

RAPID IDENTIFICATION OF OUTSTANDING REAL ESTATE INVESTMENT TRUSTS WITH OUTLIER DETECTION ALGORITHMS

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ABSTRACT

Finding outstanding stocks is always the primary goal of an investor. This is because outstanding stocks tend to outperform others in investment return. However, uncover this type of stocks from a stock pool requires extensive financial knowledge and consistent efforts in analyzing the abundant amount of financial data. Thus, it is impractical for an amateur investor. The objective of this study is to rapidly identify outstanding stocks from the Real Estate Investment Trust (REIT) sector. We adopted two outlier detection algorithms, i.e. Interquartile Range (IQR) and Local Outlier Factor (LOF) to trace REIT stocks that were deviated from the average performers. Subsequently, the outstanding REIT stocks can be identified from the small amount of outliers. The entire process is speedy and can be done on the fly. The identified outstanding stocks were assessed based on their 1-year average total return as compared with the non-outlier stocks. The preliminary result showed that their average total return is better than its non-outlier peers.

Keywords: *Outlier Stocks, Local Outlier Factor, Interquartile Range, Real Estate Investment Trusts, Financial Ratio*

1. INTRODUCTION

The world population has exceeded 7.2 billion in the year 2015 (www.census.gov). The tremendous rise of the population in many countries, especially in the Asia region has driven the rapid growth of the property development industry. At the moment, property investment is undoubtedly one of the widely accepted investment methods among the investors or even the public nowadays. In general, the objective of investing a property can be classified into three, i.e. self-occupied, rent to tenants and flipping.

Choosing the right property is the key element in property investment, and it always requires a Herculean effort to accomplish this task. For instance, an investor not only needs to evaluate the physical asset, but must also take into the consideration of other factors such as property location [1], types of ownership, neighborhood stability as well as socio-economic factors [2]. Thus, the investor must conduct numerous surveys and researches on the targeted property before making any purchase decision. These are critical since any wrong purchasing decision would result

in a serious financial loss for the investor. Furthermore, the investor has to apply mortgage loan to finance the property purchase. In the worst case scenario, the investor might bankrupt due to the default in mortgage installment during economic downturns.

Property investment may give lucrative return to some professional investors. This is because they can always lower their investment risks by carrying out in-depth analysis on the targeted properties. But for an amateur investor, it is usually difficult to conduct a thorough analysis because lacking of financial knowledge. In this case, REIT in stock markets provides an alternative for the property investors. REIT is not new in the investment world. It has started in the United States more than 50 years ago [3].

Typically, a REIT company owns commercial properties. These properties are managed by a group of appointed trust managers. The source of income for a REIT company is generated from the rental of commercial properties. REIT is deemed as a defensive investment product because it is not only providing steady income to an investor, its



value can also be enhanced by the capital appreciation of its income-producing assets [4]. As compared with the direct property investment, REIT has a lower risk profile since it is managed by professionals and it offers continuous income to an inexperienced investor. Furthermore, the investor does not require a mortgage loan to finance the purchase of a REIT stock. The investor can buy any amount of REIT units in a stock market based on what he can afford.

Data mining techniques have been applied widely in the stock market. They are used to identify interesting patterns that were hidden in a dataset [5]. The identified patterns can provide helpful information to a stock investor in decision making. Classification, clustering, and generalization are some of the data mining techniques that have been applied to forecast the movement of stock prices or stock market indices. Researchers applied classification techniques such as neuro-fuzzy classifier [6], neural network [7] and support vector machine [8] to predict the stock market fluctuation. K-means clustering [9,10], EM (Expectation-Maximization) clustering [11] and fuzzy clustering [12] were some of the clustering methods that have been used for the same purpose. Recent studies [13-15] also involved the adoption of hybrid approaches (combines two or more data mining techniques) to forecast stock markets.

REIT generates incomes via property rentals, and its incomes will be redistributed back to its shareholders. Less volatility and inflation hedge are the two primary factors that contributed to the fast-paced growth of the REIT market in recent years [16]. REIT has been introduced in many countries, thus plenty of REIT stocks are available for investors. Investor prefers to pick the stocks with exceptional financial performance, where these stocks outperform the average performers among their peers. REIT stocks with these characteristics tend to generate higher returns than its peers. Hence, it is always desirable for an investor to include them into his/her investment portfolio. However, finding outstanding stocks among the REIT stocks can be a very tedious and time-consuming task. Hence, this research aims to uncover these outperform REIT stocks rapidly with data mining techniques.

This preliminary study focuses on the REIT stocks of one country, which are the REIT stocks listed on the Singapore Exchange (SGX). Two reasons for choosing the Singapore REIT stocks are: (1) Singapore is the pioneer that launched REIT stocks in the Asia region; (2) Singapore is

also one of the most transparent real estate markets in the Asia region [17]. Outlier detection algorithms are the key research component applied in this study. They will be used to identify any REIT stock that behaves “abnormally” from a pool of REIT stocks. IQR and LOF are the two outlier detection algorithms used in this study. The outliers recognized by both algorithms will be screened manually. The screening is essential because an identified outlier could be a REIT stock with outstanding or poor financial performance.

Once the outstanding REIT stocks are confirmed by the manual screening, they shall be evaluated and compared using total returns in the following year with their non-outliers peers. The total return is calculated based on the dividend received and capital gain in the subsequent year. Two REIT datasets with different financial years, i.e. 2012 and 2013 were used to evaluate the effectiveness of the proposed method. The outliers identified in the first dataset (financial year 2012) are assessed based on their performances (dividend and stock price movement) of the year 2013, and the second dataset will be evaluated according to their performances of the year 2014. The next section describes the methodology used in this research. It is followed by presenting and discussing the experimental results. The last section concludes the paper and highlights its possible future directions.

2. METHODOLOGY

The overview of this research is as shown in Figure 1. It consists of five major steps and begins with data collection. The number of REIT stocks listed on SGX was checked and confirmed via its website (www.sgx.com). The REIT category on the website has 29 listings, but only 25 REIT stocks are displayed in Table 1. The remaining four REIT stocks were excluded from this study because they were listed less than two years. Thus, their data for the two financial years (2012 and 2013) were not available. The financial data of each REIT stock were mainly collected using DataStream provided by Thomson Reuters. Alternative data repositories, i.e. Yahoo Finance, SGX website, and company website were referred when the intended data were unavailable in DataStream. As a result, the data for the latest two financial years, i.e. 2012 and 2013 were collected for each REIT. The 2014 financial year data were unavailable at the time data was collected. This was because some REIT companies had yet release their annual financial reports.

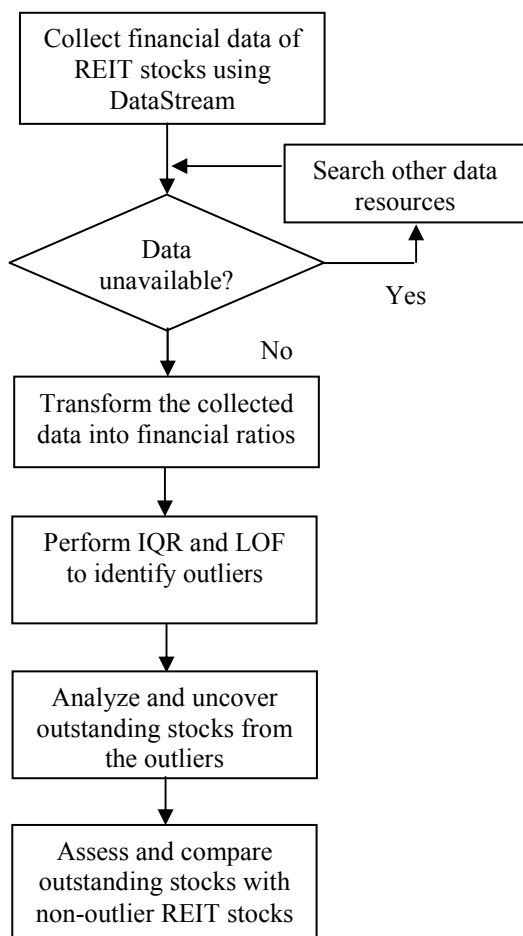


Figure 1: The Diagram Highlights The Key Components Of This Study.

The extracted financial data were unprocessed and only provided minimal information. Therefore, it is inappropriate to be used directly to measure a REIT stock performance. The data needs to be transformed into financial ratios, which are used to measure the financial status of a stock [18, 19]. Table 2 shows the 11 common financial ratios that were used in this study. Financial ratios are effective measures to compare the relative performance of stocks in the same sector regardless of their sizes and capitals. In general, these financial ratios can be grouped into four financial classes, i.e. operating performance, financial leverage, profitability, and market value.

Total asset turnover is attached to the operating performance ratio. It is used to evaluate how much revenue can be generated from a company's assets. A company with a strong operating performance implies that the company management is efficient in utilizing the company's assets to generate incomes. To find out a company's loan amount that is used to acquire assets, an investor can refer to the

financial leverage ratios, i.e. debt ratio and equity turnover. A company with a high financial leverage is more susceptible to financial distress, subsequently leads to a poor financial performance [20].

Table 1: The REITs Listed On The Singapore Exchange.

Stock Code	Stock Name	Stock Code	Stock Name
O5RU	AIMSAMP CAP REIT	D5IU	LIPPO MALLS TR
A17U	ASCENDAS REIT	N2IU	MAPLETREE COM TR
A68U	ASCOTT REIT	RW0U	MAPLETREE GCC TR
K2LU	CASCHE LOG TRUST	ME8U	MAPLETREE IND TR
J91U	CAMBRIDGE IND TR	M44U	MAPLETREE LOG TR
C61U	CAPITACOM TRUST	C2PU	PARKWAYL IFE REIT
C38U	CAPITAMAL L TRUST	M1GU	SABANA REIT
AU8U	CAPITAR CHINA TR	T8JU	SAIZEN REIT
AW9U	FIRST REIT	SV3U	SOILBUILD BIZ REIT
F25U	FORTUNE REIT HKD	SK6U	SPHREIT
ND8U	FRASER COM TR	P40U	STARHILLG BL REIT
J69U	FRASER CPT TR	T82U	SUNTEC REIT
K71U	KEPPEL REIT		

Return on assets, return on equity, net profit margin and operating margin are the profitability ratios. These ratios are the main concern of an investor, because they provide information on the profit generated by the company investments. A company with a high and sustainable profit is always preferable by an investor. The remaining four financial ratios are the market value ratios. Price to earnings ratio, price to book ratio, dividend yield and earning yield describe a company's financial condition in amounts per share. They are used to evaluate whether or not the current market price of a share is undervalued. These 11 financial ratios were the features that formed the REIT datasets. The subsequent step was the detection of outliers in the datasets using IQR and LOF.

An observation is deemed as an outlier if it is deviated too much from other observations [21]. In this research, outliers refer to the REIT stocks that did poorly or exceptionally well in financial

performance. The primary objective of this research is to identify outliers, and then uncover outstanding REIT stocks from the outliers. Two outlier detection algorithms were used to accomplish this task; (1) IQR which is based on a statistical approach, and (2) LOF which is a density-based approach.

Table 2: The Eleven Financial Ratios That Formed The Dimension Of The REIT Stock Datasets.

Financial Ratio	Ratio Class	Formula
Total Asset Turnover	Operating Performance	Sales Revenue ÷ Total Assets
Debt Ratio	Financial Leverage	Total Debt ÷ Total Assets
Equity Turnover		Sales Revenue ÷ Equity
Return on Assets	Profitability	Net Profit ÷ Total Assets
Return on Equity		Net Profit ÷ Total Equity
Net Profit Margin		Net Profit ÷ Sales Revenue
Operating Margin		Profit Before Tax ÷ Sales Revenue
Price Earnings Ratio	Market Value	Price per Share ÷ Earnings per Share
Price to Book Ratio		Price per Share ÷ Book Value per Share
Dividend Yield		Dividend per Share ÷ Price per Share
Earning Yield		Earnings per Share ÷ Price per Share

This study detected outliers with the combination of statistical and density-based approaches. Statistical approach is the earliest algorithm used for outlier detection [22]. IQR was selected because it can handle multivariate datasets. Thus, it is suitable for the datasets in this study as each of them has multiple financial ratios. Furthermore, it is one of the simplest statistical-based outlier detection methods which has been widely applied in many research domains [23,24]. IQR can be described and visualized using the box-plot. Figure 2 shows a box-plot with 5-points: the lower fence, lower quartile (Q1), median, upper quartile (Q3) and upper fence points.

A box-plot represents the dispersion of data in a graphical format. In the box-plot, the lower quartile (Q1), median and the upper quartile (Q3) refer to 25th, 50th, and 75th percentiles, respectively. Interquartile range (IQR) can be computed from the distance of Q3 – Q1. The lower fence is computed

from Q1 - 1.5*IQR, and upper fence is determined by Q3 + 1.5*IQR. Any point situated outside the lower fence or the upper fence is considered an outlier [22,25]. In Figure 2, both *a* and *b* are the outliers in the data.

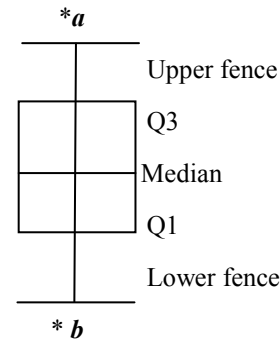


Figure 2: A 5-Points Box-Plot. Both (*a* & *b*) Are The Outliers.

Local outlier factor (LOF) is the second outlier detection algorithm used in this study. It was selected because of its capability to find outliers in a multidimensional dataset [26]. Unlike IQR, LOF applies a score-based approach. It assigns each object in the dataset with a LOF value that indicates the degree of outlier-ness of the object. As compared with IQR, it only labels an object with the outlier or non-outlier tag. In the LOF algorithm, an object with a LOF score of 1.8 is more likely to be identified as an outlier as compared with another object with a LOF score of 1.05. Non-outliers objects always have LOF scores approximately to 1.0.

LOF scores can be computed with the following five steps: (1) calculate all the Euclidean distances between any two objects in the data, (2) measures the *k*-distance for each object *obj*. The *k*-distance is small when an object is in a high density region, (3) finding the *k*-distance neighborhood for each object *obj*, it refers to objects with distance less than the *k*-distance, (4) calculate the local reachability distance (*lrd*) of object *obj*, by using the ratio of the number of *k*-nearest neighbors to the reachability distance (*rd*) between *obj* and the *k*-nearest neighbors, (5) compute the LOF score for each object *obj*, by averaging the *lrd* of object *obj* and those of its *k*-nearest neighbors.

$$lrd(obj) = \frac{\|N_k(obj)\|}{\sum_{obj' \in N_k(obj)} rd(obj' \leftarrow obj)} \quad (1)$$

Equation (1) shows the formula to calculate the



local reachability distance (*lrd*) of object *obj* in step (4) of the LOF method. In this equation, $N_k(obj)$ denotes the *k*-nearest neighbors to object *obj*, and the reachability distance of *obj* to its *k*-nearest neighbors is represented by $rd(obj' \leftarrow obj)$. The formula to compute the final LOF score for each object *obj* is displayed at equation (2). The formula shows that the LOF score will be higher when the local reachability density of object *obj* is lower and the local reachability densities of its *k*-nearest neighbors are higher. It means that an object is possibly a local outlier when its local density is relatively low compared to its *k*-nearest neighbors.

$$LOF(obj) = \frac{\sum_{obj' \in N_k(obj)} lrd(obj') / lrd(obj)}{\|N_k(obj)\|} \quad (2)$$

3. RESULT AND DISCUSSION

In this study, two REIT datasets with different financial years, i.e. 2012 and 2013 were tested using IQR and LOF algorithms. The REIT dataset year 2012 has only 22 REIT stocks (instead of 25), because the three REIT stocks, i.e. MAPLETREE GCC TR, SOILBUILDBIZ REIT and SPHREIT only listed on SGX in the year 2013. Thus, their financial data for the year 2012 are unavailable. Table 3 displays the outlier detection result for the REIT dataset year 2012. In this dataset, IQR has identified four outliers and they are ASCOTT REIT, FORTUNE REI HKD, KEPPEL REIT and SAIZEN REIT. In order to compare with IQR, the REIT stocks with the highest four LOF scores were selected in the LOF method. They were, namely, FORTUNE REIT HKD (LOF = 2.414), KEPPEL REIT (LOF = 1.514), SAIZEN REIT (LOF = 1.231) and SUNTEC REIT (LOF = 1.199). In this study, we intended to combine statistical-based and density-based approaches to identify outliers. Therefore, only outliers that were identified by both IQR and LOF were recognized as outliers. The result shows that only three REIT stocks identified by both methods. They were: (1) FORTUNE REIT HKD, (2) KEPPEL REIT and (3) SAIZEN REIT. ASCOTT REIT and SUNTEC REIT were excluded from the list because they only appeared in either one of the results.

The next step involved the screening of these outliers manually. The process scrutinized their financial performances thoroughly. The screening is essential because not all outliers are the REIT stocks with exceptional financial performances. An

outlier might also refer to a REIT stock with extremely poor financial performance in the contrary case. The screening started with examining their financial ratios thoroughly. All three outliers were making profit for the financial year 2012. Thus, none of them is a REIT stock with poor financial performance. The performances of these three REIT stocks are discussed as follows.

Table 3: The results of LOF And IQR For The 22 Singapore's REIT Stocks (Financial Year 2012).

No.	Stock Name	LOF score	IQR Outlier
1	AIMSAMP CAP REIT	1.005	
2	ASCENDAS REIT	1.041	
3	ASCOTT REIT	1.116	Yes
4	CASCHE LOG TRUST	1.010	
5	CAMBRIDGE IND TR	1.012	
6	CAPITACOM TRUST	1.021	
7	CAPITAMALL TRUST	1.005	
8	CAPITAR CHINA TR	1.011	
9	FIRST REIT	1.006	
10	FORTUNE REIT HKD	2.414	Yes
11	FRASER COM TR	1.037	
12	FRASER CPT TR	1.001	
13	KEPPEL REIT	1.514	Yes
14	LIPPO MALLS TR	0.999	
15	MAPLETREE COM TR	1.060	
16	MAPLETREE IND TR	1.019	
17	MAPLETREE LOG TR	1.020	
18	PARKWAYLIFE REIT	1.005	
19	SABANA REIT	1.011	
20	SAIZEN REIT	1.231	Yes
21	STARHILLGBL REIT	1.025	
22	SUNTEC REIT	1.199	

FORTUNE REIT HKD shows a relatively high value in its net profit margin, operating margin, price-earnings ratio and price to book ratio, and relatively low in dividend yield and earnings yield as compared with its peers (Table 4). These financial characteristics strongly suggested that the stock was well-performed because of its high net profit margin and operating margin. Thus, investors were willing to pay a higher price for the stock. Consequently, its dividend yield and earnings yield were relatively low. Nevertheless, the stock was deemed as an outstanding REIT stock even though it is not undervalued.

For KEPPEL REIT, its net profit margin and operating margin were relatively high as compared with the others. These implied that the managements were efficient in attracting tenants and cost control. Furthermore, its price-earnings



ratio, price to book ratio were slightly lower than the other REIT stocks (Table 4). These suggested that the stock was undervalued. As a result, KEPPEL REIT was included into the outstanding REIT stock list. SAIZEN REIT showed relatively low value in its price to book ratio, but its dividend yield was considered high compared to its peers (Table 4). These indicated that SAIZEN REIT was still considered attractive and undervalued. The in-depth screening on the three outliers had identified all of them as the outstanding REIT stocks.

Table 4: The Three Outstanding Stocks (Year 2012) Financial Ratios vs. The Means Of Financial Ratios.

Financial Ratio	Mean	FORTUNE REIT HKD	KEPPEL REIT	SAIZEN REIT
Total Asset Turnover	0.069	0.054	0.026	0.084
Debt Ratio	0.330	0.231	0.394	0.314
Equity Turnover	0.115	0.076	0.045	0.130
Return on Assets	0.067	0.110	0.047	0.030
Return on Equity	0.110	0.152	0.083	0.047
Net Profit Margin	1.018	2.010	1.82	0.360
Operating Margin	1.080	2.110	1.920	0.399
Price Earnings Ratio	11.04	30.05	10.24	10.67
Price to Book Ratio	1.242	4.589	0.987	0.529
Dividend Yield	0.051	0.008	0.056	0.078
Earning Yield	0.102	0.033	0.098	0.094

To assess the effectiveness of identifying outstanding REIT stocks using the outlier detection methods, their total returns (capital gain + dividend received) for the year 2013 were calculated. The capital gain was computed from the 1-year stock price movement (January till December 2013). Table 5 displays the total return for the three REIT stocks. Assumed the same amount of fund was used to purchase each of these REIT stocks in January 2013, the average total return at the end of the year 2013 was about 6.1%. This average total return was higher than investing in the non-outlier REIT stocks, where the average total return for the latter

was -1.2% (Table 6).

Table 5: Identification Of Outstanding Singapore's REIT Stocks Of The Year 2012 Via Manual Screening. Their Total Returns In The Year 2013 Were Compiled And Analyzed.

Stock Name	Capital Gain	Dividend Yield	Total Return (2013)
FORTUNE REIT HKD	- 2.0%	0.9%	-1.1%
KEPPEL REIT	-8.8%	4.5%	-4.3%
SAIZEN REIT	15.6%	8.0%	23.6%
Average Total Return			6.1%

Table 6: The Total Returns Of The 19 Non-Outlier REIT Stocks In Year 2013.

Stock Name	Capital Gain	Dividend Yield	Total Return (2013)
AIMSAMP CAP REIT	-4.0%	5.3%	1.3%
ASCENDAS REIT	-7.2%	6.0%	-1.2%
ASCOTT REIT	-8.0%	2.7%	-5.3%
CASCHE LOG TRUST	-10.0%	6.9%	-3.1%
CAMBRIDGE IND TR	1.5%	5.3%	6.8%
CAPITACOM TRUST	-14.2%	4.0%	-10.2%
CAPITAMALL TRUST	-10.6%	4.0%	-6.6%
CAPITAR CHINA TR	-18.9%	2.7%	-16.2%
FIRST REIT	0.0%	5.2%	5.2%
FRASER COM TR	-3.8%	5.2%	1.4%
FRASER CPT TR	-12.0%	5.2%	-6.8%
LIPPO MALLS TR	-15.3%	4.5%	-10.8%
MAPLETREE COM TR	-2.5%	6.1%	3.6%
MAPLETREE IND TR	-1.8%	5.7%	3.9%
MAPLETREE LOG TR	-8.3%	5.4%	-2.9%
PARKWAYLIFE REIT	9.3%	3.8%	13.1%
SABANA REIT	-5.2%	8.2%	3.0%
STARHILLGLB REIT	-0.6%	6.2%	5.6%
SUNTEC REIT	-8.3%	4.3%	-4.0%
Average Total Return			-1.2%

The second REIT dataset (financial year 2013) was also evaluated using both outlier detection algorithms. Table 7 displays the LOF scores as well

as the IQR outlier labels for the dataset. This dataset has 25 REIT stocks (three REIT stocks listed on SGX in year 2013). IQR has identified seven outliers from this dataset and they were, namely, FORTUNE REIT HKD, FRASER CPT TR, KEPPEL REIT, PARKWAYLIFE REIT, SABANA REIT, SOILBUILDBIZ REIT and SUNTEC REIT. On the other hand, the top seven stocks identified by LOF were FORTUNE REIT HKD, KEPPEL REIT, SOILBUILDBIZ REIT, SUNTEC REIT, FRASER CPT TR, FIRST REIT and SAIZEN REIT. In this dataset, both IQR and LOF had identified the five common outliers. They were: FORTUNE REIT HKD, FRASER CPT TR, KEPPEL REIT, SOILBUILDBIZ REIT and SUNTEC REIT.

Table 7: The results of LOF And IQR For The Singapore's REIT Stocks (Financial Year 2013).

No.	Stock Name	LOF score	IQR Outlier
1	AIMSAMP CAP REIT	1.002	
2	ASCENDAS REIT	1.006	
3	ASCOTT REIT	0.995	
4	CASCHE LOG TRUST	1.000	
5	CAMBRIDGE IND TR	1.007	
6	CAPITACOM TRUST	1.025	
7	CAPITAMALL TRUST	1.009	
8	CAPITAR CHINA TR	1.002	
9	FIRST REIT	1.064	
10	FORTUNE REIT HKD	2.052	Yes
11	FRASER COM TR	1.032	
12	FRASER CPT TR	1.270	Yes
13	KEPPEL REIT	1.556	Yes
14	LIPPO MALLS TR	1.001	
15	MAPLETREE COM TR	1.010	
16	MAPLETREE GCC TR	1.048	
17	MAPLETREE IND TR	1.009	
18	MAPLETREE LOG TR	1.027	
19	PARKWAYLIFE REIT	1.016	Yes
20	SABANA REIT	0.998	Yes
21	SAIZEN REIT	1.047	
22	SOILBUILDBIZ REIT	1.358	Yes
23	SPHREIT	1.003	
24	STARHILLGBL REIT	1.029	
25	SUNTEC REIT	1.346	Yes

The screening of financial data showed that these outliers were profit making companies. Hence, all

of them were possible to be identified as outstanding REIT stocks. FORTUNE REIT HKD has similar financial characteristics with its previous financial year (2012), they included: (1) high net profit margin and operating margin, (2) high price-earnings ratio and price to book ratio, (3) low dividend yield and earnings yield (Table 8). As such, this stock was shortlisted into the outstanding REIT stock list.

FRASER CPT TR, KEPPEL REIT and SOILBUILDBIZ REIT also demonstrated strong net profit margin and operating margin. In addition, their price earnings ratios were relatively low as compared with their non-outlier peers (Table 8). With these "healthy" financial characteristics, they were made part of the outstanding REIT stocks. Investigation on SUNTEC REIT also found out that its price to book ratio was among the lowest of all REIT stocks (Table 8). Based on the financial characteristics highlighted above, these four outliers were considered appealing to investors as their stock prices were cheaper than the other REIT stocks. The outcome of the screening showed that these five REIT stocks are the outstanding REIT stocks.

The total returns of these outstanding REIT stocks were evaluated based on the capital gain and the dividend received in the year 2014. Table 9 displays the summary of returns for the five REIT stocks in the year 2014. The total returns for these stocks ranged from 8.1% to 31.3%. The average total return of these REIT stocks was 17.5%, and it was better than the average total return (12.0%, refer to Table 10) achieved by the non-outlier REIT stocks. Both results shown in Table 3 and Table 7 have strongly indicated that the REIT stocks with outstanding financial performances can be identified via the outlier detection algorithms. These algorithms are capable to identify outliers from a pool of REIT stocks instantly, thus it is very easy and convenient to be used by an investor with little or minimal financial knowledge.

To confirm outstanding stocks from the outliers, even though an investor still needs to spend additional time to analyze the financial characteristics of each outlier, but it still saves a substantial amount of time as compared to the conventional method. This is because the investor only needs to analyze several outliers, which is

Table 8: The Five Outstanding Stocks (Year 2013) Financial Ratios vs. The Means Of Financial Ratios.

Financial Ratio	Mean	FORTUNE REIT HKD	FRASER CPT TR	KEPPEL REIT	SOILBUILD BIZ REIT	SUNTEC REIT
Total Asset Turnover	0.068	0.043	0.074	0.026	0.072	0.028
Debt Ratio	0.333	0.324	0.276	0.396	0.362	0.380
Equity Turnover	0.109	0.068	0.108	0.045	0.118	0.048
Return on Assets	0.070	0.119	0.131	0.070	0.051	0.025
Return on Equity	0.113	0.189	0.192	0.121	0.084	0.043
Net Profit Margin	1.146	2.768	1.776	2.704	0.708	0.899
Operating Margin	1.191	2.869	1.776	2.801	0.708	0.880
Price Earnings Ratio	9.522	18.68	5.043	6.015	11.25	9.565
Price to Book Ratio	1.085	3.728	0.992	0.848	0.986	0.722
Dividend Yield	0.051	0.009	0.060	0.049	0.087	0.047
Earning Yield	0.118	0.054	0.198	0.166	0.089	0.105

significantly faster than investigating all stocks in a stock pool. In terms of the average total return (1-year basis), evidence from Table 5 and Table 9 have supported that the outstanding REIT stocks were indeed performed better than the non-outlier REIT stocks. In brief, this identification method provides meaningful and practical knowledge to an investor in the REIT stock investment in a rapid manner.

4. CONCLUSION

This research had successfully proposed an investment tool that rapidly identifies outstanding REIT stocks using two outlier detection algorithms, i.e. IQR and LOF. The outstanding stocks identified from the outliers were then assessed and evaluated based on their 1-year total returns. The evaluation results showed that their average total return was better than the non-outlier REIT stocks. Future research directions may include: (1) expanding the dataset by covering REIT stocks from Indonesia,

Malaysia and Thailand, (2) applying other outlier detection algorithms for comparative analysis.

Table 9: Identification Of Outstanding Financial Performance (Year 2013) Of Singapore's REIT Stocks Via Manual Screening. Their Total Returns In Year 2014 Were Compiled And Analyzed.

Stock Name	Capital Gain	Dividend Yield	Total Return (2014)
FORTUNE REIT HKD	24.4%	1.1%	25.5%
FRASER CPT TR	7.7%	5.3%	13.0%
KEPPEL REIT	3.0%	5.1%	8.1%
SOILBUILD BIZ REIT	2.6%	6.8%	9.4%
SUNTEC REIT	27.3%	4.0%	31.3%
Average Total Return			17.5%

Table 10: The Total Returns Of The 20 Non-Outlier REIT Stocks In Year 2014.

Stock Name	Capital Gain	Dividend Yield	Total Return (2014)
AIMSAMP CAP REIT	2.5%	6.9%	9.4%
ASCENDAS REIT	8.2%	5.5%	13.7%
ASCOTT REIT	5.4%	4.2%	9.6%
CASCHE LOG TRUST	4.0%	6.4%	10.4%
CAMBRIDGE IND TR	-1.5%	6.3%	4.8%
CAPITACOM TRUST	21.4%	4.8%	26.2%
CAPITAMALL TRUST	7.1%	4.7%	11.8%
CAPITAR CHINA TR	21.8%	3.6%	25.5%
FIRST REIT	17.9%	5.7%	23.6%
FRASER COM TR	11.8%	6.0%	17.8%
LIPPO MALLS TR	-18.1%	5.6%	-12.5%
MAPLETREE COM TR	18.5%	6.7%	25.2%
MAPLETREE GCC TR	13.1%	7.4%	20.5%
MAPLETREE IND TR	11.6%	6.7%	18.3%
MAPLETREE LOG TR	12.8%	5.7%	18.5%
PARKWAYLIFE REIT	1.3%	3.7%	5.0%
SABANA REIT	-13.0%	6.8%	-6.2%
SAIZEN REIT	-7.0%	6.8%	-0.2%
SPH REIT	6.1%	3.8%	9.9%
STARHILLGLB REIT	1.9%	6.4%	8.3%
Average Total Return			12.0%

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