Efficiency of Real Estate Firms in Malaysia and its Correlates

Muhammad Ridhuan Bos Abdullah[#1], Selamah Maamor[*2], Mohd Zaini Abdul Karim[#3]

[#]*School of Economics, Finance and Banking, Universiti Utara Malaysia*
06010 Sintok, Kedah, Malaysia
[1]ridhuan@uum.edu.my
[3]zaini500@uum.edu.my

[*]*Islamic Business School, Universiti Utara Malaysia*
06010 Sintok, Kedah, Malaysia
[2]selamahm@ uum.edu.my

***Abstract*— This study estimates efficiency and examine factors that influence efficiency of Malaysian real estate firms in Malaysia. In the first stage, we estimate the efficiency level of real estate firms by employing the frontier efficiency methodology data envelopment analysis (DEA) approach. In the second stage, the Tobit Model was estimated to determine factors that influence efficiency obtained in the first stage. The data employed in this study consists of 67 real estate firms listed in the Kuala Lumpur Stock Exchange (BSKL). The results indicate that the highest average efficiency score is 0.70 which is being achieved by 23 firms or 34% of the listed firms. The Tobit regression result shows that profit, market share, and foreign share positively affects the efficiency of the real estate firm while cost negatively affect the efficiency as predicted.**

Keywords*—efficiency, real estate, data envelopment analysis, Tobit Model*

1. Introduction

The economic crisis started in 2008 had an unprecedented effect on the Malaysia economy. The real estate industry was no exception. The real estate industry was one of the most severely affected sectors. Hence, firms need to be efficient to survive in a competitive market. The Malaysian real estate industry accounts for about 2.5% of the gross domestic product (GDP) and 25% of the total employment in Malaysia.

A study conducted by the Economic Planning Unit of prime Minister's Department demonstrated that a RM1 million investments in the housing sector resulted in a total multiplier effect of RM1.469 million for the whole economy (Isa, Tan, and Nasir; 2009). Since 2010, private sector has been doubling their investment in property industry; investments increased more than six-fold from RM4.7 billion in 2010 to RM30.3 billion in 2012. This increase is largely due to the growing number of houses being built and the conducive environment climate in Malaysia (Jabatan Perumahan Negara, 2012).

Besides, the property industry is said to have strong linkages to more than 140 local industries and is a major source of employment. The industry is heavily influenced by the government's home-ownership policy. Hence, the industry is thus utilized by the government as an economic growth stimulant via its expansionary policies and various initiatives introduced to provide housing for the society.

Recently, the debate is shaped by concerns about housing affordability, particularly for the middle-and lower-middle-income group. This has impacted legislation, planning, economic development, as well as the industrial organization of the industry. For the last ten years, properties, just like any other asset class, saw a general rise in prices. Between 2008 and 2014, property price went on an increasing trend which resulted in higher transacted value. According to the National Property Information Centre (NAPIC) report, since 2008, the value of properties transacted (properties priced from RM500,000 and above) doubled from 31.74% in 2008 to 57.16% in 2014. In other words, today's housing prices are "so high" and beyond the reach of even the middle-income group what more the lower-income group, together which forms 80% of the population. The impact is the acute shortage of affordable housing faced by the vast majority of the country's population. Hence, if urgent actions are not taken to tackle the problem, this staggering "80% housing crisis-stricken population is clearly a fertile ground for social and political discontents".

Despite its contribution to the Malaysian economy, the economic efficiency of the Malaysian real estate firms has neither been measured, nor the factors influencing the efficiency has analyze. To survive in the competitive globalized environment Malaysian real estate firms, must find ways to improve efficiency and productivity. Hence, the objective of this study is to empirically examine the

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efficiency of Malaysian real estate firms and the factors influence it.

2. Overview On Efficiency Of Real Estate

The are many studies estimating cost, scale and technical efficiency using the frontier techniques in the literature. Most review of frontier estimation studies begin with the classic paper by Farrell (1957) which introduces the basic framework for studying and measuring inefficiency defined as deviations from optimum behaviour'. The frontier establishes the optimum benchmark against which to calculate deviations. Various methods, using statistical and mathematical programming techniques, exist for the construction-estimation of the relevant frontier. A general distinction emerges between deterministic and stochastic frontiers. Deterministic frontiers by construction fix the frontier in the relevant space and encompass all sample observations. Thus, a small subset of data supports the frontier, making it more prone to sampling, outlier, and statistical noise problems, which may distort the measurement of efficiency.

Previous study concurred that in any economic activity, economies of scale become apparent as the average cost of production decrease when output is expanded. Economies of scale result from large fixed costs and/or weakly increasing variable costs. Recently, researchers (Potepan, 1996; Somerville, 1999) argued that change in the level of residential construction affects macroeconomic conditions and is an important determinant of movement in house prices. Theory teaches us that increase in the cost of construction should reduce the supply of new housing. In much of the existing literature, construction cost inputs fail to behave in a manner consistent with theory. Housing unit (output) should fall with increases in the cost of constructing units (input costs). They finds that house construction costs rise but the supply of house also increase and house price also increase, so do land prices.

As reported by REHDA, one of the factors which have resulted in today's property development predicament is high-compliance cost. According to the report, land prices have moved up for the last several years. So does high-compliance cost such as, the cost of providing wider roads, more open space and infrastructure amenities like water, electricity and land for substation are borne by the developers. Finally, this reduces the land for actual property development which can be sold.

Besides, developers claimed that over the years the net buildable area has shrunk from 60% since the last two decades, compared to about 40% at present. As REHDA concurred, corporatised utility companies like Tenaga Nasional Bhd (TNB), the water concessionaires, Indah Water, Telekom and Construction Industry Development Board (CIDB) are frontloading capital expenditure to consumers by imposing it on private developers, who then pass the costs to house buyers. In this regard, evaluating operating efficiency will be useful to better understand the way that a company operates, and has been widely adopted in many previous studies (see Chau and Wang, 2001; Anderson et al., 2002; Coelli and Rao, 2005; Hu and Wang, 2006; Thakur et al., 2006; Chau et al., 2005 for examples).

Zheng, Chau and Hui (2011), measured the performance and efficiency of the Listed Real Estate Companies (LRECs). Three types of DEA approaches are employed, which are CCR-DEA, BCC-DEA and Super-Efficiency-DEA models. In general, this empirical research delivers four outcomes; firstly, an integrated assessment system and a ranking of the LRECs are established, which provides useful information for investors who are seeking for indirect exposure in the Chinese real estate market. Secondly, the average Overall Efficiency (OE), Pure Technical Efficiency (PTE) and Scale Efficiency (SE) of the LRECs are 0.78, 0.84 and 0.92 respectively. Thirdly, 69% of the inefficient LRECs are classified as increasing returns to scale and could further increase operating efficiency by scale expansion. Fourthly, the employees slack is prevalent at 18.96% for the inefficient LRECs.

Operational efficiency is one of the key issues and important selection criterions for stock market listing. In the last few years, many academic literatures (e.g. Bers and Springers, 1997; Anderson et al., 2000) have empirically investigated the operational efficiency of Real Estate Investment Trusts (REITs). Bers and Springer (1997) use the translog cost function to estimate economies of scale for a sample of REITs during the period 1992-1994. Their empirical results show that economies of scale exist for REITs for all years under investigation. Besides, they also find that the individual characteristics (i.e. type of management and degree of leverage) affect the magnitude of the scale economy.

Besides, previous research shows that there are significant differences in supply elasticities across countries, and that these differences seem to be correlated with the stringency of the regulatory framework in place for land and housing development. They argued that what is true across countries may also true across cities, especially in a country like the US, with significant local variation in land use and other regulatory practices.

The market structure conditions could also potentially influence the rate of technical change and hence society's welfare in the long runs. There is an extensive theoretical

as well as empirical literature on the impact of market structure variable on innovations (Shepherd, 1997). In a related study to determine changes in market structure conditions, Zainal and Phang (1993) and Nor Ghani et al. (2002) compared several market structure variables. The structural change was determined by analyzing several common measures of the elements of barriers to entry, product differentiation and seller concentration. The result of the study shows that the Malaysian industrial market structure has moved towards a more competitive environment.

The next phase of efficiency studies re-examines scale economies and addresses the concept of X-efficiency. Anderson, Fok, Zumpano and Elder (1998) use DEA to measure X-efficiencies and economies of scale. They find that firms substantially deviate from their efficient frontier as evidenced by high X-efficiency or low efficiency scores. In this study, the authors decompose inefficiency into several components. The major division is between allocative efficiency, which relates to how efficiently the managers have allocated their resources in the production process, and technical efficiency, which examines both how well the firm utilizes its assets given their allocation and the scale of the firm. The results show that allocative efficiency ranges between 34% and 68%, while technical efficiency ranges between 38% and 54%. A further examination of technical efficiency reveals firms are relatively efficient at utilizing their resources but are very scale inefficient. The results support those of the previous studies in that brokerage firms are too small to take advantage of scale efficiencies.

Efficiency studies for other industries have shown that firms not only erred by failing to minimize cost, but they also erred on the output side and fail to maximize firm profitability. In fact, a study by Berger, Hancock and Humprey (1993) shows that profit inefficiency is more significant in determining overall firm efficiency than cost inefficiency and economies of scale. Their study shows banks lose nearly 50% of their potential profits from failure to operate on their efficient profit frontier.

When examining the overall results of these efficiency studies, several key points emerge. First, all studies that examined the economies of scale issue found strong evidence of economies of scale. It thus appears as the recent consolidation and resulting increase in average firm size is a move toward efficiency and should not cause regulatory concern at this point. However, if firms continue to merge and grow, diseconomies of scale can arise. All X-efficiency studies that use parametric procedures find that real estate brokerage firms are relatively efficient and operate close to the efficient frontier. This indicates a relatively competitive and efficient market. The move towards scale efficiency provides anecdotal evidence to support this notion.
Berger and Hannan (1998) studied the potentially greater loss from market power; a reduction in cost efficiency brought about by lack of market discipline in concentrated markets. They find that the estimated efficiency cost of concentration to be several times larger than the social loss from mispricing as traditionally measured by the welfare triangle. Hence, an alternative measure of efficiency suggests efficiency cost of concentration may be considerably lower, but still on the order of three times the size of the social loss from mispricing of bank outputs.

The dominance of the efficiency cost over the social loss associated with mispricing is robust with respect to many variations in samples, specifications, estimation techniques, and controls for alternative explanations. Thus, they agreed that consideration of these efficiency costs in banking legislation and regulation may also be important because so many regulatory issues involve changes in the degree of competition or market contestability.

The cost efficiency studies using data from the early 1990s are mixed. Rhoades (1998) using US banks data found modest in the cost X-efficiency gains. Another study found very little improvement in average cost X-efficiency for mergers of either large or small banks (Berger, 1998; Calomiris and Karceski, 1998). Their results suggest that the cost efficiency effects of an M&A may depend on the type of M&A, the motivations behind it, and the way the management implemented its plans.

Vander Vennet, Rudi (2002), studies the cost and profit efficiency of European financial conglomerates and universal banks covering the period of 1995-1996. He found that, in terms of cost efficiency, specialized banks appear to exhibit no disadvantage relative to financial conglomerates in traditional intermediation activities. But conglomerates are found to be more cost efficient when nontraditional banking activities are considered. Universal banks are characterized by significantly higher average levels of operational efficiency relative to specialized banks and this finding is most pronounced for the non-German universal banks. An investigation of the equity betas under varying business cycle conditions supports the hypothesis of superior monitoring capabilities on the part of universal banks. Hence, he suggests that operational efficiency has become the major determinant of bank profitability and that oligopolistic rents have become less prevalent in European banking.

Abed, Awada, & Sen (2013) explored the efficiency of

sustainable housing units, in terms of "total" housing cost, based on the feedback from both supply-side stakeholders (planners, architects, and developers) and demand-side (residents), to help providing evidence that supports affordable sustainable housing neighbourhood. They highlighted that the effect of global economic crisis affects the housing market. For example, poor environmental quality, higher resident's health complications, and larger maintenance and operation bill have all been noticed as major common outcomes of such an impact. The study found that Affordable Sustainable Housing Neighborhood's efficiency did not meet resident's expectations.

3. Research Methodology and Data

The methodology involves two steps. First, we estimate the efficiency of real estate firms in Malaysia using the DEA approach. Second, we use these efficiency scores as the dependent variable to analyse the factors affecting efficiency of real estate firms by estimating a Tobit regression model.

3.1 Method of Analysis

To measure efficiency of real estate firms using the Data Envelopment Analysis (DEA) approach, inputs and outputs of the real estate firms must be specified first. The inputs of real estate firms used in this study are capital and labour. Hence, input costs consist of cost of capital, salary and administrative expenses, total costs of sales which include selling and distribution expenses, cost of assets. The output used in this study is revenue which is total sales of the real estate firm.

According to Farrell (1957), technical efficiency (TE) can be defined as the firm's ability to obtain as large as possible an output from a combination of inputs. Pure technical efficiency (PTE) refers to the firm's ability to avoid waste by producing as much output as input usage allows or by utilizing as little input as output production allows. In addition, Scale efficiency (SE) denotes to the firm's ability to work at its optimal scale.

To analyse the factors affecting efficiency of real estate firms in Malaysia, a Tobit regression model was developed as in general Equation 1. The Tobit model is suggested as an appropriate multivariate statistical model in the second step regression as the efficiency scores obtained from the first step are restricted to be less than one consistent with the characteristics of the distribution of efficiency measure (Grosskopf, 1996).

In this study, the general function of the real estate firm's efficiency is as follow.

$$EFre = f(ROA, PROFIT, MSHARE, COST, FSHARE, STATE, EST, BUMI) \quad (1)$$

Where EFre is the level of real estate firm's efficiency results obtained from the first step DEA estimation. It consists of Technical Efficiency (TE), Pure Technical Efficiency (PTE), Scale Efficiency (SE). ROA is return on asset; PROFIT is the profit of the firm; MSHARE is the market share; COST is the cost; FSHARE is the foreign ownership share of the firm; STATE is dummy variable for state-owned firm (STATE = 1 if state-owned, 0 if otherwise); EST is year of establishment of the firm; BUMI is dummy for Bumiputera-owned firm (BUMI = 1 if Bumiputera-owned, 0 if otherwise). . A positive coefficient implies an increase in efficiency with the increase in ROA, profit, market share, cost, foreign share, state own, establishment, and bumiputera own. Meanwhile, a negative coefficient implies a decrease in efficiency score of real estate firm with the decrease of those variables explained. The significant of the regression result will be estimated at 90% level or higher by using the maximum likelihood estimator (MLE).

3.2 Data Collection

In this study, data from the 67 real estate firms were utilized to determine the efficiency of real estate firms in Malaysia. All the data were obtained from Companies Commission of Malaysia (Suruhanjaya Syarikat Malaysia - SSM) and the Kuala Lumpur Stock Exchange (KLSE). All the data are for the year 2012.

4. Research Finding

The discussion on the findings are divided into two parts; efficiency level of real estate firms and factors determining the efficiency level of real estate firms.

4.1 Efficiency level

Table 1 present the descriptive statistics of the 67 real estate firms in Malaysia. The mean total capital for the sample firms is RM137 million with minimum total capital of RM119 thousand and maximum total capital of RM1,107 million. The difference between the minimum and maximum value is consider very high. For the cost of salary and administrative, the minimum value is RM2.5 thousand, while the maximum value is RM57 million with an average of RM6 million. The average amount of total revenue is RM74 million. This figure shows that the initial market structure of real estate industry in Malaysia is very high and therefore only the efficient firms can be sustained in this industry. It is also consistent s with the high return of investment as indicated by the value of average total revenue.

In term of efficiency level of real estate firms in Malaysia, the efficiency score of each 67 real estate firm is obtained from the estimation using the DEA approach. The empirical results which include TE, PTE and SE scores are presented in Table 1.

Table 1: *Descriptive Statistics for Input and Output of Malaysian Real Estate Firm*

Input-Output	Minimum	Maximum	Mean	Std. Deviation	Skewness
Input (RM)					
Total capital	119,261	1,107,586,437	137,262,105	235,680,532	2.145
Salary and administrative expenses	2,537	57,258,334	6,835,549	12,164,439	2.381
Total costs of sales	6,055	429,386,843	46,462,945	85,927,877	2.513
Total assets	182,433	2,002,188,431	245,755,618	447,828,357	2.265
Output (RM)					
Total revenue	14,583	652,406,076	73,945,641	137,929,813	2.373

Table 2 shows the average efficiency score for TE, PTE and SE of real estate firms in Malaysia based on both input orientation and output orientation. As we discussed earlier, the nature of business for real estate is more on profit oriented and firm will control their input to optimize their revenue as well as their profit. As such, input orientation is more suitable to be used in this case. Related to the nature of business for real estate industry, it is consistent with pure technical efficiency (PTE). As stated earlier, PTE refers to the firm's ability to avoid waste by producing as much output as input usage allows or by utilizing as little input as output production allows. As shown in Table 2, the average efficiency score for PTE based on input orientation is 0.697 which is acceptable. From the total 67 firms, only 23 firms or 34.3% operated at the efficient level. This result implies the market structure of this industry where only few companies control this industry and those companies operated at efficient level.

Table 2: *Efficiency of Malaysia Real Estate Firms in 2012*

Item	TE	PTE	SE
Input orientation	0.324	0.697	0.457
Number of firms (percentage)	5 (7.5%)	23 (34.3%)	5 (7.5%)
Output orientation	0.324	0.544	0.679
Number of firms (percentage)	6 (9%)	22 (32.8%)	6 (9%)

Notes: TE – (Technical efficiency); PTE – (Pure technical efficiency); SE – (Scale efficiency)

Table 3 summarizes the details of score for the real estate firms whether they experienced Increasing Returns to Scale (IRS), Constant Returns to Scale (CRS) or Decreasing Returns to Scale (DRS). IRS means that an increase in inputs is result in a higher outputs increase. CRS means that increase in the input results in a proportionate increase in outputs. On the other hand, DRS indicate that an increase in inputs result in a lesser output increase.

As shown in the Table 3, 91% of real estate firms are successful in increasing their output at a higher rate as they increase their input (IRS). On the other hand, only 7.5% of real estate firms operating under CRS while 1.5% of the real estate firms operating under DRS. Since the result indicate that most of the real estate firms are operating under IRS in their operations, it means that most of the real estate firms can improve their performance by increasing their inputs while a few of them can improve their performances by maintaining or decreasing their inputs.

Table 3: *Summary Results of Returns to Scale*

Returns to scale	Number of firms	Percentage
Increase Returns to Scale (IRS)	61	91
Constant Return to Scale (CRS)	5	7.5
Decrease Returns to Scale (DRS)	1	1.5
Total	67	100.00

Note: IRS, CRS DRS represent increasing returns-to-scale, constant returns-to-scale and decreasing returns-to-scale, respectively.

4.2 Factors affecting efficiency level

Table 4 present the results of the Tobit model regression estimation. Based on the results, there are four variables that found to be significant in determining the real estate firm's scale efficiency (SE); profit, market share, cost as well as foreign share. From the four variables that influence real estate firm's efficiency, all of them have a positive effect on efficiency except for cost which affect negatively. In the case of Technical efficiency (PTE), only cost has a significant effect on real estate firm's efficiency.

From the Tobit regression results, profit has a positive significant impact on real estate firm's scale efficiency at the 10% significant level. The result implies that increase in firm's profit increase also means a higher firm's revenue where they have better market penetration and are better able to exploit economies of scale and scope. Higher profit firm also have greater funds and can employ better managers as stated by Kumar (2003). Therefore, the higher the profit of the firm the greater the efficiency level of real estate firm.

Market share is expected to have a positive impact on the efficiency score. From the Tobit regression result, market share has a positive and significant impact on real estate firm efficiency at the 5% level. This means that a real estate firm with larger market share is associated with a higher efficiency score. This implies that the more control of the market they have, revenue will increase. This situation gives a positive impact for the growth of real

estate firm and thus could cater to more market needs.

Variable foreign share is defined as the shareholding of foreigners in the firm (it is either foreign-owned or locally-owned). This variable is expected to have positive impact on the efficiency score. Based on the Tobit regression results, the variable Market Share has positive and significant impact on real estate firm efficiency at the 5% level. The result indicate that foreign-owned real estate firms are more capable to operate at a higher efficiency level.

The variable cost negatively influences real estate firm efficiency as predicted. The higher the operation cost incurred, the lower the revenue generated, leading to lower efficiency level. From the findings, we can summarize that profit, market share, and foreign share positively influence the efficiency of the real estate firm while cost negatively affects efficiency as predicted.

5. Conclusion

The objective of this study is to empirically estimate the efficiency level of Malaysian real estate firms and examine factors that affect the efficiency. The results indicate that the average efficiency score of real estate firms in Malaysia is 0.70. In addition, most of the firms operate under the increasing return to scale where they still have rooms to increase their performance or efficiency by increasing their input. The findings also indicate that only 23 out of 67 companies operate at the efficient level. We can conclude that only a few firms dominate the real estate industry in Malaysia where they also operate at the efficient level.

The findings have several important implications. First, government should provide an environment where competition exists in the real estate industry. This is to prevent the industry from being dominated by only a few firms. Second, the government should have a clear policy on price determination of real estate properties so that the price and value of real estates will not be easily manipulated by the large companies since this will have negative impact on consumers especially the lower income group. This could be seen in the Malaysian Valuation and Property Services Department report where the nationwide house price index rose by 5.43% and Malaysia's average house price stood at MYR312,050 in the third quarter of 2015, up by 5.41% from 2014. As by property type, the terraced house average prices rose by 5.4% to MYR278,223 during the third quarter of 2015. This sharp increases in house price would certainly affect the ability of low income group in owning a house.

Table 4: *The Tobit Regression Results of Real Estate Efficiency*

Dependent Variable	TE		PTE		SE	
	Coefficient	t value	Coefficient	t value	Coefficient	t value
1. Constant	1.132	4.22	0.784	3.20	0.973	3.79
2. ROA	-0.112	-0.68	-0.144	-0.91	-0.184	-1.11
3. Profit	-0.006	-0.01	0.009	1.61	0.011*	1.86
4. Market Share	-0.019	-0.86	0.018	0.87	0.048**	2.17
5. Cost	-0.030	-1.62	-0.043**	-2.51	-0.049**	-2.71
6. Foreign Share	-0.001	-0.48	0.004	1.44	0.006**	2.06
7. State Own	0.088	0.42	-0.155	-0.80	-0.253	-1.25
8. Establishment	0.002	1.49	0.001	0.82	0.005	0.03
9. Bumiputra Own	-0.055	-0.52	0.046	0.48	0.122	1.21
Log likelihood	-30.75		-19.71		-21.52	
Sigma	0.312	0.035	0.297	.027	0.311	.028

Notes: ** Significant at 5%; * Significant at 10%;

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