, 1988; Fisher, 1930; Gordon, 1962):

$$P = \frac{R}{k} \qquad where \quad k = Rf + RP - g + D \tag{1}$$

Jackson et al. (2011) and Crosby et al. (2016) further specify *RP*:

Spatial scale of influence		Returns to reflect	Drivers	Variables
Macro	Investment and capital markets	RFR	Expected inflation, time preference	National level measures such as treasury bill rates, gross redemption yields on government bonds, and actual and expected inflation rates
↑	Real estate market	↑	Performance and volatility of real estate relative to other assets	Macro-economic and industry estimates of income and capital returns and key drivers in asset markets at national, local and submarket levels
	Sector and Location	Risk and growth expectations	Market specific factors, economic/ catchment profile	
	Stock/asset		Tenant	Credit worthiness
			Lease	Multi/single-let, review/user clause, period to expiry/review
		↓	Location	Micro location/accessibility
Micro			Building	Sustainability rating, obsolescence

Empirical Framework: Hedonic Price Model

Basic hedonic price model (log-log):

$$\ln P_{i\ell t} = \omega \ln R_{i\ell t} + \mathbf{\Phi}(\mathbf{L_{i\ell t}}) + x'_{i\ell t}\,\beta + \eta_\ell + \mu_t + \epsilon_{i\ell t} \tag{2}$$

where:

- P is the transaction price of property i at location ℓ
- R denotes the rent (NOI) at time t
- $\Phi(L)$ is some function of certainty characteristics L
- x, η, μ represent other controls

Rewriting towards the cap rate k as dependent variable:

$$\ln\left(\frac{P_{i\ell t}}{R_{i\ell t}}\right) = \mathbf{\Phi}(\mathbf{L_{i\ell t}}) + x'_{i\ell t}\,\beta + \eta_\ell + \mu_t + \epsilon_{i\ell t} \quad (= \frac{1}{k}) \tag{3}$$

Note that NOI abstracts away some heterogeneity (Francke et al., 2021)

Data: Sources

Data consists of investment transactions from private commercial real estate market (2010-2022). Sources include, but not limited to, RCA, Brainbay, StiVAD and internal Cushman&Wakefield data.

Table: Variables Descriptions

Label	**Definition**	**Exp**
Capitalization factor	Transaction price after transfer cost over NOI	NA
Lease term	Weighted average remaining lease term incl vacancy	+
Initial occupancy	Occupancy at time of sale as percentage of rental value	+
Age	Number of years between transaction and year constructed	-
Floor area	Lettable floor area of the property in square meters	+
Energy label	Sustainability indicator and proxy for property quality	+
Submarket	Expert delineated submarkets	NA
Period	Calendar year categories from 2010 through 2022	NA

Data: Map Transactions Amsterdam

Stack:

- Databricks (Code/Compute)
- Apache Sedona (Spatial Processing)
- Kepler/Carto (Visualize)

Data: Descriptives Statistics

Table: Descriptive Statistics

		N	Mean	SD	Min	Max	Kurt	Skew
Office	Capitalization factor	2,971	10.6	6.6	2.0	41.8	3.0	1.2
	Lease term		3.9	3.4	0.0	21.1	3.1	1.5
	Initial occupancy		0.7	0.3	0.0	1.0	0.3	-1.2
Industrial	Capitalization factor	653	14.1	5.4	3.2	35.1	0.9	0.8
	Lease term		5.2	5.0	0.0	22.2	1.3	0.6
	Initial occupancy		0.8	0.3	0.0	1.0	2.3	-1.9
Retail	Capitalization factor	1,204	16.9	4.8	5.5	36.3	1.3	0.2
	Lease term		4.4	4.0	0.0	24.3	1.1	0.9
	Initial occupancy		0.8	0.2	0.0	1.0	2.8	-2.4

Results: General

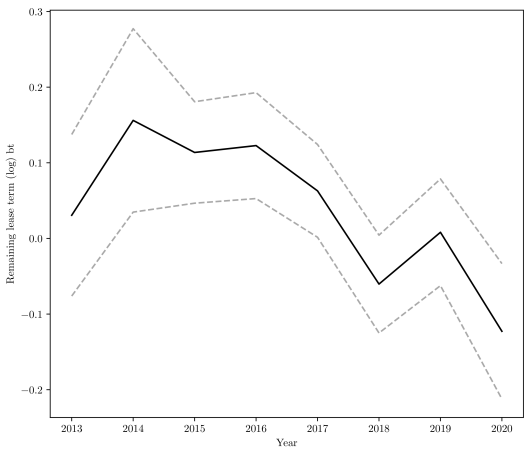
Table: Results with Capitalization Factor (log) as Dependent Variable

	Office		Industrial		Retail	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Lease term (*log*)	0.26***	-	0.13***	-	0.10***	-
	(0.00)		(0.00)		(0.00)	
Occupancy	-	0.63***	-	0.38***	-	0.25***
		(0.00)		(0.00)		(0.00)
Floor area (*log*)	−0.33***	−0.36***	−0.19***	−0.19***	−0.22***	−0.23***
Age (*log*)	0.60	0.63	0.91**	0.89**	0.56*	0.49
Age^2 (*log*)	−0.27	−0.29	−0.49**	−0.48**	−0.26*	−0.22
Energy label	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Submarket FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,971	2,971	653	653	1,204	1,204
Adj-R^2	0.54	0.48	0.65	0.64	0.50	0.47

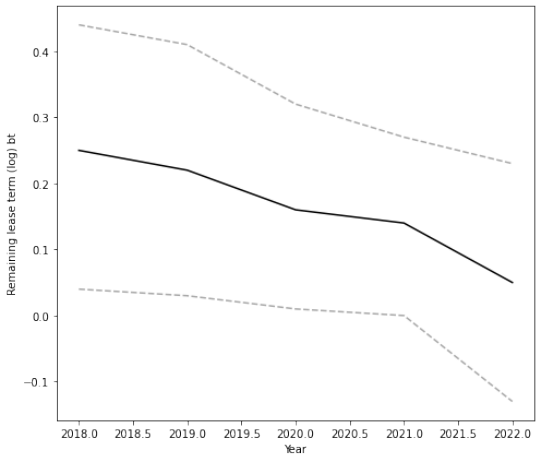
Results: Price Dynamics Time

Figure: Stability of Coefficients over Time [**WAULT**]

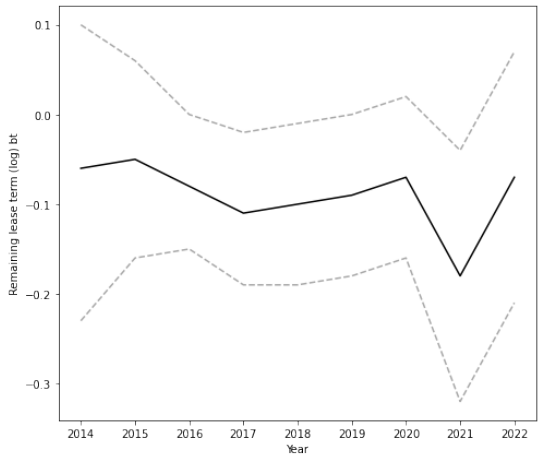
(a) Office



(b) Industrial



(c) Retail



Results: Price Dynamics Space

Table: Regression Results: Spatial Dynamics

	Office	Retail	Industrial
	(7)	**(8)**	**(9)**
Lease Term [WAULT]			
WAULT × Large city decentral	0.01 (0.86)	-	-
WAULT × Small city central	0.01 (0.73)	-	-
WAULT × Small city decentral	0.03 (0.21)	-	-
Initial Occupancy [OCC]			
OCC × Large city decentral	-0.14 (0.24)	-	-
OCC × Small city central	-0.18 (0.29)	-	-
OCC × Small city decentral	-0.15 (0.33)	-	-
Observations	2,971	-	-
Adj-R^2	0.34	-	-

Working on how to define 'centrality' for retail and Industrial.

Conclusion

Preliminary conclusions:

- Statistically and Economically significant effects for lease term and occupancy overall
- Significant differences over time with less premium in stable markets and more in periods of economic distress.
- Spatially no significant effects found in none of the segments, but requires more study.

What's Next?

- Collect more data (selection bias)
- Investigate effects of covenant strength
- Add robustness tests
- Collaborate with other countries (Cushman & Wakefield)

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