Government Ownership and Firm Value: Evidence from Singapore REITs

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ABSTRACT

This paper examines how government ownership affects firm value in the Singapore Real Estate Investment Trust (S-REIT) industry. We construct measures of Singapore government's ownership in REITs based on the shareholdings by Temasek Holdings and statutory boards of the government. First, we find that government-linked REITs (GL-REITs) tend to have both higher firm value and higher profitability than non-government-linked REITs (non-GLREITs). In particular, Tobin's Q ratio of GL-REITs is 13.3% higher than that of non-GLREITs. Second, GL-REITs enjoy about 0.5% lower interest rate costs when borrowing money compared to non-GLREITs. Third, we find that GL-REITs are associated with better corporate governance, with the chairman of the board more likely to be independent. Finally, our evidence suggests that lower financing cost is the reason why GL-REITs achieve higher profitability compared to non-GLREITs. We find that better governance seems to be among the reasons why GL-REITs have higher firm value compared to non-GLREITs.

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1. Introduction

Back to 28 July 2005, Ms. Ho Ching, the Chief Executive Officer of Temasek Holdings said when she called on regulators of Singapore REITs, "It would be an interesting challenge to see if Singapore can be a hub for another 30 to 50 of the top-quality Asian REITs over the next 10 to 20 years. It will need bolder decisions, hard work, and imagination from all stakeholders, especially from regulators and policymakers as well as market players, but it can be done." At that time, six REITs was listed on Singapore Exchange (SGX). Only one, Fortune REIT, held overseas assets - in the form of 11 retail assets in Hong Kong. Eleven years later, Ms. Ho's words have come true: by the end of March 2016, there are 35 REITs listed on SGX, with a total market capitalization exceeding S$64 billion. Almost every REIT holds some overseas assets, which not only locate in Asia but all over the world.

The successful development of Singapore REIT market cannot be achieved without the support from Singapore government. Indeed, the road to a prosperous REIT market was not smooth. In 1999, The Monetary Authority of Singapore (MAS) issued guidelines on property funds, which include REITs. However, it was not until 2001 when the Inland Revenue Authority of Singapore (IRAS) formulated a policy of granting tax transparency to S-REITs on a case-by-case basis that the first attempt to launch a REIT took off. However, the first listing was not successful due to many factors, including the lack of tax incentives and the weak market conditions. Since 2002, REITs have gained increased popularity because of better tax transparency and refinements of regulations. Besides enhancing the regulatory framework to improve the business environment for REITs, Singapore government also invest in REITs through its investment company, Temasek Holdings Private Limited and its statutory boards, such as JTC corporation.[1] These "government-linked" REITs (GL-REITs) have made up more

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[1] Temasek Holdings Private Limited (abbreviated as Temasek) is a state-owned holding company that can be characterized as a national wealth fund owned by the Singapore government. Incorporated in 1974, Temasek owns and manages a net portfolio of S$275 billion as of 31 March 2017. The statutory boards of the Singapore

than 54% of the total S-REIT market value. Given the large involvement of government in Singapore REITs, it is important to understand the role of the Singapore government and the effects it has on the value and performance of S-REITs.

In this study, we focus on the effects of government ownership by investigating the firm value differences between GL-REITs and non-government-linked REITs (non-GLREITs). We classify a REIT as government-linked if Temasek Holdings Private Limited or a statutory board of the Singapore government is one of its substantial unitholders as indicated in the REIT's annual report. In particular, we use two variables to measure government ownership: (i) a dummy variable that identifies whether a REIT is with or without government ownership, and (ii) a continuous variable that quantifies the percentage of government ownership in a REIT.

We compare firm value and other aspects of GL-REITs and non-GLREITs in our empirical analysis. First, we find strong evidence that GL-REITs have a higher firm value and better profitability compared to non-GLREITs. For instance, Tobin's Q ratio of GL-REITs is about 13.3% higher than that of non-GLREITs. Second, using direct measures of borrowing costs, we find that GL-REITs enjoy about 0.5% lower interest rate cost when borrowing money than non-GLREITs. Third, GL-REITs are associated with better corporate governance compared with non-GLREITs. We find that chairman of the board of GL-REITs is 48% more likely to be independent compared with non-GLREITs. Finally, we find that lower financing cost is the reason for GL-REITs to achieve higher profitability and better corporate governance seems to be among the reasons for higher firm value of GL-REITs.

Our study contributes to the literature in several aspects. First, to the best of our knowledge, we are the first paper to examine the impact of government ownership on REITs. Singapore REITs provide an interesting laboratory for researchers to study government

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government are organisations that are given autonomy to perform an operational function by legal statutes passed as Acts in parliament. The statutes define the purpose, rights and powers of the authority. They usually report to one specific ministry of the government.

ownership. The most important advantage is that the Singapore government ownership is *exogenously* determined at the inception of the REITs (Ramirez and Tan, 2004). In other words, for any GL-REIT in our sample, its government-linked status has been determined when it is born. This feature eliminates the potential endogeneity problem on government holdings. The difference between GL-REITs and non-GLREITs, ceteris paribus, would be a treatment effect rather than a selection effect. As a result, we treat government ownership as an exogenous event.

Another advantage is, in the context of Singapore REITs, the existence of sponsors amplifies the government ownership effect. This is because, for all GL-REITs, their sponsors are also government-linked companies, which can provide strong financial support and real estate assets with good quality. Given the intense involvement of government and the unique features of S-REITs, it is of particular interest to examine the impact of government ownership on firm value and performance in the Singapore REIT industry.

Second, our study adds to the literature by investigating the underlying reasons for the higher firm value and profitability associated with GL-REITs. Prior literature that studies government-linked companies in Singapore provides some evidence that GLCs are higher or equally valued compared with other companies but fails to explain why (Feng, Sun, and Tong, 2004; Ramirez and Tan, 2004; Ang and Ding, 2006). Third, when testing whether government-linked firms receive cheaper funding, we directly examine the costs of capital and calculate interest cost. Ramirez and Tan (2004) indirectly test whether GLCs benefit from special financing privilege by comparing the investment behavior with that of private counterparts. They suggest that if GLCs have easier access to capital, then investment will be less sensitive to liquidity. However, this method has been criticized that higher sensitivities may not indicate more financially constrained (Kaplan and Zingales, 1997). In this study, we use direct measures of financing cost: the weighted average cost of capital on debt, the weighted average cost of

capital on equity, and the average interest costs (i.e., calculated as total interest and related expensed divided by total liabilities). We found results showing that GL-REITs pay significantly lower interest rates than non-GLREITs.

The remainder of this paper proceeds as follows. Section 2 reviews the prior literature on government ownership and political connection. We describe the sample data and research methodology in Section 3. We study the impact of government ownership on REIT firm value and profitability in Section 4. Section 5 presents the result of tests on the underlying reasons for the difference in firm value and profitability between GL-REITs and non-GLREITs. The last section concludes the paper.

2. Literature, background, and hypotheses

A few earlier papers have studied related issues on Singapore GLCs. In the most relevant research, Ramirez and Tan (2004) compare the investment spending sensitivities and Tobin's Q ratio between Singapore GLCs and private sector firms empirically to see whether GLCs receive special financial advantage. They do find GLC is better valued in financial markets but fail to get a significant result to support that GLCs have easier access to credit. Feng, Sun and Tong (2004) study the stock performance of 30 GLCs in Singapore from 1964 to 1 998 and find no evidence that GLCs underperform the market portfolio. They also find that the GLCs perform as well as the market and the industry averages even before share issue privatization. Ang and Ding (2006) compare the financial and market performance of GLCs with non-GLCs, and find that Singapore GLCs have higher valuations and better corporate governance than a control group of non-GLCs. In a more recent study, Ang, Ding and Thong (2013) examine political connection on company value by investigating the firms in Singapore. They find a political connection, in general, adds little to the value of a company in Singapore,

while politically connected firms operating in a more highly regulated environment tend to have higher firm valuation.

As one of the most capital-intensive industries, REITs with government ownership may benefit more from financial advantage than other government-linked industries. This is important for Singapore REITs because of the existence of sponsorship. In Singapore, the sponsor is crucial for a REIT to thrive. Sponsor is usually the major shareholder of a REIT. It provides a REIT with pipelines of assets and financial support. For all GL-REITs in Singapore, their sponsors are also GLCs. For example, CapitaLand Mall Trust is one of the GL-REITs in Singapore. Its sponsor, CapitaLand is a typical GLC, of which about 40% of shares are held by Temasek. CapitaLand is one of Asia's largest real estate companies listed in Singapore. It is surely able to provide sponsored REIT with good quality property and financial support. GLC sponsors have more advantages in supporting its REITs than private sponsors. Literature has shown that GLCs are better off or at least as good as comparable private firms in terms of firm value, stock performance, and profitability. Therefore, we expect GL-REITs to have higher firm value and better profitability than other S-REITs. We have the first hypothesis:

H1. The differences between GL-REITs and non-GLREITs on firm value and profitability should be significantly positive.

The reasons for GLCs to be different from non-GLCs have not been well documented in the literature. In some studies, researchers suggest that GLCs may benefit from special advantages by being connected with government, such as easier access to funds, tenders, and opportunities (Mak and Li, 2001; Ramirez and Tan, 2004). However, no significant empirical evidence has been found so far. By focusing on REITs, we may find different results because of the uniqueness of REIT's regulation and S-REIT's structure.

Similar to US-REITs, REITs listed in Singapore are required to distribute at least 90% of taxable income each year to enjoy tax transparency treatment by Inland Revenue Authority

of Singapore. This requirement usually results in low retained earnings, and as such, REITs are heavily dependent on external financing (Li, Chow, and Ong, 2014; Li, Ling, Mori, and Ong, 2018). Several papers have highlighted the high leverage ratio of REITs (Feng, Ghosh, and Sirmans, 2007; Ooi, Ong, and Li, 2010). As a result, financial resources are crucial for REITs to survive. GL-REITs, sponsored by GLCs, are likely to have easier and cheaper access to different sources of capital compared to non-GLREITs. According to the Business Times (4, March 1997): "the fact that [GLCs] are part-owned (or managed) by the Singapore government enables them to raise funds much more cheaply – by up to four percentage points lower – than others." In most of the cases, the lenders perceive that the government has a moral and legal responsibility for their liabilities and this is like a payment guarantee for GLCs. Therefore, even though the government may not intend to help government-linked corporations on capital raising, the "brand effect" perceived by banks and other lenders will enable GLCs and GL-REITs to enjoy the financing benefits that are not available for non-GLCs.

Because of the compulsory dividend payout policy of REITs, the unique sponsorship structure in Singapore-REITs, we expect that GL-REITs enjoy some financial advantages such as lower interest costs compared with non-GLREITs. Based on the above reasoning, we have the following hypothesis:

H2. GL-REITs enjoy lower financing costs compared with non-GLREITs. This may help GL-REITs achieve higher earnings.

In addition to financing costs, the prior literature suggests that government ownership also affects corporate governance practices. However, there is no consensus on whether government connection enhances corporate governance or not. Ang, Ding and Thong (2013) find that politically connected firms in Singapore are associated with good governance practices such as non-duality in their chairman and chief executive officer positions and fewer executive directors. On the other hand, Mak and Li (2001) find that GLCs of Singapore tend

to employ fewer outside directors. They argue that GLCs have less incentive to control agency problem because of easier access to financing, weaker accountability for financial performance, lack of exposure to a market for corporate control, and weak monitoring by shareholders.

In Singapore, similar to other Asian economies, hostile takeovers are relatively rare. According to Rossi and Volpin (2004), the number of attempted hostile takeovers as a percentage of domestic traded firms in Singapore from 1990 t0 1999 is 0.40%, while the world average is 1.01%. This is also true for REITs. Bianco, Ghosh and Sirmans (2007) suggest that more attention should be paid to the efficiency to internal governance mechanisms since hostile takeovers are rare among REITs. In an environment where the takeover threat is weak, internal controls such as the board of directors become more critical for S-REITs. Thus in this study, we focus on the internal measures of corporate governance and compare the board structure between GL-REITs and non-GLREITS.

Numerous studies have shown that corporate governance has a significant impact on firm value (see, for example, Gomper, Ishii and Metrick, 2003; Bhagat and Bolton, 2008; Bebchuk, Cohen, and Ferrel, 2008). Given that government ownership also affects corporate governance as discussed above, we expect GL-REITs and non-GL-REITs to have different corporate governance practices. Hence we have the following hypothesis:

H3. The board structure of GL-REITs is different from that of non-GLREITs. Different corporate governance practices could contribute to the difference in firm value between GL-REITs and non-GLREITs.

3. Data and variable description

3.1 Data source and Sample

The data used in empirical tests are collected from three sources. Firm's financial data are gathered from Compustat and Bloomberg. Shareholder information and board structure

data are manually collected from individual S-REIT's annual report. Our sample covers REITs listed on SGX from 2002 to 2015, which consists of 32 SREITs. We require each REIT to have at least two consecutive years.[2] Table 1 lists all the REITs included in our sample along with their IPO years and an indicator of whether they are GL-REITs or not. In total, there are 11 GL-REITs, 21 non-GLREITs in our sample.

[Insert Table 1 here]

3.2 GL-REITs measures

We define a REIT as GL-REIT if Temasek or a statutory board sits as one of the substantial unitholders as shown in the annual report. We employ both dummy variable and percentage variable to weigh the effect of government ownership. GLREIT_D is a dummy variable equals one if a REIT is government-linked, i.e., Temasek or a statutory board is one of its substantial unitholders, otherwise equals zero. GLREIT_S is a measure of the percentage of shares holding by the government, i.e., holding by Temasek or a statutory board as indicated in each REIT's annual reports. Table 2 defines all the variables in the paper.

[Insert Table 2 here]

3.3 Firm value and profitability variables

Following prior literature (see, for example, Demsetz and Lehn 1985; Lang and Stulz 1994; Hartzell, Sun and Titman 2006; Bebchuk, Cohen and Ferrell 2008), we use Tobin's Q ratio as the major proxy for REIT's firm value. To measure profitability, we utilize return on assets (ROA), return on capital (ROC), and return on equity (ROE) in the empirical tests.

3.4 Financing cost measures

Following Sengupta (1998) and Pittman and Fortin (2004), we select three variables as capital cost measures: weighted average cost of debt (WACC_debt), weighted average cost of

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[2] As a result, three newly listed REITs are not included in the tests. They are IREIT, KEPPEL DC REIT, and BHG Retail REIT.

equity (WACC_equity), and average interest costs (Intcost). Weighted average debt maturity (WAM) is controlled when using Intcost as the dependent variable.

3.5 Board structure variables

Following Jensen (1993) and Mak and Li (2001), we consider three characteristics of board structure: board size, board composition, and board leadership. Board size is defined as the total number of directors. For board composition, we look at the proportion of executive directors.

Most prior studies look at CEO-Chair separation as board leadership structure. In our sample, none of the REITs having their CEOs as chairman. Since there is no CEO Chair-duality in our S-REIT sample, we look at the CEO independence instead.

3.6 Summary statistics

Table 3 presents the summary statistics. The mean of GLREIT_D is 0.394, meaning that about 40% of the firm-year observations belong to GL-REITs. This is comparable to the number proportion of GL-REITs (11 divided by 32). The mean of the share variable, GLREIT_S is 0.135, meaning that on average the percentage shareholdings by the government in Singapore REITs is about 14%. On average S-REIT has a Q ratio of 0.96. The mean value of the leverage ratio is about 31.4%. The maximum possible leverage ratio is 54.49%. This is because there is a leverage limit imposed on S-REITs: REITs with credit ratings are allowed to leverage up to 60%.[3] The average interest cost is about 2.8% for all S-REITs.

[Insert Table 3 here]

4. Do GL-REITs have higher firm value and profitability?

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[3] Since July 2015, The Monetary Authority of Singapore carried out new guidelines for the Singapore REIT sector: Adopting a single-tier leverage limit of 45%, as opposed to the current upper tier limit of 60% for REITs with credit ratings and 35% for those without.

In this section, we compare the firm value and profitability between GL-REITs and non-GLREITs to see whether SREITs with government ownership are better off or not. Our first hypothesis suggests that GL-REITs should have higher firm value and better performance on earnings compared with REITs with no government connections. We first examine the difference between the two groups using univariate analysis. Next, we set up regression models to test our first hypothesis.

In Table 4, we report the univariate comparison results by splitting the full sample into two subgroups: GL-REITs and non-GLREITs. It shows that on average, GL-REITs' Q ratio is 0.121 higher than non-GLREITs. This difference is significant at 1% level. As for profitability, all three measures get the correct signs, but only ROE is statistically significant. The average ROE of GL-REITs from 2002 to 2015 is 10.824%, which is more than 2% higher than the mean ROE (8.597%) of non-GLREITs. The mean leverage ratio of GL-REITs is about 3% higher than that of non-GLREITs, significant at the 1% level. The comparison results on *Ln(TA)* and *Age* show that GL-REITs tend to be larger and older. Overall, the univariate analysis results are consistent with our first hypothesis in that GL-REITs have significant higher averages in Tobin's Q ratio and ROE compared with non-GLREITs.

[Insert Table 4 here]

In the next step, we test our first hypothesis in multivariate settings. We regress our measures of firm value and profitability on the government ownership variables and various control variables. We estimate the following regression models:

$$Q_{it} = \alpha_0 + \beta_1(GLREITs\ Variable) + \beta_2(Leverage) + \beta_3(Size) + \beta_4(Age) +$$
$$\beta_5(Earnings) + \beta_6(Year\ Dummies) + \beta_7(Property\ type\ Dummies) + e_{it}, \quad (1)$$

$$Profitability\ Variable_{it} = \alpha_0 + \beta_1(GLREITs\ Variable) + \beta_2(Leverage) +$$
$$\beta_3(Size) + \beta_4(Age) + \beta_5(Year\ Dummies) + \beta_6(Property\ Type\ Dummies) + e_{it}, \quad (2)$$

where the GLREITs Variable is either the dummy *GLREIT_D* or the percentage variable *GLREIT_S*. In testing firm value, we use Tobin's Q ratio as the dependent variable. We control for leverage, firm size, firm age, and earnings. Year dummies are included to control time fixed effects. Property type dummies are to control for any unobservable heterogeneity that varies across different types of REITs but is fixed over time. We classify S-REITs into seven groups according to their property type focus as indicated in annual reports: hospitality, commercial, healthcare, industrial, logistics, residential, and retail. Profitability variables are ROA, ROE, and ROC. In the above univariate analysis, we find a significant result for ROE but not ROA. Accordingly, we expect the coefficient of GL-REITs indicators to be significant positive when ROE is the dependent variable. In these and subsequent regressions, we report robust standard errors that have accounted for clustering within firms.

Table 5 displays the results of the OLS regressions. After controlling for firm size, age, earnings, gearing ratios, time fixed effects, and property type fixed effects, we find GL-REITs have significantly higher Q ratio and better profitability in terms of ROE. Columns (1)-(4) show the results when using the dummy variable as GL-REITs indicator. Columns (5)-(6) display the estimation result when we replace the dummy GL-REITs variable by percentage variable on how much shares are held by the government. We obtain significantly positive coefficients for both of the two measures. Our estimation results on firm value in Column (1) imply that GL-REITs' Q ratio is about 13.3% higher than non-GLREITs. When using REIT profitability as the dependent variable, the coefficients of GL-REITs indicators in Columns (3), (6) and (7) are all significantly positive at the 10% level. These findings are in line with our Hypothesis 1 that REITs with government ownership are associated with higher firm value and better profitability. Overall, consistent with the univariate analysis, we obtain stronger results on the difference in firm value than the difference in profitability.

[Insert Table 5 here]

5. Why do GL-REITs differ from non-GLREITs?

In the previous section, we find that GL-REITs have higher firm value and better profitability than other Singapore REITs. In this section, we test the second and third hypotheses by investigating the reasons underlying these differences. Specifically, we are interested in using financial costs and corporate governance to explain the differences between GL-REITs and non-GLREITs on firm value and profitability since prior literature suggests that GLCs may benefit from cheaper capital and GLCs are found to be associated with better corporate governance. We expect to get significant results using the unique laboratory, S-REITs, because of the sponsorship structure and the imposed regulation on REIT dividend payout ratio.

Before getting into the reasons and explanations, we first need to show that GL-REITs do have access to cheaper capital and that they have better corporate governance practice than other REITs. As explained in the earlier section, we focus on board structure as the important internal governance characteristic. In Table 4, we also present the univariate analysis on the cost of capital and board structure between the two REITs groups. We can see the difference between GL-REITs and non-GLREITs on borrowing cost (Intcost) is 0.6%, which is significant at the 1% level. This indicates that GL-REITs are likely to pay lower financing cost compared with non-GLREITs. The differences on the weighted average cost of capital are not statistically significant. WAM is the weighted average of debt maturity. The difference on WAM is significantly negative, implying that GL-REITs have longer debt maturity as compared to other S-REITs. For board structure differences, we find GL-REITs have larger board size, fewer executive board directors, and more likely to have an independent chairman. Overall, the univariate comparison results are in favor of our hypotheses 2 and 3, that GL-REITs tend to have lower financing costs and better governance practices compared to non-GLREITs.

In addition to univariate analysis, we carry out regressions to test whether GL-REITs differ from non-GLREITs in financing cost and corporate governance. We have the following models:

$$WACC_{it} = \alpha_0 + \beta_1(GLREITs\ Variable) + \beta_2(Leverage) + \beta_3(Size) + \beta_4(Age) + \\ \beta_5(Earnings) + \beta_6(Year\ Dummies) + \beta_7(Property\ type\ Dummies) + \\ e_{it}, \qquad (3)$$

$$Intcost_{it} = \alpha_0 + \beta_1(GLREITs\ Variable) + \beta_2(Leverage) + \beta_3(Size) + \beta_4(Age) \\ + \beta_5(Earnings) + \beta_6(WAM) + \beta_7(Year\ Dummies) \\ + \beta_8(Property\ type\ Dummies) + e_{it}, \qquad (4)$$

$$Board\ Structure\ Variable_{it} \\ = \alpha_0 + \beta_1(GLREITs\ Variable) + \beta_2(Leverage) + \beta_3(Size) + \beta_4(Age) \\ + \beta_5(Earnings) + \beta_6(Year\ Dummies) + \beta_7(Property\ type\ Dummies) \\ + e_{it}, \qquad (5)$$

where WACC is either WACC_debt or WACC_equity. Board Structure Variables are *Boardsize*, *Executive*, and *Chair_independent*. The control variables are *Leverage, Ln(TA), Age*, and *EBITDA/TA*. When using average interest cost (*Intcost*) as the dependent variable, we add *WAM* to control for the differences in debt maturity. We expect the coefficient of GL-REITs variables to be negative in the regression model (3) and (4). Our hypothesis 3 suggests GL-REITs have better corporate governance practice. We expect GL-REITs to have a lower proportion of executive directors and a higher level of CEO independence. As for board size, Jensen (1993) suggests that small board is more effective than a large board. However, firm size also matters here. Boone, Field, Karpoff and Raheja (2007) find that larger and more seasoned firms have larger and more independent boards. Therefore, we expect the coefficient on GL-REITs variable to be positive when using board size as the dependent variable.

Table 6 presents the results on financing cost. We find negative coefficients on GL-REITs in all six regression specifications. We obtain the most significant result when we use *Intcost* as the dependent variable. Based on the results in Column (3), GL-REITs enjoy 0.5% lower interest rates when borrowing money compared to non-GLREITs. Overall, our results in Table 6 reveal that GL-REITs do enjoy lower financing costs than non-GLREITs, and the advantage is more significant in debt cost than in equity cost, which provides support for our second hypothesis.

[Insert Table 6 here]

The empirical results for board structure are reported in Table 7. First, we find that GL-REITs tend to have a larger board size than non-GLREITs, though the difference is not significant when we use the continuous government ownership variable in Column (4). Second, we do not find significant results on *Executive*, though we get the expected negative sign. Third, we consistently find that the chairman of the board for GL-REITs is significantly more likely to be independent than non-GLREITs. Based on the results in Column (3), the difference on the likelihood of an independent board chairman is 48.4% (with a t-stat. of 7.44). Overall, the results in Table 7 suggest that GL-REITs are associated with better governance compared to non- GLREITs.

[Insert Table 7 here]

Next, we try to explain the differences in firm value and profitability between GL-REITs and non-GLREITs as discussed in the previous section using financing cost and board structure. We add the financing cost variables or the board structure variables of REITs into equations (1) equation (2) as additional explanatory variables to see whether the coefficients on government ownership remain significant or not. Again, we control for time fixed effects and property type fixed effects in all the regressions. Our Hypothesis 2 suggests that GL-REITs have higher profitability because they can enjoy lower financing costs, while Hypothesis 3

states that difference in board structure between GL-REITs and non-GLREITs could explain their difference in firm value.

Table 8 reports the estimation results for the analysis of using the average interest rate cost to explain why GL-REITs have higher firm value and better profitability over non-GLREITs. After controlling for financing cost, we continue to see a positive and significant relationship between government ownership and firm value in columns (1) and (5). In contrast, we no longer find a significant relationship between government ownership and profitability after controlling for REIT financing cost. Our evidence suggests that costs of capital could explain the difference in profitability across GL-REITs and non-GLREITs, but not the difference in firm value.

[Insert Table 8 here]

Table 9 reports the estimation results for the analysis of using the board structures to explain the difference in firm value and profitability between GL-REITs and non-GLREITs. Consistent with our hypothesis, we find that the independence of the board chairman has a positive coefficient on firm value in column (5) of Table 9. More importantly, after controlling for board structures in column (5) of Table 9, the coefficient on government ownership becomes slightly smaller in magnitude (from 0.157 to 0.124) and has a lower t-statistic, compared to the corresponding results in column (5) of Table 5. Therefore, we find some weak evidence that corporate governance (in terms of board structure) is relevant to the valuation difference between GL-REITs and non-GLREITs.

[Insert Table 9 here]

6. Conclusion

This paper studies how government ownership affects Singapore REITs. Singapore government plays an important role in the REIT industry via its investment arms and statutory

boards. Government-linked REITs account for more than 54% of the total industry market value. Given the large involvement of government in Singapore REITs, it is essential to understand the effects of government ownership on the value and performance of S-REITs.

We find strong evidence that GL-REITs have higher firm value and better profitability compared to non-GLREITs. Then, we try to explain the differences by examining the differences in financial cost and corporate governance. Using direct measures of borrowing costs, we find that GL-REITs do enjoy lower interest rate than non-GLREITs. We find GL-REITs are associated with better corporate governance practice. For example, their board chairmen are more likely to be independent, compared to non-GLREITs. Finally, we find that lower financing cost is the reason for GL-REITs to achieve higher profitability and that better corporate governance seems to be among the reasons for the higher firm value of GL-REITs.

Table 1. List of Singapore REITs in the sample

Company name as in Compustat	IPO year	Status
AIMS AMP CAP IND REIT	2007	non-GLREITs
ASCENDAS HOSPITALITY TRUST	2012	GLREIT
ASCENDAS REAL ESTATE INVSTMT	2003	GLREIT
ASCOTT RESIDENCE TRUST	2006	GLREIT
CACHE LOGISTICS TR	2010	non-GLREITs
CAMBRIDGE INDUSTRIAL TRUST	2006	non-GLREITs
CAPITALAND COMMERCIAL TRUST	2004	GLREIT
CAPITALAND MALL TRUST	2002	GLREIT
CAPITALAND RETAIL CHINA TR	2006	GLREIT
CDL HOSPITALITY TRUST	2006	non-GLREITs
FAR EAST HOSPITALITY TRUST	2012	non-GLREITs
FIRST REIT	2006	non-GLREITs
FORTUNE REAL ESTATE INV TR	2003	non-GLREITs
FRASERS CENTREPOINT TRUST	2006	non-GLREITs
FRASERS COMMERCIAL TRUST	2006	non-GLREITs
FRASERS HOSPITALITY TRUST	2014	non-GLREITs
KEPPEL REIT	2006	GLREIT
LIPPO MALLS INDONESIA RETAIL	2007	non-GLREITs
MAPLETREE COMMERCIAL TRUST	2011	GLREIT
MAPLETREE GREATER CHINA COM	2013	GLREIT
MAPLETREE INDUSTRIAL TRUST	2010	GLREIT
MAPLETREE LOGISTICS TRUST	2005	GLREIT
OUE COMMERCIAL REAL ESTATE	2014	non-GLREITs
OUE HOSPITALITY TRUST	2013	non-GLREITs
PARKWAY LIFE REAL ESTATE INV	2007	non-GLREITs
SABANA SHARIAH COMPLIANT	2010	non-GLREITs
SAIZEN REIT	2007	non-GLREITs
SOILBUILD BUS SPACE REIT	2013	non-GLREITs
SPH REIT	2013	non-GLREITs
STARHILL GLOBAL REAL ESTATE	2005	non-GLREITs
SUNTEC REIT	2004	non-GLREITs
VIVA INDUSTRIAL TRUST	2013	non-GLREITs

This table lists all the S-REITs in our sample from 2002 to 2015. The REITs' IPO year and their status on government ownership are also presented. We view an S-REIT as GL-REIT if Temasek or a statutory board is one of the substantial shareholders as indicated in the REIT's annual report.

Table 2. Variable definitions

Variables	Definition
GLREIT_D	Equals to one if a REIT is government-linked, i.e., Temasek or a statutory board is one of its substantial unitholders, otherwise equals to zero.
GLREIT_S	The percentage of shares holding by the government, i.e., holding by Temasek or a statutory board as indicated in REIT's annual reports.
Q	Tobin's Q ratio, defined as total assets minus the book value of equity plus the market value of equity, divided by total assets
ROA	Return on assets, defined as net income divided by total assets.
ROC	Return on capital
ROE	Return on equity.
Leverage	Book value of debt divided by total assets.
Ln(TA)	Natural logarithm of the total assets. A measure of firm size.
Age	The age of the REIT. The number of years since a REIT's IPO.
EBITDA/TA	Earnings before interest, taxes, depreciation, and amortization divided by total assets.
WACC_debt	Weighted average cost of debt.
WACC_equity	Weighted average cost of equity.
Intcost	Average interest costs, defined as total interest and related expensed divided by total liabilities.
WAM	Weighted average debt maturity.
Boardsize	Total number of directors on board.
Executive	The number of executive directors on the board divided by the total number of directors.
Chair_independent	Equals one if chairman is independent and non-executive, otherwise equals zero.

Table 3. Summary statistics

VARIABLES	(1) N	(2) Min	(3) Mean	(4) Max	(5) SD
Age	231	1	8.818	13	2.940
Boardsize	231	5	7.554	11	1.467
Chair_independent	231	0	0.532	1	0.500
EBITDA/TA	205	-0.125	0.0721	0.340	0.0563
Executive	231	0	0.138	0.500	0.0812
GLREIT_D	231	0	0.394	1	0.490
GLREIT_S	231	0	0.135	0.783	0.201
Intcost	205	0.546%	2.770%	6.920%	1.140%
Leverage(%)	228	0	31.40	54.49	7.636
Ln(TA)	228	5.831	7.660	9.199	0.763
Q	226	0.491	0.960	1.668	0.188
ROA(%)	202	-12.94	6.094	32.02	5.745
ROC(%)	180	-13.24	6.389	32.44	6.090
ROE(%)	181	-22.70	9.532	62.47	9.711
WACC_debt (%)	228	0	2.989	6.679	1.486
WACC_equity (%)	227	4.060	8.707	18.39	2.232
WAM	207	0	2.767	5.540	0.971

This table presents the number of observations, minimum value, mean, maximum value, and standard deviation for the variables used in this study. Variable definitions are provided in Table 2. Our sample period is from 2002 to 2015.

Table 4. Univariate comparison of GL-REITs and non-GLREITs

VARIABLES	N	Mean	SD	N	Mean	SD	difference in mean	t-statistic
		Non-GLREITs			GLREITs			
Q	135	0.911	0.173	91	1.032	0.185	-0.121	-4.972
ROA	117	5.731	5.738	85	6.592	5.751	-0.861	-1.051
ROC	104	6.079	6.224	76	6.813	5.917	-0.735	-0.805
ROE	105	8.597	9.512	76	10.824	9.897	-2.228	-1.519
Leverage	137	30.158	8.034	91	33.281	6.604	-3.122	-3.203
Ln(TA)	137	7.369	0.654	91	8.098	0.706	-0.729	-7.855
Age	140	8.207	2.726	91	9.758	3.023	-1.551	-3.959
EBITDA/TA	119	0.073	0.062	86	0.070	0.047	0.003	0.413
WACC_debt	137	2.905	1.384	91	3.114	1.629	-0.209	-1.005
WACC_equity	136	8.733	2.388	91	8.668	1.987	0.065	0.222
Intcost	119	0.030	0.013	86	0.024	0.008	0.006	3.893
WAM	122	2.633	0.996	85	2.959	0.904	-0.326	-2.449
Boardsize	140	6.943	1.198	91	8.495	1.345	-1.552	-8.940
Executive	140	0.157	0.093	91	0.110	0.047	0.047	5.015
Chair_independent	140	0.457	0.500	91	0.648	0.480	-0.191	-2.910

This table presents the univariate analysis comparing firm value, profitability, financing cost, board structure between GL-REITs and non-GLREITs from 2002 to 2015. All variables are as defined in Table 2. The number of observations, mean value, and standard deviations are reported for non-GLREITs and GL-REITs separately. The last two columns show the differences between the means and the t-statistics.

Table 5. Firm value and Profitability

VARIABLES	(1) Q	(2) ROA	(3) ROE	(4) ROC	(5) Q	(6) ROA	(7) ROE	(8) ROC
GLREIT_D	0.133***	1.338	3.219*	1.617				
	(4.09)	(1.34)	(1.79)	(1.49)				
GLREIT_S					0.157**	4.056*	8.657*	4.284
					(2.37)	(1.66)	(1.82)	(1.61)
Leverage	0.004**	-0.111	-0.067	-0.140	0.004**	-0.111	-0.062	-0.138
	(2.14)	(-1.36)	(-0.44)	(-1.65)	(2.27)	(-1.42)	(-0.42)	(-1.64)
Ln(TA)	0.005	0.245	-1.400	-0.604	0.047*	0.261	-1.206	-0.495
	(0.16)	(0.24)	(-0.74)	(-0.55)	(1.77)	(0.28)	(-0.66)	(-0.47)
Age	0.000	-0.143	0.170	0.074	-0.002	-0.078	0.259	0.117
	(0.07)	(-0.80)	(0.60)	(0.43)	(-0.34)	(-0.39)	(0.81)	(0.60)
EBITDA/TA	-0.269				-0.231			
	(-0.96)				(-0.79)			
Constant	0.959***	3.696	8.419	12.344*	0.814***	2.355	8.265	9.895
	(4.61)	(0.77)	(1.03)	(1.95)	(5.27)	(0.54)	(1.00)	(1.47)
Observations	202	202	181	180	202	202	181	180
R-squared	0.585	0.448	0.527	0.526	0.541	0.453	0.535	0.531
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Property type FE	Y	Y	Y	Y	Y	Y	Y	Y

This table reports the results of OLS regressions testing the differences between GL-REITs and non-GLREITs on firm value and profitability from the year 2002 to 2015. All variables are as defined in Table 2. Year dummies and REIT's property type dummies are included in all columns, but these coefficients are not reported. Robust t-statistics are in parentheses, where standard errors have been corrected for clustering within firms over time. Significance levels are indicated by ∗, ∗∗, and ∗∗∗ for 10%, 5%, and 1%, respectively.

Table 6. Financing cost

VARIABLES	(1) WACC_debt	(2) WACC_equity	(3) Intcost	(4) WACC_debt	(5) WACC_equity	(6) Intcost
GLREIT_D	-0.350*	-0.470*	-0.005***			
	(-1.70)	(-1.82)	(-2.71)			
GLREIT_S				-0.993**	-0.018	-0.012***
				(-2.47)	(-0.04)	(-2.96)
Leverage	-0.011	-0.004	-0.000	-0.011	-0.005	-0.000
	(-1.09)	(-0.21)	(-0.95)	(-1.15)	(-0.29)	(-1.04)
Ln(TA)	0.418**	0.540**	-0.005***	0.398**	0.303	-0.005***
	(2.37)	(2.32)	(-2.65)	(2.49)	(1.39)	(-3.10)
Age	-0.045	0.099	0.001***	-0.053	0.120**	0.001***
	(-1.36)	(1.62)	(2.91)	(-1.65)	(2.01)	(2.70)
EBITDA/TA	0.780	0.047	-0.038**	0.943	-0.336	-0.036**
	(0.52)	(0.01)	(-2.18)	(0.62)	(-0.08)	(-2.13)
WAM			0.001			0.001
			(1.08)			(1.14)
Constant	2.432***	1.412	0.059***	2.282***	2.412	0.066***
	(2.84)	(0.87)	(4.66)	(2.69)	(1.64)	(5.52)
Observations	203	202	201	203	202	201
R-squared	0.669	0.611	0.412	0.674	0.605	0.422
Year FE	Y	Y	Y	Y	Y	Y
Property type FE	Y	Y	Y	Y	Y	Y

This table reports the results of OLS regressions on financing cost. All variables are as defined in Table 2. Year dummies and REIT's property type dummies are included in all columns, but these coefficients are not reported. Robust t-statistics are in parentheses, where standard errors have been corrected for clustering within firms over time. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1%, respectively.

Table 7. Board Structure

VARIABLES	(1) Boardsize	(2) Executive	(3) Chair_independent	(4) Boardsize	(5) Executive	(6) Chair_independent
GLREIT_D	0.669***	-0.014	0.484***			
	(2.65)	(-1.25)	(7.44)			
GLREIT_S				0.917	-0.035	0.884***
				(1.55)	(-1.19)	(6.28)
Leverage	0.021	0.001*	0.013***	0.022*	0.001*	0.014***
	(1.64)	(1.70)	(2.73)	(1.70)	(1.66)	(2.77)
Ln(TA)	0.754***	-0.064***	-0.291***	0.950***	-0.066***	-0.184**
	(3.47)	(-5.06)	(-4.10)	(4.75)	(-5.52)	(-2.51)
Age	0.049	0.013***	0.014	0.042	0.013***	0.014
	(1.04)	(4.16)	(0.66)	(0.85)	(4.21)	(0.66)
EBITDA/TA	0.598	0.110	0.252	0.720	0.114	0.243
	(0.33)	(0.94)	(0.35)	(0.39)	(0.98)	(0.32)
Constant	1.613	0.343***	2.399***	1.076	0.341***	2.195***
	(1.62)	(7.04)	(7.33)	(1.06)	(7.02)	(6.09)
Observations	203	203	203	203	203	203
R-squared	0.459	0.336	0.339	0.443	0.337	0.302
Year FE	Y	Y	Y	Y	Y	Y
Property Type FE	Y	Y	Y	Y	Y	Y

This table reports the results of OLS regressions on board structure. All variables are as defined in Table 2. Year dummies and REIT's property type dummies are included in all columns but these coefficients are not reported. Robust t-statistics are in parentheses, where standard errors have been corrected for clustering within firms over time. Significance levels are indicated by ∗, ∗∗, and ∗∗∗ for 10%, 5%, and 1%, respectively.

Table 8. Explain firm value difference and profitability difference: financing cost

VARIABLES	(1) Q	(2) ROA	(3) ROE	(4) ROC	(5) Q	(6) ROA	(7) ROE	(8) ROC
GLREIT_D	0.136***	0.483	1.934	0.797				
	(4.18)	(0.47)	(1.18)	(0.77)				
GLREIT_S					0.160**	2.123	5.871	2.493
					(2.41)	(0.90)	(1.35)	(1.01)
Leverage	0.004**	-0.116	-0.081	-0.150*	0.004**	-0.115	-0.076	-0.148*
	(2.24)	(-1.42)	(-0.56)	(-1.83)	(2.33)	(-1.42)	(-0.53)	(-1.81)
Ln(TA)	0.008	-0.163	-1.878	-0.867	0.048*	-0.265	-1.847	-0.869
	(0.24)	(-0.14)	(-0.96)	(-0.77)	(1.69)	(-0.23)	(-0.94)	(-0.77)
Age	-0.000	-0.104	0.293	0.139	-0.002	-0.063	0.363	0.171
	(-0.05)	(-0.43)	(0.93)	(0.72)	(-0.36)	(-0.25)	(1.04)	(0.81)
EBITDA/TA	-0.245				-0.223			
	(-0.86)				(-0.74)			
Intcost	0.657	-135.451***	-187.250***	-115.518***	0.212	-129.789***	-177.218***	-111.032***
	(0.55)	(-2.91)	(-2.74)	(-2.81)	(0.17)	(-2.92)	(-2.81)	(-2.85)
Constant	0.929***	13.196*	15.988**	11.344**	0.810***	13.613*	15.740**	11.290**
	(4.21)	(1.86)	(2.14)	(2.50)	(5.12)	(1.90)	(2.05)	(2.44)
Observations	202	181	178	177	202	181	178	177
R-squared	0.585	0.490	0.556	0.556	0.541	0.492	0.561	0.558
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Property Type FE	Y	Y	Y	Y	Y	Y	Y	Y

This table reports the results of OLS regressions in explaining the difference between GL-REITs and non-GLREITs using financing cost. All variables are as defined in Table 2. Year dummies and REIT's property type dummies are included in all columns, but these coefficients are not reported. Robust t-statistics are in parentheses, where standard errors have been corrected for clustering within firms over time. Significance levels are indicated by ∗, ∗∗, and ∗∗∗ for 10%, 5%, and 1%, respectively.

Table 9. Explain firm value difference and profitability difference: corporate governance

VARIABLES	(1) Q	(2) ROA	(3) ROE	(4) ROC	(5) Q	(6) ROA	(7) ROE	(8) ROC
GLREIT_D	0.135***	1.389	3.215	1.628				
	(4.26)	(1.24)	(1.58)	(1.37)				
GLREIT_S					0.124*	4.170	8.977*	4.518
					(1.94)	(1.57)	(1.68)	(1.53)
Leverage	0.004**	-0.122	-0.086	-0.152	0.004*	-0.123	-0.083	-0.150
	(2.16)	(-1.35)	(-0.52)	(-1.58)	(1.92)	(-1.43)	(-0.51)	(-1.60)
Ln(TA)	0.011	0.464	-1.076	-0.467	0.054*	0.467	-1.003	-0.425
	(0.32)	(0.42)	(-0.56)	(-0.40)	(1.68)	(0.46)	(-0.55)	(-0.39)
Age	0.002	-0.237	0.043	-0.006	-0.001	-0.172	0.131	0.038
	(0.37)	(-1.15)	(0.13)	(-0.03)	(-0.19)	(-0.77)	(0.36)	(0.16)
EBITDA/TA	-0.256				-0.231			
	(-0.90)				(-0.78)			
Boardsize	-0.012	0.217	0.310	0.242	-0.005	0.242	0.410	0.292
	(-1.37)	(0.63)	(0.56)	(0.69)	(-0.47)	(0.72)	(0.79)	(0.87)
Executive	-0.093	7.562	9.762	6.085	-0.085	7.691	10.792	6.600
	(-0.56)	(1.26)	(1.03)	(0.95)	(-0.49)	(1.27)	(1.11)	(1.02)
Chair_independent	0.009	-0.127	0.002	-0.083	0.039*	-0.107	-0.089	-0.126
	(0.44)	(-0.15)	(0.00)	(-0.10)	(1.66)	(-0.13)	(-0.07)	(-0.14)
Constant	0.990***	4.491	7.648	13.194	0.784***	4.430	6.869	9.044*
	(4.11)	(0.84)	(0.94)	(1.63)	(4.83)	(0.89)	(0.86)	(1.67)
Observations	202	202	181	180	202	202	181	180
R-squared	0.590	0.455	0.531	0.531	0.550	0.461	0.540	0.537
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Property Type FE	Y	Y	Y	Y	Y	Y	Y	Y

This table reports the results of OLS regressions in explaining the difference between GL-REITs and non-GLREITs using board structure proxies. All variables are as defined in Table 2. Year dummies and REIT's property type dummies are included in all columns but these coefficients are not reported. Robust t-statistics are in parentheses, where standard errors have been corrected for clustering within firms over time. Significance levels are indicated by ∗, ∗∗, and ∗∗∗ for 10%, 5%, and 1%, respectively.

References

Ang, J. S., & Ding, D. K. (2006). Government ownership and the performance of government-linked companies: The case of Singapore. *Journal of Multinational Financial Management*, *16*(1), 64-88.

Ang, J. S., Ding, D. K., & Thong, T. Y. (2013). Political connection and firm value. *Asian Development Review*.

Bauer, R., Eichholtz, P., & Kok, N. (2010). Corporate governance and performance: the REIT effect. *Real Estate Economics*, *38*(1), 1-29.

Bebchuk, L., Cohen, A., & Ferrell, A. (2008). What matters in corporate governance?. *The Review of financial studies*, *22*(2), 783-827.

Bhagat, S., & Bolton, B. (2008). Corporate governance and firm performance. *Journal of corporate finance, 14*(3), 257-273.

Bianco, C., Ghosh, C., & Sirmans, C. F. (2007). The impact of corporate governance on the performance of REITs. *The Journal of Portfolio Management*, *33*(5), 175-191.

Boone, A. L., Field, L. C., Karpoff, J. M., & Raheja, C. G. (2007). The determinants of corporate board size and composition: An empirical analysis. *Journal of Financial Economics*, *85*(1), 66-101.

Demsetz, H., & Lehn, K. (1985). The structure of corporate ownership: Causes and consequences. *Journal of Political Economy*, *93*(6), 1155-1177.

Feng, Z., Ghosh, C., & Sirmans, C. F. (2007). On the capital structure of real estate investment trusts (REITs). *The Journal of Real Estate Finance and Economics*, *34*(1), 81-105.

Feng, F., Sun, Q., & Tong, W. H. (2004). Do government-linked companies underperform?. *Journal of Banking & Finance*, *28*(10), 2461-2492.

Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate governance and equity prices. *The Quarterly Journal of Economics, 118*(1), 107-156.

Hartzell, J. C., Kallberg, J. G., & Liu, C. H. (2008). The role of corporate governance in initial public offerings: evidence from real estate investment trusts. *Journal of Law and Economics*, *51*(3), 539-562.

Hartzell, J. C., Sun, L., & Titman, S. (2006). The effect of corporate governance on investment: evidence from real estate investment trusts. *Real Estate Economics*, *34*(3), 343-376.

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance*, *48*(3), 831-880.

Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints?. *The Quarterly Journal of Economics*, 169-215.

Lang, L. H., & Stulz, R. M. (1994). Tobin's q, corporate diversification, and firm performance. *Journal of Political Economy*, *102*(6), 1248-1280.

Li, Q., Chow, Y. L., & Ong, S. E. (2014). Do changes in credit ratings of REITs affect their capital structure decisions?. *Journal of Property Research*, *31*(3), 264-285.

Li, Q., Ling, D. C., Mori, M., & Ong, S. E. (2018). The Wealth Effects of REIT Property Acquisitions and Dispositions: the Creditors' Perspective. *The Journal of Real Estate Finance and Economics*, 1-30.

Mak, Y. T., & Li, Y. (2001). Determinants of corporate ownership and board structure: evidence from Singapore. *Journal of Corporate Finance*, *7*(3), 235-256.

Ooi, J. T. L., Ong, S.-E., & Li, L. (2010). An analysis of the financing decisions of REITs:The role of market timing and target leverage. *Journal of Real Estate Finance and Economics*, *40*, 130–160.

Pittman, J. A., & Fortin, S. (2004). Auditor choice and the cost of debt capital for newly public firms. *Journal of Accounting and Economics*, *37*(1), 113-136.

Ramirez, C. D., & Tan, L. H. (2004). Singapore Inc. versus the private sector: are government-linked companies different?. *IMF Staff Papers*, 510-528.

Rossi, S., & Volpin, P. F. (2004). Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics*, *74*(2), 277-304.

Sengupta, P. (1998). Corporate disclosure quality and the cost of debt. *Accounting Review*, 459-474.