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Research Article

The Effects of R&D Intensity and Capital Structure on the Growth and Performance of Post-IPO Firms in Malaysia: A Dynamic Panel Data Approach

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ABSTRACT

Introduction: Initial Public Offering (IPO) could provide substantial growth opportunities to the firm. This is because capital raised through IPO can enhance the firm's Research and Development (R&D) capabilities, hence their growth and performance. However, despite the increasing importance of the IPO, not many studies were conducted on the effects of IPO firm's R&D investment and capital structure on the firms' growth and performance. In fact, there is inconclusive evidence about the impact of IPO on firm's growth and performance. Some studies found firm grew dramatically after being listed as a public company, while some stated that firms deteriorate in the years following the IPO.

Objectives: The objective of this paper is to examine the effects of post-IPO firm's capital structure and R&D on the firms' growth and performance.

Methods: The econometrics study used annual panel data gathered from 295 Malaysian IPO firms over the period of fourteen (14) years. Data were averaged by non-overlapping three-year periods. In the estimation, two indicators were used to measure firm's growth: asset growth and sales growth, and three were used for firm performance: one measuring accounting performance, one measuring stock market performance, and one measuring business performance. System Generalised Method of Moments (GMM) was used in the estimation of growth and performance equations.

Results: The estimation results showed there is a significant positive relationship between R&D and the total assets growth of Malaysian IPO firms. However, the results of total sales growth model failed to confirm the existence of such effects. This study found that the debt to asset ratio has a significant positive impact on the stock market value of IPO firms. Meanwhile, the debt-to-equity ratio affects the stock market value negatively. This paper also found financial leverage has a significant negative impact on profitability but not on the productivity of IPO firms. The growth of IPO firms has a positive impact on profitability. However, the growth affects their productivity and stock market value negatively.

Conclusions: As a conclusion, the impacts of capital structure and stock market performance indicate that the stock market performance of IPO firms is sensitive to different measures of capital structure. The study also indicates that capital structure decisions are irrelevant to business performance and may not have the ability to generate productivity for the firm. The results of the business performance model (TFP) revealed the earning power of the firm's assets determines its performance, not how its assets are financed.

Keywords: IPO, firm's performance, capital structure, stock market, Malaysia

INTRODUCTION

Initial Public Offering (IPO) is a method used by the company to increase the level of firm's capital by selling firm's share to the public (Zimmerer & Scarborough, 2005). IPO has been increasingly recognized as a critical juncture in the life cycle of a firm that could provide substantial growth opportunities (Wright et al., 2013; Lehmann & Vismara, 2020). This is because capital raised in an IPO can be used for developing firm's capabilities (e.g., investment in R&D) as well as for international expansion. However, despite the increasing recognition of the importance of the IPO, there is very little research on post-IPO strategic decisions particularly its effects on growth, and firms' performance.

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Several studies have investigated the impact of IPOs on firms' growth. The results from these studies, however, showed no general agreement that firms will grow after the IPO. Some studies discovered that firms develop after IPOs (e.g., study by Aslan & Kumar; 2011; Kenney et al., 2012; Sharma & Gupta, 2018), while others (e.g., Esumanba & Sare, 2013; Jackowicz et al., 2017) found that IPOs are not inevitably related to firm growth. Studies also recognised that IPOs have a positive correlation with market conditions (Ritter, 2003; Mohd Rashid et al., 2013; Wrońska-Bukalska & Golec, 2016). Therefore, firms' growth may decline after the IPO due to a decline in economic conditions.

Literature have also emphasized on the performance of the IPO firms, but not many were focusing on the impact of IPO on the firm performance. Studies showed that listing firms in the stock exchange through IPO has some benefits (e.g., study by Pagano et al.,1998; Chemmanur & Fulghieri, 1999; Ritter & Welch, 2002; Brau, 2012). These benefits, however, can only be justified if an IPO has a positive impact on firm performance. Prior studies (e.g., Huang & Song, 2005; Alanazi & Liu, 2013; Takahashi & Yamada, 2015) found evidence of a decline in post-IPO operating performance of firms.

IPO plays a significant role in the Malaysia capital market. In 2012, Malaysia was announced as the fifth-largest IPO market worldwide by issuing a total of RM22.1 billion, which caused the equity market capitalisation rose by 14.1% to 1.5 trillion compared to 2011 (Securities Commission Malaysia, 2012). In 2019, Malaysia IPO funds raised from RM0.7billion in 2018 to RM1.97 billion. Subsequently, Malaysia's capital market expanded from RM3.3 trillion in 2019 against RM3.1 trillion in 2018 (Securities Commission Malaysia, 2019). In 2023, a total of 18 equity applications was approved where out of this seven were for IPO on the Main Market of Bursa Malaysia with a total market capitalisation of RM9.04 billion (Securities Commission Malaysia, 2024).

In year 2023 a total of 1,014 Malaysian companies were listed as compared to 957 in 2010. However, the number of companies listed on the Main Market reduced from 844 in 2010 to 793 companies in 2023 (Bursa Malaysia, 2024). This is because IPOs are no longer seen as the only way for companies to increase their capital. Instead, private equity (PE) has become an increasingly attractive way to raise capital. One of the reasons would be the cost of securing funds via PE is lower than raising funds via IPO.

The institutional features of Malaysian stock market differ from those studied countries; hence, it will be biased to generalise their conclusions for other markets like Malaysia. Besides, most of the previous studies only concentrate on the impact of IPOs on operating performance (profitability), and little evidence exists on how a firm's business growth and performance changes following an IPO. On top of this, in the context of Malaysia, which is one of the significant and active exchanges in Asia, there is no concrete evidence on the effect of a IPO on the firms business growth and performance. Hence, this study seeks to fill this gap by providing empirical evidence on the effect of IPO especially with regard to R&D intensity and capital structure on the post-IPO firms' growth and performance in the case of developing country, Malaysia.

LITERATURE REVIEW

Several studies found that firm grow significantly after being listed as a public company (e.g., Alanazi et al., 2011; Sulaksana & Supriatna, 2019). These studies argued that accessing a large pool of capital helps IPO firms to grow further. In contrast, some studies found firms deteriorate in the years following the IPO (e.g., Boubaker & Mezhoud, 2011; Linggarini et al., 2020; Ahmed, 2021). They suspected that the practice of earnings management in the pre-IPO period is one of the reasons that firms are unable to maintain growth and their operating performance after the IPO. Meanwhile, Pagano et al. (1998) found IPOs are not connected to the firm's growth.

Number of studies have also been conducted to determine whether firm's business performance changes following an IPO. In general, these studies found firm's profitability declines after the IPO, which seems against the advantages of public status (Tapa & Mazlan, 2013; Pastusiak et al., 2016; Laokulrach, 2019). On the other hand, findings from Aslan and Kumar (2011) and Larrain et al. (2021) show that firm profitability increases after the IPO. Meanwhile, some studies (e.g., Chemmanur & He, 2011; Takahashi & Yamada, 2015) documented that the productivity declines in post-IPO.

Studies that examined the relationship between IPO firm's growth and performance found that firms do not use IPO proceeds for investment (e.g., Baker & Wurgler, 2002; Alti, 2006; Asker et al., 2015) as practically expected. Baker and Wurgler (2002) stated that firms normally use IPO proceeds to repay their debts. Asker et al. (2015) argued that firms invest less after going public. They argued that the disclosure requirement harms the firm's incentive for

investment, hence leads to a decline in investment after it goes public. The same outcome is also documented in several studies in the developed and developing countries (e.g., Alanazi et al., 2011; Pastusiak et al., 2016; Ahmed, 2021).

On the contrary, some studies found that firm's investment activity and performance increase after IPO. For example, Aslan and Kumar (2011) found evidence of an increase in the investment activity, capital investment, and profitability of firms after IPO. They argued that reason of performance increase after IPO is because of the cash injection generated by the offering. However, Auret and Britten (2008) and Kao et al. (2009) stated that the improvement in profitability only remained in the short period after the IPO but deteriorated in the long term.

It is expected that the creation of knowledge will influence the development of the post-IPO firm in terms of sales growth, profitability, or employment creation. This is in line with the studies that found R&D impacted the firms' growth positively and firms with R&D show higher growth rates (e.g., Carden et al., 2005; Mudambi & Swift, 2011; Swift, 2013). On the contrary, other find negative (e.g., Olson & Van Bever, 2008) or no significant results between the two variables (e.g., Bottazzi et al., 2001). Thus, the empirical evidence of the impact of R&D investment on firm growth is still ambiguous.

The empirical results on the relationship between R&D and firm growth also depend on the industry, the country, or the period under study. For example, Zantout and Tsetsekos (1994) found a positive market response of the increased of R&D investment for high-tech industry firms, and negative for low-tech industry firms. Garcia-Manjon and Romero-Merino (2012) found a positive effect of R&D intensity on the sales growth for a sample of 754 European firms for the 2003–2007 period. They argued that the relationship is more intense in high-growth firms especially in the high-technology sectors.

Schreyer (2000) showed that the share of firms increases with the intensity of R&D activities. Similarly, Del Monte and Papagni (2003) proved growth rates to be positively correlated with research intensity. They showed that the sales growth of firms performing R&D is higher than the sales growth of firms without R&D activities. In line with this, Adamou and Sasidharan (2007) studied the impact of R&D by using panel data on Indian manufacturing firms. They found an increase in R&D induces higher growth irrespective of the industry. A study by Yu and Tong (2015) and Segarra and Teruel (2014) also showed that R&D is the key factor for driving a firm to become a highly growing firm.

Meanwhile, a firm's leverage can provide insight into its financial health. A firm with a disproportionate amount of debt does not have the financial flexibility to withstand economic shocks. Johnson et al. (1997), for example, compared faster-growing companies to slower-growing companies. They discovered that the faster-growing companies emphasised more on financial flexibility in meeting unforeseen circumstances, used proportionally less debt, and used more of a mixture of debt and equity financing. More successful companies use a combination of debt and equity financing rather than exclusively debt. Baldwin (1998) reported that of all failures, 71% were attributed to poor financial planning.

Several researchers explicitly studied the impact of the firm's capital structure on its growth (e.g., Becchetti & Trovato, 2002; Carpenter & Petersen, 2002; Javed & Jahanzeb, 2012). The results indicate that growth is mainly funded by retained earnings, but the faster-growing companies can make more use of other sources, including debt and equity. One study found leverage (rather than cash flow) as an independent variable in a regression (rather than a mean comparison) (Becchetti &Trovato, 2002). They discovered that leverage is a positive but not significant predictor of growth. Therefore, it is essential to have sufficient capital and obtain it from a mixture of sources together with sufficient financial competence and planning.

METHODOLOGY

Data and Source of Data

This econometrics study used panel data to examine the impact of R&D and capital structure on post-IPO firms' growth, and performance. The panel data were generated from 295 Malaysian IPO firms over the period fourteen years (14). Data are averaged over five non-overlapping three-year periods in the time frame. The data were gathered from the Bursa Malaysia website, Yahoo Finance, and the Star Online website, Compustat (CapitalIQ), the DataStream, and companies' annual reports.

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The IPO firms involved in this study are based on the availability of data. Firms that listed under Finance, Infrastructure Project, Real Estate Investment Trust (REIT), Special Purpose Acquisition Company (SPAC), and Closed-End Fund sectors are excluded because their operations and liabilities are based on different requirements and regulations (Graham & King, 2000; Gan et al., 2016; Mirza et al., 2020). Infrastructure Project Companies (IPCs) are also excluded due to their high market capitalisation. The firms that listed through 'introduction' also excluded since they are not exactly IPOs. The companies that issued debt and equity together are also omitted to reduce any confusing effects.

Finally, firms that changed their financial year-end are also not included in the sample since there is no data for the specific year in which a firm changes its fiscal year-end. Based on the exclusion criteria the final sample of 295 IPOs comprises approximately 65% of IPO companies during the period fourteen years (14) have been used in the final analysis.

Variables and Indicators

There are two main dependent variables involved in this study: firm's growth and performance. Two indicators were used to measure firm's growth: asset growth and sales growth. Both indicators are commonly used in the empirical studies (e.g., study by Takahashi & Yamada, 2015; Coad et al., 2016; Coad et al., 2020). Operationally, asset growth (TAG) is measured by the difference between the natural log of current year's total assets and the previous year's total assets, while sales growth (SAG) is the difference between the natural log of current year's total sales and last year's total sales.

Three indicators were used for firm performance: one measuring accounting performance (ROA), one measuring stock market performance (Tobin Q), and one measuring business performance (TFP). In this paper, return on assets (ROA) is measured by dividing the firm's net income by the book value of total assets. For stock market performance, Tobin's Q Ratio is calculated by dividing the sum of the market value of equity and the book value of debt by the book value of total assets. Total Factor Productivity (TFP) is measuring the productivity of all factors of production and calculated following Fukao et al. (2011). Table 1 describes the variables involved in this study.

Model Specification

Previous studies (e.g., Hall & Mairesse, 1995) suggested that investment in R&D is an important determinant for firm growth in addition to firm's age and size. Studies, by Angelini and Generale (2008), Mishra and Deb (2018), and Megaravalli and Sampagnaro (2018) found that financial constraints, cash flow, and liquidity can also affect the firm growth. In this paper, Equation (1) is used to examine the impact of variables of interest, which is R&D and capital structure, on the post-IPO firm's growth.

$$FWG_{i,t} = \beta_0 + \beta_1 FWG_{i,t-1} + \beta_2 RND_{it} + \beta_3 SIZ_{it} + \beta_4 AGE_{it} + \beta_5 LEV_{it} + \beta_6 CDI_{it} + \beta_7 FCF_{it} + \beta_8 TAN_{it} + \beta_9 LIQ_{it} + \beta_{10} IND1_{it} + \beta_{11} IND2_{it} + \beta_{12} IND3_{it} + \beta_{13} IND4_{it} + \beta_{14} IND5_{it} + \beta_{15} IND6 + \beta_{156} IND7 + \beta_{17} FYE_{it} + \varepsilon_{it} \quad (1)$$

In this paper, separate specification is used for performance equation. This paper synthesises the firm's performance specification presented by Equation 2 to test the association between R&D, capital structure and the performance of IPO firms:

$$PPF_{i,t} = \lambda_0 + \lambda_1 PPF_{i,t-1} + \lambda_2 PGV_{it} + \lambda_3 LEV_{it} + \lambda_4 SIZ_{it} + \lambda_5 AGE_{it} + \lambda_6 CDI_{it} + \lambda_7 FCF_{it} + \lambda_8 TAN_{it} + \lambda_9 LIQ_{it} + \lambda_{10} RND_{it} + \lambda_{11} IND1_{it} + \lambda_{12} IND2_{it} + \lambda_{13} IND3_{it} + \lambda_{14} IND4_{it} + \lambda_{15} IND5 + \lambda_{16} IND6 + \lambda_{17} IND7 + \lambda_{18} FYE_{it} + \varepsilon_{it} \quad (2)$$

Table 1: The description of the variables

Variable	Description	Operational Definition
Dependent Variable		
Firm Growth (FWG)		
TAG	Growth Rate of Total Assets	Ln TAG_t – Ln TAG_{t-1}
SAG	Growth Rate of Total Sales	Ln SAG_t – Ln SAG_{t-1}

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Firm Performance (PPF)		
ROA	Return on Assets	Net Income / Total Asset
TFP	Total Factor Productivity	The TFP is calculated based on Fukao et al. (2011)
TBQ	Tobin's Q	Sum of market value of equity and book value of debt over the book value of total assets
Independent Variables		
Capital Structure (LEV)		
TDA	Total Debt Over Total Assets	Total of long- & short-term borrowings) /Total Assets
TDE	Total Debt Over Equity	Total of long- & short-term borrowings) /Book Value of equity capital and reserves
Research and Development Investment (RND)		
RND	R&D Intensity	Total R&D expenditure/Total Sales
Control Variables		
SIZ	Firm size	Natural Logarithm of Total Assets
AGE	Firm age	Differences between the incorporation year and the IPOs year
IND1	Dummy variable 1	Dummy of 1 indicates firm belongs to Industrial Products and 0 otherwise
IND2	Dummy variable 2	Dummy of 1 indicates firm belongs to Trading/Services and 0 otherwise
IND3	Dummy variable 3	Dummy of 1 indicates firm belongs to firm technology and 0 otherwise
IND4	Dummy variable 4	Dummy of 1 indicates firm belongs to Consumer Products and 0 otherwise
IND5	Dummy variable 5	Dummy of 1 indicates firm belongs to Property industry and 0 otherwise
IND6	Dummy variable 6	Dummy of 1 indicates firm belongs to Construction industry and 0 otherwise
IND7	Dummy variable 7	Dummy of 1 indicates firm belongs to Plantation industry and 0 otherwise
CDI	Dividend	Dividend paid as a percentage of total earnings available to shareholders
LIQ	Liquidity	(Cash and Cash Equivalents+ Marketable Securities) /Total Assets
TAN	Tangible Assets	Net Fixed Assets / Total Assets
FCF	Free Cash Flow	Net Income + Depreciation and Amortization - Capital Expenditure - Δ Working Capital
FYE	Financial Year End	Dummy of 1 if firm's fiscal year ends on 31st December and 0 otherwise
PGV	Predicted growth	Predicted values of the growth

Estimation Methods: The System GMM and Related Tests

Growth and Performance equation was estimated using System GMM estimator as proposed by Ahn and Schmidt (1995), Arellano and Bover (1995), and Blundell and Bond (1998). The System GMM estimator consists of a system of two simultaneous regressions, one in the first difference and one in level, where the instruments for the regression

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in differences are lagged values, where the instruments for the regression in levels are the lagged differences of the corresponding variables.

The GMM estimators can be estimated as one-step or two-step procedures. The one-step estimator applies a covariance matrix that accounts for autocorrelation, while the two-step estimator utilises the residuals from the first step to estimate the covariance matrix. Besides, the estimated coefficients produced by the two-step procedure are considered more efficient in the case of heteroskedasticity (Arellano & Bover, 1995; Blundell & Bond, 1998). Hence, this makes two-step estimations more efficient than one-step robust, especially for system GMM. Therefore, this study implements a two-step procedure.

Prior studies have been widely suffering from endogeneity issues. Therefore, it is essential to run the endogeneity tests as there is potential endogeneity between R&D expenditures and growth rate as a dependent variable. This endogeneity is related to reverse causality, which means that higher expenditures on R&D could not be the only reason for greater growth; higher rates of growth could also influence higher expenditure on R&D.

Besides, there could also be an endogeneity problem between the dependent variables and other explanatory variables in the model. The endogeneity problem can result in having inconsistent estimates and incorrect conclusions, which lead to misleading results and improper theoretical interpretations (Ullah et al., 2018). In this paper, the Hausman test is used to examine the endogeneity of an individual or subsets of the explanatory variables. According to the Hausman test, the endogeneity between variables exists if the P-value is lower than 10%.

An autocorrelation occurs when the error term ε_{it} in regression are correlated. Autocorrelation is a common problem in time series regressions and often found in repeating patterns when the past values affect future values. Following Arellano and Bond (1991), this study examines second-order statics to test detecting autocorrelation. A critical assumption for the GMM estimator's consistency is the overall validity of the instruments (Baltagi, 2008). In this study, the validity of the instrumental variables is examined by applying the Sargan and Hansen tests.

ESTIMATION RESULTS

Growth Model

The estimation process starts with the endogeneity tests. The results from the tests implied that the endogenous variables are instrumented accordingly. Based on the result from the tests, the growth model was estimated, and the results are presented in Table 2. The diagnostics on the estimation results of the Dynamic Panel System GMM are satisfactory with the p-value of Hansen test is 0.350 (which is above Roodman's rule of thumb threshold of p=0.25). The Arellano-Bond test for AR(2) in first differences indicated there is no second-order autocorrelation, while the test for AR(1) is satisfied at 10% significance level.

Table 2: Estimation results for growth equation

Variables	TAG	Treated as	SAG	Treated as
TAG (-1)	0.013/(0.34)***	Exogenous	-	-
SAG (-1).	-	-	-0.236/(-3.94)***	Exogenous
TDA	-0.073/(-4.58)***	Endogenous	-0.002/(-0.03)	Exogenous
TDE	-0.012/(-0.43)	Exogenous	-0.018/(-0.34)	Exogenous
AGE	-0.028/(-0.29)**	Exogenous	-0.104/(-0.46)**	Exogenous
SIZ	-0.120/(-1.04)***	Endogenous	-0.68/(-3.52)***	Endogenous
TAN	-0.333/(-0.58)	Endogenous	-1.883/(-2.55)**	Endogenous
LIQ	0.053/(0.35) **	Endogenous	0.432/(1.05)	Exogenous
CDI	-0.001/(-0.12)	Exogenous	-0.059/(-1.29)	Endogenous
FCF	0.001/(1.57)**	Endogenous	0.001/(1.73)*	Exogenous
RND	0.118/(2.28)**	Endogenous	-0.137/(-1.45) ***	Endogenous
FYE	-0.967/(-0.85)*	Exogenous	-4.027/(-1.22) **	Exogenous
IND1	-15.414/(-0.12)	Exogenous	1.452/(1.05)	Exogenous
IND2	-15.120/(-0.12)	Exogenous	0.665/(0.29)	Exogenous
IND3	15.045/(0.12) **	Exogenous	-7.243/(-0.18)	Exogenous
IND4	15.730/(0.12)	Exogenous	-2.246/(-0.81)	Exogenous

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IND5	-20.591/(-0.11)	Exogenous	6.731/(0.04)	Exogenous
IND6	-15.277/(-0.12)	Exogenous	-5.091/(-0.57)	Exogenous
IND7	176.145/(0.14)	Exogenous	-41.936/(-0.25)	Exogenous
Constant	-7.504/(-0.09)		8.262/(0.40)	
Obs.	1180		1180	
F	25.89		2.20	
Prob > F	0.000		0.004	
AR(1)	0.051		0.046	
AR(2)	0.699		0.145	
Sargan test	0.000		0.049	
Hansen test	0.350		0.159	

Note: t-statistics are based on robust standard errors and presented in brackets and parentheses. AR(1) shows the Arellano–Bond test for AR(1) in first differences. AR(2) shows the Arellano–Bond test for AR(2) in first differences. Sargen and Hansen tests are for testing overidentifying restrictions. ***, **, * denotes statistical significance at the 1%, 5%, and 10% significance level, respectively.

In general, the estimation results of growth equation using sales growth as indicator are quite similar with the estimation results that used asset growth as indicator. For both growth models, there is a significant relationship between the growth indicator (TAG/SAG) and its lagged values. The results indicated that lag total assets growth has a significant positive effect on the current total asset's growth. However, in contrast, lag total sales growth negatively influence the current total sales growth. The result also reveals that both free cash flow (FCF) and liquidity (LIQ) has a significant positive effect on total asset growth of the IPO firms. However, only FCFpositively and significantly influences the sales growth. This implies that higher cash flow is associated with sustainable long-term growth of the IPO firm.

On the R&D, the estimation results show there is a significant positive relationship between R&D and the total assets growth of IPO firms. This result points to the fact that IPO firms, being in a substantial equity-driven capital provides funds to innovating and growth-oriented. The results of total sales growth model, however, show a negative and statistically significant association between SAG and R&D. One of possible explanation is that R&D and innovation do not improve growth for the average firm but only has a positive effect on the growth rate of fast-growing firms.

Regarding capital structure, this paper found that Total Debt Over Total Assets (TDA) is significantly associated with the Total Assets Growth of IPO firms, but not with the Total Sales Growth (SAG). However, the significant relationship is negative suggesting that high assets growth IPO's firms issued less debt. This study, however, do not find evidence that the alternative measure of leverage (TDE) contributed to the assets or sales growth of the IPO firms.

Performance Model

Table 3 presents the results of the system GMM estimation of the IPO firms performance model (Equation 2) The table also provides the diagnostic tests associated with each estimated equation: the Hansen test of the validity of the instrument set used, and Arellano and Bond (1991) tests for autocorrelation in differenced residuals, AR(1) and AR(2).

Table 3: The estimation result for performance equation

Variables	ROA	TFP	TBQ
ROA(-1)	0.675/(10.14)***	-	-
TFP(-1)	-	1.089/ (342.10)***	-
TBQ(-1)	-	-	1.064/(7.42)***
TAG	3.802/(0.39)**	-3417.825/(-1.71)*	-47.005/(-7.38)***
SAG	12.138/(1.88)**	-3152.926/(-1.71)*	-9.093/(-3.04)***
TDA	-0.388/(-2.5)**	36.380/(0.52)	7.496/(7.48)***
TDE	-5.728/(-2.78)***	257.338/(0.58)	-2.024/(-5.65)***
AGE	1.627/(1.93)*	-434.270/(-2.23)**	-2.243/(-5.53)***
SIZ	12.6177/(2.39)**	-1858.190/(-1.54)	-11.735/(-5.12)***
TAN	6.512/(0.52)	-4284.253/(-1.04)	-44.257/(-5.42)***
LIQ	-8.595/(-0.86)	-3447.292/(-1.93)*	-31.160/(-4.71)***
CDI	0.577/(1.55)	-157.176/(-1.04)	-0.724/(-4.00)***

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FCF	-0.005/(-2.05)**	0.001/(1.59)	0.004/(3.59)***
RND	-3.490/(-2.28)**	-698.001/(-0.59)	1.607/(2.11)**
FYE	-71.290/(-2.46)**	12913.37/(1.75)*	-13.513/(-1.08)
IND1	dropped due to collinearity	dropped due to collinearity	dropped due to collinearity
IND2	-49.760/(-3.27)***	4901.822/(0.83)	-20.220/(-5.06)***
IND3	61.743/(0.37)	-64333.930/(-1.99)**	-777.794/(-7.39)***
IND4	-60.548/(-2.58)***	23170.910/(1.65)	25.283/(3.05)***
IND5	-58.038/(-0.76)	43339.170/(1.37)	309.645/(7.06)***
IND6	-67.111/(-2.03)**	18103.330/(0.97)	45.885/(3.03)***
IND7	2.064/(0.00)	-799436.500/(-1.95)*	-9302.526/(-7.42)***
Constant	-112.851/(-1.06)	37618.370/(1.67)	460.833/(7.23)
Obs.	1180	1180	1180
F	19.08	1.45	155.82
Prob > F	0.000	0.000	0.000
AR(1)	0.004	0.314	0.008
AR(2)	0.485	0.327	0.291
Sargan test	0.710	0.535	0.742
Hansen test	0.284	0.598	0.259

Note: t-statistics are based on robust standard errors and presented in brackets and parentheses. AR (1) shows the Arellano–Bond test for AR (1) in first differences. AR (2) shows the Arellano–Bond test for AR (2) in first differences. Sargen and Hansen tests are for testing overidentifying restrictions. ***, **, * denotes statistical significance at the 1%, 5%, and 10% significance level, respectively.

The Sargan and Hansen tests for performance models yield all *p*-values in the range of $0.05 \leq P(x2) < 0.8$, indicating that the instruments used in the estimation are valid. The AR(1) tests indicate that the residuals in first differences are not correlated, and the AR(2) tests give *p*-values above 0.10, which means that a null hypothesis of no second-order serial correlation could not be rejected. Therefore, all results of the system GMM of performance models are valid.

Specifically, the estimation results for business performance (TFP) and stock market performance (TBQ) show that IPO firms' performance is a decreasing function of the firm growth. The coefficients are negative and statistically significant at 1% and 10% levels for both TBQ and TFP. The result for operating performance (ROA), however, is opposite from the business and stock market performance. The reported coefficients are positive and statistically significant at 5% levels. suggesting that higher sales could be generated by the growth of assets, which inevitably contributes to the firm operating performance.

On the R&D, the estimation results shows that operating performance is a decreasing function of R&D as indicated by a statistically significant negative coefficient. In contrast, the result for the stock market performance suggests that market value is an increasing function of R&D. Finally, this study found the contribution of R&D to firm productivity is insignificant implying that R&D investment does not play an important role in IPO firms' business performance.

The results for capital structure are mixed. For the accounting performance model (ROA), the coefficients are negative and significant, suggesting that high profitable firms issued less leverage. In the stock market performance model (Tobin's Q), the results show that both total debt to asset ratio and debt to equity ratio significantly affect the firm market performance. The effect of leverage measured by debt over equity ratio on the firm stock market performance is negative. This is in contrast with a significant positive relationship that observed in the nexus between total debt to asset ratio and the firm market performance. Meanwhile, the business performance model (TFP) results suggest that the IPO firm's leverage is not associated with any changes in their productivity.

DISCUSSION AND CONCLUSION

There are two main objectives of this paper. First, to examines the impact of R&D as a growth strategy on the IPO firms' growth and performance, and secondly to identify the effects of IPO firms' capital structure and R&D intensity on the post-IPO firms' performance. The relationship between the variables studied were examined using panel data of over 15 years (from 2000 to 2014) that gathered from 295 IPO firms in Malaysia. The growth and performance equations were estimated using the System GMM estimator methods. In the analyse, two indicators were used for

firm's growth, which is asset growth and sales growth, and three indicators for firm performance: one measuring accounting performance (ROA), one measuring stock market performance (Tobin Q), and one measuring business performance (TFP).

The results from GMM estimation showed that the association between R&D activities and the growth of Malaysian IPO firms is sensitive to different measures of firm growth. While R&D is positively and statistically significantly related to total assets growth, is negatively correlated with total sales growth. This evidence is not consistent with previous studies (e.g., Dave et al., 2013; Neves et al., 2016; Park et al., 2019). that reported R&D affect the firm development in terms of sales growth, profitability or employment creation. The finding indicates that R&D does not necessarily increase all types of growth indicators of the firms, and it only has a positive effect on some aspects of growth only. IPO firms may also need a long learning time if they desire to make efficient use of R&D investment on all aspects of firm growth.

The findings of this paper showed that capital structure has a significant negative impact on profitability of the IPO firms. These findings are consistent with previous studies conducted in other developing countries (e.g., study by Mumtaz et al., 2013; Vătavu, 2015; Akomeah et al., 2018). The negative relationship between capital structure and the performance of firms suggests that IPO firms' debt levels are higher than the appropriate levels of debt in their capital structure. This over-leveraging may restrict the ability of the firms to control their operations effectively; hence, negatively influencing the firms operating performance.

The finding on the impacts of capital structure and stock market performance indicate that the stock market performance of IPO firms is sensitive to different measures of capital structure. While the association between debt over equity ratio and stock market performance is negative, the association between total debt over total asset ratio and stock market performance of IPO firms is positive and significant. The negative association between debt over equity ratio and stock market performance suggests that IPO firms' performance is higher when they prefer equity by avoiding debt.

The results of the business performance model (TFP) revealed that capital structure of IPO firms has an insignificant effect on firm performance. This indicates that capital structure decisions are irrelevant to business performance and may not have the ability to generate productivity for the firm. This is contradicted with the previous studies suggested that the availability of finance assists firms to improve TFP by optimising and enhancing their operations and activities. Instead, like Hutten (2014) and Azeez (2015), the finding of this study suggests capital structure is irrelevant to the business value. In the other words, the earning power of the firm's assets determines its performance, not how its assets are financed.

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