

COMPARISON OF THE PERFORMANCE AND  
RISK DIVERSIFICATION BENEFITS OF  
GOVERNMENT LINKED COMPANIES (GLCs) IN  
MALAYSIA AND SINGAPORE

BY

BRIAN LIM ZEE YI

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Student ID:

Signature:

1. Brian Lim Zee Yi

17UKB05585

\_\_\_\_\_

Date: \_\_\_\_\_

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## DEDICATION

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TABLE OF CONTENTS

	Page
Copyright.....	ii
Declaration.....	iii
Acknowledgement.....	iv
Dedication.....	v
Table of Contents.....	vi
List of Tables.....	ix
List of Figures.....	x
List of Abbreviations.....	xi
Preface.....	xii
Abstract.....	xiii
<b>CHAPTER 1 RESEARCH OVERVIEW</b>	
1.0 Introduction.....	1
1.1 Research Background.....	1
1.2 Problem Statement.....	3
1.3 Research Objectives.....	3
1.4 Research Questions.....	4
1.5 Research Significance.....	5
1.6 Chapter Layout.....	5
1.7 Conclusion.....	7
<b>CHAPTER 2 LITERATURE REVIEW</b>	

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2.0	Introduction.....	8
2.1	Overview.....	8
2.2	Measuring GLCs Performance and Risk Diversification Benefits.....	10
2.3	Malaysian Context- GLCs Performance and Risks.....	12
2.4	Singapore Context- GLCs Performance and Risks.....	13
2.5	Hypotheses Development.....	14
2.6	Conclusion.....	17
 CHAPTER 3 METHODOLOGY		
3.0	Introduction.....	19
3.1	Research Design.....	19
3.2	Data Collection Methods.....	20
3.2.1	Secondary Data Collection.....	20
3.2.2	Calculating GLCs' Risk Features.....	22
3.2.3	...Calculating GLCs' Performance.....	25
3.3	Methods of Analysis.....	28
3.4	Conclusion.....	28
 CHAPTER 4 DATA ANALYSIS		
4.0	Introduction.....	29
4.1	Empirical Findings.....	29
4.1.1	Analysis of Risk Features.....	33
4.1.2	Analysis of Performance Measures.....	34
4.2	Conclusion.....	38

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CHAPTER 5 DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0	Introduction.....	41
5.1	Discussion of Major Findings.....	41
5.2	Implications of Study.....	45
5.3	Limitations of Study.....	46
5.4	Recommendations for Future Research.....	47
5.5	Conclusion.....	48
	References.....	49



LIST OF TABLES

	Page
Table 4.1: Risk Features of M-GLCs.....	30
Table 4.2: Risk Features of S-GLCs.....	31
Table 4.3: Sharpe, Treynor and Jensen's Alpha Ratio of M-GLCs'.....	34
Table 4.4: Sharpe, Treynor and Jensen's Alpha Ratio of S-GLCs'.....	36
Table 4.5: Comparison of Risk Features between M-GLCs and S-GLCs.....	38
Table 4.6: Comparison of Performance between M-GLCs and S-GLCs .....	39
Table 5.1: Major Findings on Hypotheses Testing.....	44

LIST OF MATHEMATICAL FORMULAS

	Page
Formula 3.1: GLCs' Weekly Returns.....	21
Formula 3.2: National Market Indices' Weekly Returns.....	21
Formula 3.3: GLCs' Standard Deviation.....	22
Formula 3.4: GLCs' Total Risk.....	22
Formula 3.5: Diversifiability Measure (Method 1).....	23
Formula 3.6: Diversifiability Measure (Method 2) .....	24
Formula 3.7: GLCs' R-Squared Value.....	24
Formula 3.8: GLCs' Sharpe Ratio.....	26
Formula 3.9: GLCs' Treynor Ratio.....	27
Formula 3.10: GLCs' Jensens's Alpha.....	27

LIST OF ABBREVIATIONS

GLC	Government Linked Companies
M-GLC	Malaysia Government Linked Companies
S-GLC	Singapore Government Linked Companies
SR	Sharpe Ratio
TR	Treynor Ratio
$\alpha_i$	Jensen's Alpha
Rd	Diversifiability Measure
$\beta$	Beta (Market Risk)

## PREFACE

GLCs are becoming an increasingly popular investment choice around the world. The interest in this topic arises from the discovery that there has been limited research and studies done to investigate the nature of performance and risk diversification benefits of both M-GLCs and S-GLCs. There has also been little to no research and studies done that directly compare GLCs in different countries against each other.

Based on actual historical data from trusted and credible sources, this research aims to develop on literature by examining the investment performance and risk diversification benefits of GLCs in Malaysia and Singapore as the stark differences between the two countries such as their populations, their geographic environment and their economic capabilities provide an interesting contrast that is worth studying.

Finally, by developing a further understand of the significance of GLCs to the equity market, this study can provide valuable knowledge, data and insight to potential investors and other stakeholders, in addition to providing a stepping-off point for this current research. This study will also be the first of many to empirically and directly compare GLCs in different countries against each other using common measurement standards.

## ABSTRACT

This study examines and compares the investment performance and risk diversification benefits of Government Linked Companies (GLCs) in Malaysia (M-GLCs) and Singapore (S-GLCs) by using the tried and tested performance measures, namely the Sharpe Ratio, Treynor Ratio and Jensen's Alpha to assess their investment performance and the Diversifiability Measure (proportion of unsystematic risk to total risk OR one-minus R-squared) to assess risk diversification benefits. The study period for both M-GLCs and S-GLCs extends from 2009 to 2018 to provide a direct and straightforward 10-year comparison. The results show that M-GLCs perform better than S-GLCs in terms of Sharpe ratio and Treynor ratio, but slightly worse in terms of Jensen's Alpha. The total risk of S-GLCs is higher than M-GLCs, while the Beta values for both M-GLCs and S-GLCs are less than one, implying that GLCs in both countries are less risky when compared against their respective national market indexes. M-GLCs have lower R-Squared values than J-GLCs, which suggests that M-GLCs are not as diversified than S-GLCs and therefore, M-GLCs have more opportunities for diversification. The Diversifiability Measure calculated for M-GLCs are higher than S-GLCs and suggests that M-GLCs have better risk diversification benefits. This study aims to expand on research into GLCs as well as help investors to make more informed investment decisions when considering the addition of M-GLCs and S-GLCs into their portfolios. Best and worst performers among the M-GLCs and S-GLCs are also determined in this study. This study will provide investors with greater knowledge and insight into the actual real-world investment performance and risk diversification benefits of including M-GLCs and/or S-GLCs into their portfolios.

*Keywords: GLCs, Performance, Risk Diversification, Singapore, Malaysia*

## **CHAPTER 1: RESEARCH OVERVIEW**

### **1.0 Introduction**

This research focuses on the performance index and risk diversification benefits of Government Linked Companies (GLCs) in both Malaysia and Singapore. This research studies the GLCs' performance of both Malaysia and Singapore by studying their weekly share price from the year 2009 to year 2018, a total of 10 years of studies. By gathering secondary data like weekly share prices, financial analytics tools like beta measure, R-squared, Jensen's Alpha, Treynor Ratio, and Sharpe Ratio will be calculated and be used as a measuring tool of this research. By the end of this research, there will be a clear distinguished difference between the two countries. In this chapter, the research will include the research background, research problem, research objective and research significance.

### **1.1 Research Background**

In Malaysia, Government Linked Companies (GLCs) are defined as companies that have a primarily commercial objective despite the Malaysian government holding a direct controlling stake (Ting & Lean, 2011). GLCs have been established in other countries as well and are basically companies where their home government holds a direct controlling stake.

Furthermore, GLCs exist in most industries including plantation, trading, finance, manufacturing, transportation, shipbuilding, and services and are known to be a popular investment choice around the world. Based on studies of past literature, there is a general consensus that GLCs tend to underperform against non-GLCs in terms of financial and market performance (Najid & Rahman, 2011). However, many critics contend that GLCs could perform better than private firms because of their close relationship with the government, which gives them special advantages when it comes to assessing funds and having growth opportunities (Ting & Lean, 2011).

In Malaysia, the Malaysian government introduced state enterprises, which were later called government-linked companies (GLCs) as one of its post-independence industrialisation plans (Ting & Lean, 2011). Ever since then, the Malaysian government has made an effort to transform GLCs into high performing organizations. In Singapore, the purpose behind government's involvement was to accelerate their economic development by initiating industrialization in the early 1960s. GLCs account for about 24% of the stock market's total capitalization of US\$287 billion and control over a tenth of the country's economic output in Singapore (Ang & Ding, 2006).

In the past, there has been limited research done to develop a further understanding of the significance of GLCs to the equity market as a whole. This research attempts to provide valuable knowledge, data and insight to potential investors and other stakeholders regarding the performance and risk diversification benefits of GLCs. While few researches has been done to cover GLCs' performance and risk diversification benefits, even fewer have empirically and directly compared GLCs in different countries against each other using common measurement standards.

## **1.2 Problem Statement**

The interest in this topic arises from the discovery that there has been limited research and studies done to investigate the nature of performance and risk diversification benefits of both M-GLCs and S-GLCs. There has also been little to no research and studies done that directly compare GLCs in different countries against each other. By developing a further understand of the significance of GLCs to the equity market, this study can provide valuable knowledge, data and insight to potential investors and other stakeholders, in addition to providing a stepping-off point for this current research. This study will also be the first of many to empirically and directly compare GLCs in different countries against each other using common measurement standards.

In sum, a comparison between GLCs in Singapore, one of the largest economies in the Asia; and GLCs in Malaysia, a relatively new and emerging economy, provides an interesting contrast that is worth studying in depth.

## **1.3 Research Objectives**

The first general research objective of this study is to examine and compare the investment performance of M-GLCs and S-GLCs by assessing their risk-adjusted returns using the tried and true methods of investment performance measurement: the Treynor Ratio, the Sharpe Ratio and Jensen's Alpha.



The second general research objective of this study is to examine and compare the risk diversification benefits of M-GLCs and S-GLCs by assessing their “diversifiability” using the Diversifiability Measure.

Thus, the specific objectives of this study are:

1. To compare and contrast the investment performance of the selected M-GLCs and S-GLCs using the Sharpe Ratio.
2. To understand and compare the investment performance of the selected M-GLCs and S-GLCs using the Treynor Ratio.
3. To determine and compare the investment performance of the selected M-GLCs and S-GLCs using Jensen’s Alpha.
4. To determine and compare the Beta value for each of the selected M-GLCs and S-GLCs.
5. To investigate and compare the risk diversification benefits of the selected M-GLCs and S-GLCs using the Diversifiability Measure.

## **1.4 Research Questions**

Based on the Research Objectives, the following research questions were developed:

1. Do M-GLCs have a higher Sharpe Ratio compared to S-GLCs?

2. Will M-GLCs have a higher Treynor Ratio compared to S-GLCs?
3. Is the Jensen's Alpha for M-GLCs higher than the Jensen's Alpha for S-GLCs?
4. Do M-GLCs have lower Beta (market risk) compared to S-GLCs?
5. Will M-GLCs have higher risk diversification benefits compared to S-GLCs?

## **1.5 Research Significance**

Since this study investigates and assesses the historical performance and risk diversification benefits of M-GLCs and S-GLCs, it will provide potential investors with greater knowledge and insight into the performance and risk diversification benefits of M-GLCs and S-GLCs in their portfolios, in addition to providing a clear-cut and direct comparison of GLCs in both countries. Furthermore, this research intends to develop and expand on literature by assessing the actual benefits and significance of GLCs in general, as well as those of M-GLCs and S-GLCs in particular.

## **1.6 Chapter Layout**

Chapter 1 provides a brief and general introduction of the topic under study: GLCs and their place in the broader equity market. In addition, the problem statement is

presented here, from which derived the research questions, research objectives, hypotheses of study as well as research significance. Furthermore, a chapter layout is provided here, that aims to clearly define the subjects under discussion in each chapter.

Chapter 2 includes the reviews of literature. This chapter aims to examine past studies of M-GLCs' and S-GLCs' performance and risk diversification benefits in their respective global, regional and national contexts based on findings from academic publications such as books and journal articles. Moreover, this chapter includes the development of hypotheses and justification of those hypotheses by past literature.

Chapter 3 shows the methodology of the research. The sampling data consists of 30 M-GLCs and 30 S-GLCs from the period 2009 to 2018 for both countries. The same 10-year range was used to ensure the most consistent comparison between both countries. This chapter shows the methods of secondary data collection, as well as the mathematical formulas applied to obtain the necessary data. Finally, this chapter also discusses the manner in which the gathered data is processed and analysed.

Chapter 4 discusses the results of this analysis of the weekly share price data that has been collected from Bloomberg regarding M-GLCs and S-GLCs. The data has been calculated with given formulas and results are classified into two major categories, risk diversification benefits (risk features) and performance (Sharpe, Treynor and Jensen's Alpha Ratio).

Finally, Chapter 5 will discuss major findings of this research. In addition to that, we will discuss the implication of study and the limitations of it. Moreover, appendices and reference will be attached at the end of this chapter, providing insights and a better grasp regarding on the sources of information.

## **1.7 Conclusion**

In summary, the interest in this topic arises from the discovery that there has been limited research and studies done to investigate the nature of performance and risk diversification benefits of both M-GLCs and S-GLCs. Furthermore, we decided that comparing Singapore GLCs against Malaysian GLCs would provide an interesting contrast given the myriad of differences between the two countries. Thus, this study aims to develop and expand on literature by directly and empirically comparing M-GLCs and S-GLCs against each other using common performance standards, namely the Jensen's Alpha, Sharpe Ratio and Treynor Ratio to assess investment performance and the Diversifiability Measure to assess risk diversification benefits.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.0 Introduction**

This chapter includes the reviews of literature. This chapter aims to examine past studies of M-GLCs' and S-GLCs' performance and risk diversification benefits in their respective global, regional and national contexts based on findings from academic publications such as books and journal articles. Moreover, this chapter includes the development of hypotheses and justification of those hypotheses by past literature, followed by a chapter summary at the end of chapter.

### **2.1 Overview**

Numerous studies on GLCs compare GLC performance with those of non-GLCs which have led to various conclusions. Based on previous studies, there is a general consensus that GLCs tend to underperform against non-GLCs in terms of financial and market performance. In a study by Najid & Rahman (2011) which examined 47 GLCs and 47 non-GLCs listed on Bursa Malaysia over a 6-year period of 2001-2006, it was found that there is a significant difference in market performance and financial performance between GLCs and non-GLCs where most GLCs' corporate performance is lower than non-GLCs.

This is further supported by Razak, Ahmad & Joher (2011), which compared the financial and market performance of 210 firms consisting of both GLCs and non-GLCs over a 11-year period from 1995 to 2005. They found that non-GLCs perform better than GLCs after examining corporate governance and factors which influence company performance such as leverage, growth and risk.

However, some studies have contradicted this rule including a study comparing Singaporean GLCs and non-GLCs over an 11-year-period from 1990 to 2000 by Ang & Ding (2006). The study found that Singaporean GLCs provide superior returns on both assets and equity and are valued more highly, through their better management of expenses than non-GLCs.

According to a study conducted in China, where GLCs are more commonly known as state-owned enterprises, Zhou, Guo, Hua, & Doukas (2015) discovered that state owned enterprise acquirers outperform private owned enterprise acquirers in terms of long-run stock performance and operating performance primarily because of their higher operating cash flow over sales, lower debt ratio, and greater cash reserves. Within the context of China, studies have also found that state ownership has a U-shaped relationship with firm performance (Yu, 2013).

Despite that, in another study conducted by Bhatt (2016), it was found that there was no significant difference in performance level between GLCs and private owned companies in Malaysia. Another study by Pai & Hiremath (2013) which studied the performance of 45 companies from three different group of firms namely, foreign subsidiaries, domestic private, and public sector companies concluded that all three group firms showed similar performance.

## **2.2 Measuring GLCs' Performance and Risk Diversification Benefits**

A commonly used method for measuring performance of companies is the Sharpe Ratio. According to Ng, Leong, Lau, & Abdul Rahim (2018), the Sharpe Ratio is a reliable investment performance measure that computes the return generated by a portfolio in excess of the risk-free rate of return for every unit of standard deviation. The three main components in calculating the Sharpe Ratio include the standard deviation, average return of the portfolio, and the risk-free rate of return (Sharpe, 1966). In conclusion, the Sharpe Ratio is a way to measure portfolio performance on a risk-adjusted basis (Grable & Chatterjee, 2014). The higher the Sharpe Ratio, the higher the risk-adjusted return of the portfolio. In other words, a greater number of Sharpe Ratio indicates better performance because greater total risk (standard deviation) is rewarded with greater excess return (Shahid, 2007). An in-depth explanation on the Sharpe Ratio will be further expanded on in the Hypothesis Development section below, while its formula and method of use will be shown in Chapter 3 of this study.

Besides the Sharpe Ratio, another tried and tested method of company performance measurement is the Treynor Ratio. Like the Sharpe Ratio, it is used to accurately determine the additional profits earned as more risk is taken on. However, unlike the Sharpe ratio, the Treynor Ratio utilizes market risk to measure volatility instead of total risk (Treynor, 1965). A high and positive Treynor Ratio indicates superior risk adjusted performance of a company whereas a low and negative value shows an unfavourable risk adjusted performance of a company. An in-depth explanation on the Treynor Ratio will be further expanded on in the Hypothesis Development section below, while its formula and method of use will be shown in Chapter 3 of this study.

There is also a method of performance measure known as Jensen's Alpha. This performance measure is based on the Capital Asset Pricing Model (CAPM). Jensen's Alpha is used to calculate how much return is generated in excess of the theoretical return predicted by the CAPM (Jensen, 1968). An in-depth explanation on Jensen's Alpha will be further expanded on in the Hypothesis Development section below, while its formula and method of use will be shown in Chapter 3 of this study.

Like the Sharpe and Treynor ratios, Jensen's Alpha is also a widely used and commonly known method of measuring portfolio performance and has been applied to studies on the performance of Real Estate Investment Trusts (REIT) in the past. For example, studies by Ng, Leong, Lau, & Abdul Rahim (2018), Hamzah & Rozali (2010), as well as Low & Johari (2014) have used the Jensen's Alpha as a measure of REIT performance, alongside the Sharpe Ratio and Treynor Ratio.

Distinct from its performance, the risk diversification benefits of a portfolio are an additional metric of determining the attractiveness of the portfolio to investors. Levy and Sarnat (1984) first proposed that the desirability of diversification can be expressed as the ratio of unsystematic risk to total risk. According to a study by Kim, Gu, & Mattila (2002), a portfolio's risk diversification benefits can be determined by measuring its "diversifiability" which is essentially the ratio of unsystematic risk to total risk. Thus, this Diversifiability Measure serves as an indication of a portfolio's risk diversification benefits, as it shows the proportion of risk that can be eliminated by diversification, therefore showing the potential benefits of including it into an investment portfolio. This method of empirically determining a portfolio's risk diversification benefits has been applied in studies of REITs in past literature, such as those by Low & Johari (2014) and Ng, Leong, Lau, & Abdul Rahim (2018). An in-depth explanation on the Diversifiability Measure will be further expanded on in the Hypothesis Development section below, while its formula and method of use will be shown in Chapter 3 of this study.



In order to determine the Diversifiability Measure of a portfolio, its systematic risk component must first be determined. A portfolio's Beta value is a measure of its systematic risk and must therefore be calculated to determine its total risk, which in turn is required to find its Diversifiability Measure. An in-depth explanation on the Beta value will be further expanded on in the Hypothesis Development section below, while its formula and method of use will be shown in Chapter 3 of this study.

### **2.3 Previous Studies: Malaysian Context**

A study by Isa & Lee (2016) analysed the performance of thirteen Malaysian GLCs from 2008 to 2013 by employing performance measures methods such as ROA, ROE and Tobin's Q ratio. The study concluded that the performance of Malaysian GLCs is significantly lower than that of non-GLCs which was the result of inefficiencies in the management of the GLCs. This is further reinforced in a study by Razak, Ahmad & Joher (2011), which compared the financial and market performance of 210 firms over a 11-year period from 1995 to 2005 using Tobin's Q and ROA. The study found that non-GLCs perform better than GLCs after examining corporate governance and factors which influence company performance such as leverage, growth and risk. The results of both studies are generally consistent with the market consensus that GLCs tend to underperform against non-GLCs in terms of financial and market performance.

Furthermore, a study by Low & Johari (2014) studied the performance and risk diversification in the context of Malaysian Real Estate Investment Trusts throughout the 2007-2012 period by utilizing Jensen's Alpha, Treynor Ratio, and the Sharpe Ratio as performance measures. In addition, they utilized an alternative approach to performance evaluation known as the M-squared measure, built upon Markowitz's (1952) portfolio theory, which focused on the idea of manipulating

leverage to accomplish the best fund performance for any risk level. The results from the study which was conducted in the context of Real Estate Investment Trusts (REITS), indicated that the total risk of Malaysian REITs came mostly from the unsystematic risk component, which indicates significant opportunities to diversify.

In another study that investigated the risk diversification impact of Malaysian Real Estate Investment Trusts on portfolio diversification, Jalil, Ali, Razali, & Yim (2015) analysed expected return, standard deviation, and the efficient frontier of 13 M-REITs, with the results showing that the addition of M-REITs to an investment portfolio can have significant risk diversification benefits.

Furthermore, a study by Hamzah & Rozali (2010), also in the context of real estate investment trusts in Malaysia, utilized the three standard performance measurement methods (Sharpe Ratio, Treynor Ratio and Jensen Alpha) found that the risk-adjusted performance of M-REITs varied throughout the time period under study, and that the systematic risk of M-REITs in general were considerably higher than the market during economic crisis compared to the period immediately after the crisis, during which time the systematic risks became significantly lower.

## **2.4 Previous Studies: Singapore Context**

Government-linked companies have a significant presence in Singapore's corporate sector. A study by Ramirez & Tan (2004) found that GLCs in Singapore are no more or less liquidity-constrained in their investment decisions than their private sector counterparts. The study concludes that GLCs are competing on a level playing field as far as access to financing is concerned. Another study by Ang & Ding (2006) which compared the financial and market performance of GLCs with

non-GLCs found that Singaporean GLCs provide superior returns on both assets and equity and are valued more highly, through their better management of expenses than non-GLCs. The results of the study remained the same even when the study control for firm specific characteristics such as profitability, leverage, firm size, and foreign ownership. The result of this study is inconsistent with Najid & Rahman's (2011) results which concluded that GLCs tend to underperform against non-GLCs in terms of financial and market performance.

A study on the significance, risk-adjusted performance and portfolio diversification benefits of Singapore Real Estate Investment Trusts was done by Newell, Pham, & Ooi (2015). The study assessed the risk-adjusted performance and portfolio diversification benefits of S-REITs from 2003 to 2013. It uses monthly total returns, with efficient frontiers and asset allocation diagrams to assess the role of S-REITs in a mixed-asset portfolio. The results of the study indicated that S-REITs delivered strong risk-adjusted returns, being the best-performed asset class, but with little portfolio diversification benefit over 2003 to 2013.

Another study was done by Wong, Tong, & Keow (2012) in the context of Singapore Real Estate Investment Trusts to examine the potential diversification and performance enhancement that S-REITs as an asset class. The research found out that there are significant differences in terms of financial performances when compared against other major asset classes. These differences allowed the S-REIT asset class to play a crucial role in achieving diversification and performance improvement benefits for the multi-asset investment portfolios.

## **2.5 Hypothesis Development**

**Hypothesis 1: M-GLCs' SR > S-GLCs' SR (M-GLCs' have higher Sharpe Ratio in comparison to S-GLCs)**

The Sharpe Ratio is a measure of each individual GLC's performance, adjusted for risk. The ratio is essentially the return earned in excess of the risk-free rate per unit of total risk (Sharpe, 1966). It is used to accurately determine the additional profits earned as more risk is taken on. Generally, the higher of the Sharpe Ratio, the more attractive the return is, adjusted for the level of risk taken. The Sharpe Ratio is a tried and true performance measure for GLCs and has been used as such in many past studies on REITs, such as in research by Ng, Leong, Lau, & Abdul Rahim (2018), Hamzah & Rozali (2010), as well as Low & Johari (2014). Ng, Leong, Lau & Abdul Rahim (2018) also hypothesized that Malaysian companies have a higher Sharpe Ratio compared to other countries like Singapore and Japan.

**Hypothesis 2: M-GLCs' TR > S-GLCs' TR (M-GLCs have higher Treynor Ratio in comparison to S-GLCs)**

The Treynor Ratio is a performance metric for determining how much more return was earned for each unit of risk taken on by a portfolio (Treynor, 1965). Like the Sharpe Ratio, it is used to accurately determine the additional profits earned as more risk is taken on. However, unlike the Sharpe ratio, the Treynor Ratio utilizes market risk ( $\beta$ ) to measure volatility instead of total risk (standard deviation). Generally, the higher of the Treynor ratio, the more attractive the return is, adjusted for the level of risk taken. The Treynor ratio is a tried and true performance measure for GLCs and has been used as such in many past studies on REITs, such as in research by Ng, Leong, Lau, & Abdul Rahim (2018), Hamzah & Rozali (2010), as well as Low & Johari (2014). Moreover, prior studies showed that Malaysian companies have a higher Treynor Ratio compared to other countries (Ng, Leong, Lau & Abdul Rahim, 2018).

**Hypothesis 3: M-GLCs'  $\alpha_i$  > S-GLCs'  $\alpha_i$  (M-GLCs have higher Jensen's Alpha in comparison to S-GLCs)**

Jensen's Alpha is calculated to determine the abnormal return on each GLC over the expected or required return as determined by the capital asset pricing model (CAPM), given the GLCs' beta and the average market return (Jensen, 1968). In sum, the CAPM is used to determine the expected return for each GLC, while Jensen's Alpha is used to calculate how much return is generated in excess of the theoretical return predicted by the CAPM (Fama & French, 2004). Jensen's Alpha is a tried and true performance measure for GLCs and has been used as such in many past studies on REITs. Kim, Gu, & Mattila (2002), Ng, Leong, Lau, & Abdul Rahim (2018), Hamzah & Rozali (2010), as well as Low & Johari (2014) have shown that Malaysian companies have a higher Jensen's Alpha.

**Hypothesis 4: M-GLCs'  $\beta < \text{S-GLCs' } \beta$  (M-GLCs' have smaller Beta [market risk] in comparison to S-GLCs)**

In order to measure the systematic risk of each individual M-GLC and S-GLC, the  $\beta$  value must be calculated. This allows us to measure the volatility of each GLC in comparison to the market risk, as  $\beta$  is a measure of the tendency of the GLCs' return to change in relation to the market. A positive  $\beta$  indicates a positive correlation with the market, while a negative Beta indicates a negative correlation with the market. Past studies that have utilized  $\beta$  as a measure of systematic risk includes Ng, Leong, Lau, & Abdul Rahim (2018), as well as Low & Johari (2014). Moreover, prior studies showed that companies based in Malaysia have a lower beta compared to companies from countries (Ng, Leong, Lau & Abdul Rahim, 2018).

**Hypothesis 5: M-GLCs'  $R_d > \text{S-GLCs' } R_d$  (M-GLCs have greater risk diversification benefits in comparison to S-GLCs)**

The GLCs' risk diversification benefits are an additional metric of determining their attractiveness to investors. The ratio of unsystematic risk to total risk can serve as a measure of risk "diversifiability" (Kim, Gu, & Mattila, 2002). It can be calculated by the following formula: *1-R-squared*. The further the ratio is from 0, the more unsystematic risk remains in the portfolio to be diversified away. However, if a

portfolio's diversifiability measure has a ratio that is close to 0, it has little unsystematic risk remaining and is not diversifiable. Thus, the R Squared of each individual GLC is used to calculate the risk diversifying measure that serves as an indication of risk diversification benefits, as was done in the past by Low & Johari (2014) and Ng, Leong, Lau, & Abdul Rahim (2018). In addition to that, prior research done by Low & Johari (2014) hypothesized that Malaysian companies have better risk diversification benefits compared to other countries.

## **2.6 Conclusion**

While there is a general consensus among previous studies that GLCs tend to underperform against non-GLCs in terms of financial and market performance, there has been limited research and studies done to investigate the nature and performance and risk diversification benefits of both M-GLCs and S-GLCs.

Furthermore, the status of Malaysia as an emerging economy makes for an interesting contrast with Singapore, a major developed economy, hence the actual difference in the performances and risk diversification benefits of M-GLCs and S-GLCs could be very informative to potential investors. Besides that, this literature review has also identified the best methods to empirically measure the investment performance and risk diversification benefits of the GLCs under study, namely the Sharpe Ratio, Treynor Ratio and Jensen's Alpha to assess their performance and the Diversifiability Measure to assess their risk diversification benefits. The reasons for selecting the above methods of assessment are their prevalent and ubiquitous use as assessment tools in past studies on REITs.

Thus, based on the review of past studies, the present study seeks to:

1. evaluate and compare the investment performance of both M-GLCs and S-GLCs by employing the tried and true performance measurement methods justified by numerous past studies, namely: Jensen's Alpha (Jensen, 1968), Sharpe Ratio (Sharpe, 1966) and Treynor Ratio (Treynor, 1965), as well as
2. assess the risk diversification benefits of both M-GLCs and S-GLCs by employing the Diversifiability Measure used by Kim, Gu, & Mattila (2002) and Low & Johari (2014).

## **CHAPTER 3: METHODOLOGY**

### **3.0 Introduction**

This chapter shows the methods of secondary data collection, as well as the mathematical formulas applied to obtain the necessary data. Finally, this chapter also discusses the manner in which the gathered data is processed and analysed. The sampling data consists of 30 M-GLCs and 30 S-GLCs from the period 2009 to 2018 for both countries. The same 10-year range was used to ensure the most consistent comparison amongst both countries. The matrix that is used to compare both GLCs was stated above and will be further explained below.

### **3.1 Research Design**

The research design used in this study was **exploratory**. According to Neuman (1997), exploratory research is conducted to learn more about a relatively unknown subject, enabling future researchers to get to know new information relating to it and determine if further research is necessary.

Based on the review of the existing literature, the chosen research design is justified because there has been limited studies and research conducted on the performance of GLCs in individual countries. There has also been fewer studies have been done on the comparison between GLCs in different countries. Thus, this research uses



exploratory research design in this study as it involves the direct comparison of the investment performance of M-GLCs and S-GLCs, a subject that is relatively unknown and can serve as a starting point for future research on the subject, as well as provide new information that may be useful to potential investors.

Furthermore, this study also seeks to explore the relatively unknown subject of the risk diversification benefits of GLCs, by using a relatively new measure, namely the Diversifiability Measure, in order to empirically determine the “diversifiability” of M-GLCs and S-GLCs. This was done in order to measure and compare the GLCs’ risk diversification benefits as well as to expand on past studies utilizing the Diversifiability Measure by applying it in this study to show its viability as a measure of risk diversification benefits for future studies.

## **3.2 Data Collection Methods**

To answer the described research questions and hypotheses, this study utilizes secondary data from verified and credible sources as well as the application of well-justified and tested mathematical formulas to obtain the required data.

### **3.2.1 Secondary Data Collection**

The weekly stock prices of all the 30 M-GLCs and 30 S-GLCs listed from the year 2009 to year 2018 were collected from the Bloomberg terminal from Universiti Tunku Abdul Rahman library. Bloomberg is a financial software that provides all financial related data regarding companies around the world

and is the primary method of data collection. The weekly share prices of M-GLCs' and S-GLCs' were used to compared against the indexes from Kuala Lumpur Composite Index and Straits Times Index which are collected from the Bloomberg terminal as well. The risk-free rate of return for Malaysia and Singapore were collected from Bank Negara Malaysia and the Monetary Authority of Singapore respectively.

The weekly returns of the 30 M-GLCs and 30 S-GLCs were calculated using the following formulas:

**Formula 3.1: GLCs' Weekly Returns**

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100 \quad (1)$$

where,

$R_t$  = GLC's stock price for week t

$P_t$  = GLC's closing share price on the chosen day of week t

$P_{t-1}$  = GLC's closing share price on the chosen day of the week prior to week t

The weekly returns for Kuala Lumpur Composite Index and Straits Times Index were calculated with the following formula:

**Formula 3.2: National Market Indices' Weekly Returns**

$$R_{index} = \frac{I_t - I_{t-1}}{I_{t-1}} \times 100 \quad (2)$$

where,

$R_{index}$  = Index for week t

$I_t$  = Closing index value on chosen day of week t

$I_{t-1}$  = Closing index value on chosen day of the week prior to week t

### 3.2.2 Calculating GLCs' Risk Features

The standard deviation of each GLC was calculated before being used to determine the volatility of each GLC against the respective index, namely the Kuala Lumpur Composite Index for M-GLCs and the Straits Times Index for S-GLCs. The GLCs' standard deviation is a statistical measure of the volatility of their individual sample weekly return. Risk averse investors may prefer an investment portfolio with lower standard deviation compared to the market benchmark as it implies lower volatility, and therefore lower risk or uncertainty within the portfolio.

#### Formula 3.3: GLCs' Standard Deviation

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \mu)^2}{n-1}} \quad (3)$$

where,

$X_i$  = GLCs' Weekly Return

$\mu$  = Mean return of GLCs for the year (%)

n = sample period (years)

Besides that, the total risk (comprising of market risk and unsystematic risk) of each of the 30 M-GLCs and 30 S-GLCs were calculated and compared with the following formula:

#### Formula 3.4: GLCs' Total Risk

$$\sigma_i^2 = \beta_i^2 \cdot \sigma_m^2 + \sigma_e^2 \quad (4)$$

where,

$\sigma_i^2$  = GLCs' Total Risk

$\beta_i^2$  = GLCs' Beta Squared

$\sigma_m^2$  = Market Portfolio's Variance of Return

$\beta_i^2 \cdot \sigma_m^2$  = GLCs' Systematic Risk

$\sigma_e^2$  = GLCs' Unsystematic Risk

Diversification is “the process of allocating capital in order to reduce the exposure to risk” (Ng, Leong, Lau, & Abdul Rahim, 2018). In other words, diversification can be used by investors to reduce overall portfolio risk by mixing a wide variety of investments within a portfolio.

This Diversifiability Measure can be determined in one of two ways. The first way is by simply determining the percentage of unsystematic risk over the total risk. The closer the ratio is to 0, the more insignificant the unsystematic risk component of the GLC. Conversely, the closer the ratio is to 1, the more significant the unsystematic risk component of the GLC.

The first method of calculating the Diversifiability Measure is shown below:

**Formula 3.5: Diversifiability Measure (Method 1)**

$$\text{Diversifiability Measure} = \frac{\sigma_e^2}{\sigma_i^2} \quad (5)$$

where,

$\sigma_e^2$  = GLCs' Unsystematic Risk

$\sigma_i^2$  = GLCs' Total Risk

The other way is by first calculating the R-squared value for each GLC before applying it in the following formula: one minus R-squared ( $1 - R^2$ ). The further the result is from 0 and thus, the nearer it is to 1, the more unsystematic risk remains in the portfolio to be diversified away. However, if a portfolio's diversifiability measure has a ratio that is nearer to 0, it has little unsystematic risk remaining and is not diversifiable.

The second method of calculating the Diversifiability Measure is shown below:

**Formula 3.6: Diversifiability Measure (Method 2)**

$$\text{Diversifiability Measure} = 1 - R^2 \quad (6)$$

where,

$R^2 = R$ -squared

The formula for computing the R-squared value of the GLCs is as below:

**Formula 3.7: GLCs' R-Squared Value**

$$R^2 = \frac{\beta_i^2 \cdot \sigma_m^2}{\sigma_i^2} \quad (7)$$

where,

$R^2 = R$ -squared

$\beta_i^2 = \text{GLCs' Beta-squared}$

$\sigma_m^2 = \text{Market Portfolio's Variance of Return}$

$\beta_i^2 \cdot \sigma_m^2 = \text{GLCs' Systematic Risk Component}$

$\sigma_i^2 = \text{Total Risk}$

In addition to being used to calculate each GLC's Diversifiability Measure, the R-squared of each GLC is also used to determine the market movement of each GLC that can be explained by the movement of the corresponding national market index. In sum, the relationship between the systematic risk and the total risk can be shown by the R-squared value, as it explains how much of the overall risk is made up of systematic risk.

The greater the R-squared value, the higher the likelihood that the GLC moves in the same direction as the market index, indicating that most of the risk within the GLC is caused by the systematic risk. Conversely, if the GLC has a low R-squared value, it shows that the GLC does not move together with the market index, indicating that the GLC does not behave much like the market index.

### **3.2.3 Calculating GLCs' Performance (Treynor Ratio, Sharpe Ratio, Jensen's Alpha, and M-Squared Measure)**

The Treynor Ratio, Sharpe Ratio, and Jensen's Alpha of each GLC are calculated in order to assess:

1. the GLCs' performance against the projected risk, and
2. the possible abnormal return generated by each GLC in excess of the market index.

The Sharpe Ratio computes the return generated in excess of the risk-free rate of return for every unit of standard deviation in each GLC. The three main

components in calculating the Sharpe Ratio are: standard deviation, average return of the portfolio, and the risk-free rate of return. The standard deviation indicates the degree of variation of the returns of each GLC throughout the sampling period.

The formula for calculating the Sharpe Ratio is shown below:

**Formula 3.8: GLCs' Sharpe Ratio**

$$SR = \frac{r_i - r_f}{\sigma_i} \quad (8)$$

where,

SR = Sharpe Ratio

$r_i$  = GLCs' Average Return

$r_f$  = Risk-Free Rate of Return

$\sigma_i$  = GLCs' Standard Deviation

The greater the value of Sharpe Ratio, the more attractive the GLC's return is compared to the risk-free rate of return. A positive Sharpe Ratio value indicates returns generated in excess of the risk-free rate of return, while a negative Sharpe Ratio value indicates that the REIT generates a lower return compared to the risk-free rate of return.

The Treynor Ratio is a performance metric for determining how much more return was earned for each unit of risk taken on by a portfolio (Treynor, 1965). Like the Sharpe Ratio, it is used to determine the additional profits earned as more risk is taken on. However, unlike the Sharpe ratio, the Treynor utilizes  $\beta$  (market risk) to measure volatility instead of total risk (standard deviation).

The formula for calculating the Treynor Ratio is shown below:

**Formula 3.9: GLCs' Treynor Ratio**

$$TR = \frac{r_i - r_f}{\beta_i} \quad (9)$$

where,

TR = Treynor Ratio

$r_i$  = GLCs' Average Return

$r_f$  = Risk-Free Rate of Return

$\beta_i$  = GLCs' Beta

Generally, the higher of the Treynor ratio, the more attractive the return is, adjusted for the level of risk taken. The higher the Treynor Ratio is, the greater the GLC's excess returns gained against the portfolio benchmark.

Jensen's Alpha is a tool used to evaluate and determine the abnormal return on each GLC over the expected or required return as determined by the capital asset pricing model (CAPM), given the GLCs' beta and the average market return (Jensen, 1968). In sum, it utilizes the CAPM to gauge the rate of return based on market volatility by measuring the beta of each GLC and comparing it against the market beta (Fama & French, 2004).

The formula for calculating Jensen's Alpha is shown below:

**Formula 3.10: GLCs' Jensens's Alpha**

$$\alpha_i = R_i - [R_f + \beta_i(R_m - R_f)] \quad (10)$$

where,



$\alpha_i$  = GLCs' Jensen's Alpha

$R_i$  = GLCs' Return

$R_f$  = Risk-Free Rate of Return

$\beta_i$  = GLCs' Beta

$R_m$  = Portfolio Market Return

### **3.3 Methods of Analysis**

Once all the necessary data was collected, the figures were compiled and tabulated as follows: Risk Features of M-GLCs (Table 4.1), Risk Features of S-GLCs (Table 4.2), Performance of M-GLCs (Table 4.3) and Performance of S-GLCs (Table 4.4). Furthermore, average figures for the following metrics were calculated and compared between M-GLCs and S-GLCs: standard deviation, Beta, R-squared, and the Diversifiability Measure to assess their investment performance, and Treynor Ratio, Sharpe Ratio, Jensen's Alpha to assess their risk diversification benefits.

### **3.4 Conclusion**

In summary, this research was done by collecting secondary data such as GLCs' share prices and returns from trusted and verified sources such as Bloomberg. The raw data was then applied to tried and tested measurement tools in the form of mathematical formulas to empirically determine M-GLCs' and S-GLCs' investment performance and risk diversification benefits. The results were then tabulated and analysed.

## **CHAPTER 4: DATA ANALYSIS**

### **4.0 Introduction**

This chapter will be analysing all the weekly share price data that has been collected from Bloomberg regarding M-GLCs and S-GLCs. The data has been calculated with given formulas and results are classified into two major categories, risk diversification benefits (risk features) and performance (Sharpe, Treynor and Jensen's Alpha Ratio).

### **4.1 Empirical Findings**

Using the data that this research has gathered, an analysis of the selected M-GLCs and S-GLCs is done based on their risk features to assess their potential risk diversification benefits and Sharpe Ratio, Jensen's Alpha and Treynor Ratio to assess their investment performance.

### 4.1.1 Descriptive Statistics

**Table 4.1: Risk Features of M-GLCs**

<b>No</b>	<b>Malaysia GLCs</b>	<b>Beta (<math>\beta</math>)</b>	<b>R-Square</b>	<b>Total Risk</b>	<b>Systematic Risk</b>	<b>Unsystematic Risk</b>	<b>Diversifiability Measure</b>
1	Maybank Berhad	1.16369	0.47966	5.42024	2.59987	2.82036	0.52034
2	AMMB Holdings	1.18093	0.37746	7.09337	2.67749	4.41588	0.62254
3	Axiata Group Berhad	1.38953	0.36159	10.25177	3.70697	6.54480	0.63841
4	BAT (M) Berhad	0.73251	0.08336	12.35811	1.03017	11.32793	0.91664
5	CIMB Group Holdings Berhad	1.51341	0.46585	9.43945	4.39740	5.04205	0.53415
6	Digi.com Berhad	0.74504	0.20614	5.16994	1.06572	4.10422	0.79386
7	Genting Berhad	1.49377	0.39916	10.73258	4.28400	6.44858	0.60084
8	Genting Malaysia Berhad	1.32237	0.30323	11.07172	3.35729	7.71443	0.69677
9	Hap Seng Consolidated Berhad	0.66844	0.08305	10.32913	0.85783	9.47130	0.91695
10	Hong Leong Bank Berhad	0.76365	0.21961	5.09830	1.11963	3.97868	0.78039
11	Hong Leong Financial Berhad	1.11468	0.32717	7.29135	2.38551	4.90584	0.67283
12	IJM Corporation Berhad	1.21796	0.25539	11.15168	2.84802	8.30366	0.74461
13	IOI Berhad	1.05270	0.36788	5.78343	2.12759	3.65584	0.63212
14	MISC Berhad	0.86218	0.13987	10.20377	1.42717	8.77660	0.86013
15	Kuala Lumpur Kepong Berhad	0.80239	0.22101	5.59303	1.23611	4.35692	0.77899
16	Petronas Dagangan Berhad	0.67431	0.12846	6.79583	0.87297	5.92286	0.87154
17	Petronas Gas Berhad	0.68065	0.19502	4.56089	0.88947	3.67142	0.80498
18	PBB Group Berhad	0.86620	0.23696	6.07920	1.44050	4.63870	0.76304
19	Public Bank Berhad	0.72490	0.36338	2.77634	1.00888	1.76746	0.63662
20	Sime Darby Berhad	1.04082	0.25464	8.16767	2.07983	6.08784	0.74536
21	Telekom Malaysia Berhad	0.76133	0.12277	9.06449	1.11284	7.95165	0.87723
22	Tenaga Nasional Berhad	0.92659	0.27765	5.93690	1.64837	4.28852	0.72235
23	UMW Holdings Berhad	0.83241	0.14367	9.25922	1.33031	7.92891	0.85633

Comparison of The Performance and Risk Diversification Benefits of GLCs

In Malaysia and Singapore

24	YTL Corporation Berhad	0.76962	0.11795	9.64130	1.13719	8.50411	0.88205
25	Nestle Berhad	0.23463	0.02864	3.69039	0.10569	3.58470	0.97136
26	Dialog Group Berhad	1.27362	0.25692	12.12149	3.11429	9.00720	0.74308
27	Malaysia Airport Holdings	0.97225	0.15071	12.04174	1.81482	10.22692	0.84929
28	Top Glove Corporation Berhad	0.33508	0.01412	15.26793	0.21556	15.05236	0.98588
29	Fraser & Neave Holdings Berhad	0.38293	0.05014	5.61466	0.28152	5.33314	0.94986
30	QL Resources Berhad	0.61478	0.10403	6.97544	0.72565	6.24979	0.89597
	<b>Average</b>	<b>0.90378</b>	<b>0.22452</b>	<b>8.16605</b>	<b>1.76329</b>	<b>6.40276</b>	<b>0.77548</b>

Source: Developed for the Research

**Table 4.2: Risk Features of S-GLCs**

<b>No</b>	<b>Singapore GLCs</b>	<b>Beta (<math>\beta</math>)</b>	<b>R-Square</b>	<b>Total Risk</b>	<b>Systematic Risk</b>	<b>Unsystematic Risk</b>	<b>Diversifiability Measure</b>
1	Ascendas Real Estate Investment Trust	0.71082	0.23185	9.53110	2.20980	7.32130	0.76815
2	CapitaLand Limited	1.33064	0.56176	13.78499	7.74387	6.04112	0.43824
3	CapitaLand Commercial Trust	1.05454	0.36116	13.46697	4.86369	8.60328	0.63884
4	CapitaLand Mall Trust	0.78301	0.30134	8.89841	2.68148	6.21693	0.69866
5	City Developments Limited	1.37063	0.52754	15.57479	8.21640	7.35839	0.47246
6	ComfortDelGro Corporation Limited	0.50499	0.15834	7.04366	1.11531	5.92835	0.84166
7	DBS Group Holdings Ltd	1.20166	0.69556	9.07962	6.31544	2.76418	0.30444
8	Genting Singapore Limited	1.12081	0.31829	17.26146	5.49413	11.76733	0.68171
9	Golden Agri-Resources Ltd	1.17566	0.26724	22.62046	6.04513	16.57533	0.73276
10	Hongkong Land Holdings Limited	0.95665	0.34112	11.73394	4.00264	7.73130	0.65888
11	Jardine Cycle & Carriage Limited	1.10301	0.33162	16.04574	5.32103	10.72471	0.66838
12	Jardine Matheson Holdings Limited	0.72215	0.21336	10.69042	2.28086	8.40956	0.78664
13	Jardine Strategic Holdings Limited	0.80369	0.26043	10.84766	2.82501	8.02266	0.73957
14	Keppel Corporation Limited	1.29264	0.55298	13.21552	7.30790	5.90762	0.44702
15	Oversea-Chinese Banking Corporation Limited	1.12069	0.73943	7.42872	5.49300	1.93572	0.26057

16	SATS Ltd.	0.53991	0.12881	9.89771	1.27490	8.62281	0.87119
17	Sembcorp Industries Ltd	1.20967	0.52034	12.29938	6.39990	5.89948	0.47966
18	Singapore Airlines Limited	0.73879	0.36388	6.56024	2.38714	4.17310	0.63612
19	Singapore Exchange Limited	1.07838	0.61283	8.29938	5.08607	3.21331	0.38717
20	Singapore Press Holdings Limited	0.52767	0.25595	4.75772	1.21774	3.53998	0.74405
21	Singapore Technologies Engineering Ltd	0.62048	0.25338	6.64534	1.68379	4.96155	0.74662
22	Singapore Telecommunications Limited	0.68466	0.35849	5.71887	2.05016	3.66870	0.64151
23	StarHub Ltd	0.37036	0.10461	5.73461	0.59992	5.13469	0.89539
24	Thai Beverage Public Company Limited	0.43753	0.06563	12.75731	0.83724	11.92007	0.93437
25	United Overseas Bank Limited	1.18257	0.68339	8.95011	6.11640	2.83371	0.31661
26	UOL Group Limited	1.17296	0.52035	11.56402	6.01731	5.54670	0.47965
27	Wilmar International Limited	0.79325	0.26603	10.34497	2.75204	7.59293	0.73397
28	Yangzijiang Shipbuilding (Holdings) Ltd	1.29723	0.35287	20.85747	7.35992	13.49755	0.64713
29	Olam International Limited	1.10524	0.31860	16.76908	5.34257	11.42651	0.68140
30	Mapletree Logistics Trust	0.61573	0.23344	7.10297	1.65813	5.44484	0.76656
	<b>Average</b>	<b>0.92087</b>	<b>0.36335</b>	<b>11.18275</b>	<b>4.08996</b>	<b>7.09279</b>	<b>0.63665</b>

Source: Developed for the Research

According to our findings, 30 M-GLCs' overall average weekly returns are calculated at approximately 0.2194% and the average return of all M-GLCs actually performed much better than the Kuala Lumpur Composite Index, which stands at 0.1318%. On the other hand, for the 30 S-GLCs, the overall weekly returns stand at 0.1666%, which also generated excess return against the Straits Times Index at 0.1197%. Comparing both M-GLCs' and S-GLCs' overall average weekly returns, M-GLCs with 0.2194% actually performed slightly better than S-GLCs' 0.1666%, generating slightly more return. In addition to that, S-GLCs gathered a lesser overall rate of return as compared to M-GLCs because a S-GLC, Singapore Press Holdings Limited, generated negative overall weekly returns and it vastly underperformed against the Straits Times Index of 0.1197%. Moreover, there were also several other S-GLCs that underperformed against the Straits Time Index. As a result, this

has impacted the average rate of return of GLCs in Singapore, whereas on the other hand, all of the M-GLCs have greater than zero weekly returns and perform better against the Kuala Lumpur Composite Index, which boosted the overall average weekly returns of M-GLCs.

Furthermore, S-GLCs have a higher standard deviation of approximately 3.2827% as compared to M-GLCs' 2.8084%. In other words, S-GLCs have achieved a significantly higher average return volatility in which it exceeded the Straits Times Index's average return volatility of approximately 2.0913%. M-GLCs have also achieved a significantly higher average return volatility in which it exceeded the Kuala Lumpur Composite Index's average return volatility of approximately 1.3856%. The total risk is calculated using the squared of the average return volatility. For S-GLCs, it is calculated at approximately 11.18275% and it is significantly higher than M-GLCs which is calculated at a value of approximately 8.16605%. Thus, it can be concluded from the total risk value from both GLCs that both markets take a significantly different total risk. M-GLCs risk is lower as compared to S-GLCs. Moreover, S-GLCs have a higher systematic risk value of approximately 4.08996% whereas M-GLCs have a lower systematic risk value of approximately 1.76329%. The systematic risk value of M-GLCs also fluctuates less compared to S-GLCs. This shows that there is a larger undiversifiable risk that exist in S-GLCs.

#### **4.1.2 Analysis of Risk Features**

S-GLCs have yielded an average beta of 0.92087, which is greater than M-GLCs' beta value of 0.90378. This explains the higher systematic risk of S-GLCs compared to M-GLCs, which in other words shows that it is more

volatile against the market movement. Among all 30 S-GLCs, there are 15 different companies with beta value higher than 1 compared to M-GLCs' 11. The higher the beta value, the more the portfolio contributes towards the average systematic risk of the entire market. From M-GLCs' perspective, the results have shown lower volatility of each M-GLC which indicates a lower degree of systematic risk. In conclusion, M-GLCs has a relatively lower systematic risk and total risk when compared to S-GLCs and it can be speculated that M-GLCs can prove to be a more defensive investment portfolio as it carries lower risk and is less susceptible to market movement changes whereas S-GLCs is a more aggressive investment portfolio with slightly greater risk and a higher degree of volatility against the market movement.

On the other hand, in terms of their R-square value, M-GLCs have an average R-square value of 0.22452 which is lower than S-GLCs' 0.36335. This indicates that there is a higher likelihood that S-GLCs move in the same direction as the market index. Besides that, the diversifiability measure of M-GLCs and S-GLCs are valued at 0.77548 and 0.63665 respectively. For M-GLCs, the diversification value is higher than S-GLCs' and nearer to 1, which means that M-GLCs have higher diversification value and has greater opportunities for diversification as there is more unsystematic risk remaining in the portfolio to be diversified away.

### 4.1.3 Analysis of Performance Measures

**Table 4.3: Sharpe, Treynor, and Jensen's Alpha Ratio of M-GLCs'**

No	GLCs	Sharpe Ratio	Treynor Ratio	Jensen's Alpha
1	Maybank Berhad	0.18527	0.05884	0.00478
2	AMMB Holdings	0.09771	0.03498	0.00503

Comparison of The Performance and Risk Diversification Benefits of GLCs

In Malaysia and Singapore

3	Axiata Group Berhad	0.05951	0.02177	0.01078
4	BAT (M) Berhad	-0.08289	-0.06315	-0.00844
5	CIMB Group Holdings Berhad	0.11651	0.03755	0.01443
6	Digi.com Berhad	0.21298	0.10318	-0.00663
7	Genting Berhad	0.15088	0.05253	0.01362
8	Genting Malaysia Berhad	0.00185	0.00074	0.00859
9	Hap Seng Consolidated Berhad	2.67625	2.04267	-0.00463
10	Hong Leong Bank Berhad	0.80717	0.37886	-0.00474
11	Hong Leong Financial Berhad	0.76745	0.29512	0.00515
12	IJM Corporation Berhad	0.03887	0.01692	0.00602
13	IOI Berhad	0.03896	0.01413	0.00113
14	MISC Berhad	-0.09606	-0.05649	-0.00503
15	Kuala Lumpur Kepong Berhad	0.32647	0.15275	-0.00464
16	Petronas Dagangan Berhad	0.53343	0.32737	-0.00745
17	Petronas Gas Berhad	0.17990	0.08961	-0.00858
18	PBB Group Berhad	0.24034	0.10860	-0.00311
19	Public Bank Berhad	0.62543	0.22821	-0.00660
20	Sime Darby Berhad	0.13159	0.05736	0.00144
21	Telekom Malaysia Berhad	-0.08937	-0.05611	-0.00767
22	Tenaga Nasional Berhad	0.35315	0.14742	-0.00112
23	UMW Holdings Berhad	-0.04009	-0.02326	-0.00527
24	YTL Corporation Berhad	-0.09910	-0.06347	-0.00759
25	Nestle Berhad	1.30187	1.69208	-0.01886
26	Dialog Group Berhad	1.84285	0.79970	0.01152
27	Malaysia Airport Holdings	0.45306	0.25670	0.00112
28	Top Glove Corporation Berhad	1.73438	3.21061	-0.01393
29	Fraser & Neave Holdings Berhad	0.62492	0.61386	-0.01541
30	QL Resources Berhad	2.58526	1.76306	-0.00667
<b>Average of M-GLCs'</b>		<b>0.52262</b>	<b>0.40807</b>	<b>-0.00176</b>

Source: Developed for the Research



**Table 4.4: Sharpe, Treynor, and Jensen's Alpha Ratio of S-GLCs'**

No	GLCs	Sharpe Ratio	Treynor Ratio	Jensen's Alpha
1	Ascendas Real Estate Investment Trust	0.11560	0.07970	-0.00716
2	CapitaLand Limited	-0.02481	-0.01099	0.00842
3	CapitaLand Commercial Trust	0.22414	0.12382	0.00275
4	CapitaLand Mall Trust	0.08593	0.05197	-0.00544
5	City Developments Limited	-0.00840	-0.00384	0.00971
6	ComfortDelGro Corporation Limited	0.03847	0.03210	-0.01315
7	DBS Group Holdings Ltd	0.10301	0.04101	0.00646
8	Genting Singapore Limited	0.13109	0.07714	0.00432
9	Golden Agri-Resources Ltd	-0.01952	-0.01254	0.00476
10	Hongkong Land Holdings Limited	0.21576	0.12264	0.00000
11	Jardine Cycle & Carriage Limited	0.35870	0.20679	0.00478
12	Jardine Matheson Holdings Limited	0.45416	0.32642	-0.00546
13	Jardine Strategic Holdings Limited	0.45203	0.29406	-0.00330
14	Keppel Corporation Limited	0.04133	0.01845	0.00797
15	Oversea-Chinese Banking Corporation Limited	0.20748	0.08010	0.00386
16	SATS Ltd.	0.38781	0.35873	-0.01052
17	Sembcorp Industries Ltd	-0.04440	-0.02043	0.00498
18	Singapore Airlines Limited	-0.08913	-0.04905	-0.00792
19	Singapore Exchange Limited	0.01507	0.00639	0.00185
20	Singapore Press Holdings Limited	-0.15726	-0.10319	-0.01401
21	Singapore Technologies Engineering Ltd	0.03255	0.02147	-0.01017
22	Singapore Telecommunications Limited	-0.04672	-0.02591	-0.00902
23	StarHub Ltd	-0.09709	-0.09965	-0.01767
24	Thai Beverage Public Company Limited	0.29207	0.37850	-0.01325

25	United Overseas Bank Limited	0.10954	0.04399	0.00519
26	UOL Group Limited	0.23874	0.10988	0.00577
27	Wilmar International Limited	-0.04955	-0.03189	-0.00607
28	Yangzijiang Shipbuilding (Holdings) Ltd	0.17375	0.09710	0.00947
29	Olam International Limited	0.00812	0.00477	0.00296
30	Mapletree Logistics Trust	0.52531	0.36095	-0.00851
<b>Average of S-GLCs'</b>		<b>0.12246</b>	<b>0.08262</b>	<b>-0.00161</b>

Source: Developed for the Research

In this segment, there are three performance measures that are used to indicate the well-being of the GLCs, which are the Treynor Ratio, the Sharpe Ratio and Jensen's Alpha. First and foremost, as observed in Table 4.3 and Table 4.4, in the Sharpe Ratio aspect, M-GLCs have a higher ratio compared to S-GLCs, valued at 0.52262 compared to S-GLCs' average Sharpe Ratio of 0.11246. It can be implied that the overall performance of M-GLCs is comparatively better than S-GLCs because of its higher Sharpe Ratio. Only 5 M-GLCs yielded a negative ratio return whereas 9 S-GLCs showed negative values, which means that the 9 S-GLCs performed worse against the investments with risk free rate of return, hence, obtained a less than zero value ( $r_f > r_i$ ). The risk-free rate of return for Malaysia and Singapore is valued at 2.870% and 2.750% respectively.

Furthermore, the performance index can be measured using Treynor Ratio, which is similar to Sharpe Ratio but compared against beta instead. While both Treynor Ratio records an average positive value of Treynor Ratio, M-GLCs Treynor Ratio value is relatively better than S-GLCs, with 0.40807 for M-GLCs compared to the 0.08262 of S-GLCs. In M-GLCs, the GLC with the highest Treynor Ratio is Top Glove Corporation Berhad, standing at 3.21061. Only 5 out of 30 M-GLCs recorded a negative Treynor Ratio

whereas 9 out of 30 S-GLCs generated a less than zero ratio. This indicates that those 9 S-GLCs did not perform well against the risk-free rate of returns investment and underperformed against the market benchmark. According to the findings shown, S-GLCs lowest value of Treynor Ratio stands at -0.10319 by Singapore Press Holdings Limited, and the highest value stands at 0.37850 by Thai Beverage Public Company Limited.

The third and final metric of measuring performance index of GLCs is the Jensen Alpha formula, which uses the capital asset pricing model (CAPM). First of all, according to the findings, both M-GLCs and S-GLCs generated an average negative Jensen Alpha value of -0.00176 and -0.00161 respectively. S-GLCs have yielded a greater Jensen Alpha ratio compared to M-GLCs as only 14 out of 30 S-GLCs yielded a negative value compared to 18 out of 30 M-GLCs which yielded a negative value. This indicates that 16 S-GLCs outperformed against the benchmark of the Straits Times Index. Although, S-GLCs have yielded a greater Jensen Alpha value, the value difference between the two markets is not much. In summary, S=GLCs performed slightly better against the benchmark of market portfolio compared to M-GLCs.

## 4.2 Conclusion

**Table 4.5: Comparison of Risk Features between M-GLCs and S-GLCs**

Risk Features (Average)	M-GLCs	S=GLCs
Weekly Return	0.2194%	0.1666%
Standard Deviation	2.8084%	3.2827%

Total Risk	8.16605%	11.18275%
Systematic Risk	1.76329%	4.08996%
Unsystematic Risk	6.40276%	7.09279%
R-Square	0.22452	0.36335
Beta	0.90378	0.92087
Diversifiability Measure	0.77548	0.63665

Source: Developed for the Research

In summary, the results of this study found that M-GLCs outperformed S-GLCs in terms of average weekly return as shown in table 4.5, while also containing significantly lower systematic, unsystematic and overall risk compared to S-GLCs. Based on the assessment of risk diversification benefits, M-GLCs were found to have a much higher Diversifiability Measure relative to S-GLCs, therefore indicating more opportunities to diversify and better diversification benefits compared to S-GLCs.

**Table 4.6: Comparison of Performance between M-GLCs and S-GLCs**

Performance Ratio	M-GLCs	S-GLCs
Sharpe Ratio	0.52262	0.12246
Treynor Ratio	0.40807	0.08262
Jensen's Alpha	-0.00176	-0.00161

Source: Developed for the Research

In terms of the investment performance assessment, according to table 4.6, M-GLCs were found to significantly outperform S-GLCs based on the Sharpe Ratio and

Treynor Ratio performance measures, but marginally underperformed relative to S-GLCs in the Jensen's Alpha analysis.

## **CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS**

### **5.0 Introduction**

This chapter discusses major findings of this research. Additionally, the research will discuss the implication of study as well as the limitations of it. Reference will be attached at the end of this chapter, providing insights and a better grasp regarding the sources of information.

### **5.1 Discussion of Major Findings**

This research study was conducted with the aim to compare and analyze the overall performance and risk features between GLCs in two distinctive countries: Malaysia and Singapore. M-GLCs' and S-GLCs' risk-adjusted performance were assessed by utilizing the following tried and true evaluation methods: Sharpe Ratio, Jensen's Alpha and Treynor Ratio. In addition to that, the research also compares the risk diversification benefits of both M-GLCs and S-GLCs by applying the Diversifiability Measure. For both GLCs, the period of study was conducted from 1<sup>st</sup> January 2009 to the last date 28<sup>th</sup> December 2018, which is a total of 10 years study.

The results have shown that between two GLCs, the overall average weekly return of M-GLCs (0.2194%) is slightly higher than S-GLCs (0.1666%). In other words, it means that M-GLCs performed better in terms of average weekly return as compared to S-GLCs. Moreover, in terms of the Sharpe Ratio, Jensen's Alpha and Treynor Ratio, on average, M-GLCs performed better in two of those three components, yielding positive results in all Sharpe and Treynor Ratio whilst yielding negative results in Jensen's Alpha. While M-GLCs are the more profitable investment portfolio to consider, the negative Jensen's Alpha value proves that it does not earn any excess returns and it is not earning the proper return for its level of risk. However, M-GLCs do generate an even higher rate of return than the risk-free rate in Malaysia as compared to S-GLCs in Singapore due to its high Sharpe Ratio and Treynor Ratio, as shown by the fact that only 5 M-GLCs yielded a negative ratio return whereas 9 S-GLCs showed negative values. This means that the 9 S-GLCs performed worse against the investments with risk free rate of return, hence, obtained a less than zero value ( $r_f > r_i$ ). The risk-free rate of return for Malaysia and Singapore is valued at 2.870% and 2.750% respectively.

Overall, it is observed that S-GLCs have obtained lesser than expected returns as compared to the risk-free rate of returns against the volatility of the portfolio. On the other hand, Treynor ratio results have shown that S-GLCs did not perform well against the risk-free rate level over the market risk, which is also known as the beta. Therefore, between M-GLCs and S-GLCs, the positive ratios of M-GLCs indicated that they are able to gain better returns as compared to the risk-free rate of return. It can be concluded that M-GLCs generate a better return against the standard deviation in Malaysia as compared to S-GLCs in Singapore. M-GLCs also generate a better return against the beta in Malaysia as compared to S-GLCs in Singapore.

According to the data tabulated, M-GLCs' and S-GLCs' have been compared and contrast. Total risk of S-GLCs is substantially higher than M-GLCs. On top of that, a lower than 1 beta value is observed in both M-GLCs and S-GLCs, which in other words indicates that GLCs in both countries are less susceptible to market

movement and have relatively low risk. Besides that, S-GLCs have a higher degree of R-squared value as compared to M-GLCs, which means S-GLCs are actually much more diversified as compared to M-GLCs. This suggests that S-GLCs market has already been diversified and there are more diversification opportunities left open for M-GLCs. M-GLCs have also shown a greater value of diversifiability measure as compared to S-GLCs, which indicates that M-GLCs may have better and greater diversification benefits. In a nutshell, risk-averse investors would prefer to invest in M-GLCs rather than S-GLCs based on the findings, due to the lower risk yielded by M-GLCs. Moreover, M-GLCs also outperformed both the KLCI Index and their risk-free rate of return. However, investors should make careful consideration and plan their investing strategies by evaluating the market trend using the necessary financial analysis of the market movement before making their ultimate decision.

In conclusion, the results of our study and all the major findings have been tabulated and shown in Table 5.1.



**Table 5.1: Major Findings on Hypotheses Testing**

No.	Hypotheses	Findings	Conclusion
1.	<b>H<sub>1</sub></b> : M-GLCs' SR > S-GLCs' SR (M-GLCs' have higher Sharpe ratio compared to S-GLCs)	M-GLCs' SR (0.52262) >  S-GLCs' SR (0.12246)	Accept H <sub>1</sub>
2.	<b>H<sub>1</sub></b> : M-GLCs' T > S-GLCs' T (M-GLCs have higher Treynor ratio compared to S-GLCs)	M-GLCs' T (0.40807) >  S-GLCs' T (0.08262)	Accept H <sub>1</sub>
3.	<b>H<sub>1</sub></b> : M-GLCs' $\alpha_i$ > S-GLCs' $\alpha_i$ (M-GLCs have higher Jensen's Alpha compared to S-GLCs)	M-GLCs' $\alpha_i$ (-0.00176) <  S-GLCs' $\alpha_i$ (-0.00161)	<b>Do not accept H<sub>1</sub></b>
4.	<b>H<sub>1</sub></b> : M-GLCs' $\beta$ < S-GLCs' $\beta$ (M-GLCs' have lower Beta [market risk] compared to S-GLCs)	M-GLCs' Beta (0.90378) <  S-GLCs' Beta (0.92087)	Accept H <sub>1</sub>
5.	<b>H<sub>1</sub></b> : M-GLCs' R <sub>d</sub> > S-GLCs' R <sub>d</sub> (M-GLCs' have higher risk diversification benefits compared to S-GLCs')	M-GLCs' R <sub>d</sub> (0.77548) >  S-GLCs' R <sub>d</sub> (0.63665)	Accept H <sub>1</sub>

Source: Developed for the Research

To sum it up, the findings of this study is found to be consistent with several key findings from the literature review. The results are consistent with the results from past studies such as Ng, Leong, Lau & Abdul Rahim (2018) which found out that Malaysian REITs outperformed REITs in Japan and Singapore in terms of performance and risk diversification benefits.

## **5.2 Implications of the Study**

The purpose of this study is to look in depth into the transparency of both M-GLCs and S-GLCs for the readers to understand the risk it would take to invest in both GLCs by providing a variety of different but meaningful quantitative evaluation of the performance and risk diversification benefits of both Malaysia Government Linked Companies and Singapore Government Linked Companies. It also aims to develop and expand on literature by directly and empirically comparing M-GLCs and S-GLCs against each other using common performance standards.

Thus, for potential investors seeking to include GLCs into their investment portfolios, this study will provide them with valuable insight regarding the performance and risk diversification benefits of GLCs in both Malaysia and Singapore. Furthermore, this study also found M-GLCs and S-GLCs both generated returns that surpassed their respective risk-free rates of return.

However, there are many other factors investors should also take into account when they choose which market to invest in that were not included into this research, which are intangible qualities like corporate management, growth strategy and the asset quality of each GLCs. All these qualities have to be carefully evaluated by the

investors so that it will provide a better insight and a better overall picture on the performance in order for the investor to make a careful yet precise investment decision.

Besides that, the results of this study may also imply that M-GLCs have high performance and risk diversification benefits when compared against S-GLCs. Finally, the findings of this study also indicate that S-GLCs do indeed have lower diversification benefits as shown by their lower Diversifiability Measure compared to M-GLCs.

### **5.3 Limitations of the Study**

There were some complications and difficulties that I encountered throughout the course of this study. All of them had to be solved before proceeding forward. With the help of my research advisor, Mr David, I was able to navigate my way through all the complications and difficulties that I encountered.

First of all, due to recording error or data collection error from the Bloomberg terminals, some of the data for M-GLCs and S-GLCs were incomplete and some of the data were accidentally replicated for different companies. Because of this, some of the share prices of the weeks are missing and which caused a few problems to my research. I had to revisit the Bloomberg terminals to recollect all of the missing data before I could proceed with my research.

Moreover, it was extremely hard to find past research and studies done on GLCs. This is because there were limited research and studies done to investigate the nature of performance and risk diversification benefits of both M-GLCs and S-

GLCs. Furthermore, past studies that directly compare the performance of GLCs between countries are extremely rare which presented challenges during the research, I was forced to use past studies on REITs for certain parts as some REITs were GLCs as well which made them relevant. There has also been ample researches and studies done to investigate the performance and risk diversification of REITs.

Other than that, the research topic which is the topic of “comparison of the performance and risk diversification benefits of Government Linked Companies in Malaysia and Singapore” was a research that has not been done before. This research study is an exploratory research where this research study had venture into a land of unknown with limited previous studies to refer with. However, I was able to seek advice from my advisor, Mr David, and took his paper on “A comparison on the performance and risk diversification benefits of real estate investment trusts in Malaysia and Singapore” as a base reference for the assignment.

## **5.4 Recommendations for Future Research**

This research study has been a major ride for final year students like us. In this sub chapter, the research will discuss a few recommendations that can provide for other fellow mates who are interested in extending the research or even conducting a brand-new research related to this research topic.

First of all, the data collection of the share prices has been a major part of the research topic, there will be difficulties during the collection process and there are things that you should take note of. It's very easy to make a random human error while collecting all the data. Hence it is strongly recommended that you take your

time and make sure the you collect all the data carefully without making any errors such as repetition of similar data for different companies. After the collection of data, you need to make sure that you double check everything to ensure that you have a complete and comprehensive data for your research.

Other than that, a thorough and intensive research on the variables of this research topics on financial terms like risk, diversification measure, beta, Sharpe Ratio, Treynor Ratio, and Jensen's Alpha must be done before conducting the research. The understanding of each of the term definitely helps a lot during the course of the research and will assist in conducting the discussion in the findings of the results and be able to provide better insights towards the analysis of the results.

## **5.5 Conclusion**

In summary, the results of this study conclude that based on historical data M-GLCs have significantly better risk diversification benefits compared to S-GLCs given their lower overall risk and higher Diversifiability Measure. Furthermore, this study has also found that M-GLCs generally outperformed S-GLCs based on our Sharpe Ratio and Treynor Ratio analyses but underperformed against S-GLCs in terms of Jensen's Alpha analysis.

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