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Renewing a Lease at a Discount or Premium?

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Abstract *Occupancy discount* is a long-accepted doctrine in literature. Search theory supports such a proposition, but empirical evidence is mixed. This study revisits this dilemma and puts forward an alternative argument that both a landlord may exploit sitting tenants who have made non-redeployable investments and charge them an occupancy premium. Based on data of high-end commercial properties where quality information is symmetric, this study confirms that the magnitude of discounts/premiums hinges on the tradeoff between asset specificity and search. It also demonstrates that instrumental variables estimation is a better approach to correcting endogeneity bias in lease renewal decisions.

1. Introduction

Suppose a lease for a property is about to end. Its landlord can either renew the lease with the sitting tenant or find a new tenant. In a frictionless market, competition would determine rents such that landlords are indifferent to sitting and new tenants. However, with positive transaction costs, the literature asserts that the landlord should give a rent discount – often known as an *occupancy discount* (Marshall and Guasch, 1983; Guasch and Marshall, 1987; Shear, 1983) – to the sitting tenant due to the cost of searching for a new tenant, which includes not only a brokerage fee, but also the opportunity cost of maintaining a vacant property. This cost can be avoided by offering the sitting tenant

an incentive to stay in the form of a discount. Another reason is information asymmetry on tenant quality (e.g. whether one pays rent on time, maintains the property well, etc.). The landlord may be willing to renew the lease at a discount if s/he learns during the first contract period that his/her sitting tenant has been better than the average tenant (Hubert, 1995).

While the above reasoning seems to be clear, empirical evidence is not. Guasch and Marshall (1987), after correcting censoring bias,

[1] indeed found insignificant occupancy discounts in the U.S. housing market – a discount could be as large as 13% or as small as -18% (a premium). There is a different strand of studies on *length-of-residency discounts* (e.g. Follain and Malpezzi, 1980; Goodman and Kawai, 1985) and *premiums* (e.g. Grenadier, 1995; Barker, 2003; Clapham and Gunnelin, 2003). They are about the term structure of lease rates and should not be confused with the occupancy discount this study examines. It remains puzzling why the evidence does not stand up for the reasoning on search cost.

To solve this puzzle, we offer an argument against occupancy discounts – the landlord may hold up sitting tenants who have made non-redeployable investments in the property. This is generally known as asset specificity (Williamson, 1985). In the commercial real estate market, some sophisticated tenants require special locations and technology to run their businesses. A notable case in point is investment banks, which provide round-the-clock services and perform high-frequency trading. Their

supercomputer networks, cooling systems, and power backups have to be specially designed for the properties they occupy. The moving cost of these firms is typically high. In such cases, opportunistic landlords would offer a lower occupancy discount or even charge a premium to such asset-specific tenants.

This is the first study to argue that both occupancy discounts and premiums can co-exist, depending on whether the search cost or asset specificity dominates. Occupancy discounts are expected when the former is high (e.g. the space to let is large or the vacancy rate is high). Occupancy premiums, however, are expected when the moving cost of a sitting tenant is high (e.g. asset-specific tenants under a long-term lease). These different predictions from search cost and asset specificity will be evaluated by Hong Kong's high-grade office leasing data. An advantage of using this real estate segment is that information on property and tenant quality is more observable, so the problem of information asymmetry can be minimized. This distinguishes our work from Guasch and Marshall's (1987) study of the housing market, in which tenant quality was less observable. Another merit is that the office market is not subject to any rent control regulation, which may distort lease renewal decisions.

If occupancy discounts and premiums can both exist, it is also necessary to revisit whether censoring bias, as proposed by Guasch and Marshall (1987), is a necessary outcome. They argued that any lease renewal case observed was likely one that received an occupancy discount. However, in light of asset specificity, sitting tenants

may still renew their leases even if they have to pay an occupancy premium. The importance of censoring bias, if applicable, is not clear. In this study, we contend that censoring bias is better viewed as a special case of the endogenous selection process in which a lease renewal decision is jointly determined with the rent. That means removing censoring bias alone does not automatically address the endogeneity problem caused by a lease renewal dummy as a right-hand-side variable. We propose to use the instrumental variables (IV) estimation as a more general method to model the endogenous selection process.

2. Development of Hypotheses

We start with the intuition motivating our hypotheses. Suppose a sitting tenant is willing to renew his/her lease at a rent, R_s. But a new tenant is willing to pay a rent, R_n, for the same property. If both tenants' quality is about the same, the landlord will lease the property to whoever offers a higher rent. Competition between tenants will then drive the rent to $R^*=R_s=R_n$ in equilibrium. No occupancy discount or premium should exist in this market.

Now, suppose the market is characterized by two types of new tenant: one who is not interested in the property (i.e., his/her willingness to pay is zero) and one who is willing to pay (R_n). Without knowing in advance the interest of a prospective tenant, a landlord has to incur an extra cost, C, to search for an interested new tenant. For the landlord to be indifferent to the sitting and new tenants, the equilibrium rent has to be $R_s=R_n–C$, resulting in an occupancy discount. C includes the marketing cost (e.g. a brokerage fee), which can otherwise be saved if the lease is renewed with the sitting tenant. More importantly, C also includes the opportunity cost of maintaining a vacant property during the marketing period. Pre-marketing is possible, but not necessarily effective because prospective tenants are usually not allowed to inspect the property until after the current tenant moves out.[2] This is especially true when letting a large property, which takes time to redesign and renovate before a new tenant can move in. Therefore, from the perspective of both marketing and opportunity costs, C should increase with property size.

Hypothesis 1 *Ceteris paribus, the larger a property's size, the greater is its occupancy discount for the sitting tenant.*

Search costs can vary with market conditions. Clapp (1993) used a "vacancy gap" – the difference between the actual and natural vacancy rates – as a crucial indicator to describe the search dynamics in the rental market. When the actual vacancy rate is above the natural one (i.e., a positive gap), there are more spaces 'seeking' tenants than vice versa. Holding the amount of stock constant, this means fewer prospective tenants on the market. If a landlord does not renew a lease, s/he has to spend greater efforts (i.e., a higher C) to secure a tenant in order to achieve R_n. Otherwise, based on the equilibrium relationship, $R_s=R_n-C$, a larger occupancy discount is needed to induce the sitting tenant to stay.

Hypothesis 2 *Ceteris paribus, the larger the vacancy gap, the greater is the occupancy discount for the sitting tenant.*

So far, we assumed away the tenant's moving cost. This is not unreasonable for most office tenants whose space and facility requirements are standard. However, some businesses, like investment banks mentioned in the Introduction, may need to invest in specialized assets that are tailor-made for a certain property or location. This is what Williamson (1985) termed "asset specificity". Knowing that a sitting tenant's assets are movable or re-deployable only at great cost (say, M), a landlord may hold him/her up by charging a higher rent upon lease renewal. The upper bound of R_s is R_n+M, beyond

which the sitting tenant would rather move to another property. Its lower bound is $R_n - C$, below which the landlord is better off finding a new tenant. While the landlord has to weigh the benefits of opportunism against the potential loss of his/her reputation, there is a chance that holdups will occur (Klein, 1996). Suffice it to say that asset specificity would result in a smaller occupancy discount than before or even create a premium. In particular, the degree of asset specificity can be approximated by the lease length, as longer contracts are known to be a solution to the holdup problem. Hence, our third hypothesis is:

Hypothesis 3 *Ceteris paribus, the longer a lease, the smaller is the occupancy discount for the sitting tenant.*

3. The Data

To test the hypotheses above, we use rental transaction data from Hong Kong's high-grade office market. The data, compiled by CBRE Hong Kong Research, contain detailed information on 1,643 office leasing deals made from January 2007 to December 2012.[3] It includes lease terms (e.g. effective rent,[4] lease length, and renewal/new rental), property attributes (e.g. building location, building height, building age, floor level, floor area, and strata title/single ownership), and each tenant's business type. Exhibit 1 (a) and (b) summarize their descriptive statistics.

Some stylized facts about the Hong Kong office market can be identified from the descriptive statistics in Exhibit 1(a).

First, the monthly effective rent (*R*) of Hong Kong office space averaged at around HK$45 (or US$6) per square foot, which is comparable to that in many top cosmopolitan cities such as London and New York. As an international financial centre and gateway to China, Hong Kong has attracted many foreign corporations, especially those in the finance, insurance, and real estate (*FIRE*) sectors, to set up their regional headquarters. Our sample shows that *FIRE* tenants have occupied 30% of Hong Kong's high-grade office space. The effective rent of *FIRE* tenants was almost the double of other tenants, as shown in the last three columns of Exhibit 1(a). This is reflected in their choice of better quality offices – better accessibility (*ACCESS*), higher floor level (*FLOOR*), larger floor area (*AREA*), etc.

Second, the typical lease length (*LEN*) is about three years, which is shorter than that for most other places and makes the Hong Kong office leasing market very active. As manifested in our sample, the average lease length of *FIRE* tenants was only longer than that of non-*FIRE* tenants by two months. Indeed, among *FIRE* tenants, there was considerable variation in lease length – investment banks generally committed to a long lease up to nine years, while financial services companies commonly signed a 2-year lease. This suggests that not all *FIRE* tenants are asset-specific.

Third, among the 1,643 rental transactions, 36% were renewals (*RENEW*) and 64% were new rentals. New rentals in the office market are indeed more common than those in the housing market, which comprised only 28% on average according to other studies. This indirectly supports our argument that information asymmetry is less an issue for high-grade offices where new tenants' (usually established firms) quality is readily observable.

Fourth, given the current trend of office decentralization, office stock is not only present in Hong Kong's CBD, but also in other districts. Hence, we created an accessibility index (*ACCESS*) to measure the commute time between Hong Kong's different business districts. The index is high when an office building is located in an accessible district (e.g. the CBD). Appendix I explains the method employed to compile this index. Other than location, the quality of an office building is also a prime consideration of tenants.

Since there is no official quality rating of high-grade offices, building height (*HEIGHT*) and age (*AGE*) are used as proxies. Newer office towers tend to be taller than older ones, with the tallest one in our sample being 118 stories high. Newer buildings are also presumably better climate conditioned, and more modern electronically.

Fifth, office buildings are segmented by ownership type. The most common type of building is owned by a single landlord (usually a developer). The other type is a strata title, under which the office units within the building are owned by different landlords (usually property investors). These landlords have to compete among themselves and, thus, possess a lower degree of autonomy and flexibility compared to single ownership buildings. In our sample data, only 13% of the rental transactions came from strata title buildings (*STRATA*). Exhibit 1(b) shows that the proportion of each business type in strata title buildings as compared to single ownership buildings. In general, the distribution is fairly similar across the two building types, so tenants' self-selection bias due to the building type is unlikely an issue.

Last but not least, we also collected aggregate statistics on Hong Kong's office market for 2007-2012. This was a comparatively "tight" period in the sense that the vacancy rate (*VAC*) was only 4% on average, although in some sub-markets it was 31%. During the sample period, the market experienced ups and downs as a result of the sub-prime mortgage crisis in the U.S. The office market's rental index (*INDEX*) initially showed a sharp downward trend due to the uncertain business outlook triggered by the global

financial crisis. But with strong economic growth in Asia, office rents rebounded quickly in 2009 and kept rising through the end of the sample period.

Exhibit 1 (a) Definitions and Descriptive Statistics of Variables

		All industries		***FIRE versus non-FIRE***		
Variable	**Description**	**Mean**	**Std.Dev.**	**Non-*FIRE* mean**	***FIRE* mean**	**Difference**
R	Effective rent in HK$ / month	45	34.3	36.48	66.58	30.10 ***
LEN	Lease length in months	34.1	9.3	32.91	35.30	2.39 ***
HEIGHT	Building height in stories	34.8	16.2	32.45	41.49	9.05 ***
AGE	Building age in years	15.8	7.6	15.84	15.97	0.13
ACCESS	Accessibility index	46.7	32.8	28.85	49.22	0.53 ***
FLOOR	Floor level of the office	20	12.7	19.00	22.47	3.47 ***
AREA	Floor area of the office ('000 sf)	6.9	7.8	7.53	9.91	2.38 **
INDEX	District rental index	98.7	8.8	4.58	4.58	-0.01
VAC	District vacancy rate	0.05	0.03	0.05	0.04	-0.01 ***
FIRE	% tenants from *FIRE*	0.3	0.4	-	-	-
Dummy variables:						
RENEW	1=renewal; 0=new rental	0.36	0.5	0.37	0.33	-0.04
STRATA	1=strata title; 0=single owner	0.13	0.3	0.14	0.11	-0.04 **

Source: CBRE; Notes: 1) ** and *** represent significant differences at the 5% and 1% levels, respectively; 2) observations are based on individual leasing deal data from 2007-2012.

Exhibit 1 (b) | Breakdown of Tenants' Businesses by Building Type (as % of total)

Industry	Strata	Single ownership
FIRE	31.1	32.9
Professional, administrative & business service activities	14.2	13.9
Community, social and personal services	8.4	9.3
Wholesale, retail and import/export trades, restaurants and hotels	17.9	19.6
Information and communications	6.3	6.7
Transportation, storage, postal and courier services	5.3	3.4
Manufacturing	8.9	8.4
Construction	1.6	1.2
Professional, scientific and technical activities	3.2	2.7
Others	3.2	2.0
Total	100.0	100.0

Source: CBRE; Notes: The industrial classification is simplified by authors. Please refers Appendix B for details of the industry classifications.

4. Empirical Models

Rosen's (1974) hedonic pricing model provides a framework to examine the factors that lead to occupancy discounts or premiums. A semi-log hedonic equation is commonly used:

$$\ln(R) = \beta_1 X_1 + \beta_2 X_2 + L + \varepsilon \quad (1)$$

where R = monthly effective rent; X_1 = structural and location characteristics; X_2 = market conditions; L = lease-related effects; ε = unobserved components; α and β are the unknown parameters to be estimated by OLS first and then by the Instrumental Variable estimation to correct for the endogeneity sample bias.

In our data set, X_1 includes the characteristics of office buildings (*AGE* and *HEIGHT*) and office space (*FLOOR* and *AREA*) that a tenant occupies. Geographic location is captured by an accessibility index (*ACCESS*), which is higher for a more accessible location. Buildings with fragmented ownership is represented by a dummy variable *STRATA*. As discussed before, *FIRE* tenants are more likely to choose offices of higher quality, which may not be adequately captured by the above characteristics. *FIRE* is therefore also included in an attempt to control for any omitted quality. However, it should be noted that *FIRE* is not a proxy of asset specificity. In Introduction, investment banks were used as a motivating example of asset specificity, but we should not expect that all *FIRE* tenants require tailor-made technologies or configurations in their premises. As discussed in Data, many financial services companies in our sample only committed to a short lease of less than 3 years. Our asset specificity hypothesis is

therefore based on lease length, not *FIRE*. We expect that *HEIGHT*, *FLOOR*, *ACCESS* and *FIRE* have a positive effect on rent, whereas *AGE*, *AREA*, and *STRATA* have a negative effect (Exhibit 2).

X_2 adjusts the nominal rent for changing market conditions (*INDEX* and *VAC*). Two indicators are included because they complement each other in the rental adjustment process. Due to search costs and the rigidity of long-term leases, vacancy is often found to adjust before rental changes.

[5] When the vacancy rate is high, landlords are more eager to rent out their office spaces by lowering the rent. Therefore, *INDEX* is expected to have a positive relationship with rent, while the effect of *VAC* on rent should be negative (Exhibit 2).

L captures the effects of the lease terms agreed between landlords and tenants. Since effective rents have already accounted for rent-free periods, rent rebates, etc., the remaining factors to be considered are lease length and lease renewal. As mentioned in the Introduction, a longer lease can result in a length-of-residency discount or premium, depending on market expectations of future rents (Grenadier, 1995). *LEN* is, therefore, entered as a control variable without an expected sign on its coefficient, α_1. The same is true for a lease renewal. *RENEW* can have a positive or negative coefficient (α_2), depending on whether asset specificity or search cost dominates. Equation (2) shows the baseline specification to test our hypotheses:

$$L = \alpha_1 LEN + \alpha_2 RENEW \qquad (2)$$

Here we allow for different lease renewal effects according to our three hypotheses. Based on the search cost argument, Hypothesis 1 predicts that the larger a property's size, the greater is the occupancy discount for the sitting tenant. This can be tested by adding an interaction term of *RENEW* and *AREA*, whose coefficient should be negative ($\alpha_2\gamma_1<0$). Similarly, Hypothesis 2 predicts that the larger the vacancy gap, the greater is the occupancy discount for a sitting tenant. Assuming a constant natural vacancy rate, an interaction term of *RENEW* and *VAC* should give a negative coefficient ($\alpha_2\gamma_2<0$). Finally, based on asset specificity, Hypothesis 3 predicts that the longer a lease, the smaller is the occupancy discount for the sitting tenant. It can be tested by an interaction term of *RENEW* and *LEN*, which should have a positive coefficient ($\alpha_2\gamma_3>0$). Equation (3) summarizes all these interactive effects:

$$L = \alpha_1 LEN + \alpha_2 RENEW(1 + \gamma_1 AREA + \gamma_2 VAC + \gamma_3 LEN) \qquad (3)$$

Equation (3) is restrictive in the sense that the interactive effects are assumed to be linear and continuous. In terms of the degree of asset specificity, a tenant with an eight-year lease may not be different from a tenant with a ten-year lease, but they would certainly be different from a tenant with a two-year lease. Equation (4), therefore, adopts a more general specification by using a step function:

$$L = \alpha_1 LEN + \alpha_2 RENEW(1 + \gamma_1 AREA^{+} + \gamma_2 VAC^{+} + \gamma_3 LEN^{+}) \qquad (4)$$

where $AREA^{+}$ is a large area dummy that is set to 1 if the leased office space is larger than the sample's upper quartile (9,000 sf) and 0 if otherwise; VAC^{+} is a high vacancy dummy that is set to 1 if the vacancy rate of the office submarket is higher than the

sample's upper quartile (8%)[6] and 0 if otherwise; and LEN^+ is a long-term lease dummy that is set to 1 if the lease is longer than the sample's upper quartile (36 months) and 0 if otherwise. The expected signs of these interaction terms are the same as above.

Exhibit 2 Definitions of the Variables in the Hedonic Equation

Dependent Variable: *ln(R)* – Logarithm of Monthly Effective Rents

Variable	Definition	Expected Sign	Remark
AGE	Building age	–	Control
HEIGHT	Building height in stories	+	Control
FLOOR	Floor level of the office space	+	Control
ln(AREA)	Logarithm of the floor area of individual office space (in thousands of square feet)	–	Control
ln(ACCESS)	Logarithm of the accessibility index	+	Control
STRATA	Strata title = 1; single owner = 0	–	Control
ln(INDEX)	Logarithm of the submarket office rental index	+	Control
VAC	Office submarket vacancy rate	–	Control
LEN	Lease length (in months)	+/–	Control
FIRE	*FIRE* industry = 1; Non-*FIRE* = 0	+	Control
RENEW	Renewal = 1; new lettings = 0	+/–	
$\boldsymbol{RENEW \times AREA^+}$	RENEW interacted with a large area dummy ($AREA^+$ = 1 if the leased office space is larger than the sample's upper quartile; = 0 if otherwise)	–	Prediction of Hypothesis 1
$\boldsymbol{RENEW \times VAC^+}$	RENEW interacted with a high vacancy dummy (VAC^+ = 1 if the vacancy rate of the office submarket is higher than the sample's upper quartile; = 0 if otherwise)	–	Prediction of Hypothesis 2
$\boldsymbol{RENEW \times LEN^+}$	RENEW interacted with a long-term lease dummy (LEN^+ = 1 if the lease is longer than the sample's upper quartile; = 0 if otherwise)	+	Prediction of Hypothesis 3

4.1. The Endogenous Selection Process

As noted in the Introduction, Guasch and Marshall (1987) suggested that the OLS method would introduce a downward bias in the coefficient of *RENEW* (α_2) because sitting tenants who are offered occupancy discounts are more likely to renew their leases. They then used a censored regression model to adjust for the bias. However, they did not consider that asset specificity could have reduced the downward bias, as some landlords may charge a premium to renew a lease. The influence of censoring on OLS estimation is an empirical question.

Generally, we argue that the econometric problem here is an endogenous selection process in which the rent and lease renewal decisions are jointly determined. This means the renewal decision (*RENEW*) is correlated with the residual (i.e.$E(RENEW_i\varepsilon_i \neq 0)$ in Equation (1), resulting in biased and inconsistent OLS estimates. Guasch and Marshall (1987) were aware of endogeneity, but their model mainly dealt with the censoring problem.[7] To model the endogenous selection process, we employ the instrumental variable (IV) approach as a robustness check of the OLS results.

The IV approach uses a set of instrumental variables *Z* that are exogenous to the residual ($E(Z_i\varepsilon_i) = 0$) to obtain a consistent estimate of the coefficient of *RENEW*. For Z to be a valid instrument, two requirements have to be met (Angrist and Krueger, 2001). One is that *Z* is uncorrelated with the residual. Although exogeneity cannot be directly tested, the *J*-test for over-identifying restrictions is commonly used when the instrument variables are more than the number of regressors.[8] The other requirement is that Z is

correlated with the renewal decision. The *F*-test is used to check if *Z* is a weak instrument.[9]

In our case, the appointment of a property agency (*AGENCY*) and the tenants' industry type (*INDUSTRY*), including their interaction that captures the specialization of agents in certain industries, are considered reasonable candidates for the instruments.

The instruments are considered to meet the exogeneity requirement because the hedonic pricing theory asserts that rents are determined by office characteristics. The use of high-grade offices also means that tenant quality was similar (because it mostly comprised established firms), so the choice of appointing an agent and the type of industry in which the tenant operates should not be a direct determinant of rents. Later, we will show how our instrument passes the Hansen *J*-overidentification test of all instruments.

For the second requirement, agents involved in a lease negotiation should have a strong bearing on the lease renewal decision, plausibly due to the incentive arising from a potentially higher commission when a tenant signs a new lease. Exhibit 3 indicates that leases involving agency (*AGENCY* = 1) are less likely to be renewed (more negative relative to *AGENCY* = 0). In general, the agency and industry type dummies have a statistically significant impact on the lease renewal decision (*RENEW*). F-test (with F-statistics of 348.39; p-value: 0.0000) rejects the null hypothesis that the interactions of agency and industry types dummies jointly have no effect on *RENEW*. This gives us confidence in the use of our instruments. In addition, anecdotal evidence indicated that

certain agency tends to favor keeping certain tenants or vice versa that can match their lease strategies and add value to their leasing businesses.

Exhibit 3 The Effect of Tenants' Industry Types and Agency Dummies on the Renewal Decision

INDUSTRY (HSIC 1-21):-			*(AGENT = 1) × ($HSIC_i$)*		*(AGENT = 0) × ($HSIC_i$)*		***INDUSTRY (HSIC 22-41):-***		*(AGENT = 1) × ($HSIC_i$)*		*(AGENT = 0) × ($HSIC_i$)*	
HSIC_2	0.5583***	(0.1995)	-0.6851***	(0.2535)	-0.5741*	(0.3245)	HSIC_22	0.7150***	(0.1700)	-1.0790***	(0.2130)	-0.7464***	(0.2180)
HSIC_3	0.7064***	(0.1696)	-0.8881***	(0.2728)	-0.9335***	(0.2712)	HSIC_23	1.0973***	(0.0707)	-0.8957***	(0.2579)	-1.6397***	(0.1229)
HSIC_4	0.5407***	(0.1536)	-0.6299***	(0.2028)	-0.5649***	(0.2063)	HSIC_24	0.7832***	(0.2342)	-0.8464**	(0.3972)	-	-
HSIC_5	0.7450***	(0.1353)	-0.9603***	(0.1980)	-0.8788***	(0.1802)	HSIC_25	-0.0545	(0.0582)	-0.3324**	(0.1296)	0.1187	(0.3581)
HSIC_6	0.6541***	(0.1129)	-0.6895***	(0.1554)	-0.7356***	(0.1782)	HSIC_26	0.9828***	(0.0545)	-	-	-1.3729***	(0.1265)
HSIC_7	0.6789***	(0.1533)	-0.8716***	(0.1998)	-0.7365***	(0.2176)	HSIC_27	0.5805***	(0.1069)	-0.9945***	(0.1468)	-	-
HSIC_8	0.3968*	(0.2052)	-0.5875**	(0.2515)	-0.4848	(0.3009)	HSIC_28	0.4865*	(0.2778)	-0.3318	(0.3704)	-0.6071*	(0.3306)
HSIC_9	0.0575	(0.0669)	-0.1995	(0.2035)	-0.2479	(0.1826)	HSIC_29	0.4142*	(0.2303)	-0.3681	(0.2811)	-0.5982**	(0.2682)
HSIC_10	0.1212**	(0.0576)	-0.074	(0.1874)	-0.3569*	(0.1992)	HSIC_30	0.8158***	(0.2128)	-1.4265***	(0.2362)	-1.1633***	(0.2540)
HSIC_11	0.4423**	(0.2149)	-0.4952**	(0.2443)	-0.5023**	(0.2416)	HSIC_31	0.4893***	(0.1866)	-0.3358	(0.2651)	-0.8287***	(0.3126)
HSIC_12	1.1730***	(0.0624)	-1.8010***	(0.1243)	-1.3316***	(0.2051)	HSIC_32	0.4627***	(0.1291)	-0.5185***	(0.1859)	-0.5422***	(0.1797)
HSIC_13	0.5120***	(0.1564)	-0.5582***	(0.2094)	-0.6253***	(0.1943)	HSIC_33	0.5190***	(0.1819)	-0.6900**	(0.2724)	-0.7653***	(0.2259)
HSIC_14	0.5257***	(0.1633)	-0.6447***	(0.1941)	-0.5785***	(0.2095)	HSIC_34	1.0232***	(0.0576)	-1.2498***	(0.2217)	-1.4438***	(0.1223)
HSIC_15	0.1256**	(0.0569)	-0.2202	(0.1656)	-0.2852	(0.1739)	HSIC_35	0.6670***	(0.2322)	-0.8186**	(0.3734)	-0.591	(0.4316)
HSIC_16	-0.0525	(0.0566)	0.0704	(0.2676)	-0.2657	(0.1821)	HSIC_36	-0.0023	(0.0590)	0.041	(0.3602)	-0.2039	(0.2130)
HSIC_17	0.3880***	(0.1427)	-0.4866***	(0.1881)	-0.4955**	(0.1968)	HSIC_37	0.8898***	(0.0581)	-	-	-0.9797***	(0.2796)
HSIC_18	0.3757*	(0.2131)	-0.4313	(0.2700)	-0.5833**	(0.2549)	HSIC_38	-0.1132	(0.1529)	-	-	-	-
HSIC_19	0.5849***	(0.2142)	-0.5400**	(0.2695)	-0.7081**	(0.2857)	HSIC_39	-0.0081	(0.0630)	-0.4727***	(0.1151)	-0.1553	(0.3178)
HSIC_20	0.2681	(0.2325)	-0.349	(0.3166)	-0.4815*	(0.2899)	HSIC_40	-0.0493	(0.0586)	0.1702	(0.4024)	-0.2866**	(0.1209)
HSIC_21	1.0546***	(0.0664)	-1.2980***	(0.1763)	-1.0899***	(0.1899)	HSIC_41	0.5368	(0.4097)	-0.9906**	(0.4355)	-1.1112***	(0.4246)

Notes: The dependent variable is *RENEW.* Standard errors are in parentheses. *, **, and *** mean that the coefficient is significant at the 10%, 5%, and 1% level, respectively. Agency (Yes = 1) yields 0.5486*** (0.1048) and (No =0) is 0.5562*** (0.1172). *F-statistic* is 348.39 (p-value: 0.0000) rejects the hypothesis that the interactions of agency and industry types dummies jointly have no effect. The relevance of instruments cannot be ruled out. Details of HSIC codes can refer to the appendix B.

4.2. Results

The estimated results of the hedonic equations are presented in Exhibit 4. Columns (1) and (2) are the OLS estimates, while (4) to (5) are the IV results that account for the endogenous selection process. They all achieve a desirable adjusted R-squared value of about 90%. All estimated coefficients of the control variables are statistically significant and generally yield the expected signs. A 1% increase in office unit size (*AREA*) is associated with about a 1% increase in rent. Offices in taller buildings (*HEIGHT*) and on upper floors (*FLOOR*) are more expensive. Their marginal rental increments are 1.2% and 0.5% per story, respectively. Building age (*AGE*) has an unexpected positive coefficient, which could be due to the omission of building refurbishment effects or demand-side components such as the locational advantage enjoyed by older buildings (Clapp and Giaccotto, 1998).

[10]

At the district level, better geographical locations obviously attract higher rents, as reflected by the positive coefficient of *ACCESS*. A rental premium is also observed for offices with longer leases (*LEN*). Compared to buildings under single ownership, strata title buildings (*STRATA*) lower rents by about 16% due to stronger competition between landlords and more passive building management. *FIRE* industries' tenants usually pay 25% more than its counterparts for renting their office space. Market conditions are another determinant of rent – rents increase with upward market trends (*INDEX*), but decrease when vacancy rates (*VAC*) are high. This is consistent with the rental adjustment process commonly found in the literature.

Exhibit 4 Lease Renewal Premium and Asset Specificity, Instrumented Evidence

	OLS	**OLS**	**IV Model**	**IV Model**	**IV Model**
Dep. variable: *ln(R)*			1st Stage: (GMM)	2nd Stage (GMM)	2nd Stage (GMM)
	(1)	(2)	(3)	(4)	(5)
AGE	0.0082***	0.0080***	0.0053***	0.0077***	0.0077***
	(0.0013)	(0.0013)	(0.0010)	(0.0012)	(0.0010)
HEIGHT	0.0120***	0.0121***	0.0017	0.0120***	0.0121***
	(0.0009)	(0.0009)	(0.0012)	(0.0008)	(0.0007)
FLOOR	0.0048***	0.0049***	-0.0008	0.0052***	0.0052***
	(0.0009)	(0.0009)	(0.0012)	(0.0009)	(0.0009)
STRATA	-0.1631***	-0.1598***	-0.1865***	-0.1460***	-0.1497***
	(0.0249)	(0.0245)	(0.0343)	(0.0232)	(0.0209)
ln(ACCESS)	0.3407***	0.3393***	-0.0025	0.3452***	0.3447***
	(0.0107)	(0.0108)	(0.0140)	(0.0089)	(0.0087)
ln(INDEX)	0.7437***	0.7944***	0.4349***	0.6868***	0.7725***
	(0.1094)	(0.1108)	(0.1356)	(0.1058)	(0.1045)
ln(AREA)	0.9545***	0.9688***	0.0739***	0.9442***	0.9686***
	(0.0104)	(0.0118)	(0.0133)	(0.0081)	(0.0110)
VAC	-3.1029***	-2.5037***	0.0739	-3.3276***	-2.6957***
	(0.3621)	(0.3947)	(0.4402)	(0.3219)	(0.3387)
LEN	0.0061***	0.0049***	-0.0040***	0.0065***	0.0052***
	(0.0012)	(0.0013)	(0.0016)	(0.0011)	(0.0012)
FIRE	0.2547***	0.2484***	-0.0547**	0.2551***	0.2484***
	(0.0233)	(0.0232)	(0.0281)	(0.0213)	(0.0195)
RENEW	0.0561***	0.0812***	-	0.1438***	0.0969**
	(0.0203)	(0.0232)		(0.0384)	(0.0421)
***RENEW* × *AREA*⁺**		-0.0694*	-		-0.0924*
		(0.0419)			(0.0486)
***RENEW* × *VAC*⁺**		-0.2569***	-		-0.2402***
		(0.0558)			(0.0520)
***RENEW* × *LEN*⁺**		0.1316**	-		0.1427**
		(0.0653)			(0.0632)
IV: *AGENCY* × *INDUSTRY*	No	No	348.39 [0.000]	Yes	Yes
No. of Obs.	1675	1675	1675	1675	1675
Adj. R-squared	0.9007	0.9019	-	0.8995	0.9018
p-value of Hansen J-test	-	-	-	0.5936	0.5690
p-value of Kleibergen-Paap rk LM test	-	-	-	0.5256	0.5372

Notes: The dependent variable *ln(R)* is the logarithm of the monthly effective rent (HK$ per mth). Standard errors are in parentheses. *, **, and *** mean that the coefficient is significant at the 10%, 5%, and 1% level, respectively. Constant terms are not reported. Estimations allow for heteroskedasticity across the variables. Column (1) and (2) are OLS estimation. Column (3) is the first stage of generalized method of moments (GMM) estimation, with indicator variables of *AGENCY×INDUSTRY* as the instrumental variables (IV). The *F*-statistics of 348.39 [*p-value=0.000*] rejects the null hypothesis that the instrumental variables have no joint effect on *RENEW*. Column (4) and (5) show the second stage of GMM estimation. The high *p-value* of the Hansen *J*-test on over-identifying restrictions suggests that the *AGENCY* × *INDUSTRY* dummies are a reasonable choice of instruments. Similarly, the high *p-value* of *Kleibergen-Paap rk* LM test also confirms that the dummies are strong instruments.

The key variables in this study are *RENEW* and its interaction terms. Exhibit 4 shows that *RENEW* is always significantly positive, which starkly contrasted the occupancy discount suggested in the literature and Guasch and Marshall's (1987) insignificant results. On average, renewed leases are charged a 9% to14% rental premium over new leases, according to Columns (4) and (5). In developing our hypotheses, we clearly pointed out that while search costs lead to occupancy discounts, asset specificity acts as an opposite force that could reduce the discount or even create a premium. The significantly positive coefficient of *RENEW* suggests that the effect of asset specificity dominates in our sample.

More importantly, the interaction terms in Columns (2) and (5) confirm the three hypotheses. Based on the search cost argument, Hypothesis 1 predicts that the larger a property's size, the greater (smaller) is its occupancy discount (premium). This is confirmed by the interaction term, $RENEW \times AREA^{+}$, whose coefficient ($\alpha_2\gamma_1<0$) is significantly negative. Upon lease renewal, sitting tenants occupying large office spaces are charged 9% less than those occupying smaller spaces (i.e. result in Columns (5)). As a result of this search-induced discount, sitting tenants occupying larger offices almost avoid the occupancy premium (9%, as indicated by the *RENEW* coefficient in IV estimate in Column (7)) and, thus, pay a discounted similar rents as new tenants.

As for the search cost related to market dynamics, Hypothesis 2 predicts that a larger vacancy gap results in a greater (smaller) occupancy discount (premium). As illustrated in Exhibit 4, we found a significantly negative coefficient ($\alpha_2\gamma_2<0$) for the interaction term, $RENEW \times VAC^{+}$, confirming that the occupancy premium decreases as the actual vacancy rate goes beyond the natural vacancy rate. The decline is as much as 24%,

meaning that sitting tenants enjoy an occupancy discount of around 14% compared to new tenants in a weak market. This is consistent with market wisdom or anecdotal evidence, which stated that occupancy discounts or premiums depend a lot on market conditions.

Asset specificity, the major argument in this paper, states that some tenants could be highly asset-specific to the space they rent – the longer the lease, the smaller the occupancy discount for the sitting tenant. Exhibit 4 confirms this hypothesis. The interaction term, $RENEW \times LEN^{+}$, carries a significantly positive coefficient ($\alpha_2\gamma_3>0$). Upon lease renewal, sitting tenants with leases longer than the median in our sample (three years) pay up to 14% more than other sitting tenants and 24% more than new tenants. This implies an extraordinarily high moving cost for asset-specific tenants.

As noted before, endogeneity is a potential problem in our OLS estimations because the observed rent in our sample depends on the renewal decision.[11] The IV approach is therefore employed as the robustness check of our OLS estimates. As Exhibit 4 shows, all the signs of coefficients are the same under the OLS and IV estimates. The magnitude of the premium varies within in a reasonable range (9%). A noteworthy issue is that the lease renewal premium without considering our three hypothesis (Column (4)) could be up to 14% after correctly the endogeneity selection problem. This is an expected outcome after correcting the downward endogeneity bias induced by tenants not renewing their leases due to high rents.

5. Conclusion

This paper makes two novel contributions.

First, in terms of theoretical contribution, this is the first study to argue that both occupancy discounts and premiums could exist, depending on whether search cost or asset specificity dominates. Occupancy discounts are expected when search cost is high (e.g. the space to let is large or the vacancy rate is high). Occupancy premiums, however, are expected when a sitting tenant's (e.g. asset-specific tenants under a long-term lease) moving cost is high. These different predictions from search cost and asset specificity were evaluated by Hong Kong's high-grade office leasing data.

Second, in terms of this article's empirical contribution, we argued that if occupancy discounts and premiums could both exist, whether or not censoring bias is a necessary outcome is contestable. In light of asset specificity, a sitting tenant may still renew its leases even if it has to pay an occupancy premium. The importance of censoring bias, if exists, is not clear. In this study, we contended that the censoring selection bias should be viewed as a particular case of endogeneity bias adhered to in the observable samples, since whether or not an office lease is renewed is subject to the asking rent. That means the renewal decision and rent are both endogenously determined and censoring bias only occurs when the asking rent is beyond the observable rent level. In view of such endogeneity bias, we proposed that instrumental variables (IV) estimation is a better approach to correct this sample bias than just correcting the censoring bias.

More specifically, our analysis employed a standard hedonic model that accounted for the various factors' impact on tenants' renewal decisions. We tested both asset

specificity and search theories by capturing their interactive effects with the renewal indicator variable on rents. By using the lease transactions in Hong Kong's office market for 2007-2012, we found support for our three developed hypotheses. We dealt with the endogeneity selection bias concern over the renewed rents (i.e., unobserved tenants who did not renew were not captured by the renewed leases and, hence, were not represented in the observed data) by using instrumental variables approaches as a robustness check against our OLS-estimated results. Overall, the results reinforced our view that not only is the search doctrine involved in the lease renewals, but asset specificity also matters.

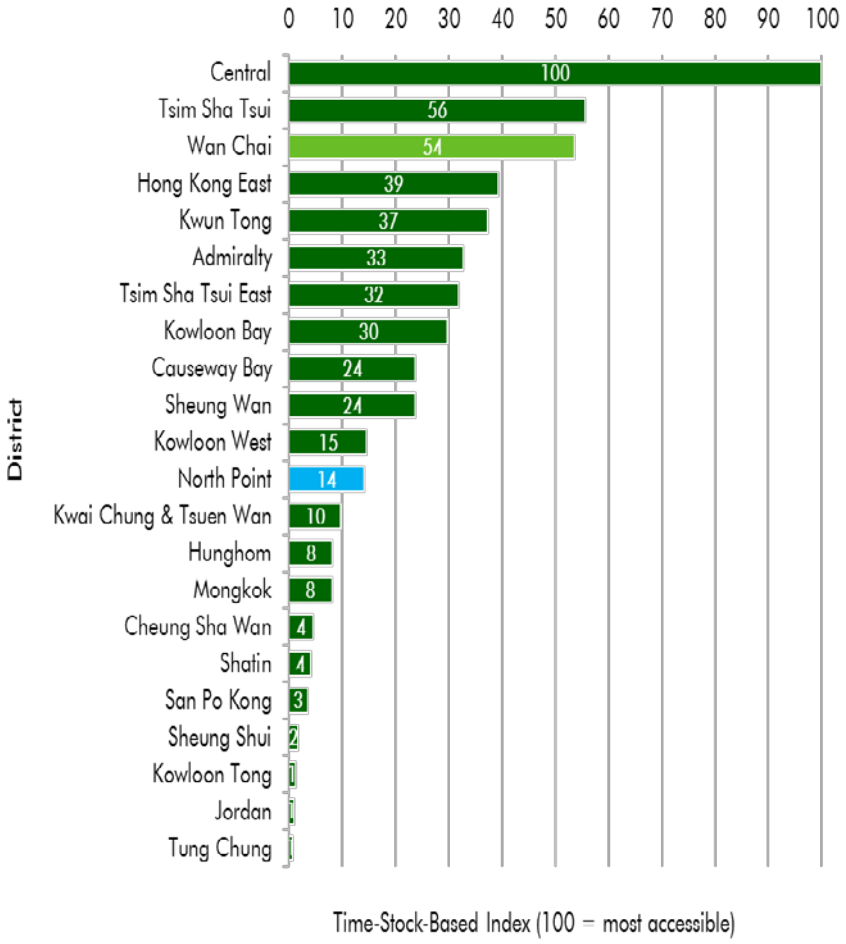
Appendix 1 Accessibility Index for Office Buildings in Hong Kong

Locational choice is one of the very important factors for determining rents for office space, particularly in Hong Kong, where significant rental differentials have been witnessed just a mile away from the Central CBD. In order to control the influence of location, we attempted to use the accessibility index to specify the hedonic pricing model. Simply put, the accessibility index is a weighted index formed by combining the travel time index and its corresponding office stocks index. First, the travel time index was compiled by summarizing the travel times between Hong Kong's main office districts. For instance for Central, we picked Charter House as the reference point and mapped out all the travel times between it to Admiralty (whose reference point was One Pacific Place), Sheung Wan (The Center), Wan Chai (Central Plaza), etc. (22 districts in total). The aggregate time traveled was re-based with Central given a value of 100 and named the time index for convenience.

Travel time should not be the mere consideration when examining the accessibility of office districts. The importance of an office district also matters. Therefore, we used the amount of office stock in each district as a proxy to weigh against the time index. The net floor area of the office stock in each district of the CBRE office basket was used for this purpose. It is noteworthy that Central has the largest cluster of Grade A Office buildings (21% of the office basket), which was twice that of the second largest district, Wan Chai. Based on the size (net floor area) of the office space in the start district and travel times between districts, we constructed an accessibility index for each office district in Hong Kong. Central is the most accessible district of all, whilst the next two most convenient districts (Tsim Sha Tsui and Wai Chai) are about half as accessible (Figure). Districts in the single digits (Hung Hom and below) were quite

remote in terms of travel time and size of their office stock. Central was 6-7 times more accessible than West Kowloon (ICC), for instance.

Accessibility Index of Hong Kong Office Districts



Notes: Light Green – 90%-tile; Blue – 50%-tile

Appendix 2 Hong Kong Standard Industrial Classification (HSIC) Version 2.0

The Census & Statistics Department (C&SD) of the Hong Kong Special Administrative Region Government devises and maintains the Hong Kong Standard Industrial Classification (HSIC) as a statistical classification framework for classifying economic units into industry classes based on their major activities. Essentially, the HSIC is modelled on the United Nations' International Standard Industrial Classification of All Economic Activities Revision 2 (ISIC Rev. 2) with local adaptation and its Version 1.0 was introduced in 1990. The HSIC has been reviewed from time to time to reflect changes in the industrial structure of the Hong Kong economy and the emergence of new economic activities. The latest round of update was implemented since 2009.

HSIC	Industry	HSIC	Industry
1	Insurance activities	21	Other professional services
2	Legal	22	Transportation, storage, postal and courier services
3	Energy, Oil, Mining and quarrying	23	Agriculture, forestry and fishing
4	Retail trade	24	Architectural firm
5	Import/export & Wholesale trade	25	Serviced office/business centre provider
6	Financial services	26	Publishing
7	Banking	27	Information
8	Information Technology	28	Education
9	Scientific and technical activities	29	Other service activities
10	Telecommunications	30	Construction
11	Unknown	31	Real estate activities
12	Accounting	32	Import/export, wholesale and retail trades
13	Manufacturing	33	Human health and social work activities
14	Finance and Banking	34	Activities of extraterritorial organisations and bodies
15	Arts, entertainment and recreation	35	Developer
16	Accommodation and food service activities	36	Real estate consultancy, agency & management
17	Professional, scientific and technical activities	37	Water supply; sewerage, waste management and remediation activities
18	Administrative and support service activities	38	Public administration
19	Information and communications	39	Advertising/Media
20	Consultancy	40	Electricity and gas supply
		41	Real estate investment

Notes: Coding is redefined as number by authors for ease of presentation; original coding scheme uses alphabets.

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Endnotes

[1] Other things being equal, a sitting tenant is less likely to renew a lease if the landlord raises the rent. Therefore, the lease renewal cases observed in the data set would be skewed towards those receiving occupancy discounts.

[2] This institutional feature arguably makes tenant searches more costly for landlords than for sitting tenants. The latter can minimize disruption to his/her business by searching for another property before the current lease expires. This may, however, incur moving costs, which Hypothesis 3 covers.

[3] CBRE Group, Inc., a Fortune 500 and S&P 500 company headquartered in Los Angeles, is one of the largest commercial real estate services firms in the world and a major office leasing agency in Hong Kong.

[4] Effective rent is the contracted rent adjusted for any distortion caused by rent-free periods, rent rebates, etc. It is computed by the present value of the net cash flows over the lease term. One advantage of using effective rent as it eliminates the rental premium on the gross lease (Wiley, 2014).

[5] For example, Frew and Jud (1988) suggested that the vacancy rate be included when estimating the rent of commercial office space.

[6] We use the upper quartile instead of the median because the former is closer to the ten-year average (natural) vacancy rate of high-grade offices (9%).

[7] They approached the endogeneity problem by using unit-specific characteristics observed on the previous survey date (p.300). While these 'past' characteristics are arguably exogenous, it is not clear how they correlated with the endogenous lease renewal variable.

[8] The null hypothesis of the *J*-test is that the instrument is valid (i.e., uncorrelated with the residual) and that the instrument is correctly excluded from the estimated equation. A rejection of the null cast doubt on the validity of the instrument and, hence, a non-rejection is deemed a necessary condition (though not a sufficient condition) for the instrument to be exogenous.

[9] Instruments with low correlation between the endogenous regressors are called weak instruments. There is empirical and theoretical evidence that IV estimation with weak instruments may perform badly and even worse than OLS (surveyed by Stock et al., 2002). The relevance of the instruments was tested in the first-stage regression. As a rule of thumb, the F-statistic of a joint test states that all excluded instruments (the variables in Z_i that are not in X_i) that are significant should be bigger than 10 for a single endogenous regressor. The respective results will be shown in our results.

[10] While not reported here, we have tried to use the GLS estimator of Goodman and Thibodeau (1995) and include quadratic and cubic age terms in the regression equation. However, the coefficient of AGE either remains significantly positive or becomes negative yet insignificant.

[11] Recent research (Nizalova & Murtazashvili, 2012) demonstrated that if the source of heterogeneity and omitted variable are jointly independent of treatment, then the OLS estimate on the interaction term between the treatment and endogenous factor could still be consistent.

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