An Analysis Of Office Investment Depreciation - Hedonic Modelling Of Its Sources

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Abstract

This paper is an extension of a previous paper published in The Journal of Valuation and Property Services, Volume 2, 1999. It attempts to develop a systematic statistical methodology for the analysis of office depreciation. An appropriate functional form, which avoids potential bias as well as links depreciation to physical deterioration, building and site obsolescence, is selected. A hedonic model for the City of Kuala Lumpur offices rental depreciation aims to explain rather than to predict the phenomenon as the cross-section analysis of rental market in 1996 was undertaken. The perceived importance of variables in causing depreciation is identified and explained in detail. The result indicates that depreciation of offices in the city of Kuala Lumpur is largely dominated by physical deterioration and building obsolescence compared to site obsolescence.

Keywords: impact of depreciation, physical deterioration, obsolescence and hedonic modelling

Introduction

Depreciation and its impact on property investment have been a focus of many studies in the early 1980s. In the United Kingdom, the analysis of property depreciation concerns the growing awareness of property mispriced as a result of implicit analysis of its impact. This issue has raised the need for better approach to quantify the impact as well as one capable of considering other depreciation variables apart from 'age'. The approaches to estimate depreciation have developed significantly since the last decade especially in economic (see Hulten and Wykoff, 1996) and accounting. The methods progressed from a simple measurement to more complicated methods (bivariate to multiple depreciation causal) with increased incorporation of statistical tools aimed to appropriately quantify and explain property investment depreciation.

This paper aims to construct a hedonic model for office depreciation considering all possible causes of depreciation. This empirical model expands upon the previous research (Md Yusof, 1999 and 1999a) into the relationship between rental depreciation and its three major causes (physical deterioration, building obsolescence and site obsolescence) using the hedonic price technique. Within the context of a hedonic price model, the contribution of included variables explains the impact of depreciation. This offers an alternative to a version of an *age* to explain depreciation as in Sykes (1984), Salway (1986), Barras and Clark (1996) and Clapp and Giacotto (1998). In this paper, depreciation factors, which are represented by original and an orthogonal combination of depreciation variables, are used. The hedonic price for each factor is calculated and used to explain the perceived importance of each factor in office investment depreciation.

To develop the model, related literature is reviewed in the next section of the paper. This literature review is followed by the specification of the model. Data used in developing the model is presented. Problems associated with data efficiency and bias in the construction of the hedonic model are discussed. The empirical results are reported and the research is summarised and concluded in the finai section.

Literature Review

In property investment, depreciation rate (especially of housing) is commonly estimated by examining price data on units of various ages (Barras and Clark, 1996 and Clapp and Giaccotto, 1998). The rate of change of observed property prices with respect to *age* is interpreted as a depreciation rate. Works, such as by Sykes (1984), Salway (1986), and Barras and Clark (1996) also quantified the rate of depreciation as property ages. The age-life method of estimating depreciation is one method that incorporates the above information and is often used by practising appraisers (Cannaday and Sunderman, 1984). The difficulty of using *age* is attributed to the fact that 'Age' is strongly correlated to other variables (Epley, 1990); therefore the effect of other depreciation variables, such as design factors, is incapable of being separated.

Md Yusof (1999 and 1999a) proposed three main sources of depreciation: physical deterioration, building obsolescence and site obsolescence (fuller discussion on sources of depreciation can be found in Md Yusof, 1999 and 1999a). Physical deterioration indicates the situation of declining utility due to physical usage and the passage of time. Physical deterioration emanates from 'use' and 'action of elements', which require the passage of time, as both 'use' and 'action of elements' occur progressively through time. Obsolescence is a decline in property utility or usefulness, which is not directly related to physical deterioration (Salway, 1986 and Baum, 1989). The property becomes obsolete as it falls in comparative status due to factors such as technology or design of a new property. Obsolescence can be classified as building obsolescence and site obsolescence.

Building obsolescence refers to a degree of mismatch between a building and its use. Building obsolescence may arise from deficiencies in design, building systems, services and other factors. Site obsolescence indicates a decline in usefulness of a site (Md Yusof, 1999 and 1999a). Factors that may cause obsolescence of a particular site or location include accessibility, site-specific factors (such as size, location, etc), planning and the environment.

Attempts to incorporate different sources into the analysis of depreciation had resulted in the application of statistical tools. In Baum (1989), Hulten and Wykoff (1996), Khalid (1992) and Md Yusof (1999), multiple regression analysis and its extension hedonic price model has been used to explain rather than predic the impact of depreciation on property investment especially when the data is analysed cross-sectionally, i.e., at one particular time. The main concern in this part is to review the material to support the need to consider multiple causes of depreciatior using the hedonic price technique. The technique has been used as a better alternative to explain different sectors in property investment analysis. The hedonic price technique has been used in determining rental and house price and the impact of the countryside characteristics on house values (for example, Garrod and Willis, 1991 and 1993). In addressing the impact of depreciation, numerous studies such as Palmquist (1979), Linneman (1980) and Chinloy (1980) have measured house depreciation by the coefficient on age in the hedonic regression. The most recent is a rational expectation framework for interpreting the coefficient on age in a standard hedonic model developed by Clapp and Giacotto (1998) for residential sector.

In office investment, the models used to measure office performance can be linked to the analysis of depreciation as depreciation is largely related to property performance. Bough and Kratz (1983) and Vandell and Lane (1989), for example, consider the price of good architecture in rental determination of offices by hedonic price technique, which can be linked to depreciation in terms of the method and variables used. Dunse and Jones (1998) include factors such as physical characteristics, tenure and location to determine value of offices in the United Kingdom, which are also appropriate to the analysis of depreciation.

What is hedonic regression? Hedonic regression is an extension of MRA, which can be applied to a series of property values, together with their associated characteristics to identify and quantify the significant determinants of value and, consequently depreciation. Hedonic multivariate regression is a technique for measuring price while controlling for the quality of the heterogeneous commodities. Hedonic price is the implicit price of each attribute possessed by those goods. Each attribute contributes to the value of the good as the model specified that the good *per se,* does not affect the level of their utility to a consumer. It is the attributes possessed by the good that increase or decrease the utility (Rosen, 1974). The interpretation suggests that the price paid for a particular good is the sum of the implicit prices of the associated attributes as the hedonic price equation is a reduced-form equation reflecting both the demand and supply influences (Halvorsen and Pollakowski cited by Edmond, 1984).

In this study, the hedonic model is based on the assumptions that an office's utility is a general function of a dimensional vector of characteristics which encompass locational and physical characteristics where the market prices are known for any offices and each user maximises utility, subject to a budget constraint. As in Dunse and Jones (1998), the office unit, Z, is composed of n attributes z_i, z_2 ....z_n and vector of n attributes for which rent depends upon the quantities of the various attributes associated with Z. The rent function can be expressed as

$$R(Z) = f(z_i, z_2 \ldots Z_n).$$

The hedonic equation is estimated using regression analysis to obtain a price measure, $R(Z_k)$, the corresponding rent being for the kth property. This equation can be as follows:

$$R(Z_k) = \beta_o + \sum_{i=1}^{n} \beta_i Z_{ik} + \varepsilon_i \qquad 1.0$$

The hedonic price function may increase, decrease or remain constant depending on the functional form of R(Z). Despite various advantages of hedonic analysis, some issues require careful consideration. Caution must be taken to ensure that the included characteristics must be restricted to those which pertain to the good itself. A proper set of characteristics of demander and supplier should be carefully examined. Other issue is related to the underlying factors that cause depreciation to vary and whether the importance of these factors will vary cross-sectionally. This is also a subject of interest that requires accurate measures of prices on a standardised bundle of office services for each locality considered. More importantly, the appropriate functional form for a hedonic price equation cannot in general be specified on theoretical grounds and the lack of a firm basis for the choice of functional form is unfortunate. This, nonetheless, does not prevent the application of hedonic price model in other studies as well as in this study.

Methodology and Research Design

This research is designed to model or explain the impact of depreciation on rental for offices in the City of Kuala Lumpur. The modelling process involves the identification of data for analysis, construction of a hedonic model, model specification and an assimilation of the whole process to explain the impact of depreciation. Previous works have been used to justify the selection of the data used in the analysis. Appropriate statistical tests such as correlation analysis and ANOVA test are further employed to ensure that significant and relevant variables are included in the model. The development of models follows an order of variables selection, model specification and validation. In selecting variables, stepwise selection in regression analysis is used since the method refines and combines both forward and backward selection. In stepwise method, the variables are assessed and reassessed at every stage for their significance in the model wheres in the forward or backward procedures variables remain in the equation once they are entered.

As mentioned earlier, the model developed aimed to show the perceived importance of each variable in depreciation by regressing dependent variables (rental depreciation) with two sets of independent variables: non-transformed and transformed variables. Non-transformed variables consist of original variables, which are significantly associated with rental depreciation as observed in correlation matrices.

Data: Data for this study is derived from information on forty nine offices in the city of Kuala Lumpur. The average rental for these offices ranged from RM3.10 to RM5.80 per square foot in 1996. The offices are located in three traditional commercial areas: Golden Triangle Area (GTA), Central Business District (CBD) and Decentralised Area (DCA). The GTA is the most prime location in the city followed by the Central Business District and Decentralised Area. Rental depreciation as dependent variable is denoted as the percentage difference between subject (which is under investigation) and prime offices. The 'prime' is used to indicate the highest rental achieved in the market based on the consumer theory: a good is paid the highest price for the highest utility offered (Lancaster, 1966). The selection of property characteristics or attributes is guided by the analysis of sources of depreciation as well as statistical significance. Variables selected are linked to physical deterioration, building obsolescence and site obsolescence. A total of 53 variables were collected. Nonetheless, not all variables are significantly associated with rental depreciation, hence insignificant variable are eliminated from further analysis. The list of all variables is shown in Exhibit 1.0. The specific information on broad categories compiled for each property is summarised under the category of Location, Age of the offices, Physical characteristics, Services available in the building, Building systems and Building Design according to the City of Kuala Lumpur's, 'Guideline on Office Classification' (DBKL).

As mentioned earlier, in addition to the original variables, eight components or factors are also used to explain the impact of depreciation based on three sources of depreciation: physical deterioration, building obsolescence and site obsolescence. The components, which were extracted with the Principal Component Analysis, represent the underlying constructs of thirty-seven office characteristics collected (please refer Md Yusof, 1999 and 1999a). Principal Component Analysis is performed on 31 variables (which are strongly correlated with rental depreciation), aimed at summarising and reducing the number of independent variables. The use of large number of independent variables can create a number of problems such as multicollinearity. Principal Component Analysis eliminates multicollinearity problem, which can easily be observed when variables are strongly linked to each other. The problem of multicollinearity may cause difficulty in determining causal variables in the model, as the independent variables are closely associated among themselves. Eight orthogonal factors derived in the Principal Component Analysis performed are:

1) The quality of the building (BldQty),
2) Size and Efficiency (SizeEff},
3) Design and Lay-out (DesLay),
4) Location (Locat),
5) Appearance (Appear),
6) Complementary (Compl),
7) Facilities (Facil),
8) Parking services (Park),

As the variables have been identified, the next step is specifying the model. This is discussed in the following sub-section.

The Specification of the Model

The model specification includes selection of the dependent and independent variables and determining the overall functional form of the model. As mentioned earlier, two forms of hedonic model are developed in this paper: non-transformed and transformed. The highest rental achieved in the market is selected as a benchmark. In 1996, the prime rent was RM5.80. The rate of depreciation is arrived as follows:

$$\text{Rental Depreciation (\%)} = \frac{[\text{Prime Rent - Office Rental}]}{[\text{Prime Rent}]} \times 100 \qquad 2.0$$

Dependent variable, rental depreciation *($DepR_{it}$)*, is the difference in rental between the equivalent new, modern and prime and the subject property (property in the study). The use of this as an indicator for rental depreciation is consistent with other studies (Baum, 1989, Khalid, 1992 and Barras and Clark, 1996). Selection of independent variables for the model is attempted to incorporate all the physical deterioration, building obsolescence and site obsolescence variables that would be required to minimise specification bias. Therefore, the selection of variables is guided by the results of previous studies and the availability of data.

A testable form of equation related to depreciation begins with a standard cross-sectional hedonic model (Rosen, 1974):

$$DepR_{it} = f\ (\textit{Physical deterioration, Building obsolescence and Site obsolescence}) \qquad 3.0$$

Depreciation for offices is a function of physical deterioration, building obsolescence and site obsolescence. This equation can be rewritten as Equation 4.0 and Equation 5.0

$$Y = a + b_1x_1 + b_2X_2 + \ldots\ldots b_nx_n \qquad \text{or}$$

$$Y_i = a + b_1x_{1i} + \ldots\ldots + b_nx_{ni} + \varepsilon_i \qquad 4.0$$

$$DepR_{it} = a_0 + b_1x_{1t} + b_2x_{2t} + b_3x_{3t} \ldots + b_nx_{nt} + e_{it} \qquad 5.0$$

where

$DepR_{it}$ = Rental depreciation of office i during period t

a_0 = Constant represents that portion of rental depreciation for each office that may be attributed to the overall level of depreciation

e_{it} = Random errors for the rental of property i during period t

$b_{1t...nt}$ = The coefficients for the quantitative or qualitative variable i n for period t

$x_{1...t}$ = The observed value of the quantitative or qualitative depreciation variable j for office i in period t

The intercept 'a', the coefficients on 'b_1 to 'b_n', are allowed to change over time. Any unexplained variation is captured by the random error e.

Based on the above equations, two models have been developed and are discussed below.

i) *Model with original variables*

In the model, rental depreciation is a function of a set of original variables.

$$DepR_{it} = a + b_1(Variable\ 1) + b_2(Variable\ 2) + b_3(Variable\ 3) + b_4(Variable\ 4) + \ldots b_n(Variable\ N) + e_i \qquad 6.0$$

ii) *Model with transformed factors*

$$DepR_{it} = Constant + \beta_1(Fac1) + \beta_2(Fac2) + \beta_3(Fac3) + \beta_4(Fac4) + \beta_5(Fac5) + \beta_6(Fac6) + \beta_7(Fac7) + \beta_8(Fac8) + e \qquad 7.0$$

$$DepR_{it} = b_0 + Fac_1 x_{1t} + Fac_2 x_{2t} + Fac_3 x_{3t} \ldots Fac_n x_{nt} + e_{it}$$

Any violation of the model is carefully observed. Problems of multicollinearity (strong correlations amongst independent variables), normality error, linearity or heteroscedasticity are analysed through appropriate statistics. Tolerance level, for example, shows the proportion of variability, which cannot be explained by other variables and the smaller the tolerance, the larger the standard errors of the coefficient. Large standard error of coefficients causes computational problems and is always associated with multicollinearity. The determination of the importance of variables in the equation can be difficult if the model is affected by multicollinearity.

Findings

The first stage of the analysis involved performing different methods of selecting variables. As discussed earlier, stepwise selection provides extra advantages over forward selection and backward elimination. The included independent variables were reassessed at every step of the model development, ensuring the significant variables remain in the model. The capability of explaining rental depreciation is determined by the high value of R^2, which refers to explanatory power of the model. Hence the higher the R^2, the better the model. However, this is subject to some limitations. In most cases, adjusted R^2 will be observed as the adjusting process takes place. Two models with different sets of independent variables are presented as follows:

(i) Model with original variables

Only variables that are statistically significantly associated with rental depreciation are selected for further analysis. Thirty-seven variables are regressed with rental depreciation. These variables are selected based on their significant association with dependent variable. Eight variables included in the model are 'Age'(age of the building), 'Bay_rate' (parking bay relative to floor area), 'Ex_fin'(external finishes), 'Fl_fin' (floor finishes), 'Plrat' (plot ratio of particular site), 'S_chrg' (service charges), Stry' (number of storey) and 'Ty_con' (type of construction). The model is developed using eight variables (selected from a range of variables listed from Exhibit 1.0), which explains 82.9 per cent of variation in DepR. The R^2 of the model is adjusted to 79.3 per cent. Equation 6.0 can be rewritten as follows to indicate rental depreciation in 1996:

$$DepR_{96} = 49.27 + 0.34\,(Age) - 2.02\,(Bay\_rate) - 1.02\,(Exfin) - 2.535\,(Fl\_fin) - 0.557\,(Plrat) - 21.492\,(S\_chrg) - 0.161\,(Stry) + 2.72\,(Ty\_con)$$

There is no site-related factor included in the equation, which means that the aim to consider the site obsolescence may not be achieved. Further statistical tests are carried out and relevant statistics are observed. The associated F-test shows that there is significant relationship between the dependent and the entire set of independent variables. With eight variables, the model explains 82.9 per cent of variation in rental depreciation. Adjusted R^2 is used to compare equation fitted not only to a specific set of data and two or more entirely different sets of data. In this case, adjusted R^2 fall to 79.3 per cent, which indicates that the ability of model is decreasing. A summary of the model is shown in Exhibit 2.0.

The equation can be read as, for example, one unit of 'age' contributes 0.34 per cent to rental depreciation. The largest variation in rental depreciation is attributed to 'S_chrg', the negative sign means that as service charge increase, depreciation decreases. The main concern here is 'service charges' neither represents nor indicates any depreciation factors. Furthermore, although most variables indicate correct signs of coefficient (the better quality of variables minimise depreciation), 'Ty_con' displays contradictory association. An error is suspected in the model. No site related variable is included and therefore there is no scope to consider the impact of site obsolescence. In addition, Exhibit 2.0A, shows that the equation is seriously affected by multicollinearity. Low level of tolerance level indicates this problem. As a result, the model with original factors/variables is not favourable to model the impact of depreciation on offices in the City of Kuala Lumpur.

(ii) Model with orthogonal or transformed factors

The rental depreciation model for 1996 is developed with seven orthogonal factors.

$$DepR_{96} = 15.61 - 5.203(BldgQty) - 3.438(EffSize) - 1.557(DesLay) - 3.143(Locat) - 1.947(Compl) - 1.587(Facil) - 1.515(Parking)$$

In order to link the factors to the classification of sources identified earlier, the discussion in this section begins with factor classification.

Classification: In the earlier discussion, the sources of depreciation can be classified into physical deterioration, site obsolescence and building obsolescence. In Md Yusof (1999 and 1999a), it is suggested that physical deterioration is related to the normal wear and tear of mechanical and electrical systems. The rate of deterioration depends on the level of use and the quality of the materials used. In the analysis, the components 'BldgQty' and "SizeEff' can be classified as physical deterioration-related factors. "Deslay, Facil and Parking' can be building obsolescence factors. Nonetheless, it is important to realise that this is not an ultimate classification, as 'SizeEff' and 'BldgQty' may also indicate building obsolescence and vice-versa. The only possible difference between them is that physical deterioration is concerned with wear and tear but obsolescence is more related to qualities correspondent to changes in demand. In the study, site obsolescence is described by "Compl' and 'Locat' .These factors can be used to show the relative impact of site obsolescence.

b) Variables inclusion

The model incorporates multiple variables which are different from Sykes (1984), Harker (1985) and Salway, (1986). In these studies, 'Age' is the only explanatory variable. The first factor entered into the equation is 'Building Qly'. With a statistical significance of 0.000, the 'BldgQty' explains 32.2 per cent of variation in rental depreciation for the selected offices in the City of Kuala Lumpur in 1996. This further shows that rental depreciation was reduced by 5.2 per cent with an increase in one unit of 'BldgQty', as shown in the rental depreciation model.

A 15.2 per cent of variation in DepR is caused or explained by 'SizeEff'. Here, the size of the space and the level of efficiency offered by the property influence more than 15 per cent of office rental depreciation. In other words, high-rise buildings with efficient services are preferred and, therefore, a higher rental could be expected (hence low rental depreciation). In the model, an increase in one unit of 'SizeEff' decreases rental depreciation by 3.4 per cent.

Additional variables such as 'Locat' and 'Compl' explain further variation in rental depreciation. Although the contribution of each component is still considered to be significant, it is obvious that as more variables entered equation, the marginal contribution of each factor decreased steadily. The role of each factor in minimising depreciation becomes less. Exhibit 2.0B summarises the contribution of factors in the model.

The above discussion shows that with seven factors or components, 73.8 per cent (adjusted to 69.1 per cent) of variation in rental depreciation in 1996 is explained. The remaining 26.2 per cent (30.9 per cent as adjusted) is due to factors which were collected but are not in the equation or were not collected or observed during the proforma survey. This includes micro aspect of location, which could explain further variations in rental and consequently, depreciation.

c) Violations checking

The model is checked for any violation that may result in any inconsistent findings. The following have been undertaken:

Heterogeneous Variance: It is always assumed that errors of variance of regression models are homogeneous. The assumption of a homogenous error of variance, as suggested by Myers (1989) is often violated in practical situations. This occurs because as the number of either dependent or independent variables increases, variation around the trend of fitted models becomes larger. To investigate if the error variance is homogenous, One-Way ANOVA was performed and is discussed. With the one-way test of equality of variance, the hypothesis is that all residuals from which the random samples are taken must not only be normal but must also have the same variance. Here, if the significance levels are relatively large, the hypothesis that the populations have the same variance cannot be rejected. In case of rental depreciation, the result of the test indicates a significance level of 0.2022. This means the hypothesis that variances are the same cannot be rejected. Thus, for the model there was no danger of violation in terms of equality of variance.

Non-normal error: In regression analysis, the error is assumed to be normally distributed. Kolmogorov-Smirnov and Shaphiro-Wilks tests check the normality assumption. Again, although it is possible to test normality using a histogram of standardised residual to visualise the error distribution, it has poor resolution in the tails or wherever data are sparse.

The Kolmogorov-Smirnov test is used to test how well a random sample of data fits a particular distribution (Uniform, Normal and Poisson). It is based on the comparison of the sample cumulative distribution function to the hypothesised cumulative distribution function. If the D statistic is significant, then the hypothesis that the respective distribution is normal should be rejected. The result of the test indicated high significance levels, D-statistics for rental depreciation model (0.9379) suggesting that error terms for the models are normally distributed. The normality error distribution was further justified by a high significance value of Shapiro-Wilks as another test of normal distribution. The Wilks statistics are 0.5327 for rental depreciation and the result of the test proved that the error for the model is normally distributed.

Outliers: Outliers are problems of individual data points that do not fit the trend set by the rest of the data. The model violations may produce a suspicious data point on two occasions: (i) there is a breakdown in the model at the i^{th} point, producing a location shift, $E(e_i) = D_i\ {}^{1}0$, which is known as the mean shift outlier model, and (ii) there is a breakdown in the model at the i^{th} point and $Var(e_i)$ exceeds the error variance at the other data locations. In the statistical package, the outliers cases are those with residual of greater than ± 3. However, in this study, a standard deviation of ± 2.5 has been used as well as ± 3. There were no outliers for DepR in both, ± 2.5 and ± 3, standard deviations used.

Appropriate statistical tests have been performed to detect any violation in the model. There is no evidence to suggest that violation exist in the model thus it is robust to explain depreciation based on the information collected.

Conclusion

The analysis of rental depreciation indicates that for the selected Kuala Lumpur offices, the level of depreciation ranged from 1.2 per cent to 33.6 per cent in 1996. The study shows that the level of risk associated with the city's offices is a function of changes in demand for and supply of better quality offices. The study of decline or loss in value, in terms of rental was undertaken in 1996, aimed to explain the impact of depreciation based on three sources of depreciation; physical deterioration, building obsolescence and site obsolescence. Although the attempt to model each factor separately has not been successfully undertaken, the hedonic price model shows that physical deterioration and building obsolescence have been the major causes of depreciation for offices in the City of Kuala Lumpur. This, nonetheless, does not negate the importance of site obsolescence in the city's office depreciation. When the offices are considered based on location, the analysis shows less systematic influence of the site factor but there is scope for cancelling the severe impact of building obsolescence and deterioration for offices in the Golden Triangle Area only, as the impact of site obsolescence was low.

The study indicated that Kuala Lumpur office depreciation is greatly influenced by differential in building characteristics. The differences are attributed to variations in construction technology to respond to changes in working styles. The requirements of office occupiers changed over the 1980s where demand for modern offices became significant. The finding of this study is similar to some tenant's survey (for example, Valuation and Property Services Department, 1992) where the building components were rated above location or site-related variables. This indicates that the role of site becomes less dominant as evident from hedonic pricing for site related factors, which are less significant, compared to those related to building. It was found that good location might not necessarily lower the level of depreciation. However, the combination of good location and good buildings may reduce the impact of rental depreciation.

The study has been repeated using data on performance in 1998. Surprisingly, based on information in 1998, building characteristics have been identified as factors that explained large variations in rental depreciation. Despite weak market in 1998, the trend to occupy better offices (termed as intelligent offices) is still significant. In conclusion, this preliminary study requires more rigorous information on property-specific characteristics and its performance.

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EXHIBIT 1.0

A LIST OF VARIABLES IN THE STUDY

Labels		Description
1.	Ac_sys	Air-conditioning system in the building. The variable is measured by score with higher values for better and modem systems
2.	Ac_fl	The variable indicates whether the air-conditioning system is equipped with the latest feature of system: Variable Air Volume. The score is indicated by Yes or No
3.	Access	The variable used to describe the accessibility of the property from the main road and public transport
4.	Age	Age of the building
5.	DepR	Annual Depreciation on Rent.
6.	DepY	Annual depreciation on Yield
7.	Bas	Explain the state of the Building Automation System of the building. Modern or best system denoted by higher scores.
8.	Bay	Number ofparking spaces provided in the building.
9.	Bay_rate	Indicates percentage provision of parking spaces based on floor area and space ratio.
10.	Bi_spac	The biggest space occupied by single tenant in the building
11.	Bigs_ten	Number ofbigger tenants occupying space of 5,000 square feet and above
12.	Ce_high	Measured floor to ceiling height, more or less than 10 feet
13.	Comm	Telecommunication system in the building
14.	Cm_ref	Shows whether facility of Common Refreshment area is available in the buildin
15.	Conf	Conference hall or room in the building
16.	Cr_fin	The state of architectural finishes of lift car
17.	Dine	Dining facility
18.	Ex_fin	External finishes of the building
19.	Fn_com	Tenant Profile - Finance Companies
20.	Fire	Fire Prevention System of the building
21.	Fl_area	Gross floor area of the building, denoted by several categories.
22.	Fl_fin	Building floor finishes
23.	Gen-com	Type of the ownership - general commercial
24.	Govtagen	Tenant Profile - Government Agency
25.	Gym	Gymnasium facility
26.	Int_car	Car interval movement
27.	Lascap	The state of landscape in the building
28.	Ld_area	Land area of the property
29.	Lif_car	Number of lift cars
30.	Lif_con	The control system for the lift
31.	Locat	Location of the property - Three commercial areas in Kuala Lumpur used
32.	Mj_Inst	Type of ownership - Major institution
33.	Numten	Number of tenants in the building

34.	Occrate	Occupancy rate of the building
35.	Owrel	Relationship to owner
36.	Plratio	Plot ratio of the property
37.	Profser	Tenant Profile- professional service
38.	Prox	Proximity to other uses such as retail
39.	Rd_fr	Is the property is situated on road frontage
40.	Re_count	The state of Reception counter in the building
41.	Refur	Any refurbishment undertaken
42.	Rnt_rev	Rent review interval
43.	Schrg	Service charge, measured as fraction of gross rent
44.	Security	Security system of the building
45.	Sp_utl	The space utilisation (Column free, etc.)
46.	Spd_car	The speed of the lift cars
47.	Stck-br	Tenant Profile -Stock broker
48.	Stry	Number of storeys
49.	Trdagen	Tenant Profile - Trade agent
50.	Ty_bay	Type of bay provided in the building
51.	Ty_con	Type of construction - Modem, Transitional or Traditional
52.	Use_lev	The intensive use, based on type of business and number of tenants
53.	Wait_car	The average waiting time during peak hours

EXHIBIT 2.0

A SUMMARY OF STEPWISE SELECTION

DEPENDENT VARIABLE: DepR

Multiple R 0.91026

R Square 0.82858

Adjusted R Square 0.79249

Standard Error 4.08027

Variable	B	SE B	Beta	Tolerance	VIF	T	Sig T
Age	0.3404	0.138	0.245	0.457	2.189	2.465	0.0183
Bay-Rate	-2.0231	0.862	-0.187	0.789	1.267	-2.477	0.0178
Ex_fin	-1.0167	0.587	-0.172	0.457	2.184	-1.732	0.093
Fl_Fin	-2.535	0.571	-0.332	0.855	1.169	-4.437	0.0001
Pl_Rat	-0.557	0.252	-0.171	0.754	1.329	-2.215	0.0328
S_Chrg	-21.492	4.06	-0.452	0.617	1.621	-5.289	0.0000
Stry	-0.161	0.078	-0.184	0.573	1.744	-2.073	0.0450
Ty_con	2.717	1.052	0.260	0.443	2.253	2.582	0.0138
Constant	**49.273**	**5.116**	-	-	-	**9.631**	**0.0000**

Notes:

1) B is registered coefficient - the relative importance of variables
2) SE B is Standard Error of Coefficient
3) Beta is the standardised regression coefficient
4) Tolerance - Variance of Estimators
5) VIF - Variance Inflation factor
6) T - statistic
7) Sig T - observed significance level

EXHIBIT 2.0B

A SUMMARY OF MULTIPLE COMPONENT REGRESSION ANALYSIS

DEPENDENT VARIABLE: DepR

Multiple R 0.85893

R Square 0.73776

Adjusted R Sq 0.69069

Standard Error 4.98157

Analysis of Viriance

DF Sum of Squares Mean Squares

Regression 7 2722.80374 388.97196

Residual 39 967.82435 24.81601

F = 15.67424 Signif *F* = .0000

Variable	B	SE B	Beta	Tolerance	VIF
(Fac1-BldgQty)	-5.203	0.741	-.576	-7.016	.0000
(Fac2-FftSize)	-3.438	0.729	-.387	-4.718	.0000
(Fac3-DesLay)	-1.557	0.720	-.177	-2.164	.0366
(Fac4-Locat)	-3.143	0.727	-.355	-4.323	.0001
(Fac6-Compl)	-1.947	0.728	-.219	-2.674	.0109
(Fac7-Facil)	-1.587	0.733	-.178	-2.167	.0364
(Fac8-Parking)	-1.515	0.720	-.172	-2.014	.0419
Constant	15.614	0.728		21.452	.0000

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