



THE IMPACT OF FINANCIAL CONSTRAINTS AND RATINGS ON FIRM PRODUCTIVITY IN MALAYSIA

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ABSTRACT

Each firm needs sufficient financial resources to ensure that it can operate smoothly and expand its market share. However, firms will face problems if there are financial constraints and low ratings to convince outside investors. Therefore, this study aims to analyze the impact of financial constraints and the influence of a firm's rating on firm productivity. The firms selected as the sample of study are firms listed on Bursa Malaysia's main board. The firm data are obtained from Thomson Reuters Data Stream and rating agencies' websites. The collected data are annual data from 2000 to 2015. The firm's production data are analyzed to obtain the Total Factor Productivity (TFP). Further, TFP is tested using a dynamic panel data model that employs the generalized method of moments (GMM) to analyze the impact of financial constraints and ratings on firm productivity in Malaysia. The findings show that financial constraints and short-term ratings play important roles in influencing firm productivity. In this regard, the results show that firms rely heavily on internal funding sources. In addition, an increase in firms' short-term ratings have a positive impact on their productivity. In contrast, long-term ratings do not have a significant impact on firm productivity. It implies that better short-term ratings are important in such that firms provide a positive signal to investors to invest in the firms. Hence, providing external sources of financing.

Keywords: Financial constraints; firm's productivity; credit ratings; short-term ratings; long-term ratings

INTRODUCTION

Credit rating is an assessment of the ability of debtors to repay their debts. The main purpose of this credit rating is to provide investors with confidence that firms are capable of generating growth. In addition, credit rating is important for firms to see how far the firm's financial position changes. Therefore, firms in Malaysia need a good credit rating to attract investors from inside or outside the country to invest in their firms. In Malaysia, there are two registered credit rating agencies namely, RAM Rating Services Berhad (RAM) and Malaysian Rating Corporation Berhad (MARC). These credit rating agencies are responsible for determining the financial position of firms' creditworthiness, specifically in the capital market. Credit rating has an influence on a firm's investment as financial position is a determining factor in the investors' decision to invest. A good credit rating will attract high investment from outsiders. With this, firms will have the ability to enhance growth.

The growth of a firm is dependent on a strong financial position and sufficient funding sources. At firm level, there is a positive and significant relationship between internal and external sources of finance, and growth (Karim et al., 2013). This is because firms need financing resources to conduct firm activities such as product releases and asset purchases. In addition, funding is also required by firms to finance their investments. An example of external financing by firms is bond issuance. This source of funding is related to the investment activity of a firm. Investments are very important to firms to ensure good cash flow and continuous profitability.



However, firms often face impediments in carrying out investment activities. Among the obstacles faced by firms in investing are difficulties to obtain external funding sources. Consequently, they are only relying on internal source of financing. This situation shows that the firm is experiencing financial constraints in obtaining funding sources. As explained in previous studies such as Fazzari et al., 1988 and Ismailet al., 2010a, firms' financial constraints prevent them from accessing or obtaining external funds to finance their investment activities. When firms do not receive adequate internal financing, external financing is required. The existence of financial constraint limits firms from raising funds to finance their investments (Ismail et al., 2010a; 2010b). Every firm that faces financial constraints should seek aids in procuring funding to continue its investment as each firm has the potential to move forward. Therefore, firms need to gain trust from investors to invest in the firm. From firms' perspective, outside investors are very important as they are financiers to firms. To build investor confidence, firms need to rely on good credit ratings. This is because good credit rating will guarantee a firm's ability to generate growth and increase profits. This can be achieved through an increase in firm productivity.

The role of credit rating agencies in Malaysia is vital in contributing to the development of the corporate bond market. The credit rating given to each firm is important to ensure that potential investors have a high confidence in the firm's ability to pay its debt. Credit ratings are based on grades starting with AAA, AA, A, BBB, BB, B, C, and D. Grade AAA is the best while D is the worst. Most studies on credit rating are more focused on overseas credit rating agencies such as studies by Cantor and Packer (1995), Mullard (2012), and Xia (2014). This study incorporates not only the ratings, but also the financial constraints to analyze their impact on firm productivity. In addition, the studies on financial constraints and credit ratings in Malaysia are still underdeveloped.

Therefore, this study is aimed to examine the impact and extent of financial constraints and credit rating on productivity in Malaysia. This study is vital as it investigates a firm's ability to enhance its growth. A good credit rating is important for firms in attracting more investors to invest in the firm. In addition, this study is also useful to policy makers and governments as accessibility to the sources of financing is important. This is to ensure that the financial constraints do not prevent the firm from becoming more competitive in the market. Productivity and growth will occur when firms have enough financial resources to undertake investment activities. In addition, this study also contributes to becoming a source of reference and guidance for future researchers. The financial constraints of firms in Malaysia are scarcely studied by previous researchers. Furthermore, for credit rating factors, there are also very limited studies. Hence, this study scrutinizes the impact of credit ratings and financial constraints on the growth of firms in Malaysia.

This paper is organized as follows: the next section is literature review, followed by methodology, sources of data, empirical method as well as results and discussion. The conclusion and policy implication conclude this paper.



REVIEW OF LITERATURE

In the early stages, most researchers focus on the relationship between financial and growth using data at the macro level only. Among the earliest studies is Goldsmith (1959) which finds significant relationship between financial sector development and economic growth in some countries. The study is further supported by the finding of the study by McKinnon (1973) which indicates a significant relationship between the development of the financial sector and economic growth using data from several countries. In addition, a study conducted by Majid (2008) finds unidirectional causality running from finance to growth in Malaysia. However, the result contradicts the finding by Ang and McKibbin (2007) that the reverse holds in Malaysia such that growth affects finance. The comparison was made based on eight countries including Malaysia. The results show that the association between economic growth and financial development is diverse.

Studies that use data on micro levels are also growing. At firm level, the issue often being examined is the impact of financial constraints on firm growth. One of the factors that indicates the presence of financial constraints is asymmetric information, in which firms are more well-known by internal parties such as managers as opposed to shareholders and prospective investors (Myers and Majluf, 1983). This situation creates a wedge between internal and external investors (Tohirin and Ismail, 2016). The firm's financial constraints are also often associated with the problem of inadequate internal and external financing. The study by Fazzari et al. (1988) shows that the source of internal financing of firm affects the firm's investment. As a result of financial constraints, the cash flow of the firm is affected; and subsequently the firm's own investment. During uncertain period, firms tend to hold large cash in order to face any unpredictable events (Du and Temouri, 2015). Financial constraints are also the determinants of the firm's probability to survival (Musso and Schiavo, 2008). Ismail and Salim (2017) finds that financial factor plays an important role in influencing firm productivity. Fan et al. (2015) find that under tight credit constraints, firms tend to lower their optimal price as they only produce low quality products. Coad et al. (2015) also find that the availability of finance negatively affects productivity. Hence, the access to external fund is important as it enhances the firm's ability to increase productivity and growth. However, the finding is different from the study by Moreno-Badia and Sloomakers (2009). They find that financial constraints do not affect firm productivity in the Estonian manufacturing and services sectors unless the firms are involved in research and development (R&D) activities. In Malaysia, the Basel II accords have not improved the financing patterns of firms in Malaysia such that firms do not borrow from external resources for R&D expenditures (Said and Iglesias, 2017). However, small and young firms tend to face financial constraints over large and established firms. Guariglia et al. (2011) find that financial constraints only affected private firms and foreign firms but did not significantly affect the growth of government-owned enterprises. This is because government-owned companies are found to have the capability to obtain broader cash flow and investment opportunities than private and foreign firms. Hence, private and foreign firms need to be more aggressive in seeking better investment opportunities and increasing firm growth. Firms need funding source to enable them to invest for the increase of productivity and growth activities. With sufficient funding



sources, firms need not worry about carrying out any activities that can benefit them. According to Ismail et al. (2010a; 2010b), firms experiencing information asymmetries and agency problem need to rely on internal sources of funds for investment. Hence, these firms have to save more cash for future investment at the price of positive net present value projects that need to be forgone (Azmat and Iqbal, 2017). On the other hand, external funding is required as a perfect substitute for firm internal financing if all firms have equal access to the capital market (Ismail and Annuar, 2015). When a firm manages to secure external funding, all activities will run smoothly without requiring long standing delays to be completed.

In addition, there is also a study on the impact of financial constraints on productivity and firm growth. Ferrando and Ruggieri (2015) find that financial constraints experienced by firms will reduce productivity levels. Their studies which were conducted on firms in European countries such as Belgium, Germany, Spain and Italy have shown a decline in productivity due to financial constraints, particularly micro and small firms and firms in the innovation sector. The results of this study have supported previous study by Chen and Guariglia (2013) who study the Chinese firms. They find financial constraints in internal financing sources affect the firms' productivity. While firms in China have been encouraged to exports, local firms and exporters still have difficulty in increasing productivity in the face of financial constraints. The results of these studies show that the financial constraints inherent in firms will inevitably affect the firms' productivity.

Furthermore, credit rating is also a factor that affects firm's financial constraints. Recent studies by many researchers have seen the impact of credit ratings and credit rating's changes on firm's capital structure decisions (Kisgen, 2006; Hovakimian et al., 2009; Hess and Immenkotter, 2014). However, the study on credit ratings and financial constraints on firm growth is still under-researched. A study by Tsoukas and Spaliara (2014) find that financial variables are very important in determining credit ratings for firms dealing with financial constraints. The finding shows that financial variables, such as leverage, show a significant difference between firms experiencing financial constraints and firms that have no financial constraints when estimating equity and 'credit default swaps' rating during the initial period of the rating.

Internationally, firm credit ratings are given by credit rating agencies such as Standard and Poor's and their objective is to assess firm creditworthiness in facilitating access to external financing. Most firms are classified as having financial constraints with the existence of firm credit ratings (Faulkender and Petersen, 2006). This proves that even though firms have lower investment rating grades than non-rating firms, they are still classified as having financial constraints. The findings of this study have been supported by Bottazzi et al. (2010). They also find that credit ratings are a measure of financial constraints. Altman and Rijken (2004) demonstrate that rating agencies focus on long-term default rates but place less weight on short-term indicators. In contrast, He and Xiong (2012) analyze the impact of debt market liquidity on firm's risk. They find that short-term debt amplifies firm's rollover risk. Therefore, it is clear that credit ratings can affect a firm due to its financial constraints and this needs to be addressed. In addition, there are also past studies on other factors involved in productivity. Among the factors involved and being made as independent variables are firm size, firmage,



leverage and cash flow. For firm size factor, a study by Ismail et al. (2010b) find that small-sized firms more experienced financial constraints compared to large firms. This had an impact on productivity. The next study by Obembe (2011) has used non-financial firm data of Nigeria from 1997 to 2007. The findings show that firm size measured by firm asset is significant in affecting output growth but is negatively related. Therefore, this study shows that firm size affects productivity negatively, such that the larger the size of the firm, the less productivity it endures.

Other than firm size, independent variable of firm age is also often measured in most previous studies. One of the studies is conducted by Cucculelli et al. (2014), whereby they studied manufacturing firms in Italy. These firms were divided into two types: family owned firms and non-family firms. Their findings show that firm age is significant and has a negative relationship with productivity for family-owned firms. This means that older the family-owned firms experienced less productivity. Contrary to previous studies, a study by Coad et al. (2013) have two findings regarding the age of the firm and productivity. The first finding shows that the increase in the age of the firm influences productivity while the second finding shows no relationship between the two. In addition, studies involving leverage with firm productivity are also conducted by previous researchers. Avarmaa et al. (2013) has been studying two types of firms, namely local and multinational firms in Baltic countries. The findings show that local firms have a positive relationship between leverage and labor productivity, while multinational firms show a negative correlation between leverage and labor productivity. While credit constraints are seen positively in relation to the labor productivity of local firms, limited access to credit does not seem to be sufficient for sustainable productivity growth. Similar findings are also found by a study by Huynh and Petrunia (2010) for a new manufacturing firm in Canada. The financial factor of leverage has a positive effect on the firm's productivity.

The study of firms in Malaysia on financial constraints and credit ratings for firms is still under-developed. However, there has been a growing number of studies on financial constraints and other factors involved in productivity and firm growth. Among the studies on the effects of financial constraints on firms in Malaysia are Ismail et al. (2010a; 2010b). In addition, studies by Karim et al. (2013) also discuss the impact of financial constraints on growth. The findings show that internal financing has more influence on the growth of shariah-compliant firms than external financing. In contrast to conventional firms, their growth is more sensitive and influenced by external financing. The study by Adnan and Ismail (2014) has reviewed the performance of firms and financial constraints in terms of firm size. The results show that the positive relationship between firm's performance and cash flow illustrates the influence of financial constraints as well as other factors such as size, industry growth and the risks involved. The firm's performance of the previous year also has a positive impact on the current performance of the firm.

To sum up, past studies have examined the impact of financial constraints and ratings on firm productivity, separately. This study incorporates both factors to investigate their impact on productivity. Considering He and Xiong (2012), we split the samples to analyze the impact of short-term credit ratings and long-term credit ratings. Though both ratings are inter-related,

short-term ratings cover firm liquidity to meet short-term financial obligation, in which it is not covered by long term ratings (RAM, 2018). Hence, the results are expected to explain the behavior of firms toward short- term or long-term financing.

RESEARCH METHODOLOGY

Modelling

To measure the Total Factor Productivity (TFP), this study follows the method introduced by Levinsohn and Petrin (2003). Thus, the production model is presented as follows:

$$Y_{it} = \beta_0 + \beta_L L_{it} + \beta_K K_{it} + \beta_W W_{it} + \omega_{it} \quad (1)$$

Based on Model (1), Y_{it} is the output, L_{it} is the labor, K_{it} is the capital, W_{it} is the investment measured based on firm capital expenditure to indicate firm productivity and ω_{it} the error term[†]. β_0 is the constant while β_L , β_K and β_W are the coefficients of labor, capital and investment, respectively. The production model is estimated using the ordinary least squares (Ismail and Salim, 2017). The estimated value of total factor productivity is derived from deviations between the observed output and estimated output presented by the error term (ω_{it}). Next, Model (2) is established to analyze the determinants of TFP. The baseline model is as follow:

$$tfp_{it} = \alpha_0 + \alpha_1(tfp_{it-1}) + \alpha_2(X_{it}) + \alpha_3(CF_{it} / K_{it}) + \varepsilon_{it} \quad (2)$$

where,

$$\varepsilon_{it} = \mu_i + e_{it}$$

The variable of tfp_{it-1} , is the lagged TFP. CF_{it} is the cash flow, scaled by the capital, K_{it} . ε_{it} is the error term that consists of unobserved firm effects[‡], μ_i , and independent and identically distributed (i.i.d.) disturbance, e_{it} . X_{it} is the vector of firm characteristics. α_i for all $i = 1, 2, 3$ are parameters to be estimated.

Then, Model (2) is augmented to incorporate short-term firm credit ratings, as presented in Model (3) and long-term credit ratings as shown in Model (4), respectively. Contemporaneously, two interaction terms are also added which are the interaction term of the cash flow to capital ratio to a dummy of negative liquidity, $(CF_{it}/K_{it}) * NEGLIQ_{it}$, and the interaction term of cash flow to capital ratio to exports, $(CF_{it}/K_{it}) * EXP_{it}$. Hence, the models are as follow:

$$tfp_{it} = \alpha_0 + \alpha_1(tfp_{it-1}) + \alpha_2(X_{it}) + \alpha_3(CF_{it} / K_{it}) + \alpha_4(CF_{it}/K_{it}) * NEGLIQ_{it} + \alpha_5(CF_{it}/K_{it}) * EXP_{it} + \alpha_6(shortrate) + \varepsilon_{it} \quad (3)$$

[†] The output is measured based on added value which is sum of net income, income tax, labour wage, depreciation and interest paid. All variables in Model are in natural logarithm (Ismail and Salim, 2017).

[‡] Time effects are controlled using time dummies.

$$tfp_{it} = \alpha_0 + \alpha_1(tfp_{it-1}) + \alpha_2(X_{it}) + \alpha_3(CF_{it} / K_{it}) + \alpha_4(CF_{it}/K_{it}) * NEGLIQ_{it} + \alpha_5(CF_{it}/K_{it}) * EXP_{it} + \alpha_6(longrate) + \varepsilon_{it} \quad (4)$$

where the error term ε_{it} consists of unobserved specific effects μ_i for all i firms and the i.i.d. disturbance, e_{it} . The parameter α_0 is the constant while other parameters, $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$

and α_6 are the coefficients of the variables used.

Based on the models constructed in Equation (3) and (4) above, there are six independent variables used. The definition of each variable is summarized in Table 1. The lagged TFP, tfp_{it-1} , is included to check for TFP persistency. It is expected to be positively signed; signifying previous productivity level may promote the current level of productivity. Chen and Guariglia (2013) use the lagged TFP to control for serial correlation.

Table 1 Definition of variables

Variables	Definition
tfp_{it-1}	Lagged TFP
X_{it} includes:	
Insize	The natural log of firm assets
Inage	The log of firm's age measured based on the current year of 2016 minus the year the firm is established (entering the market).
export intensity	The percentage of international sales as a fraction of the total sales.
lev	The ratio of total liabilities to total assets of the firm.
(CF_{it}/K_{it})	The net income plus depreciation, scaled by, the gross capital stock that includes property, plant, equipment and other assets
$(CF_{it}/K_{it}) * NEGLI_{it}$	An interaction between cash flow-capital ratio to a dummy of 1 if liquidity is negative. The liquidity is sum of current assets minus current liabilities divided by total assets.
$(CF_{it}/K_{it}) * EXP_{it}$	An interaction between cash flow-capital ratio to a dummy of 1 if export is positive.
Shortrate	Average short-term ratings. The credit ratings grade for each firm is rated ranging from 1 to 8. Value 1 refers to the best grade of AAA and up to grade 8 for grade D.
Longrate	Average long-term ratings. The credit ratings grade for each firm is rated ranging from 1 to 8. Value 1 refers to the best grade of AAA and up to grade 8 for grade D.

Note: The definition is based on Ismail and Salim (2017).

The ratio of cash flow, CF_{it} , to the stock of capital, K_{it} , is an indicator of internal financial resources. Ismail et al. (2010a) use this indicator to identify the presence of financial constraints. With the expected positive sign, the coefficient of α_3 measures degree of market imperfection. Next, X_{it} is the vector of firm characteristics to take into account certain firm information. Following Ismail and Salim (2017), four characteristics are observed. They are firm size, age, export intensity, and leverage. The firm size and firm age are expected to be positively signed to show that larger firm or matured firms produce higher productivity, or negatively signed to indicate that the larger size or more matured firms have deteriorate firm coordination; and thus reduced firm productivity. The export intensity is expected to positively affect TFP as larger export reduces competition risk but increases market penetration, while the firm leverage is expected to negatively affect the TFP as higher



leverage increases default risk.

In addition, two interaction terms are included in both equations. First, the interaction term between the cash flow to capital ratio and a dummy of negative liquidity, $(CF_{it}/K_{it}) * NEGLIQ_{it}$. This term is purposely inserted to control the effect of financial constraints on productivity during negative liquidity. Firms with negative liquidity will face difficulties to access the external sources of financing. It worsens the financial constraints problem. In this case, α_4 is expected to be positively signed. Second, this study also looks at the impact of financial constraint and its relationship with exports. This is indicated by $(CF_{it}/K_{it}) * EXP_{it}$. α_5 should be negative as firms with international market enjoy more market access.

Finally, to investigate the effect of firm credit ratings, both short- and long-term ratings are included in the models, namely *shortrate* and *longrate*. Both variables are constant across years. The credit ratings that have been taken into consideration in this study are intended to discover the effect of two types of ratings on productivity for the firms involved. The coefficients for both variables are expected to be negative, indicating that better ratings improve firm productivity.

Empirical Approach

Models (3) and (4) have dynamic features. To suit dynamic panel data analysis, this study employs the Generalized Method of Moments (GMM) to estimate the models. The approach has the ability to overcome pooled data econometric problems such as autocorrelation and endogeneity (Arellano and Bond, 1991; Blundell and Bond, 1998; Adnan and Ismail, 2014; Ismail and Salim, 2017). The approach has been used by many previous studies such as Ismail et al. (2010a; 2010b), Ghosh (2006), Koo and Maeng (2005), and Laeven (2002).

There are two types of GMM. Since, difference GMM may suffer high persistence problem due to the problem of weak instruments, this study uses system GMM (Ismail et al., 2010a; Ismail and Annuar, 2015; Ismail and Salim, 2017). In addition, the system GMM produces lower biases (Soto, 2009). After comparing the efficiency of one-step and two-step GMM approaches, Soto (2009) suggests taking the one-step estimates for inference purposes. Furthermore, the number of time series is $T = 15$ while $N = 48$, where the instruments would be larger than N . Hence, we restrict the lags of instruments for levels and differences. Soto (2009) also argues that if the number of instruments is larger than N , the covariance matrix becomes singular and the two-step estimator cannot be computed. As a result, we use one-step estimates for this paper. To diagnose the GMM results, the Arellano-Bond (AR (2)) test and Hansen test are used. The AR (2) is used to check for the second order serial correlation, while the Hansen is to identify the legitimacy and orthogonality of instruments. Both AR (2) and Hansen tests must not be significant at least at the 10 percent level of significance in order to justify model specification.

Sources of Data

All firm specific data used in this study except ratings were taken from Thomson Financial Datastream. The data include financial and non-financial data for firms listed on the main board of Bursa Malaysia from 2000 to 2015. The data are annual time series data except firm age data in which are static data. The original number of firms involved were 1375. Since, not

all firms were listed on the main board of Bursa Malaysia since 2000, the data become unbalanced. Therefore, the unbalanced panel data method is used.

Besides, the data of firm credit ratings were obtained from rating agencies websites in Malaysia namely RAM Rating Services Berhad (RAM) and Malaysian Rating Corporation Berhad (MARC). For credit ratings' data, they are calculated based on the average rating given to the firms involved. The averaging process is made because some firms have several ratings for their financial sources such as *sukuk*, bonds and commercial papers. The dates of ratings are different for the firms. All ratings are ratings published between 2000 and 2015. There are two types of ratings, and those are short-term and long-term ratings. In order to meet the regression requirement, the ratings are transformed into numerical values. The credit ratings grade for each firm is rated ranging from 1 to 8. Value 1 refers to the best grade of AAA, and the lowest is grade 8 for grade D. The lowest average is to show the best rating grade with an average value of 1 followed by higher number for lower rating grades.

Later, the raw data obtained are refined according to some criteria outlined by Ismail et al. (2010a). According to the criteria, the financial firms are to be discarded because the behavior of the firms in investing is different from firms in non-financial sectors (Ismail et al., 2010a). Subsequently, the firms suffering losses for the financial year of three consecutive years in the history of firms are also discarded. This is because these firms usually perform poorly during and after economic crises such that they recover slowly to restore the financial situation of the firm. In addition, firms with missing data are also discarded. The final filtering criteria is to remove firms operating less than five years in the market. Hence, the final sample consists of 48 firms with short-term ratings and 66 firms with long-term ratings. These firms have ratings on their short-term and long-term financing funds. Since being rated is not compulsory, the samples are relatively small as compared to the total number of listed firms on Bursa Malaysia.

RESULTS AND DISCUSSION

This study analyses the role of internal finance and credit ratings in influencing firm productivity. The data are analyzed using the system GMM. The results of the analysis and its discussion are discussed in this section. There are two results. Table 2 shows the results of GMM estimation for short-term ratings, while Table 3 for long-term ratings. Some firms have both short-term and long-term ratings, while some firms have either short-term or long-term rating. Similarly, the data are unbalanced, in which there are missing data for certain years due to data unavailability. Therefore, there are 48 firms for short-term ratings analysis with 367 observations and 66 firms with long-term ratings analysis with 516 observations.

Based on Table 2, the estimation results empirically show that the lagged dependent variables, tfp_{it-1} , is significant at 5% of significance level. It indicates that the lagged productivity has significant influence on the current productivity level. This influence implies that the productivity in the coming year is affected by the previous achievement such that a currently productive firm will usually remain productive in the coming years. The estimated coefficient shows that 1 unit increase in the previous year TFP will increase the current TFP by 0.1908 units. Therefore, firms can expect that the increase in TFP in the current year will have a

positive impact on TFP in the coming years. This finding coincides with the finding of the study by Adnan and Ismail (2014) stating that the firm's performance in the previous year has a positive impact on the firm's current performance.

For internal finance, the cash flow to capital ratio (CF_{it}/K_{it}) is significant at 1% level of significance, while the firm negative liquidity level, $(CF_{it}/K_{it}) * NEGLIQ_{it}$, is significant at 5% significance level. The signs shown by both variables are positive. The results exhibit that firm productivity are influenced by the availability of internal resources. The results also indicate the presence of financial constraints. With this, it indicates that firms experiencing difficulties in obtaining financing resources will face the problem of increasing their investment activities. Subsequently, this situation will affect the productivity. Similar to a previous study, the inherent financial constraints have a positive relationship with productivity in the short-term (Musso and Schiavo, 2008). Furthermore, in the situation of negative liquidity, the financial constraints become severe as the coefficient become $\alpha_3 + \alpha_4$, in which firms become more dependent on internal finance. On the other hand, the interaction term of $(CF_{it}/K_{it}) * EXP_{it}$ is not significant. This result contradicts the earlier theoretical expectation that export activity reduces financial constraints.

For short-term credit rating variable, it is significant at 5% of significance level. Its negative sign indicates that better credit rating improves firm productivity. This happens as lower rating values exhibit better credit ratings as have been explained in the previous section. This result proves the theory that good ratings display firm's current ability to have profit and repay its debt obligations. Next, it attracts investors to subscribe to their financial instruments.

Regarding firm characteristics as control variables, the table shows that firm size has a very significant relationship with TFP at the 1% significance level. This indicates that the larger the size of the firm, the higher the firm's productivity. In terms of firm age, the result shows that there is no significant relationship between firm age and its productivity. This means that as a firm's age increases, in which firm becomes more mature, there is no effect on the firm's productivity. This is in contrast of theoretical expectation. Coad et al. (2013) also find that the age factor does not affect firm productivity. In addition, the export intensity variables also show an insignificant relationship with TFP. Thus, this indicates that export activity does not affect productivity, which is also against the theory. In contrast, the result of firm leverage shows that there is a significant effect of firm debt-worthiness; that is, it will affect negatively the productivity of the firm. It explains that higher leverage increases firm's default risk. The increase of 1 unit of leverage will decrease productivity at 0.6695 units. This negative relationship is similar to the study by Avarmaa et al. (2013).

Based on the GMM results, the second order serial correlation test, AR (2), and the Hansen test unveil consistent and reliable results. The Hansen test is used instead of the Sargan test because the standard errors in this study are robust. The results shown in Table 2 demonstrate that the Hansen and AR (2) tests are not significant at 10% significance with 0.1840 and 0.2770, respectively. Both results show that the model is well-specified, while the instruments are valid.

Table 2 GMM Estimation Results for Short-term Ratings

Dependent variable: tfp_{it}		System GMM step 1	P value
Independent variable:			
tfp_{it-1}		0.1908***	0.004
X_{it} includes :			
i)	Lnsize	0.3828***	0.000
ii)	Lnage	- 0.0119	0.174
iii)	export intensity	0.0002	0.779
iv)	Lev	- 0.6695***	0.007
	(CF_{it}/K_{it})	0.3765***	0.000
	$(CF_{it}/K_{it})*NEGLIQ_{it}$	0.2870**	0.038
	$(CF_{it}/K_{it})*EXP_{it}$	0.1157	0.456
	Shortrate	- 0.0384*	0.062
	AR (2)	0.2770	
	Hansen Test	0.1840	
Number	Observations	367	
	Firms	48	
	Average	7.65	
	Instruments	44	

Note: The signs of ***, ** and * indicate significance levels at 1%, 5%, and 10% respectively. The number of lags for instruments matrix is limited to 5 lags.

Table 3 presents estimation results for the long-term rating analysis, the table shows that tfp_{it-1} is positively signed and significant at 1% of significance level. This result indicates that the previous productivity achievement influences current level of productivity. Specifically, a one unit increase in productivity in the previous year will impact productivity in the next year by 0.2926.

The internal finance results indicate that the ratio of cash flow to capital (CF_{it}/K_{it}) shows the presence of financial constraints as the variable is significant at 1% of significance level. Similar to earlier result, it indicates that firm productivity is influenced by difficulties to obtain funding. The firm negative liquidity $(CF_{it}/K_{it})*NEGLIQ_{it}$ and the interaction of cash flow ratio to export $(CF_{it}/K_{it})*EXP_{it}$ are insignificant. The results unveil that, for this group of firms the financial constraints do not become severe during negative liquidity. Furthermore, the impact of financial constraints on firm productivity is indifferent between exporting and non-exporting firms, and between negative liquidity and non-negative liquidity firms.

Next, the estimation result for long-term credit ratings variable exhibits that long-term rating is not statistically significant. This suggests that long-term credit ratings do not affect the firm's productivity. This finding is different from the firm's rating in the short-term as described in Table 2. With respect to diagnostic tests, the AR (2) and the Hansen tests show that both of these tests are not significant at 10% significance level with 0.440 and 0.163 respectively. Both of these results also show that the model and instruments of the study are well-specified and valid.

For firm characteristics, Table 3 also show that the variable, firm size is also positively signed and significant at 1% of significance level. The 1% increase in firm size will increase productivity by 0.3274. Hence, it can be concluded that productivity is influenced the size of

the firm. This result contradicts the result for firms with short-term ratings. Another independent variable, i.e. firm age, is slightly insignificant at 10% of significance level but negatively marked. The results obtained are seemed to be consistent with the study by Cucculelli et al. (2014). This suggests that the firm's age may negatively affect firm productivity. In addition, the table also shows that export intensity and leverage variables are not significant at 10% of significance level. The findings show that export activity and firm leverage do not affect this group of firm's productivity. Thus, it can be shown that export activities and firm leverage are not relevant in enhancing firm productivity. This finding is in contrast to the study by Huynh and Petrunia (2010) which states that leverage has a positive relationship with productivity.

Overall, it can be summarized that the short-term ratings are very important to firms as the ratings affect firm productivity. On the other hand, long-term ratings do not affect firm productivity. Even though in many cases the long-term ratings are needed to convince long-term lenders and investors, the finding indicates that firms require more short-term ratings rather than long-term ratings as the ratings have a positive impact on productivity. In addition, the finding is likely to give important insights to prospective investors who want to invest in firms if short-term ratings are seen to be better at impacting productivity than firms with long-term ratings.

Table 3 GMM Estimation Results for Long-term Ratings

Dependent variable: tfp_{it}		System GMM step 1	P value
Independent variable:			
tfp_{it-1}		0.2926***	0.000
X_{it} includes :			
i)	Lnsizes	0.3274***	0.000
ii)	Lnage	-0.0087	0.104
iii)	export intensity	0.0008	0.383
iv)	Lev	-0.0850	0.706
	(CF_{it}/K_{it})	0.6846***	0.000
	$(CF_{it}/K_{it}) * NEGLIQ_{it}$	-0.0873	0.667
	$(CF_{it}/K_{it}) * EXP_{it}$	-0.1228	0.364
	Longrate	-0.0242	0.276

Table 3 Cont.

AR (2)		0.440
Hansen test		0.163
Number	Observations	516
	Firms	66
	Average	7.82
	Instruments	56

Note: The signs of ***, ** and * indicate significance levels at 1%, 5%, and 10% respectively. The number of lags for instruments matrix is limited to 8 lags.

CONCLUSION AND POLICY IMPLICATION

This study uses annual data of firms listed on the main board of Bursa Malaysia for the period from 2000 to 2015. Based on the criteria set out, the number of firms involved has been

reduced from the original selection and eventually only 80 firms are chosen; in which 48 of them have short-term ratings, while 66 firms have long-term ratings. Using the system GMM method, the determinants of TFP have been analyzed. The results of the study have shown that financial constraints have an important role in influencing firm productivity. This finding supports earlier finding by Ismail and Annuar (2015) that financial factors have significant impact on firm productivity. The result implies that the need for financial factors is important as a source to increase firm productivity. In contrast, internal financial shortage will cause firms to require the access to external funding to cope with the shortage of firm activity. Hence, firms need to have sufficient cash flow and return as a guarantee of good financial structure. Additionally, this study examines firms with short-term credit ratings as well as firms with long-term ratings. After analyzing, the results of the study show that there is a difference between the two types of firm ratings, in terms of their impact on firm productivity. For firms with short-term ratings, it is found that the ratings will have an impact on firm productivity while for firms with long-term ratings, the ratings will not affect them. Therefore, the existence of credit ratings for firms in the short-term is important at observing increased productivity. However, the rating requirement also depends on the investment decision as the effect on productivity is negatively related. This suggests that in the short run, better credit ratings obtained for the firm do guarantee high productivity.

The outcome of this study can provide useful information to policy makers and rating agencies in designing policies that can improve productivity and spurring firm and economic growth. Policy makers should not consider any specific and single study to serve as a basic guide to policy action and formulation of instruments (Silva and Carreira, 2012). Among the measures that the government can take are to provide investment opportunities and funding funds to firms, especially those with financial constraints. For credit rating agencies, they need to monitor all investment activities and productivity levels of firms in Malaysia so that investment activities grow in tandem with productivity and growth. These agencies must also tighten the implementation of credit ratings on Malaysian firms so that the assurance to investors is more reliable. In addition, the information obtained from this study also allows firms to take preliminary steps in addressing financial resources. As a smart measure, firms should always be prepared and provide adequate internal financial resources to further enhance investment activities to improve revenue and productivity of firms.

Among the recommendations for future research on financial constraints and credit ratings are the use of more extensive ratings information and not to only focus on the average ratings' grade that has been classified. Information like how ratings are assigned by agencies is important for firms so that the firms will strive to improve their ratings. Hopefully, the results of this study can be used as a guide for future researchers and can contribute to literature on ratings for firms in Malaysia.

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