The Impact of Market Sentiment on Business Fixed Investment in Malaysia

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Abstract Understanding how market sentiment reflects the firm investment decision (capital expenditure) is crucial for businesses to make a proper investment strategy. This is because investor sentiment and firms' investment decision-making lie behind the reasoning that a firm's investment selection forms the most crucial part of its overall business decisions. Thus, this study examines how market sentiment, measured by Business Condition Index (BCI) and Consumer Sentiment Index (CSI), reflects Malaysian firms' investment from 2000 to 2018. This study applies a system generalised method of moment (GMM) technique with 673 firms' unbalanced panel data. Due to global uncertainty and market downturn, an investor's confidence level can change from optimism to infectious pessimism. When the market is pessimistic, investors' confidence becomes negative, leading to a decline in capital expenditure (CAPEX). The findings show that both market sentiment indicators significantly influence private firms' investment. Higher market sentiment indices create optimism for firms and increase business fixed investment.

Keywords Market sentiment · Firm investment · Systematic GMM · Tobin Q · Investment

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1 Introduction

Market sentiment, which portrays investors' irrational expectations towards investment performance, has been a central focus of the economic research, as it holds the key to making sound investment decisions (Cuomo et al., 2018; Haritha & Rishad, 2020; Moseki & Rao, 2018). The financial market's uncertainties and complexities have influenced how investors perceive an investment instrument's future profitability, affecting its price, hence overall performance. Understanding how investors feel about any investment equity is crucial to help them seize better opportunities since such information can expose investors' investment preferences (Kenneth & Statman, 2000). For that reason, scholars have been exploring the correlation between market sentiment and investment returns, intending to find the empirical evidence of market sentiment's impact on the financial market; the significance of market sentiment in the investment performance; and the best indices to capture the market sentiment (Chen et al., 2020; Chowdhury et al., 2021; Danso et al., 2019).

However, as much as scholars want to unlock insights into how market sentiment plays a role in yielding investment performance, market sentiment analysis is certainly not an easy task. The intangibility of investors' feelings or beliefs towards the stock market makes it challenging to precisely measure the investors' confidence in a particular asset or the stock market. Moreover, the financial market is a complex system of key players and investors whose mindsets are influenced by numerous factors, including price history, economic reports, and other external factors, adding more to quantifying the market sentiment (Stauffer & Sornette, 1999). Past studies have used different indicators to represent market sentiment in their empirical analyses. Some examples are; Consumer Confidence Index (Schmeling, 2009; Wang, 2018), Conference Board's Consumer Confidence Index (CCI) (Ho & Hung, 2009), market liquidity (Baker & Stein, 2004), and Baker and Wurgler's index (Yu & Yuan, 2011). Creating an investment sentiment index by exacting principal components from several proxy variables suggested, is often associated with choosing suitable proxies (Baker & Wurgler, 2006). Meanwhile, some countries require other proxies of market sentiment depending on their actual market conditions and rules (Chen et al., 2020). A study by Chaiyuth et al. (2019) revealed that investor sentiment proxy by trading volume also plays an essential role in stock market activities. However, the relationships between investor sentiment and stock market activities are different between developed and developing markets. Interestingly, the developed stock markets over-react more to the search volume than developing markets.

The growing importance of understanding the relationship between investor sentiment and firms' investment decision-making lies behind the reasoning that a firm's investment selection forms the most crucial part of its overall business decisions. Hence, it is only relevant to identify the investor sentiment's direct impact on firms' investment decisions. Good market sentiment will encourage the managers to reinvest and encourage the participation of new investor in the market due to the positive expectation of the future profit. Meanwhile, the Malaysian financial market has not

been excluded from the effect of market sentiment. The investment-sentiment literature for the Malaysian case has shown that investors' confidence in the stock market significantly influences stock market returns (Tuyon et al., 2016; Zainudin et al., 2019). Furthermore, scholars have extended market sentiment by investigating how such a sentiment drives firm investment decisions (Dang & Xu, 2018; Danso et al., 2019; Du & Hu, 2020; Zhaohui & Wensheng, 2013; Zhu et al., 2017). Nevertheless, despite the proliferation of market sentiment and firm investment studies as seen in the literature, there has been minimal research on such studies for Malaysia's case. Jiun Chia et al. (2020) have examined COVID-19 and Movement Control Order (MCO) on Malaysian equity return.

In the Malaysian context, private sector investment is more volatile than other aggregate demand components. The ratio of private sector investment as a percentage of GDP was higher at 27% in 2000. However, the rate dropped in 2009 to 18%, the lowest level due to the 2007/2008 Global Financial Crisis (GFC). Capital expenditure was up and down, recorded at 26% in 2016 before falling below 24% in 2018. Both market sentiment indicators fell below 100 points in 2008/2009 due to the GFC but showed a positive momentum after 2010 to rise above 100 points. Thus, examining how the movement in BCI and CSI has been reflected in the capital investment (firm-level) is crucial to understand further how the firm investment responds to market sentiment. Thus, given this background, the main objectives of this study are three-folds. First, it examines the determinants of Malaysian listed firms' investment decisions by focusing on the role of market sentiment indicators. Second, it examines how small and big firms' investment decisions behave differently in response to market sentiment and other firm-specific variables. Third, it analyses the long-run response of the firms-level investment spending to market sentiment and other variables.

This study contributes to potential stakeholders and the literature in the following ways. First, it shall have implications for investors and traders in planning their investment decisions prudently and for policymakers' relevance to precisely implementing a monetary policy to stabilise the market sentiment. Firms need to invest in proper capital investment strategies because its decision will affect their future performance. In contrast, stabilising the market sentiment is crucial for the monetary authority to minimise the fluctuation of the capital investment and stabilise the aggregate expenditure and domestic price level. Second, to the literature, this study extends the Malaysian market sentiment by focusing on the impact of market sentiment proxied by BCI and CSI on capital expenditure (CAPEX) of Malaysia's publicly listed firms, relying on a recent dataset (2000 to 2018) and an extensive sample of publicly listed firms (673 firms). This study also augments the Tobin-Q investment model by controlling firm characteristics such as size, asset tangibility, growth, and cash flow. Third, this study employs a recent dynamic panel GMM model to capture short-run and long-run relationships among variables. The dynamic panel technique can illustrate the dependent variable's lagged effect or temporal dependency on the explanatory variables, which indicates that its past realisations determine the dependent variable.

The remaining of this chapter is organised as follows. Section 2 summarises the related theory on investment and organised the literature debates regarding the

determinants of firm-level investment. Section 3 focuses on the research methodology and econometric specification, whereas Sect. 4 summarises the main empirical findings using dynamic panel data. Section 5 concludes and discusses some policy implications of the new findings.

2 Market Sentiment and Investment Decision

2.1 Theoretical Perspective

The theory of market sentiment affecting investment decisions has been explored by a few researchers, such as Barberis et al. (1998), Daniel et al. (1998), Hong and Stein (1999), and Chari et al. (2017). Based on their studies, investors tend to overreact or underreact to the news prevailing in the stock market. Optimistic news can drive investors to an exaggerated optimism about the future; therefore, their overreaction can lead to increased stock prices. Contrariwise, when news announcements are likely to contradict optimism, it may lead to lower returns (Barberis et al., 1998). Markets become more dynamic as many investors enter them; therefore, intuition alone in making a decision will cause errors and losses in some cases (Hirshleifer, 2015; Norman et al., 2017). The decision maker's emotions drove the firm investment decision depending on the situation or event (Hribar et al., 2017).

Gao and Suess (2012) constructed their sentiment index based on six proxies: changes in implied volatility and skewness, first differences in Chicago Board Options Exchange Volatility Index (CBOE's VIX) and Chicago Board Options Exchange Skewness indexes (CBOE's SKEW), changes in closed-end fund discounts, first-day returns of IPOs, changes in trading volume, and changes in the dividend premium. Meanwhile, Baker and Wurgler (2007) formed a composite index of sentiment based on the common variation in six underlying proxies for sentiment: the closed-end fund discount, New York Stock Exchange (NYSE) share turnover, the number and average first-day returns on Initial Public Offering (IPOs), the equity share in new issues, and the dividend premium. Ishijima et al. (2015) built an index of the Nikkei market sentiment, a popular newspaper in Japan. Zhou (2018) reviewed various investor sentiment measures and applications based on market data, surveys, text, and news media. He concluded that there is a need to produce more accurate sentiment measures that yield a systematic sentiment factor explaining the cross-section of asset returns. This approach is vital to understanding how sentiment has been used in practice and affects prices, enhances the economic value of sentiment information, and understands the corresponding risk premium. Thus, investor sentiment shall not be taken lightly; it must be analysed and evaluated to consider the information forecasted before making an investment decision.

Investor sentiment reveals the movements in financial markets dictated by the psychological perception of operations or trades (Concetto and Ravazzolo, 2019). Extensive studies have been done on market sentiment, but most studies are on the

relationship or effect of market sentiment on other important financial and economic variables. The market sentiment influences a foreign investor before deciding whether to proceed with an investment. Hassan et al. (2016) examined investor sentiment toward Foreign Direct Investment (FDI). They found that investor sentiment has a positive bidirectional relationship with FDI, surpassing all other macroeconomic variables regarding the impact on FDI. Malaysia must create good market sentiment conditions to attract more foreign sources as an emerging economy. Consistent with our argument, Hassan et al. (2016) suggested that Malaysia must positively impact the local and regional economy and financial development as an impetus for foreign investors to invest in Malaysia as an emerging country. The high and low market sentiment are essential indicators for an emerging market since market sentiment has a positive relationship with firms' investment and affects countries' performance in attracting FDI.

2.2 Previous Empirical Evidence

The sentiment is one of the essential behavioural risks reflected in the stock market (Tuyon et al., 2016). Market sentiment affects various areas of finance and the economy as it is responsible for the volatility of stock prices in the market, which may include macroeconomic factors such as inflation, FDI, unemployment, and income (Raza, 2015; Raza & Jawaid, 2014; Raza et al., 2015). These sentiments do not follow the necessary knowledge or statistics; they rely on general market information or particular market trends (Raza et al., 2019). Zhu et al. (2017) found that market sentiment affects firm investment through top management decisions. For example, top management teams' irrational investment decisions cater to investor sentiment and ignore the feasibility of companies' projects and conditions. Overconfident managers believe that they can generate greater profit from their investment ventures. This overconfidence often leads to overinvestment (Ben-David et al., 2013; Campbell et al., 2011; Goel & Thakor, 2008; Graham et al., 2013; Malmendier & Tate, 2008; Pikulina et al., 2017). As a result, they overvalue their investment ventures and incorrectly interpret negative net present value (NPV) projects as value-creating (Kim et al., 2016). Therefore, the companies' stock prices collapse due to continuously undertaking negative NPV projects, which leads to the company's bad performance. Besides, the manager's overconfidence may affect the crash risk if the manager is more dominant in the top management team, mainly if there are more significant differences in the investor.

On the other hand, Tuyon et al. (2016) found that sentiment captures price overreaction, which is corrected in the short-run as in two-sized portfolios. Besides, Jiang et al. (2018) stated that market sentiment affects firms' top management's investment decisions. Danso et al. (2019) found that market sentiment and firm investment positively correlate using alternative investment measures. They also observed that the sentiment-investment relationship is significant and positive across all models, even after dealing with possible endogeneity issues. Research on market sentiment

supports the role of psychological and cognitive biases in influencing firms' corporate decisions. Top management teams are not rational; they may make investment decisions that cater to investor sentiment and ignore the feasibility of projects and companies' conditions to some extent (Danso et al., 2019; Zhu et al., 2017).

Zhou (2018) argued that investor sentiment shows the gap between the asset's valuation and its economic bases, which can be measured from various sources such as market surveys and official documentation. Mushinada and Veluri (2018) found that the post-investment analysis is necessary for the investment to correct the errors from previous behavioural estimates. Market participants' behaviour is heterogeneous due to the assumptions regarding risks and returns and induces market noise. The findings contradict the idea that efficient markets will make the information sufficient if the investor behaves rationally. Meanwhile, Dang and Xu (2018) further found that market sentiment affects R&D investments through its influence on manager sentiment. Market sentiment is imperative to firms' investment levels. The effect of market sentiment on firm investment is amplified when there is an influx of free cash flow and unused debt capacity. Besides, Danso et al. (2019) found that excess cash flow reinforces the sentiment-investment relationship, intensifying the manager's choice to invest more during high sentiment periods. Otherwise, market sentiment can be valuable in driving firms' investment decisions. Researchers also found evidence of the relationship between investors' sentiment and firm investment even for IPO performance (Danso et al., 2019; Giannini et al., 2017; Zalina et al., 2019; Zhu et al., 2017). Market sentiment undoubtedly affects firm managers' decisions to invest. Increases in market sentiment may cause investors to increase their investments in higher-risk fund categories and reduce their investments in safer funds (Hilliard et al., 2019). Human factors such as judgement and behaviour (optimism or pessimism) hold an essential position in a firm. Even with information in hand, managers responsible for investing in the future face an absolute risk that must be dealt with.

In the Malaysian context, studies relating to firm investment determinants highly concentrate on capital structure and financial constraints (Abdulazeez et al., 2020; Ismail et al., 2016; Ramli et al., 2019). Malaysia and the investors have unique features such as culture and government institutions comparable to other developing and developing countries in the market (Vuong & Suzuki, 2020). Furthermore, well-developed and functioning bonds in Malaysia are compatible with developing an equity market (Matemilola et al., 2018). Ramli et al. (2019) suggested that capital structure is vital in managerial decisions. The study about market sentiment which affects firm investment in Malaysia is relatively understudied. Zainudin et al. (2019) focus on Malaysian IPO firms, while Tuyon et al. (2016) have studied the role of investor sentiment in the Malaysian stock market. Their principal findings revealed a positive long-term and short-term relationship, which is more pronounced in a big company and cyclical industry in the market. The sentiment data from news prevailing in the market is considered reliable information to the investor (Kuan et al., 2017). Besides, Zainudin et al. (2019) support the notion of investor sentiment and timing theory as a valid phenomenon in Malaysia.

Given this background, this present study differs from the previous studies, particularly in the Malaysian context, in the following ways. First, compared with the previous study that has concentrated on the impact of market sentiment on stock return, this study extends the literature by focusing on market sentiment (BCI and CSI) on firm-level investment spending. Second, although Karim and Azman-Saini (2013) have modelled the determinants of firm-level investment in Malaysia, their study has not considered the role of both market sentiments, namely, BCI and CSI. Third, this present study has used more recent data (up to 2018) and large firm size (673 firms) to better understand how market sentiment reflects the investment decision by controlling firm-specific variables.

3 Research Methodology

According to Toit and Moolman (2003), there are four main investment models: the accelerator model, cash-flow model, neoclassical model, and Tobin's Q model. However, the most widely used investment model is Tobin's Q model (Harrison et al., 2004; Laeven, 2002) and is also commonly used in empirical studies (Bharadwaj et al., 1999). One of Tobin's Q model advantages is that it can calculate the firm's past and expected future performance. Tobin's Q is calculated as the ratio of market value to the book value of total assets. This ratio shows the importance of investments in a firm. Tobin's Q above 1 indicates that the firm has expanded in value and managed accurately. It means higher economic performance (Copeland & Weston, 1988). An essential strength of Tobin's Q model is that it shows the present value of expected future profits. For this reason, the study employs the Q investment model in investigating the relationship between market sentiment and firm capital investment in Malaysia. The baseline model used in this study can be represented as follows:

$$Investment_{i,t} = \propto + \beta_1 TobinQ_{i,t} + \beta_2 Sentiment_{i,t} + \beta_3 X_{i,t} + \omega_i + \mu_t + \varepsilon_{i,t} \quad (1)$$

In Eq. (1), i denotes the ith firm, and t represents the fiscal year. Investment as the dependent variable is firm capital expenditure (CAPEX). The use of CAPEX to proxy the firm's investment is in line with many previous studies, for example, Chirinko et al. (1999), Bhagat et al. (2005), Karim and Azman-Saini (2013), and Ismail and Yunus (2015). The market performance indicator Tobin's Q measures firm performance in the stock market (Koo & Maeng, 2005). Singhal et al. (2016) found that higher Tobin's Q ratios are related to firms' higher future operating performance. The sentiment variable was based on the Malaysian Institute of Economic Research (MIER), Business Sentiment Index (BSI), and Customer Sentiment Index (CSI) and counted as a yearly average of the past four quarters of data. X is the vector of the control variables employed in the analysis, α and β are parameters, ω_i is a firm-fixed effect, and μ_t is a year-fixed effect, and $\varepsilon_{i,t}$ is the errors term. All continuous variables are tested using Cook distance to mitigate outliers' effect (Cook, 2000). Finally, to

deal with potential reverse causality between dependent and independent variables, this study follows existing literature (e.g. Danso et al., 2019) by considering the lagged dependent variables by one period ($INV_{i,t-1}$). Thus, the baseline model in Eq. (1) can be rewritten as follows:

$$INV_{i,t} = \propto INV_{i,t-1} + \beta_1 Q_{i,t} + \beta_2 Sentiment_{i,t} + \beta_3 GROW_{i,t} + \beta_4 CF_{i,t} + \beta_5 TANG_{i,t} + \omega_i + \mu_t + \varepsilon_{i,t} \quad (2)$$

In Eq. (2), INV refers to CAPEX as a percentage of the previous capital stock (PPE), Q refers to the firm performance measured by Tobin's Q, GROW is the one-year growth rate of sales, CF is the cash flow, which is defined as operating income plus depreciation, and TANG is asset tangibility, which is the ratio of property, plant, and equipment to the value of total assets.

3.1 Data and Variables

This study used the sample of companies listed on the Main Market of Bursa Malaysia (Malaysian Bourse) from 2000 to 2018. The financial data have been collected from Thompson Reuters Datastream, and the sentiment index is obtained from the MIER survey. The data for a listed firm represents various sub-sectors of the economy, such as construction, food production, industrial, household goods and home construction, general industry and retail, technical hardware and equipment, software and computer services, finance, support services, travel, and leisure, personal goods, oil equipment services, oil and gas production, REIT and services, and a few other sectors. The raw data went through a refining process. First, financial firms were excluded because they are high in cash flow but low in capital expenditure (Karim & Azman-Saini, 2013); therefore, only non-financial firms were considered. Second, only firms consecutively present for at least five years (2014–2018) were considered to ensure that a sufficient number of lags was available for the explanatory variables. This selection is also essential to avoid data reduction because of the data transformation process and the selection of the instrument choice for the dynamic panel data. Third, firms with many missing values were deleted as it can cause discontinuities if not dropped. Fourth, the Cook's distance outlier test (Cook, 2000) was used to detect outliers influencing the estimation results. After refining the data, the data became an unbalanced panel, representing 673 firms or 7595 firm-year observations.

3.2 Variables Measurement

In line with Danso et al. (2019), this study also uses several control variables likely to affect firm investment, such as firm size, asset tangibility, growth, and cash flow.

3.2.1 Splitting the Sample

To further explore the heterogeneous effects of market sentiment on firm investment, the sample is divided into two size categories: small and medium and large firms. There are a few ways that firms can be segmented. Laeven (2002) and Rungsomboon (2005) segmented firms according to their total assets, while Zainudin et al. (2019) and Danso et al. (2019) measured firm size as the natural log of total sales, and Gupta et al. (2017) controlled firm size using the natural logarithm of market value. This study divides the firms using their index size classification based on the definition used by Tuyon et al. (2016), Baker and Wurgler (2007), and Bursa Malaysia. The firms are segregated into small and medium capital firms and large capital firms. The small and medium cap category refers to firms with a market capitalisation of up to RM2 billion, while large-cap firms have above RM2 billion. Segmenting the firms according to their market capitalisation resulted in 60 large-cap firms and 613 small and medium-cap firms.

3.2.2 Variable Definitions

a. Investment ($INV_{i,t}$)

This section briefly explains the definitions of variables used in this study.

Capital expenditure is measured in domestic currency (Malaysian Ringgit) at current market prices following extant literature (e.g., Chirinko et al. (1999), Bhagat et al. (2005), and Karim and Azman-Saini (2013). The dependent variable was measured as the current-period investment spending for a firm i at time t, which included the capital expenditure (CAPEX) on property, plant, and equipment (PPE) for the current year as a percentage of the previous PPE. Thus, the ratio of investment as a percentage of previous capital stock can be rewritten as follows:

$$INV_{i,t} = \frac{CAPEX}{l.PPE} \tag{3}$$

b. Tobin's-Q ($Q_{i,t}$)

The independent variable for firm performance at the beginning of period t, Q is measured by dividing total debt and market capitalisation by total firm assets. This definition of Q is used in Koo and Maeng (2005). Singhal et al. (2016) found that higher Tobin's Q ratios are related to firms' higher future operating performance.

$$Q_{i,t} = \frac{(tdebt + mcap)}{tasset} \tag{4}$$

c. Market sentiment

Business Sentiment Index (BSI).

The BSI is constructed from surveys conducted on over 350 manufacturing businesses incorporated locally and foreign manufacturers operating in Malaysia, covering 11 industries. The BSI index gives advanced information that permits inferences drawn regarding emerging economic trends. The quarterly data are taken from the Malaysian Institute of Economic Research (MIER). However, for this study, we average the figure yearly.

d. Customer Sentiment Index (CSI)

The CSI is a series of surveys conducted quarterly on a sample of over 1200 households in peninsular Malaysia to gauge consumer spending trends and sentiments. Consumer behaviour reflects the income level and general economic conditions. Respondents are asked about perceptions of their household's current and expected financial positions and their employment outlook. The survey also seeks to uncover general economic conditions such as inflation from the consumers' perspective. The quarterly data are taken from the MIER. However, for this study, we average the figure yearly.

e. Growth (GROW)

Firm growth (GROW) refers to the one-year growth rate of sales, that is sales or revenue of the current period divided by revenue of the previous period (t–1). This calculation follows extant literature such as Zhu et al. (2017) and Danso et al. (2019).

$$GROW_{i,t} = \left(\frac{salesv_t}{salesv_{t-1}}\right) - 1 \tag{5}$$

Tangibility (TANG): Asset tangibility is the ratio of PPE to the book value of total assets (tasset) (see Zainudin et al. 2019), as follows:

$$TANG_{i,t} = \frac{PPE}{tasset} \tag{6}$$

Cash flow (CF): Cash flow is defined as operating income plus depreciation (OPRM) calculated at the beginning of period t as a percentage of the previous PPE. Depreciation includes total depreciation, amortisation, and depletion. This variable is used to measure the degree of market imperfections caused by financial constraints and is measured in Malaysian Ringgit. The calculation follows extant literature such as Karim and Azman-Saini (2013).

$$CF_{i,t} = \frac{(OPRM + Dep)}{l.PPE} \tag{7}$$

3.3 GMM Estimation

Panel data estimation has been increasingly used in economic and other social studies (Gujarati, 2003). Hsiao (2006) found that this development is partly contributed by the availability of panel data sets and partly by the individual researcher's rapid growth in computational power. Law (2018) indicates that panel data are (i) able to control for individual heterogeneity; (ii) allow more information on data sets; (iii) suitable for studying the dynamics of the adjustment process; and (iv) identification of parameters. Using a dynamics model is crucial for recovering consistent estimates of other parameters. Thus, this study employs a dynamic panel data estimation to examine the relationship among interest variables. According to Nickell (1982), correlation creates a large sample bias in estimating a lagged dependent variable coefficient that is not mitigated with increasing N (number of individual units). An OLS estimator will result in upward bias since correlation does not increase with increasing N, producing biased results due to the endogeneity problem.

Endogeneity is a problem when there is a correlation between the X variable and the model's error term. It may arise due to the omission of explanatory variables from the regression. This issue will result in the error term being correlated with the explanatory variables, violating a fundamental assumption behind ordinary least squares (OLS) regression analysis. Endogeneity bias can cause inconsistent estimates and incorrect inferences, contributing to misleading conclusions and inappropriate theoretical interpretations. Blundell and Bond (1998) suggested a system estimation of the generalised method of moments (system GMM). This model solves all three endogeneity types: omitted variables, simultaneity, and selection bias. The fixed effects estimator will result in a downward bias where the tendency which decreases with larger t would yield consistent coefficients in the absence of serial correlation. Using the unbiased estimator GMM technique provides an excellent solution to the problem. Specifically, the GMM uses all the linear moment conditions specified by the model. The GMM estimators are robust concerning the non-normality of the dependent variable (Blundell & Bond, 1998).

Choosing the optimal instrument set may lead to several instruments that are more than the number of observations. Therefore, this study applies the J-test of over-identifying restrictions to evaluate the validity of instruments used in estimation. The validity of instruments can be assured if the residuals do not exhibit second-order serial correlation. This property can be achieved by testing the second-order autocorrelation (AR(2)) using the Arellano-Bond (1991) tests. Another test is Sargan's over-identifying restrictions, which tests the validity of the moment conditions imposed in the GMM (Blundell et al., 2000). The null hypotheses of these tests indicate the validity of the models. Therefore, if the nulls failed to be rejected at least at the 10% significance level, though the nulls are true, the instrument variables are considered valid. For removing firm-specific effects in Eq. (1), Arellano and Bover (1995) proposed a forward orthogonal deviation transformation or a forward Helmert's procedure. This transformation subtracts the mean of future observations in the sample from the first T–1 observation. This procedure will remove

the firm-specific effect. Its main advantage is to preserve sample size in panels with gaps.

Roodman (2009) stated that the system GMM could generate instrument proliferation effectively. Too many GMM system instruments can overfit an endogenous variable and weaken the Hansen test for the joint instrument validity. Therefore, to deal with instrument overfit, this study uses two techniques to lessen the number of instruments. First, only certain lags are used as instruments rather than all the available lags. Second, the instruments are combined into smaller sets by collapsing the block of the instruments' matrix. This technique was used by previous studies such as Karim and Azman-Saini (2013) and Roodman (2009).

4 The Impact of Market Sentiments on Firms-Level Investment

Table 1 reports the short-run coefficients of firm-level investment spending determinants using the one-step system GMM estimation for the whole sample period. The results show that the business sentiment index's coefficient is statistically significant at the 5% level. The coefficient of 0.0147 indicates that a 1% increase in the business sentiment index (BSI) causes the firms' investment spending to increase by 0.0147%. The consumer sentiment index's (CSI) coefficient has also been statistically significant at 5%. The coefficient of 0.0146 indicates that a 1% increase in the consumer sentiment index causes firm investment spending to increase by 0.0146%. Thus, the significant and positive effect of both the business sentiment index and the consumer sentiment index on firms' investment in Malaysia supports the notion that the sentiment index influences firms' investment decisions.

The significant and positive effects of both market sentiment indicators, BCI and CSI, provide some implications for the economic and financial aspects of the firms. First, in terms of the economic aspect, the significant effects of BCI and CSI on capital expenditure (INV) provide the investor and the policymakers some insight to ensure that the capital expenditure is not volatile according to the changes in market sentiment. This conjecture is because capital expenditure is more volatile than other aggregate demand components, in which market conditions influence investment decisions. Thus, policymakers should prioritise ensuring a good business environment and consumer sentiment in stabilising the firm capital expenditure. Second, in terms of the financial aspect, stability in BCI and CSI is very important for the firm's top management in planning their sources of capital expenditure, whether from internal financing (cash flow) or external financing (borrowing). This finding is because both sources of funding have a different financial risk to the firm, thus needing the top management to choose the fund accordingly to expand their business.

Meanwhile, the Q ratio is also statistically significant at the 5% significance level, positive for both market sentiment indicators. The results show that a 1% increase in the Q ratio leads to a rise in firm investment spending by 0.0486%. Thus,

Table 1 System GMM estimation for the whole sample

Independent variables	Business sentiment index (BSI)			Consumer sentiment index (CSI)		
	Coef	S.E	*p*-value	Coef	S.E	*p*-value
Lagged INV	0.179	(0.111)	0.107	0.179	(0.111)	0.107
Q	0.0486***	(0.0162)	0.003	0.0486***	(0.0162)	0.003
BSI, log	0.0147**	(0.00590)	0.013			
CF	–0.00382	(0.00440)	0.385	–0.00382	(0.00440)	0.385
GROW	0.0281	(0.0263)	0.286	0.0281	(0.0263)	0.286
TANG	–0.102**	(0.0493)	0.040	–0.102**	(0.0493)	0.040
CSI, log				0.0146**	(0.00585)	0.013
Year Dummies		Yes				
Number of observations		7465			7465	
Number of groups		673			673	
Observations per group avg		11.09			11.09	
Number of instruments		76			76	
Number of firms		673			673	
AR(2): *p*-value		0.132			0.135	
Hansen test: *p*-value		0.111			0.103	

Notes Robust standard (S.E) errors in parentheses. Asterisks ***, **, and * indicates significant at 1%, 5%, and 10%, respectively

these findings indicate the importance of the q ratio in influencing firms' investment spending. Asset tangibility is also statistically significant at the 5% significance level but with a negative sign, in which a 1% increase leads to a decrease in firm investment spending by 0.102%. These findings indicate that higher asset tangibility reduces the firms' investment spending. The full sample results in Table 1 suggest that the business sentiment index, consumer sentiment index, q ratio, and asset tangibility are essential in influencing firm-level investment spending.

Table 2 provides the short-run coefficients of the determinants of firm-level investment spending for large sample firms. From the table, the results also show that both the business sentiment index and consumer sentiment index are statistically significant at a 5% significance level. Both coefficients are positive, indicating that the good market sentiment (optimist sentiment) leads the higher firms' investment. Simultaneously, the effect of asset tangibility on firms' investment spending is also statistically significant at a 5% significance level for both models but negatively. This result means that the higher asset tangibility, the lower firms' capital investment. The results also show a positive and significant lag dependent on firms' investment, indicating that the previous year's investment significantly influences the current year's investment. However, the results show that the q factor is insignificant for both models for large sample firms.

Table 3 reports the short-run coefficients of firms' investment spending determinants for small and medium sample firms. Results in Table 2 are consistent with

Table 2 System GMM estimation for the large cap firm sample

Independent variables	Business sentiment index (BSI)			Consumer sentiment index (CSI)		
	Coef	S.E	*p*-value	Coef	S.E	*p*-value
Lagged INV	0.669***	(0.0992)	0.000	0.669***	(0.0992)	0.000
Q	0.00938	(0.00751)	0.211	0.00939	(0.00751)	0.211
BSI, log	0.0174***	(0.00592)	0.003			
CF	–0.00241	(0.00646)	0.709	–0.00242	(0.00646)	0.708
GROW	–4.95e–10	(5.03e–10)	0.325	–4.93e–10	(5.03e–10)	0.327
TANG	–0.0877**	(0.0429)	0.041	–0.0877**	(0.0429)	0.041
CSI, log				0.0172***	(0.00588)	0.003
Year Dummies		Yes				
Number of observations		741			741	
Number of groups		60			60	
Observations per group avg		12.35			12.35	
Number of instruments		51			51	
Number of firms		60			60	
AR(2): *p*-value		0.259			0.259	
Hansen test: *p*-value		0.149			0.148	

Notes Robust standard (S.E) errors in parentheses. Asterisks ***, **, and * indicates significant at 1%, 5%, and 10%, respectively

the previous findings for the whole and large sample firms. They show that the business sentiment index (BSI) and consumer sentiment index (CSI) are statistically significant at a 5% significance level. Both coefficients are positive, signifying that the higher the market sentiment is associated with a positive capital expenditure movement. Concurrently, the asset tangibility has also significantly influenced firms' investment spending for both models in the opposite direction. The higher asset tangibility led to lower firms' capital investment. The q ratio is also statistically significant at the 5% significance level, positive for both sentiment indicators.

The results of the specification tests suggest that the model is sufficiently specified. The *p*-value of the second-order serial correlation tests is greater than 0.1, indicating no serial correlation (autocorrelation) within the transformed residuals. Additionally, the *p*-value of the Hansen test for testing over-identification is also above 0.1, indicating that the instruments (moment conditions) used are valid in the baseline model. Besides, the system GMM results show that the signs and magnitude of the independent variable's coefficient remained similar (i.e., positive and significant at least the 5% level) for the whole sample and sample splitting (large and small-medium firms).

In summary, the results for the large and small-medium sample firms provide clear evidence that both market sentiment indicators (business sentiment index and consumer sentiment index) and asset tangibility significantly influence firm-level investment spending. The results are in line with Zhu et al. (2017), Jiang et al. (2018),

Table 3 System GMM estimation for the small and medium firm sample

Independent variables	Business sentiment index (BSI)			Consumer sentiment index (CSI)		
	Coef	S.E	*p*-value	Coef	S.E	*p*-value
Lagged INV	0.164	(0.106)	0.123	0.164	(0.106)	0.123
Q	0.0579***	(0.0169)	0.001	0.0579***	(0.0169)	0.001
BSI, log	0.0123**	(0.00593)	0.038			
CF	–0.00303	(0.00402)	0.450	–0.00303	(0.00402)	0.450
GROW	0.0228	(0.0271)	0.400	0.0228	(0.0271)	0.400
TANG	–0.0957*	(0.0509)	0.060	–0.0957*	(0.0509)	0.060
CSI, log				0.0122**	(0.00588)	0.038
Year Dummies		Yes				
Number of observations		6692			6692	
Number of groups		613			613	
Observations per group		10.92			10.92	
Number of instruments		76			76	
Number of firms		613			613	
AR(2): *p*-value		0.121			0.121	
Hansen test: *p*-value		0.102			0.096	

Notes Robust standard (S.E) errors in parentheses. Asterisks ***, **, and * indicates significant at 1%, 5%, and 10%, respectively

and Danso et al. (2019), who revealed that market sentiment and firm investment have a positive relationship.

4.1 Long-Run Effects of Firm Investment

Table 4 provides the long-run elasticity of firm investment concerning BCI, CSI, Tobin's Q, and asset tangibility for all sample sets (whole sample and sample splitting). The long-run coefficients for BCI, CSI, Tobin's Q, and asset tangibility are relatively higher than the short-run coefficients for all samples. Besides, the impacts of BCI, CSI, and asset tangibility are also somewhat higher for large firms than for small and medium firms. Therefore, these findings indicate that market sentiment's impact is more significant on large firms than on small and medium firms. Chowdhury et al. (2014) also noted that large-cap stocks tend to be more prone to sentiment.

Table 4 Long-run estimation

Key variables	Whole firm		Small and medium firms		Large firms	
	Coef	Std. Err	Coef	Std. Err	Coef	Std. Err
Business Sentiment Index	0.018**	0.008	0.014*	0.008	0.053***	0.017
Tobin Q	0.059***	0.017	0.069***	0.017	0.0283	0.0217
Tangibility	–0.124*	0.069	–0.114*	0.069	–0.265*	0.139
Customer Sentiment Index	0.018**	0.008	0.015*	0.008	0.052***	0.017
Tobin Q	0.059***	0.017	0.069***	0.017	0.0284	0.0217
Tangibility	–0.124*	0.069	–0.114*	0.069	–0.265*	0.139

Note The long-run coefficient is estimated using delta method

5 Summary and Conclusions

This study examines the impact of market sentiment on capital expenditure (firms' investment) in Malaysia using a dynamic panel data approach from 2000 to 2018. A sample of 673 firms with the unbalanced panel and system GMM estimations are used to estimate the augmented Tobin-Q investment model. Instead of analysing a full sample, the firms split into large and small-medium sub-samples to further examine their investment behaviour on market sentiment. The main results show that market sentiment indicators (business sentiment index and consumer sentiment index), asset tangibility, and Tobin-Q significantly influence investment spending. The findings also show that market sentiment's impact is relatively higher for large firms than for small and medium firms. This finding is consistent with Chowdhury et al. (2014), who found that large-cap firms tend to be more prone to market sentiment. Large firms tend to be more sensitive to the market sentiment in making an investment decision.

This study has proposed four crucial implications for the policy purpose. First, since market sentiment is vital in influencing capital expenditure, the policy should encourage a friendly environment for Malaysia's businesses and consumers. This strategy is essential because capital expenditure is generally so volatile than other aggregate expenditure components; therefore, encouraging more capital investment is vital to improving business and consumer sentiment. Besides, stability in capital expenditure due to the excellent market sentiment is also a prerequisite to sustaining long-term economic growth. Second, since Tobin-Q is statistically significant on firm investment, and a higher value of Tobin's Q indicates higher economic performance (Copeland & Weston, 1988), this signals that the firm's stock market performance is also an essential driver of their decision on capital expenditure. Thus, stock market stability and improvement in firm market capitalisation (due to increased share prices) have provided a positive signal for firms to invest more. Third, to the firm's managers, observing the current condition of the market sentiment (businesses and consumers)

is crucial for their capital expenditure planning. This is vital for the firm's management team to plan their business and capital investment strategy prudently. Finally, since large firms' capital expenditure is responded to more than small-medium firms on the market sentiment, the policymakers should assist the large firms during the pessimistic outlook. This is important to ensure that the large firms are not severely affected by the bad sentiment since they play a significant role in the economy.

However, this present study also has some limitations that future researchers can extend. First, it is interesting for future researchers to consider the various alternative of the firm-investment model, such as neo-classical, Tobin's Q, cash-flow, and Euler equation in modelling the determinants of firm investment. This uptake is crucial for further understanding how the firm behaves according to the various economic, finance, non-economic, and non-finance factors in deciding their investment. Second, the future study may consider using unlisted firms, particularly the small and medium enterprises (SMEs), to understand how they determine their capital expenditure. This proposal is because the business's nature and the firm's characteristics differ from the listed firms. Lastly, future research can also consider using a more recent econometric method, for example, the threshold regression, for further examination of how the level of BCI and CSI have a different impact on the capital investment decision of the firms.

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