‘Space-As-A-Service’: A Premium to Office Rents?

1. Introduction

The increasing emphasis on creating a positive workplace experience in a highly serviced environment has led to a change in occupational demand for office space. Practices, first adopted by co-working operators, have been transformed into strategies that traditional landlords need to follow to improve benefits both to occupiers and employees. Enhancing productivity, worker satisfaction and attracting talent are corporate objectives and accommodation plays a significant role to accomplish them. Although the concept of the “innovative office” – like serviced offices – has been around in various forms since the 1990s, a rapid adoption of this concept was seen in recent years, led by the co-working culture. As an attribute of the office space environment, the co-working culture now underpins the development of the ‘Space-As-A-Service’ (SAAS) model (Cushman & Wakefield, 2015). The SAAS approach implies that tenants are putting more emphasis on aspects including flexibility, well-being and community in the workplace as well as accessibility. As a result, corporates can no longer evaluate the quality of an office solely by its physical and locational characteristics, but also by its “provision of services.”

Facing the rapidly changing demand and the challenge of co-working spaces, landlords have no choice but to take the components of SAAS into consideration when they are planning for a new office development or refurbishment (JLL, 2019). Consequently, design, spatial planning, tenant mix and provision of services will change and become more “innovative”. Popular examples of SAAS features include public touchdown space on the ground floor (enabling tenants to give a warm welcome to their clients and visitors), an on-site fitness centre, conferencing facilities and regular community events organised by the property management team.

The SAAS model is becoming mainstream in tenant demand, where leasable space is sacrificed in order to increase flexibility for occupiers, but at a cost. Indeed, Jude (2020) argues that a strategy driven by the SAAS model should result in higher rents. The key question therefore is whether tenants will pay a higher rent and investors a higher price for buildings with SAAS features. If not, there might be insufficient incentive for developers and landlords to embrace these features.

The existing literature on the SAAS real estate model mostly comprises the views of professionals on the importance of a building providing service and experience and how this is accomplished. It should be noted that there is no rating system solely concerning how "innovative" or how "serviced" a building is. Further, there is no of empirical work on the pricing of SAAS features and to the best of our knowledge, this is the first attempt to quantify the impact of SAAS features on office rents.

In the present study we focus on five SAAS features - public touch down space, conference/event facilities, on-site fitness centre, rooftop/terrace and tenant mobile applications - commonly reported in the professional literature, and assess their impact on office rents. In addition, the findings should contribute to the future development of a specialised rating system of building with SAAS attributes. Our findings show that not all SAAS features have a statistically significant impact on office rents. In our sample, a premium on rents is established for the provision of exclusive mobile applications to tenants and the existence of a roof top/terrace space.

The structure of the paper as follows. The next section provides a quick review of the literature on serviced offices and the co-working concept to show that the SAAS model is a blend of the two. The methodology and data presented in section 3. Section 4 presents the empirical results. The last section concludes and presents the key implication of the study.

2. Occupational demand and co-working place concepts

The prototypes of the SAAS model are the serviced office and co-working space. Although these two concepts sound similar and reflect the evolution of the same phenomenon (Kojo and Nenonen, 2017), there is a fundamental difference between serviced offices and co-working space.

Serviced offices are not a new concept. Lizieri (2003) gives a comprehensive overview of the historic change in occupational demand and denotes the rapid growth of the serviced office sector since the early 1990s. Serviced offices are generally classified as a working space offering shared facilities and the provision of services, for example, secretarial service to tenants (Byrne *et al*, 2002). The rent paid for such services is based on a menu system in which there is a standard product bundle for a fixed price that can be upgraded with communal services on a pay-as-use basis (Gibson and Lizieri, (2000). The access to support services is regarded an important reason for tenants to choose a serviced office (Gibson and Lizieri, 2000), as particular users can have a different purpose for using serviced accommodation (Dabson and McAllister, 2014). Serviced offices might also provide highly personalised service to tenants (Reed and Steward, 2003). Studies of serviced offices focus on explaining the drivers behind their initial popularity (e.g. Harris, 2001), valuation issues (McAllister, 2001), the type of owners who can best coordinate the provision of so many services (Bröchner et al., 2004) and implications of popularity and growth for Central Business District offices (Reed and Kay, 2003). And there is a wealth of industry reports assessing the attractiveness and viability of this accommodation model.

Co-working offices (also called co-working spaces by Kojo and Nenonen, 2014) are places where many freelancers and employees, who previously worked from home, satisfy the need

to interact, socialise or collaborate with others. Operators and users of co-working offices appreciate the benefits of knowledge sharing, collaboration and interaction as the main reasons to work in this kind of office space (Kojo and Nenonen, 2014). Cushman & Wakefield (2015) expect SAAS to be "a strategic tool where employees come together on a short-term basis, to inspire and innovate in an environment outside the usual corporate constraints."

Unlike serviced offices, co-working space does not have a long history (Berbegal-Mirabent, 2021). The first co-working space appeared in 2005 – a collective space in San Francisco set up by Brad Neuberg (Coworking Resources, 2019). However, co-working space went viral since 2010. According to Coworking Resources (2020) by the end of 2019, 2.2 million people were working in 22,000 co-working spaces around the world.

The main driver for this growth being the rise of a new generation of workers, mainly entrepreneurs and freelancers, which disrupted the traditional way of how and where to work, leading to experiments with new ways of working and unconventional accommodation. The geography of co-working spaces has also shifted from sub-urban areas to central business locations, the preferable place of millennials (Waters-Lynch & Potts, 2017). In addition, the size of co-working space had grown from several floors to entire buildings (Bates, 2006). Studies on co-working offices are scarce (Leclercq-Vandelannoitte and Isaac, 2016) and focus largely on the performance of their users with regard to creativity and innovation (Capdevila, 2013) or their importance to the city (Moriset, 2013).

A fundamental difference between serviced office and co-working space is that co-working spaces are considered as a provision of service (Bates, 2006), while serviced offices are more likely to be viewed as an office with better facilities and services. Co-working also organises activities and events to facilitate collaboration and the sharing of ideas among tenants that

feeds innovation and creativity under the slogan "working alone together" (Spinuzzi, 2012). Kojo and Nenonen (2017) conclude that the co-working space concepts would lead to an increasing emphasis on the physical and contractual flexibility and the well-being of occupiers. These are certainly the changes seen in the occupier market accelerated by the pandemic in 2020-2021. However, while these developments in the workplace characterise developed real estate markets, they will inevitably affect more markets to different degrees, as experienced in earlier workplace changes (Celka, 2011).

Serviced offices provide facilities and services specific to the tenants, while co-working provides space for collaborative working between tenants. The SAAS model can be seen as a mix of two concepts.

In the UK, two studies have examined the impact of the changes in the workplace on office design and facilities. Dabson and McAllister (2014) study the evolution of both services offices and co-working spaces, using semi-structured interviews with 21 corporate tenants and serviced office operators to identify key issues and trends of the serviced office and co-working sector. The authors find that flexibility and agility viewed as increasingly important workplace requirements. Harris (2015) survey corporations in the City of London and finds that flexibility and community in the workplace are becoming a major focus of tenants. The author also observed an increasing trend of shared facilities in the workplace. The organisational, workforce, working style and workplace changes considered to be the key drivers of the changing occupational demand (Harris, *op.cit*).

3. Methodology and Data

We investigate the impact of SAAS characteristics on office rent in the present study with the method of hedonic analysis. Researchers have made use of hedonic models in the study of office rents seeking to assess the significance and size of the premium attributed to locational,

physical and lease characteristics of buildings. . This work guides the specification of the model to study the premium on office rents from SAAS features and control variables to consider subject of course to data availability.

3.1 Control variables – Insight from hedonic studies of office rents

Early studies document a statistically significant relationship between office rent and travel distance to a transport junction (Clapp,1980; and Dunse and Jones, 1998) and to the central point of the CBD (Hough and Kratz, 1983; Cannaday and Kang, 1984; and Brennan *et al*., 1984). However, taking the travel distance to a specific point as the locational variable could be problematic since the modern urban transportation network is much more complicated than the past and the clustering effect not addressed. Our sample of buildings is in the City of London and all buildings are in close proximity to metro and train stations. . Dunse and Jones (2002) consider clustering effects in their hedonic model for asking office rents in Glasgow. They confirm that submarkets classified by real estate agents demonstrate significant differences in rent implying particular influences on rents in these submarkets.

A host of physical characteristics are found to be significant determinants of office rents. Clapp (1980) provide support for building size, building age, provision of internal parking and number of stories. . Hough and Kratz (1983) obtain similar results and they further highlight the importance of conferencing facilities. Cannaday and Kang (1984) show that the average unit size and the average number of units on a typical floor affects office rent differentials. Mills (1992) argues that amenities like restaurants can command a rental premium. Dunse and Jones (1998) points to the statistically significant impact of air-conditioning, carpeting, double glazing, raised floors systems, acoustic design and layout on office rents.

Closer to the theme of the present study is scholarly work examining the impact of 'green' features on rents and prices. Eichholtz *et al* (2010) investigate the effects of LEED green certification and Energy Star (ES) ratings on effective rents and transaction prices in U.S. offices. They find that green labels bring a significant rent premium of about 3%. The magnitude of the rent premium though varies across cities and buildings. Fuerst and McAllister (2011) perform a similar analysis and extend the study on sub-ratings of green labels. Utilising the detailed CoStar database in the US over a ten-year period (1999-2008) and including time dummiesto address time effects on rent, the authors confirm the significance of green labels, with a rent premium of about 6%. They also find that sub-ratings make no significant difference. Other studies using similar data sets have come up with a range of premia on rents - between 15.2% and 17.3% (Wiley et al., 2010), 8% (Murray, 2008), 2.9%. (Reichardt *et al*., 2012), and 12.8% (Chi-man Hui *et al*., 2015). The set of control variables in the models of these studies includes dummy variables for location, physical and other characteristics.

3.2 Variable definition, measurement and notation

Intuition from existing studies and availability of building and lease level information largely determine the specification of the hedonic office rent model in this study and the determinants of rents. .

The variables that are included in the rent specification to capture the hedonic influences on rents fall into three main categories – physical (non-SAAS), SAAS and location.

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(i) Physical features:

Three physical attributes of lease transactions are included in the model. The SAAS features are also physical but they are categorised separately. The size of the leased space (*AREA*), the floor of the building (*FLOOR*) and the age of the building *(AGE*).

- Total leased area (*AREA*) is the net leased are in in '000s of sq.ft. A negative impact on rents can be argued as landlords might apply a discount if the tenant leases a greater amount of space.
- Floor level the tenant occupies (*FLOOR*). If the tenant occupies more than one floor we take the first of the two floors, if three floors are let we take the middle floor, if four floors are leased we take the second of the four floors and so forth to obtain the representative floor in the transaction. This variable contains a particular floor level for each letting. The impact of $FLOOR$ could be negative or positive. Studies in the US report a negative impact the higher the floor level, reflecting security issues. In the City of London, however a positive impact might be expected for reasons such as views.
- *A*ge of building (*AGE*). in years. A new building delivered or a building renovated in 2020 is one-year old, in 2019 is two-year old and so on. A negative relationship with rent is expected.

(ii) Space-as-a-Service (SAAS) features:

There is no a definitive list of what constitutes building SAAS features and which building amenities can be classified as SAAS features. In the absence of established guidance, we limit our analysis to those five elements of SAAS, which enhance workplace flexibility, improve occupiers' well-being and facilitate community interaction, in line with the discussion in relevant professional reports.

- *Public touchdown space or Breakout space (TDSPACE)*: A building is considered to provide public touchdown space if there is seating space for visitors before the security gate.
- *Conferencing facilities and event areas (CONF)*: It refers to any conferencing facilities, e.g. meeting room and auditorium or other event space that are not included in the net leased area .
- *On-site fitness centre* (*FIT*): A fitness centre or facilities located in the building accessed by all tenants, with or without free access -.
- *Rooftop or terrace (ROOFTOP)*: Rooftop and terrace open to all tenants, i.e. we exclude those buildings where an individual tenant exclusively accesses a terrace, rooftop or courtyard.
- *Tenants' exclusive mobile application (MAPPS)*: A mobile application that is exclusive to tenants of the building

A positive impact of all five SAAS variables on office rents is expected.

(iii) Location attributes

The sample of buildings all come from the City of London. Real estate companies and property data providers divide this market into four main submarkets: City core North, City core East, City core West and City Fringe. There is no category for City core South. We examine whether the location of the building matters and control for sub-market differences in office rents.

3.3 Model specification

Equation (1) gives the general specification of the model containing the variables outlined earlier.

$$RENT_j = a + AREA_j + FLOOR_j + AGE_j + TDSPACE_j + CONF_j + FIT_j + ROOFTOP_j +$$

$$MAPPS_j + LOC_k + TIME + u_j \qquad u_j \sim N(0, \sigma^2) \qquad (1)$$

where:

- j refers to the individual transaction or letting sign up.
- $RENT_j$ is the asking rent in £s per sq ft per annum in the jth lease transaction. The reason we use asking rents instead of the effective rent or transaction rent is the availability of data. By using the asking rent, we have more data points. It is common for landlords to maintain the asking rent by adjusting the rent free periods (hence obtaining the effective rent). Data are not as readily available as tenants and landlords might not disclose the rent-free periods or other lease terms affecting the effective rent. Estimates of market wide rent-free periods are available but not at individual lease transactions.
- $AREA$ is the total leased area in the transaction measured in sq ft; *FLOOR* is the floor level the tenant occupies; *AGE* is the age of buildings in years; *TDSPACE* is a dummy variable that takes the value '1' if there is touch-down space at the reception, '0' otherwise; $CONF$ is a dummy variable evaluated as '1' if there are conference or event facilities, '0' otherwise; FIT is a dummy variable that takes the value '1' to denote an onsite fitness facility, '0' otherwise; $ROOFTOP$ is a dummy variable that takes the value '1' if there is a roof terrace or similar facility (eg courtyard), '0' otherwise; $MAPPS$ refers to the availability of exclusive mobile applications to tenants. It is evaluated as '1' if this facility is provided, '0' otherwise.

- LOC_k represents a set of four dummy variables (k=4). The four dummy variables are for properties located in City core North, City core West, City core East and City Fringe. $TIME$ is a time effects variable to account for any changes in rents over time across the

market. The sign on this variable cannot be *a priori* determined as $TIME$ could convey the impact of random events affecting the entire market.

- u_j is the random error satisfying all assumptions of CLRM.

In the empirical investigation logged and semi-logged variations of equation (1) are considered. Further, the existence of interaction effects on rents (or logged rents) are tested. The empirical estimation involves robustness tests with key diagnostics tests calculated at every stage to assess the strength of the specifications.

3.4 Data

The data are obtained from CoStar. The CoStar database contains rental records and collects comprehensive building information, including market brochures and building plans that enable researchers to identify innovative office elements of sample buildings. In addition, building websites and marketing brochures were consulted to maximise the amount of information available for SAAS characteristics. All sample buildings have attained either "Excellent" or "Very Good" in BREEAM rating. Hence, a green premium is not included in the model. Following the findings of Fuerst and McAllister (2011), it is likely that such a distinction will not produce different results.

From an initial sample of fifty-two 5-Star Costar rated offices in the City of London we eliminated fifteen buildings as there was no record of of asking rents in these transactions. In our final sampe we have thirty-seven buildings which were either built or renovated between 1995-2019. The sample comprises 317 transactions in these thirty-seven buildings over the period 1 November 2004 to 15 July 2020. The small sample size is affected by the fact that the SAAS model is a new concept in real estate and therefore these innovation

elements are mostly present only in state-of-the-art buildings Table I presents summary statistics:

[TABLE I HERE]

4. Results

We initially run the model including all variables, without time effects, and estimate a general to specific model. The models estimated on the raw data and their natural logs. Variables that are not statistically significant dropped from the model and the new model is re-run. Another criterion we apply is that all variables in the final model should be statistically significant on their own (that is statistically significant in bivariate regressions) to account for possible spurious results due to multicollinearity among explanatory variables.

[TABLE II HERE]

Table II shows the results of the final model in the first stage. The model is in semi-log form (the dependent variable rent is in natural log form). Starting with building characteristics the floor area (*AREA*) and floor level (*FLOOR*) are significant determinants of the log rents. The former takes a negative sign, in accordance with the findings of previous studies. For every 10,000 sq ft larger net letting area, rents tend to be lower by 3%. The positive sign on $FLOOR$ suggests that tenants pay a higher rent for upper floors, with each additional floor adding around 0.7% to rent; i.e. ten floors higher will command a 7% rent premium.

Building age (*AGE*) is not statistically significant. This is not surprising as this study focused on a sample of 5-star buildings moderating any deterioration of physical qualities associated with building age.

Of the SAAS variables, rooftop/terrace ($ROOFTOP$) and mobile applications ($MAPPS$) are statistically significant. Both these variables exert a positive impact on office rent as expected. If the building has a rooftop or similar amenity, the average premium on rent is 8.8%. The impact of exclusive mobile applications ($MAPPS$) on rents is quite notable. The existence of this service pushes rents up by 21%. It is likely that $MAPPS$ encapsulates other features of the modern 5-star building (that make up the present sample). For example, it is likely that the tenants' exclusive mobile apps had a very high rent premium because usually only state-of-the-art buildings provide this service.

An on-site fitness centre (*FIT*), public touchdown space (*TDSPACE*) and conference facilities/event spaces (*CONF*) all found to be insignificant. The insignificance of the fitness facilities may be due to the availability of a large number of exiting off-site fitness centres within the City of London. Public touchdown space can be substituted by a private reception area, which is another common feature in higher quality buildings. It is rather surprising that the dummy variable for conference facilities and event spaces, which are some of the most promoted features of the co-working concept, is not significant. It may be that this cost-saving and flexible feature, however, is not required by those corporates occupying a prime office building.

There are clear building location impacts on office rents. City core West location commands a 14% premium on office rents whereas a City core North location has a negative impact on rents by about 12%. The composition of the occupiers is clearly different in the two locations. For example, investment management firms with greater rent paying ability, locate in City West, which also offers a greater number of transport links.

The model explains 40% of the cross-section variation of rents, a moderate explanatory power, not unusual in cross-sectional studies. White's test for heteroscedasticity indicates that the assumption of constant variance in the residuals of this model is violated. The model is therefore estimated with the Newey West estimator to obtain robust standard errors and have confidence in the inferential statistics (t-ratio and p-values). Ramsey's RESET also indicates a possible functional form misspecification or possible non-linearity (null hypothesis of no functional form problems is rejected at the 10% level but not at the 5% level).

In the next stage, we examine the importance of yearly time effects. It is the practice in the literature to examine such effects jointly. Time effects are important Table III reports the results of an omitted variable test. When we include them in the model presented in Table II, we reject the null hypothesis that these effects are not statistically significant (p-values are very low; rejection at 1% significance level on both tests). The joint significance of time effects does not mean that there is market wide influence on office rents every year but as a group they should be included in the model.

[TABLE III HERE]

Time effects can reflect an omitted influence (or influences). Such an influence can be a market wide trend which in our case can be represented by City Office rents. We, therefore, test for the relevance of the overall market influence on rents in our sample. We consider the MSCI office rent index, a widely used index of City office rents, representing a benchmark for City office rents. Further, we examine office vacancy in the City of London as a whole, to pick up the impact of a soft market or a tight market on rents. Vacancy is not statistically significant but we do find that the MSCI rent index is statistically significant and strongly

correlated with time effects. Given this finding we replace time effects with the inclusion of the natural logarithm of the MSCI City office rent index. The results presented in Table IV.

[TABLE IV HERE]

The results in Table IV show that the MSCI rent variable is highly significant and has a major impact on rents. Changes in the market rent index (which is based on valuations) of 1% cause a movement in the same direction of 0.63% in asking rents in our sample.

As a robustness test, the inclusion of market rent does not change the signs or significance of the variables in the model (see Table 1) but it does effect the magnitude of the coefficients, particularly for mobile applications ($MAPPS$). The premium on rent from the provision of mobile applications has fallen to 13.2% from 21%. There is also a smaller change recorded for the impact of $ROOFTOP$, down from 8.8% to 6.5%. Similarly, the magnitude of location factors is affected, with City North location effects on rents notably reduced from close to 12% to 5.5%, while the coefficient value on the City West dummy is a little down to 13% from 14%. The explanatory power of the model has increased from 40% to 60%, a good performance.

The model reported in Table IV shows no signs of heteroscedasticity or the presence of non-linearities unlike the original model reported in Table II. The residuals are not normally distributed, as shown by the Jarque-Bera test. The residual series contains a small number of outlier values that make the distribution heavily skewed to the left,

This is not unexpected, as a general hedonic model cannot capture all the heterogeneity of buildings in the sample. Given the number of observations and the fact that the model passes two other key tests we do not view the results in Table 4 unreliable.

As a further robustness test we examine the impact of interaction terms. In this way we can test arguments such as whether the effect of area, floor level or mobile applications on office rents differs by location. We incorporate in the model presented in Table IV interaction terms. Interaction terms that contain location variables either are not statistically significant or it results in estimation problems (co-variance matrix cannot be determined). We also examine whether the impact of the two SAAS variables in Table IV is exacerbated with the area leased. The theoretical argument is that these two features – mobile applications and rooftop/terrace are more valuable to a tenant if more space is leased (which is likely to reflect a greater number of employees). We find that the interaction term *AREA*x*MAPPS* is statistically significant. The results are reported in Table V.

[TABLE V HERE]

The interaction term takes the expected positive sign. That is tenants value more the provision of mobile applications (*MAPPS*) the larger the area they lease (most likely to accommodate more employees) and pay a premium (positive sign of coefficient). The coefficient on the interaction term suggests that for every additional 1000 sq ft of space in a building that has exclusive tenant mobile applications the premium on asking rent is 1.1%.

The model presented in Table V does not contain *MAPPS*. In the presence of the interaction term, *MAPPS* takes a negative sign which is at odds with *a priori* expectation. Hence this term is removed. The remaining explanatory variables retain their sign and significance. The magnitude of the coefficients has not altered much. This is confirmation of model robustness. Similar to the model in Table IV, the model with the interaction term is not subject to

heteroscedasticity or functional form problems. The residuals of the model though remain skewed and they are not normally distributed. As argued previously (Table IV) the combination of the sample size and the non-existence of heteroscedasticity or non-linearities substantiates the results presented in Table V. A caveat of these findings is the small number of transactions in buildings with exclusive mobile applications.

5. Conclusions

The SAAS real estate model is gaining populariy as occupiers acknowledge the impact of workplace on human productivity and wellbeing and the role of accommodation in attracting talent and retaining employees. With tenant demand continuously changing, the building features are under review by both occupiers and investors. The changed workforce and occupier needs will increasingly shape occupier demand and building specifications. Consequently, more landlords are incorporating SAAS features in their buildings to meet the tenants' expectations. In addition, SAAS is a business concept in the real estate market that will evolve further and it is expected to influence rents and building prices. The provision of SAAS features, however, incurs extra costs. An emerging area of investigation is what building characteristics and services constitute SAAS features, how they are valued by tenants and whether there is a premium on rents.

To the best of our knowledge, this is the first study trying to analyse the impact of SAAS features on office rents. The difficulty in this type of study is to create a sample of SAAS buildings, as there are no clear guidelines as to what constitutes a SAAS building, unlike the definition of a 'green' building. Guided by industry reports, this study employs five office elements recognised by the real estate profession to represent SAAS features: public touch down space, conference/event facilities, an on-site fitness centre, rooftop/terrace and tenant mobile applications.

The impact of these features on rents examined with a sample of 317 transactions in the City of London office market using CoStar data. We control for the quality of the buildings by focusing on 5-star buildings, as rated by CoStar. These buildings are more likely to incorporate SAAS features.

Our results show that tenant exclusive mobile applications and a public terrace or rooftop command a rent premium of around £13 and £6.5 per sq. ft per annum, respectively. We also find that the impact of mobile applications varies with the size of space let. For every 1000 sq ft more space let with mobile applications the premium on rents is 1.1% higher. Other SAAS features such as conferencing facilities, an on-site fitness centre and touch down space have no significant impact on office rents. The results are robust even after controlling for location (office sub-market within the City of London), quality of buildings (CoStar 5-star), broad market influences (City of London office rents), building age, floor level and area leased.

A key implication of the present investigation is that tenant exclusive mobile apps and a public terrace or rooftop, emerge as two candidate components in a SAAS rating system that future research will construct.

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