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Difficulties in Conducting Short Horizon Event Studies: Call for Further Research

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Abstract

The wide variety of applications and the richness of data available have made event studies commonplace in economic, finance, and accounting research. The strength of the event study methodology is that abnormal returns due to a firm-specific, but time independent event may be precisely estimated by aggregating results over many firms experiencing a similar event at different times. The case study examines whether Malaysian GLC's headline KPI announcements over the transformation period FY 2005-2014 resulted in significant abnormal stock returns. A pilot study using three-factor model of [4] showed that virtually all the significant abnormal stock returns were recorded in the first month following the announcement (short market reaction, i.e. short horizon). However, since the company book values used in computing the HML proxy factor is only available at month-ends, the [4] model cannot be used for this short horizon study; even though R-squared increased due to additional proxy factors besides company beta, namely company size and growth. Thus, the actual study had to be conducted using a one-factor Short Horizon Event Study - the risk factor (beta) for each security is obtained through regression and then used to predict daily stock returns, and subsequently the abnormal returns, over a short horizon of 30 days' post-announcement date. Company size factor was controlled by grouping the securities according to small, medium, and large securities. Results showed that small and large securities consistently recorded abnormal stock returns.

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Overall, the study has demonstrated that over a short horizon, the stock value of GLCs can be increased through headline KPI announcements, thus reinforcing the signalling and agency theories. The more important contribution of this research is that it has highlighted deficiencies in the current model to study short horizon events, which hopefully will encourage more rigorous future research.

Keywords: headline key performance indicators (headline KPIs); announcement; stock returns.

1. Introduction

The wide variety of applications (corporate events, macroeconomic events) and the richness of data available (from stock market) have made event studies commonplace in economic, finance, and accounting research. Firm-specific abnormal returns can be precisely estimated by aggregating results cross-sectionally over many firms experiencing a similar event at different times, and this constitutes the strength of this methodology. Evidences showed that an extremely large number of event study research have been conducted worldwide on stock market announcements [1:5]. For example, in the Turkey Stock Exchange alone, the authors [2] reported that a huge volume of studies was undertaken for announcements relating to corporate events such as dividend announcements, restructurings, capital expenditure projects, stock splits, litigations, management change, directors' equity dealings, mergers and acquisitions, etc. In the one-factor model of event studies, the abnormal stock returns are calculated by taking the difference between actual and predicted stock returns, the latter determined by company beta. Then in 1993, the authors [3] highlighted distinctively that this traditional one-factor model to predict stock returns only predicted about 70% of the returns, as according to his studies there is still another about 21% to be accounted by firm's size and growth. The same authors in [4] finalized their three-factor model for Event Studies with the following factors: company beta (β), a proxy factor for company size (SMB), and a proxy factor for company growth (HML). Since then, researchers have extended it to four and even five factor models, e.g. [5] included a fourth factor called "momentum

1.1 Problems Associated with Multi-factor Models

The present case study examines whether Malaysian government-led companies (GLCs) headline KPI announcements over the transformation period FY 2005-2014 resulted in significant abnormal stock returns. A pilot study using multi-factor model, though increases R-Squared, was found to be unsuitable for the short horizon event. Though R-squared increased due to additional proxy factors besides company beta, namely company size and growth, virtually all the significant abnormal stock returns were recorded in the first month following the announcement (short market reaction) – meaning that the short horizon is still the preferred mode to study headline KPI announcements (refer to Table 2). Unfortunately, the proxy factor for company growth (HML) uses book values and these are not available on daily basis to enable an event study over a short event window of one month (30 trading days). From the results of the pilot study in Table 2, it has been confirmed that headline KPI announcement is a short horizon study over approximately 30 trading days' event window. Thus using a long horizon approach would not help in understanding the trend of the stock returns over the 30 trading days. It is disappointing to know from this study that the authors [4] model is suited only for long horizon studies (e.g. merger and acquisition announcements, etc.) because no daily company book values are

available to enable a short horizon event study, at least in the case of the Malaysian Stock Market. Thus, the current researchers reverted back to the traditional one-factor model using company beta, but improved it by mitigating the effect of company size on stock returns; by grouping the stock returns according to firm size.

1.2 Primary Research Literature

The American Accounting Association [6: 353-362] in their journal Accounting Horizons ("Commentary" section) mentioned that so far (up to 2002) the evidences that disclosure of nonfinancial performance measures can enhance the value of financial measures disclosure due to complimentary and interactive effects between the two, have been anecdotal. It was much later, e.g. in 2012, that [7] confirmed that financial and non-financial measures have a complementary effect on analysts' ratings (N=119) to invest in firms. The high degree of comparability of financial performance measures across business segments have long been the factor that account for its wide usage among analysts and investors; but disclosing nonfinancial measures that compliments the financial measures would make analyst and investors more ready to accept them [7]. A large volume of previous studies had only examined industries in which nonfinancial performance measures are already publicly available directly from the industry sources, which may lead to concerns over small sample and sample selection biases. Examples of this are:

Table 1: Examples of Research in Nonfinancial Information Disclosure

#	Method	Findings
[8]	Regression	Nonfinancial and financial variables exhibit incremental explanatory power
[9]	Discussion of [8]	Findings motivate researchers to examine other industries to generalize the results.
[10]	Regression	KPI information contribute to the cross-sectional variation of stock prices in the wireless and e-comm industries
[11]	Regression	Earnings dominates EBITDA and cash flow from operations in explaining stock returns
[12]	Regression	DPS, EPS, and P/E ratios accounts for 57.8% of share prices movements
[13]	Event study with regression	Investor's decision is positively and significantly associated with earnings and with non-financial information in biotechnology industry
[7]	Regression	Financial and nonfinancial performance measures and their favorableness have an interactive impact on analysts' recommendation
[14]	Regression	DCF disclosures explain 64% of variation in contemporaneous stock prices
[15]	Regression	Nonfinancial information significantly affects the amount invested by investors.

Market reaction to the disclosure (announcements) of key performance measures, usually in the form of nonfinancial alongside financial KPIs, has not been researched adequately. Indeed, recent major studies, e.g. by [16, 17], on the economic consequences of disclosing nonfinancial performance measures were limited to only stock analyst usage of those KPI information in annual reports, which according to the latter is for the analyst's triangulation purpose only. According to [16], the determinants of KPI disclosure quality have been researched very limitedly, despite of evidences pertaining to the importance of financial KPIs disclosure for capital market.

Though there have been several studies about the value relevance of financial disclosures, the value relevance of KPIs (nonfinancial alongside financial KPIs) has not yet received much attention in academia [16]. Our study propagates that the best time to study the stock market reaction to KPI disclosure is not at the time the annual report is released, but at the time the KPI is first announced to the market. Indeed, according to a recent study in the UK by [17], equity analysts highlighted that a significant amount of KPI information is released to the market in advance of the annual report which to them (analysts) performs a confirmatory role only. Whilst analysts highlighted inconsistencies in calculation methods of KPIs they did not feel that a standard calculation should be prescribed. Further they did not feel that assurance (e.g. by auditors as suggested by [18]) over the calculation would be valuable as they perceived that this would remove the flexibility of companies to select the most appropriate measures that match with their firm strategy.

Thus the problem statement for this research can be stated as:-

"While the issue of KPIs reporting and disclosure has attracted growing interest by regulators, very limited empirical results are available to support such interest, e.g. the economic consequences of such reporting and disclosures."

Event study involves the analysis of security price behavior around the time of an information announcement of an event (event date). This sort of approach has been used to study a variety of events such as the announcements of annual earnings, accounting principle changes, corporate mergers, and so on [19]. The headline KPIs announced to the stock market can be financial, non-financial, or both. Financial KPIs are performance indicators tied to the financials, and are usually focused on revenue and profit margins. Financial KPIs assess the short-term impact of managerial decisions in areas such as revenue growth, asset utilization, and cash flows. Nonfinancial KPIs are performance measures that are not tied directly to the financials, like customer satisfaction index, employee engagement index, and other nonfinancial performance measures considered critical to the business and its stakeholders. Nonfinancial KPIs capture variables that are likely to influence future financial performance, such as customer service and quality products. The signaling theory argues that quality corporate disclosure is able to reduce the information asymmetry between insiders and outsiders (e.g. [20]). There is a possibility that the enhanced quality disclosure would lead to an increase in the demand for a company's share in the light of new favourable information being made available and also correct any firm misevaluation [21]. The KPIs reporting in the US and EU countries offers a unique setting to contribute to the disclosure literature. However, one shortcoming is that the KPIs disclosure can be considered as not fully mandatory in the sense that a high degree of discretion is left to the manager despite of its requirement by Companies Act (2006) in UK. Despite the favorable potential gains to the firm in using KPIs, in general, the literature on the economic consequences of disclosing KPIs (particularly the nonfinancial KPIs such as corporate governance, and customer and employee satisfaction) is not rich [22]. Authors [23] found that firms in four countries (China, Denmark, Malaysia, and South Africa) not only increase nonfinancial disclosure, but also seek assurance of those disclosures and adopt reporting guidelines that increase comparability of disclosed information. Authors [24] argue that the theoretical research provides little guidance on what form of KPI disclosure is relevant for various stakeholders. Authors [25] argue that there is a lack of a definition of voluntary disclosure and financial reporting quality and recommend that future research addresses this issue. In

spite of this call, researchers are still facing the challenge of identifying and capturing the most important dimensions of high quality corporate information like that found in KPIs [24]. Based on these arguments and the need for more assurance and clarity on the term "headline KPIs', the researchers conducted interviews to ascertain the precise nature of these headline KPIs, and in particular how they are set. The definition by [26] of 'professional elites' is used to identify the best informants i.e. interviewees, which refers to the employees working at some level of an organization, and they are 'highly skilled, professionally competent, and class-specific. In summary, the current researchers reviewed the literature on disclosure of performance measures and its consequences. They then address the current state of research for the purpose of establishing the research gaps. They noticed that the bulk of literature on KPI disclosure had centred around annual reports and limited to the regulatory disclosure requirements in the US and EU countries. Many argued that the KPIs disclosed via annual reports performs only a confirmatory role to previously release KPI information, thus its usage is limited interviews that seek analysts' opinion on the usefulness of the disclosures. Stock market announcements (and press releases) are more timely disclosures for analyzing stock market reaction, the only difficulty is identifying the date (event date) the information was first released. Finally, nonfinancial KPIs are often used to validate the financial KPIs used by stock analysts. The reliability of the nonfinancial KPIs makes its relevance impaired, but if reliability is not an issue, its impact on stock returns is positive and almost immediate.

2. Methods

For this study, the researchers lean on the pragmatism research philosophy (paradigm) where concepts become relevant only if they support action, and hence research question is the most important determinant [27]. Under this paradigm, there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities. This philosophy augurs well with the mixed-method research design adopted in our study, beginning with event study which is quantitative and followed by case studies on headline KPI setting processes (qualitative). The primary research question (RQ1) is: Do GLC headline KPI announcements generate significant abnormal returns (i.e. stock price gains or losses) surrounding the announcement date. The following research framework is used for the quantitative phase:

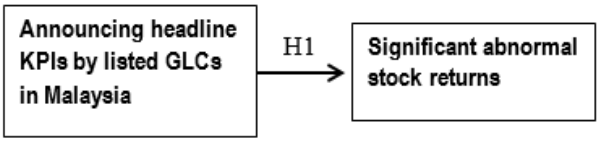


Figure 1: Research Framework for Quantitative Study

H1: Cumulative average abnormal returns due to headline KPI announcements by government-linked companies are significantly different from zero. To measure the effect (i.e. stock return, R) of a macroeconomic or corporate event like KPIs announcement on the value of a corporation, we measure the change in the price of the stock. Assuming that markets are rational in assessing the information released to them, it will set a new value that incorporates this information. Actual normal return of security j in period t,

$Rjt = (P_t - P_{t-1}) \div P_{t-1}$ where P is stock price.

2.1 Pilot Study Using Three-Factor Model

When two more factors relating to company size and growth (i.e., market capitalization and company book value to market value ratio) are added, [4] arrived at their three-factor model to predict stock returns which they found to explain more than 91% of the predicted stock returns. Expected or predicted returns using the [3] model is given by:

$E(R_{jt}) - R_{ft} = b_{jt}(R_{mt} - R_{ft}) + s_{jt} SMB_t + h_{jt} HML_t$ where t = 0, +6 months

i.e., $E(R_{jt}) = R_{ft} + b_{jt}(R_{mt} - R_{ft}) + s_{jt} SMB_t + h_{jt} HML_t$

Where,

$E(R_{jt})$ = *the expected return on asset j*

$(R_{mt} - R_{ft})$ = *the actual excess return on a stock j in time t*

R_{mt} = *the market return, on day t*

R_{ft} = *risk-free rate in period t of a long-term government bond*

SMB_t = *return differential between portfolios of small-cap and large-cap stocks*

HML_t = *return differential between portfolios of stocks with high book-to-market ratios (value stocks) and low book-to-market ratios (growth stocks)*

b_{jt} ; s_{jt} ; h_{jt} = *the coefficients or, we say, the betas of the three independent variables* $(R_m - R_f)$, *SMB , and HML, which are found by regressing the factors over 60 months (-60 months, 0) prior to the event window (= 0, +6 months)*

Actual returns are then obtained by excluding the expectation symbol $E(\ )$ from the equation and including the intercept, time subscripts, and a noise error term:

$(R_{jt} - R_{ft}) = \alpha_{jt} + b_{jt}(R_{mt} - R_{ft}) + s_{jt} SMB_t + h_{jt} HML_t + e_{jt}$ where t = 0,+6 months

Whereby,

e_{jt} = *error term, and* α_{jt} = *intercept*

At the beginning of the study, the researchers are not sure of the horizon to conduct the event study, i.e. whether announcing headline KPIs fall under a short or long event window. So a sample of data was run on the three-

factor model of [4], noting that only monthly book values and not daily book values) are available for Malaysian listed companies to calculate the book-to-market ratios (HML). Significantly large R-squared were observed for all the events (announcements). It reaffirms findings by [4] that company beta, size, and growth, effect stock returns. For this pilot three-factor study, the following result is obtained. The t-statistics are extremely low and just sufficient to make the AAR significant (Months +1 and +4) and CAAR significant.

Table 2: Results of Three-Factor Model (n=38) Source: Project Excel and SPSS Files

Month-End	**Average CAAR**	**Standard Deviation**	**t-Test**
0	1.982	7.219	1.693
+1	4.481	8.703	**3.174 ***
+2	-1.053	6.409	-1.013
+3	-0.970	6.429	-0.930
+4	2.439	5.506	**2.730 ***
+5	-0.872	4.422	-1.216
+6	1.232	9.855	0.770
Cumulative	7.238	16.446	**2.713 ***

* Significant abnormal returns i.e. above the critical value for t of 2.712

An overall CAAR of 7.238 (in Table 2 above) and t-statistic of 2.713 (critical t value = 2.712 for n=38) is obtained. Note the results using this three-factor model [4] are obtained monthly for the reason mentioned previously. It is observed from the t-test statistic that virtually all the abnormal stock returns occurred in Month 1. Although the t-value in Month 4 was slightly above the critical value for n=38, it is not as much as Month 1 t-value, and looking as the negative t-values for Months 2 and 3, the slightly higher t-value in Month 4 could be due to speculation (buying pressure). Our sample size n=38, has covered a wide cross-section of the listed GLC headline KPI announcements (i.e. representative). The determining of the SMB and HML factors (which are proxies for size and growth) has followed the sixteen steps formulated by [4] and took three months to finish covering the years 2000-2014.

2.2 Actual Study Using One-factor Model

Because of difficulties in obtaining daily book values to calculate HML in the three-factor model, to measure expected Market Return, E(R), the one-factor model, Capital Asset Pricing Model (CAPM) is used as in Equation 1 below which contains a factor coefficient known as firm beta (β). In the single-factor model, β is calculated by regressing the share's daily share price return over the 200 trading days preceding the event window against the KLCI (Kuala Lumpur Composite Index) for the same period. After that, the expected normal returns (for security *j* in period *t*) for each day in the event window was found by substituting beta into the CAPM in Equation 1 below.

$E(R)\,jt = Rft + \beta j\,(Rmt - Rft)$ $\quad t = -30, +30$ - Equation 1

Where, $\beta j = Cov\ (R_{j,}\ R_{mt}) / Var\ (R_{mt})$

In this theoretical formulation:

E(R)jt = the predicted normal returns for security j on day t

Rmt = the market return on day t

Rft = risk-free rate in period t of a long-term government bond

Cov (Rj,Rmt) = covariance between returns of a stock and market returns

Var (Rmt) = variance of returns on the market

βj = relative security risk compared to market risk

The abnormal return for each day in the event window is the difference between actual returns and the predicted normal returns, and this is attributed to the reaction of investors to the announcement.

$ARjt = Rjt - E(Rjt)$

Where:

ARjt = the abnormal return of security *j* in period *t*

E(Rjt) = the required or expected return of security *j* in period *t* as estimated

Rjt = actual return of security *j* in period *t.*

For any Day *t* (short horizon) or Month *t* (if long horizon) of the event window, the abnormal stock returns are added and averaged (cross-sectionally) as follows:

$$AAR_t = \sum_{j=1 \text{ to } N} AR_{jt}\, N$$

Where, N is the number of announcements in the sample at day *t*. Thus, the cumulative average abnormal returns (CAAR) up to any Day/Month *t* can be calculated by:

$$CAAR = \Sigma\, AAR_t$$

Where, *t* is any day from Day -30 to Day +30 (short horizon), or from Month 0 to Month +6 (long horizon), depending on the horizon studied. This statistical procedure to find abnormal stock returns was done on SPSS and MS Excel. The null hypothesis (H0) states that such cumulative returns are equal to zero, following a *t*-

distribution which is:

$$t_{AAR} = AAR_{jt} / [\sigma (AAR) / \sqrt{n}]$$

The statistical significance of the cumulative abnormal returns is given by:

$$t_{CAAR} = CAAR_{jt} / [\sigma (AAR) d^{0.5}]$$

Where, σ(*AAR*) is the estimated standard deviation, *d* stands for the total number of days for which AAR is cumulative. Once the primary research question (RQ1) is answered, the study proceeded to studying the nature of the headline KPIs (its setting process) as there is no universal definition for it.

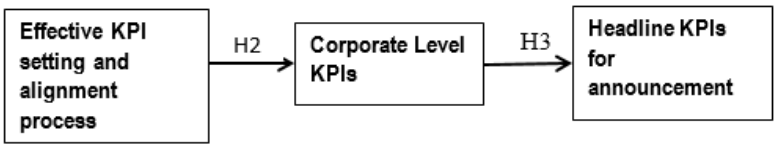


Figure 2: Research Framework for Qualitative Study

H2: There are effective KPI setting and alignment processes in government-linked companies to support corporate level KPIs.

H3: Headline KPIs in government-linked companies are selected from corporate level KPIs.

Thus the whole study hence becomes a mixed-method design like this:

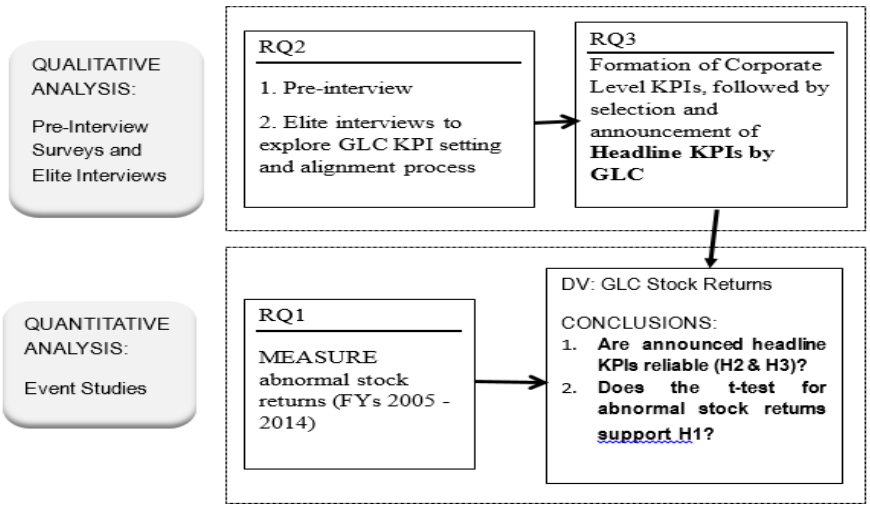


Figure 3: Theoretical Framework

RQ1: Do GLC headline KPI announcements generate significant abnormal returns (i.e. stock price gains or losses) surrounding the announcement date.

RQ2: Are there effective KPI setting and alignment processes in listed government-linked companies in Malaysia?

RQ3: How are announced headline KPIs determined (selected) in government-linked companies?

3. Results

The Cumulative Average Abnormal Returns (CAAR) for N=120 is shown graphically below in Figure 4. Significant CAARt (t > 2.358) are earned from Day 7 onwards (late reaction), thus the first hypothesis (H1: CAARt > 0) is supported. Additionally, the daily abnormal returns (ARs) were analysed for N= 120 at 99% confidence interval, and critical value 2.358. Table 3 below shows the significant abnormal returns (AARs) which can be either positive (peaks) or negative (troughs).

Table 3: Summary of Overall Findings (N=120) for the Significant (*) Daily Abnormal Returns (Critical value for t = 2.358)

Event Date	AAR $_{population}$	AAR $_{population}$ (t-statistic)
-20	-0.28	-1.92
-1	0.31	2.15
0	0.32	1.68
2	0.00	-0.01
7	0.63	**3.35***
18	-0.34	**-3.06***
29	0.45	**2.82***

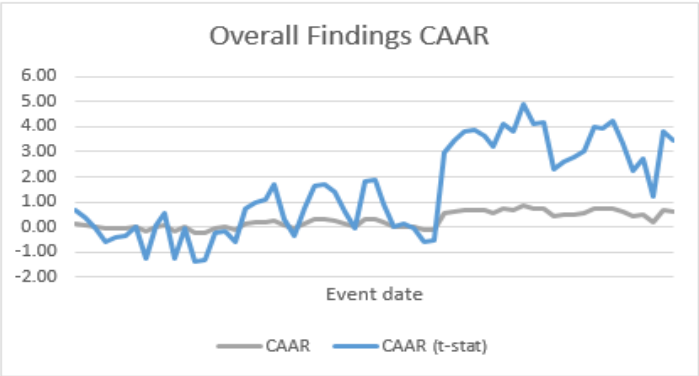


Figure 4: Graph of Cumulative Average Abnormal Returns and t-statistics (Critical value for t 2.358 and Event Window -/-* 30 Days)

For our short horizon event study, we can still control the size effect by grouping and analysing the firms (GLCs) according to size, as done in this study – refer to Figure 5 below. On company size basis, the trend of abnormal returns from one-factor study can be displayed as follows:-

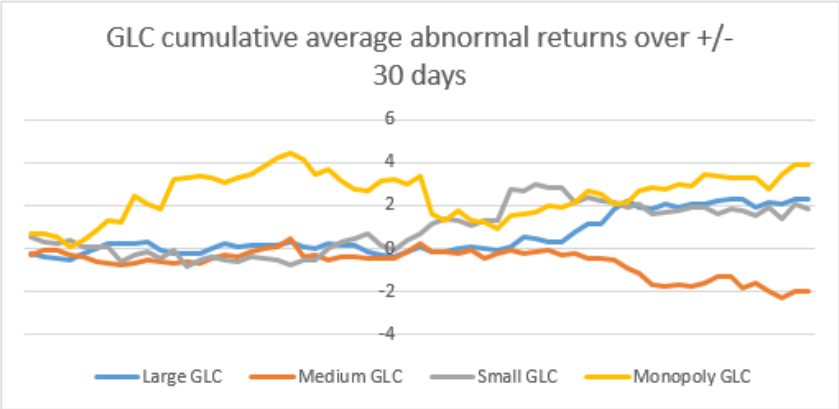


Figure 5: Cumulative avenge abnormal returns according to firm size using one-factor model (Event Window 30 Days)

Almost all the interviewed respondents (KPI senior managers) gave ratings of above 8 out of 10 for "KPI setting and alignment" in their GLC (GLC group), with only one exception (i.e. Takaful Ikhlas Berhad of MNRB Group) which gave 7/10 for KPI setting, but indeed 10/10 for alignment. Strategic alignment is also observed whereby all respondents augur (find it comfortable) on the use of the Balanced Scorecard to align functional objectives (and the KPIs) to the firm's strategy. The findings from the interviews indicated that all the GLCs' KPIs are aligned to the strategy, with strategy mapping being the common mechanism to align KPIs. Given these findings for the qualitative study, that Hypothesis 2 and Hypothesis 3 are both supported, hence, Hypothesis 1 is further augmented and supported.

4. Discussion

Eventhough the pilot event study was conducted using three-factor model (section 2.1), it only led to the conclusion that all the significant abnormal returns were recorded within the 30 days after announcement date (Table 2), meaning that headline KPI announcements fall under a short horizon study and the abnormal returns have to be calculated daily. Since the three-factor model by [4] could not calculate daily factors for growth (SMH) because no daily company book values are available, the actual study has to be conducted using a one-factor model (Equation 1). The firm size factor was control crudely by grouping the securities according to size (Figure 5). The one-factor model, after controlling for the size effect (Fig. 5 above), shows significant abnormal returns for large and small GLCs, but not for the medium-sized ones. Overall for all GLCs, there is significant abnormal returns from headline KPI announcements. Results from the qualitative study indicated that headline KPIs are selected from the Corporate Level KPIs, which in the GLC's opinion will meet its most critical stakeholders' expectations. As indicated in the qualitative study, the proper setting and alignment of KPIs is documented in all the cases studied. Headline KPIs are generated from critical operational KPIs that flow up from subsidiaries to the holding company to be amalgamated into the Corporate Level KPIs. Given the quantitative finding that the market reacted rationally to headline KPI announcements, performance executives should explore the best driver measures for these headline KPIs. Announcing headline KPIs appears to mitigate the individualistic aspects of the agency theory, and provide more added-value to the GLC. This research has

adopted a signalling theory approach underpinned by agency and contingency theories to answer the research questions. It demonstrated how GLCs use signalling theory to reduce information asymmetry between managers and stock market participants through transparent business reporting of headline KPIs, which in turn enhances the GLC market value (share price). On the other hand, the type of headline KPIs announced by a GLC is contingent upon the expectation and goals set on the GLC by its most critical stakeholders. Headline KPI announcements is one way managers of a high-quality firm can signal the firm's true and potential value to its stakeholders, besides good company management and governance. Specifically for GLCs, they engage in headline KPI reporting as a way to signal to stakeholders the success of their transformation initiatives. Additionally, when the headline KPIs are benchmarked to the industry (e.g. Airport Service Quality, i.e. ASQ), the GLC is actually providing high quality information to the stakeholder's showing that they are doing better than rival companies (non-GLCs in the same industry). Thus, it is crucial to document a precise operational definition of headline KPIs, if GLCs want to announce headline KPIs that convey the right picture of their performance. Key to the success of headline KPI announcements is the proper management of the KPI system itself. This implies that KPI executives must implement specific plans to set challenging tresholds (targets) to achieve. Strategies to enhance the performance culture must be implemented. Employees must feel empowered while still exhibiting transparency with regards to the benefits and risks of KPI announcements. To ensure there is value derived from headline KPI announcements, performance executives must be able to help employees understand the organizational fit and implications of their own work and the importance of achieving KPI targets (tresholds) to the organization as a whole, particularly headline KPI targets. Division managers must assist individuals in interpreting events and their relevance within the context of headline KPI announcement. Through the use of proper corporate communications, performance executives can convince and engage their organizations' people in realizing the benefits from headline KPI announcements. The employees must see the perceived value of their effort, and get rewarded for achieving crucial headline KPIs. Undeniably, the effective monitoring role of the board of directors is a factor that contributes towards good corporate governance, and their strong support for high quality reporting of headline KPIs will boost investors' confidence in the GLC as it signals the board's commitment to corporate success. The challenging part of the qualitative research is in getting a whole set of the KPIs used by the GLC, and in this respect, the pre-interview survey instruments using the most popular KPIs list (KPIs according to industry) purchased from the KPI Institute, Australia, has tremendously assisted the researcher to get an overall view of the KPIs used (an indirect means) even prior to the interview sessions. MA Sepang Bhd (KLIA) management was so impressed with the contents of the pre-interview instrument that they requested from the researcher a copy of the published study that has been done by the KPI Institute on the World Airport Industry KPIs. As mentioned, another challenge is the absence of daily firm's book values. Researchers conducting short horizon event studies will have to be contented in using one factor model, controlling the size effect by grouping manually the securities according to small, medium and large companies, as performed in this study. But the digitalization era may bring about new changes and make daily reporting of company book values possible. Till such time, it looks like the three factor model of [4] and others like [5] four-factor model (an extension of [4]), will only be suitable for long horizon (prolonged market reaction) Event Studies. For short horizon event studies, there lies an urgent need for more research into developing multi-factor models, as the existing one-factor model is able to predict only about 70% of the abnormal stock returns [4].

5. Conclusions

It can be concluded from the event study (quantitative) that both the large and small GLCs had contributed towards significant positive abnormal stock returns (Figure 5). However, compared to the superior positive abnormal stock returns of large and monopoly GLCs, the small GLCs' contribution towards positive abnormal returns is much less. Larger GLCs documented higher stock returns than small GLCs in Malaysia, and both performed better than medium-sized GLCs. The quantitative findings in the pilot study also show that the long horizon study using the three-factor model by [4] is not suitable when used in a short horizon (short market reaction) study like headline KPI announcement. Nevertheless, the high R-squared of about 0.91 confirms [3] findings that firm size and growth value are two additional factors that significantly explain stock returns, apart from the firm beta. Difficulty, or impossibility perhaps, in getting daily book values for the stock market firms to calculate HML coefficients in the[4] three-factor model, limits its application to long horizon studies only. This is because the event window (which will then be in months) is only suitable for studies of corporate events with anticipated late (prolonged) market reaction, e.g. corporate studies of post-merger and acquisition events, post-rights issues events, or post general election (macroeconomic issue). Same goes for the regression period which will then stretch into years (60 months as suggested by [1] or 5 years in our case).

Pending a system for stock market firms to post their daily book values from their balance sheets, which may not be foreseeable in the near future, the one-factor model using firm beta to predict stock returns will have to be used for short horizon studies e.g. headline KPI announcements. In conclusion, the results of both the quantitative and qualitative studies supported all the three Hypotheses and Research Objectives in this study: H1 is supported: Cumulative average abnormal returns due to headline KPI announcements by government-linked companies are significantly different from zero. (This means that there are significant abnormal stock returns from GLC headline KPI announcements in Malaysia, and is positive, i.e. CAAR > 0) H2 is supported: There are effective KPI setting and alignment processes in government-linked companies to support corporate level KPIs. (This means that there are appropriate KPI infrastructures supporting the Corporate Level KPIs in Malaysian GLCs) H3 is supported: Headline KPIs in government-linked companies are selected from corporate level KPIs. (This means that the announced GLC headline KPIs for financial periods 2005-2014 are reliable) Though the study is not about the efficient market hypothesis (EMH) per se, it contributes towards understanding the level of efficiency of the Malaysian stock market, which is the extent to which the market reflects new information rapidly in the share price. Overall, this study corroborates the view that meaningful, reliable, and standardised methods of determining headline KPIs are essential for GLCs that wish to announce them. This study attempts to highlight important information, concepts, tools, and techniques, that public listed companies should consider in the development of an effective strategy to announce headline KPIs to the market.

The one-factor study using firm β as the factor coefficient remains the the principal method in short horizon studies: $E(R)\,jt = Rft + \beta j\,(Rmt - Rft)$. Estimating the β is not problematic because daily share prices and stock market indices are available on daily basis. The main problem is the low R-Squared – only about 0.7 according to Fama and French (1993, 1996) study on the Wall Street stocks. In contrast, analysis using the three-factor model very often yielded very high R-Squared (close to 0.9 as I Table 4 below) with nice P-P Plot.

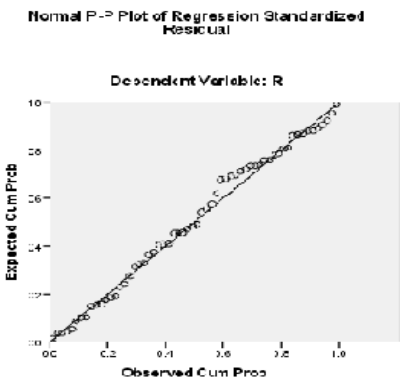
Table 4: R-squared from Three-Factor Model (Source: SPSS project file)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.942[a]	.887	.881	1.9100251

a. Predictors: (Constant), HML, SMB, Rm-Rf

b. Dependent Variable: R



The researchers re-iterate here again that there is a pressing need for developing suitable multi-factor models for short horizon event studies. Authors [3, 4] advocated and provided empirical support for their three-factor model, but the method model is unsuitable for short horizon studies: E(Rjt) = Rft + bjt (Rmt − Rft)+ sjt SMBt + hjt HMLt. The problem is not in the goodness of fit (coefficient of determination, R-squared) but in the determination of coefficient h, for which daily data on company book value is not available. These two factor coefficients (s, h) have to be determined at month-end for studies involving [4] three-factor model. For long horizon studies, the [4] formula works well, but not for short horizon studies which invariable use daily data to predict stock returns. At least in the Malaysian stock market, company book values are posted from the Balance Sheet only at month-ends. Alternative three-factor models to that of [4] are also not available to study short horizon events. Four and five factor models have been proposed, but they are merely extensions to the three-factor model by [4].

6. Recommendations

The title of this study alleviated the need to do further research in short horizon event study multi-factor models. Though the three-factor model by [4] contained additional proxy variables for firm size and growth which contributed towards higher R-squared (typically close to 0.91), the method of determining the growth proxy has to be re-emphasized (re-visited) for short horizon studies. Researchers have to test other means to determine this proxy variable for growth, since firm book values are not available on daily basis. As far as the firm size proxy, it can be controlled (albeit crudely) by conducting the study according to various firm size groups, which again is not satisfactory. Undoubtedly, a lot of time and cost has to be expensed for further research using data from Wall Street or other big markets, of similar time and scale to that performed by [3].

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