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Impact of Observable Determinants and Unobservable Effect on Capital Structure: Evidence from Quoted Public Manufacturing Companies in Sri Lanka

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Abstract:
The determinants of capital structure has been a widely discussed notion in finance studies and it leads to investigate the factors affecting the firm's capital structure. However, the recent empirical studies question the validity of such studies due to the absence of unobservable effect in models and the explanatory power of the determinants of capital structure. Importantly, these contradictories are subject to the argument of unobservable effect affecting to the capital structure explains a high proportion of the variation of leverage than the observable determinants of capital structure. Hence, the study tested the impact from unobservable effect on capital structure of Sri Lankan firms. To attempt this research problem, three objectives were formulated as; explore the importance of unobservable effect in the capital structure,   identify the determinants of capital structure and to measure the variance decomposition of capital structure pattern. In order to achieve these objectives the study analyzed the selected variables of quoted public manufacturing companies within the time period of 2004 to 2013.. The study revealed that there is an unobservable effect affecting the capital structure in Sri Lankan firms and after accounting unobservable effect into the model the study found profitability, size and liquidity as determinants of book leverage and growth, profitability, size, earnings volatility and stock return as determinants of market leverage. Further, after employing Analysis of Covariance (ANCOVA), the study found a robust result that the unobservable effect explains most of the cross sectional variation in leverage, and the power of usual determinants to explain such variation is fairly limited.

Keywords: *Determinants of Capital Structure, Leverage, Manufacturing firms, Sri Lanka, Unobservable Effect, Analysis of Covariance*

1. Introduction

Within the domain of capital structure, the determinants of capital structure are topical and have been considered as a central issue. Therefore, studies began to identify different time variant firm characteristics such as tangibility, size, growth, profitability, liquidity, earnings volatility, non debt tax shield and stock return. Even though researchers have found variety observable determinants, recently few studies attempt to find out the validity of these observable determinants. The main reason behind this argument is unobservable effect is more significant than observable determinants on leverage variation. Firstly it is important to comprehend the meaning of unobservable effect. An unobserved, time-constant variable is called an unobservable effect in panel data analysis and unobservable effect can be named as unobserved component, individual effect, and latent variable or unobserved heterogeneity (Wooldridge, 2002). As a result unobservable effect can be identified as an effect that is not captured by the observed variables. Further, Wooldridge (2002) stated that if the unit of observation is the firm, then unobserved effect contains unobserved firm characteristics, such as managerial quality, managerial performance or organizational structure etc. which are constant over the period. As a result, unobservable effect in capital structure can be identified as time invariant firm specific effect (Lemmon, Roberts, & Zender, 2008; Matemilola, Bany-Ariffin, & McGowan, 2013).

Even though there are number of studies attempted to find out the determinants of capital structure, there are very few studies identified the importance of unobservable effect and explanatory power of unobservable effect on leverage. And the researchers postulate that, in an attempt to identify the factors affecting on capital structure, it is indispensable to acknowledge the impact of

unobservable effect. The reason behind that is, studies have found that failure to account for unobservable firm-specific factors in capital structure modeling will lead to bias the empirical results (Flannery & Rangan, 2006; Lemmon, Roberts & Zender, 2008; Chang & Dasgupta, 2011).However, the researcher is not found any studies attempt to identify the importance and contribution of this unobservable effect on leverage variation in Sri Lankan firms. Thus the researcher strives to affirm that results are being held inconclusive in the context desired. As a result, since studies not account the unobservable effect, there is a question regarding the validity of the findings of determinants of capital structure in Sri Lanka.

Furthermore, researchers have made a debate on validity of determinants of capital structure and they argued that majority of the variation on capital structure is explained by unobservable effect and determinants of capital structure explain the minority of the variation on capital structure. Therefore, there is a problem to identify validity of these findings into Sri Lankan context and to examine the factors which affect to majority of variation on capital structure. With regard to that the research problem of the study is "Whether the impact of unobservable effect on capital structure in Sri Lankan firms is more significant than the determinants of those firms leverage?". Hence, the objectives of this study formulated as; explore the importance of unobservable effect in the capital structure models which used to identify the determinants of capital structure and measure the variance decomposition of capital structure pattern attributable to unobservable effect, time effect and other determinants.

In order to achieve the objectives, the study analyses selected variables in quoted public manufacturing firms for the period 2004 to 2013. Panel data analysis and analysis of covariance used as the analytical techniques. Study revealed that not accounting unobservable effect into the model will lead the bias empirical results and majority of variation of leverage explained by unobservable effect.

The balance part of the paper is organized as follows. The next section consists with the prior research studies on unobservable effect, time effect and determinants of capital structure. Methodology section explains the sample, population of the study, variables of the study, data and research method. Fourth section analyses the data, results and findings. Lastly, the conclusion of the study presented.

2. Literature Review

The scholars began to identify the determinants of capital structure to find the solutions for the questions of "How firms choose their capital structure and what are the factors affecting capital structure decisions?". As a result since the study of Myers (1977) which was carried out to identify the determinants of corporate leverage, the literature on capital structure has grown steadily with different capital structure theories which are trying to explain factors affecting capital structure.

However, studies such as Flannery & Rangan (2006), Lemmon, Roberts, & Zender (2008) and Matemilola, Bany-Ariffin, & McGowan (2013) have identified that leverage depend on set of explanatory variables which are known as observed firm specific determinants and unobservable effect. If the unit of specification (unit of observation) is a firm, then the unobservable effect means unobserved firm characteristics or in other words firm effect (Wooldridge, 2002) such as managerial quality, managerial performance, organizational structure, reputation, capital intensity and attitudes towards risk. Panel data analysis provides two ways to accomadate the unobservable effect namely, "random effects" estimator and the "fixed effects" estimator. Some scholars who have done studies on capital structure such as Lemmon, Roberts, & Zender (2008), Forte, Barros, & Nakamura (2013) and Matemilola, Bany-Ariffin, & McGowan (2013) treat unobservable effect as the firm fixed effect.

In the early studies, cross sectional regression was dominantly employed to analyse the determinants of capital structure. However, studies began to question the validity of the findings of these studies due to fact that the unobservable effect which does not account in the model[1]. As a result, studies such asAttaullah & Safiullah (2007), Serrasqueiro & Nunes (2008),Ali (2011), Kouki & Said (2012) and Bayrakdaroglu, Ege, & Yazici, (2013)move to the panel data analysis to account unobservable effect into the models and thereafter provide unbiased estimates.As a result, those studies have identified that firm's unobservable effect has an impact on the firm's capital structure and as a result, the regression coefficients of variables and inferences made based on a model that does not control for unobservable firm-specific effects would be incorrect and therefore panel regression models are important to at least to control this unobservable firm specific effect.

Further, studies such as Flannery & Rangan (2006), Lemmon, Roberts, & Zender (2008), Chang & Dasgupta (2011), Hanousek & Shamshur (2011) find that firm fixed effect large proportion of the cross sectional variation and traditional determinants of capital structure such as profitability, growth, tangibility and earnings volatility have limited power to explain leverage variation.Strengthening the work done by above studies Menichini (2012) also find that the unoservable effect explains most of the cross sectional variation in leverage, and the power of usual time-varying determinants to explain such variation is fairly limited. Furthermore, extending the work done by Lemmon, Roberts, & Zender (2008), Akhtar (2012) identified that the majority of the variation of leverage is explained by unobservable effect and the results were somewhat different when the business cycles are incorporated to the model. Further the study concluded that this result is because of the fact that business cycle phases carry significant

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[1]Studies on different fields also tend to identify the importance of unobservable effect. The several studies have identified the importance of unobservable heterogeneity on consumer brand choice(Peter, Leszczyc, & Bass, 1998), to identify the relation between earnings and firm size (Soderbom, Teal, & Wambugu, Unobserved Heterogeneity and the Relation between Earnings and Firm Size: Evidence from Two Developing Countries, 2005), to explain the disposition effect in emerging stock markets (Farag & Cressy, Do Unobservable Factors Explain the Disposition Effect in Emerging Stock Markets?, 2010) to measure the accounting conservatism (Huang, Tian, & Wirjanto, 2012).

explanatory power, which is important in the relative significance of the unobserved permanent component of the leverage ratios. Consequently, these findings question the explanatory power of determinants of capital structure which are identified by several studies and highlighted that most of the explanatory power of leverage varations comes from firm fixed effect rather than observable determinants or time fixed effect.

Even though there are ample of studies in internationally on determinants of capital structure, the researcher have identified few published studies in Sri Lankan context. However, the above studies in Sri Lanka have not identify the impact and importance of accounting unobservable effect in capital structure of Sri Lankan Firms. Hence, this study fills the gap in the body of the literature pertaining to the unobservable effect and capital structure determinants in Sri Lankan firms.

3. Methodology

This section focuses the mechanism which used to achieve three research objectives of this study. Therefore, this explains the sample and population of the study, conceptual framework, variables of the study, operationalization of the variables, data and research method.

All quoted public companies in manufacturing sector were used as the population of this study. Currently 35 companies are registered under the manufacturing sector in Colombo Stock Exchange (CSE). From that, the companies which do not have continuous data, changed their industry during the considered period and registered in the CSE after 2004 were excluded from the sample. Since the time period is ten years study has 250 observations. Appendix 1 presents the operationalization of the variables which were developed based on the literature.

To explore the importance of accounting unobservable effect in capital structure model, this study compares two models, named as restricted model and unrestricted model followed by Gujarati (2004)and Matemilola, Bany-Ariffin & McGowan (2013). The model which does not account unobservable effect was selected as restricted model and pooled Ordinary Least Square (OLS) with time fixed effect employed for that. The model which does account unobservable effect was selected as unrestricted model and Fixed Effect (FE) model[2] was selected for that.

Restricted Model – Model 1 = $Leverage_{it} = \propto_{it} + \beta X_{it} + v_t + \varepsilon_{it}$

Unrestricted Model – Model 2 = $Leverage_{it} = \propto_{it} + \beta X_{it} + {}_i + v_t + \varepsilon_{it}$

Where,

X_{it} = determinants of capital structure for the i firm and t time (consist with tangibility, growth, profitability, size, earnings volatility, liquidity, non debt tax shield and stock return)

$\Box_{i =}$ The unobservable effect (firm fixed effect)

$v_{t =}$ Time fixed effect (year fixed effect)

$\varepsilon_{it =}$ The residual term

Based on the above restricted model; two models have been developed as 1a and 1b for book leverage and market leverage respectively and based on the above unrestricted model; two models have been developed as 1a and 1b for book leverage and market leverage respectively.

Since the study has used FE model as unrestricted model, three specification tests were carried out to verify the validity of model. Firstly, by using F test it examines the group effects to see whether which model is best over from pooled OLS and FE model. Secondly, it carries out Hausman test to see whether which model is best over from FE model and random effect model. Thirdly, it tests the existence of time fixed effect. Also the study tested the multi-collinearity, cross sectional dependence, heteroskedasticity and serial correlation of panel data to assure that the study used well behaved panel data.

Thereafter to select the best model over from restricted model and unrestricted model the study used restricted f test (refer appendix 2) and then after compares the R^2 value and durbin-watson static of two models.

Finally, this study uses Analysis of Covariance (ANCOVA)[3] to decompose the variations of the book leverage and market leverage due to the different factors based on the following fixed effect model which was used to identify the determinants of capital structure.

$$Leverage_{it} = \propto_{it} + \beta X_{it} + {}_i + v_t + \varepsilon_{it}$$

The sole objective of this analysis is to understand the relative importance of various determinants, time fixed effect and firm fixed effect in capturing leverage variation. Based on the above model, 14 step-wise FE models are developed to identify the variance decomposition of book leverage and market leverage.

In order to calculate the variance decomposition of determinants of leverage, firm fixed effect and time fixed effect, the researcher computes the type III partial sum of squares[4], which explains the incremental of model sum of squares due to adding the variable of

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[2]Fixed effect model treat that unobservable effect as parameter to estimate (Wooldridge, 2002). STATA software which is used in this study and other popular softwares (Ex: Eviews and SAS) allows accounting unobservable effect (cross section effect) and time effect under fixed effect model and does not provide value for both unobservable effect and time effect

[3]Regression model that contains admixture of both quantitative and qualitative variables or dummy regressors which affect dependent variable are called Analysis of Covariance (Gujarati N. D., 2004)

[4]In this study, type I sum of squares or type III sum of squares can be used. Type III sum of squares is more appropriate than Type I sum of squares, since the former does not depend on the order in which the explanatory variables are entered into the model. Based on this fact, the study uses Type III sum of squares.

interest to a model that already contains all the other control variables. This type III partial sum of squares is calculated for each variable, and then divides the partial sum of squares for each effect by the aggregate partial sum of squares across all effects in the model. This provides a normalization that forces the columns to one. The normalization procedure eases the interpretation of the results by demonstrating the relative importance of each factor. As a result, values which are used to interpret the results are the fractions of the model sum of squares attributable to particular effects (firm fixed effect, time fixed effect, tangibility, profitability, size, growth, earnings volatility, non debt tax shield, liquidity and stock return).[5] Therefore columns which represent each model specification sum up to one which in return make it possible to explain the results as the fraction of the type III sum of squares which is due to a certain variable or effect.

4. Analysis of Data
This section analyses the data, results and findings of the study. Firstly, the study carries out the specification tests for model 2a and model 2b. The results of F test indicated that the existence of firm fixed effect and it implied that the FE model was better than the Pooled OLS; the results of the hausman test confirmed that the fixed effect model is an appropriate method to identify the determinants of book leverage and market leverage than the random effect model; the results of the joint validity of time fixed effect confirmed the existence of time fixed effect.

Thereafter to assure that the study used well behaved panel data firstly it test the multi-collinearity by using Variance Inflation Factor (VIF) and tolerance value, since the all the tolerance values are lie above 0.10 and VIF value lie below 10 the each independent variable acts independently. Next the results of Pesaran's test of cross-sectional dependence accept the null hypothesis of no cross sectional dependence for both model 2a and model 2b. Then the results of Modified Wald test accept the null hypothesis of no heteroskedasticity for both model 2a and 2b. Finally, the results of Wooldridge test accept the null hypothesis of no first-order autocorrelation.

4.1. Parameter Sensitivities to the Model Specifications
Table 1 presents the empirical results of model 1a, model 1b, model 2a and model 2b which used book leverage and market leverage as dependent variables.

Independent Variables	Book Leverage			Market Leverage		
	Pooled OLS (1)	FE Model (2)	% Change (3)	Pooled OLS (4)	FE Model (5)	% Change (6)
Tangibility	0.374200*** (4.663051)	-0.052802 (0.6342)	-114%	0.078263 (1.239548)	0.092951 (0.975231)	19%
Growth	0.032403*** (2.642336)	0.005862 (0.5355)	-82%	-0.047934*** (-4.968101)	-0.027739*** (-3.414433)	42%
Profitability	-0.536002*** (-3.014877)	-0.294248* (-1.970473)	45%	-0.326780** (-2.336148)	-0.364245*** (-2.835786)	-11%
Size	-0.028634 (-0.834599)	0.528768*** (6.595966)	1947%	0.097437*** (3.609562)	0.519072*** (7.527737)	433%
Earnings Volatility	0.337087** (2.450550)	0.080006 (0.3910)	-76%	0.293173*** (2.708863)	0.247856*** (3.096188)	-15%
Liquidity	-0.056007*** (-6.590323)	-0.014971** (-2.024513)	73%	-0.040413*** (-6.044057)	-0.009052 (-1.423110)	78%
Non Debt Tax Shield	-0.684706 (-0.889862)	0.204105 (0.7917)	130%	0.027344 (0.045167)	0.091878 (0.138376)	236%
Stock Return	-0.736573** (-2.085009)	-0.223756 (-0.970396)	70%	-0.689911** (-2.482140)	-0.643319*** (-3.243579)	7%
Time Fixed Effects	Yes	Yes		Yes	Yes	
Firm Fixed Effects	No	Yes		No	Yes	
R-squared	0.367	0.779		0.376	0.740	
Adjusted R-Squared	0.321	0.735		0.331	0.688	
Durbin-Watson Static	1.567	1.961		1.624	1.878	
Observations	250	250		250	250	

Table 1: Parameter Sensitivities to the model specifications
Notes: [a] *Numbers in parentheses under the coefficients are t-statistics.* [b] *The model is estimated using OLS and Fixed effect method.* [c] **,**, and *** indicate that the coefficient is significant at 10%, 5% and 1% respectively.*

[5]Recently, Huang, Tian, & Wirjanto, (2012) used a similar method to examine the role of the firm heterogeinity (unobservable effect) of earning and also Gala & Gomes, (2012) uses this method to identify the variance decompositon of investment levels and concluded that firm fixed effect (unobservable effect) account large portion of variation in investment levels.

The reported estimates indicate that the statistical significance of the effects found depends greatly on the model specification and the results illustrate that when model specification is changed, the determinants of both book leverage and market leverage become change. Also estimated magnitudes are very sensitive to the specification. These results are in line with the findings of Lemmon, Roberts and Zender (2008), Gormley & Matsa, (2013), Matemilola, Bany-Ariffin and McGowan (2013). They concluded that the Pooled OLS estimates are considerably different from the FE model estimates and it suggests the presence of unobservabale effect and as a result such unobservable effect cause to bias the OLS results.

For the pooled OLS regression, except size and non debt tax shield, other determinants were significant on book leverage and except tangibility and non debt tax shield other determinants were significant on market leverage. But in fixed effect model, only profitability, size and liquidity become significant determinants of book leverage and growth, profitability, size, earnings volatility and stock return become significant determinants of market leverage. The fixed effect model introduces firm fixed effects, which absorbs much of the impact of other variables; especially those that change little over time. We could find that the adjusted R squared) increases in fixed effect models which accounted an unobservable effect into the model than the adjusted R squared) in pooled OLS models which did not account unobservable effect into the model. So this OLS estimates, reported in Column (1) and (4) of Table 1 differ considerably from the FE estimates in column (2) and (5); this suggests the presence of an unobserved effect and it explore the importance of accounting unobservable effect.The similar findings were experienced by the studies such as Lemmon, Roberts & Zender (2008), Gormley & Matsa (2013), Matemilola, Bany-Ariffin & McGowan (2013). These results suggest that since there are unobservable effect or inotherwords firm fixed effect as proven in the model 2a and model 2b validity, failure to account this unobservable effect into the model would lead to omitted variable bias as well as bias the estimates of the regression parameters (Lemmon, Roberts & Zender 2008; Gormley & Matsa 2013; Matemilola, Bany-Ariffin & McGowan 2013). Furthermore, Serrasqueiro & Nunes (2008) test the inconsistency of the determinants of capital structure, comparing the pooled OLS regression which does not account unobservable effect and fixed effect model which account unobservable effect into the model and identify that the results generated from two models are diffrerent and they conclude that the conclusion of studies of the determinants of capital structure, backed up by pooled OLS regression, are biased by not controlling the unobservable effect.

4.2. Selection of Best Model over from Restricted Models and Unrestricted Models
Identification of determinants of book leverage and market leverage should be based on the best model from restricted model and unrestricted model. Therefore firstly, the study compares the adjusted R^2 value and durbin-watson static and calculate restricted F test.

Models	R^2 Value	Durbin-Watson Static
Restricted Models		
Model 1a	0.367360	1.566882
Model 1b	0.376262	1.624374
Unrestricted Models		
Model 2a	0.778941	1.96062
Model 2b	0.739511	1.87849
Restricted F test for model 1a and model 2a	F = 446.85	
Restricted F test for model 1b and model 2b	F= 334.68	

Table 2: Selection of Best Model

The above table shows that two unrestricted models have higher value of R^2 and higher durbin-waston static than two restricted models and this conserve the FE model is powerful than OLS to identify the determinants of capital structure.
Further, based on the F test and Hausman test which were carried out to strength the validity of models; model 2a and model 2b could be selected as best models to identify the determinants of book leverage and determinants of market leverage.
The F value for 1 numerator df and 240 denominator df should be 3.880. Therefore, the F values are highly statistical significant and therefore the restricted models (model 1a and 1b) seems to be invalid and unrestricted models (model 2a and 2b) can be selected as the best model to identify the determinants of book leverage and market leverage.

4.3. Determinants of Book Leverage and Market Leverage
The empirical results of the fixed effect regression which account unobservable effect to the model showed that profitability, size and liquidity as determinants of the book leverage. From these three determinants profitability and liquidity are negatively related with the book leverage and size is positively related with the book leverage. Since the coefficient of remaining five factors namely, tangibility, growth, earnings volatility, non debt tax shield and stock return are not significant, they cannot be considered as determinants of book leverage.
And Growth, profitability, size, earnings volatility and stock return as determinants of the market leverage. From these five determinants size and earnings volatility were positively related with the market leverage and growth, profitability and stock return are negatively related with the Market leverage. Since the coefficient of other remaining three factors namely, tangibility, liquidity and non debt tax shield were not significant, they could not be considered as determinants of market leverage.

4.4. Variance Decomposition of Leverage

The results in the Table 3 represented the fraction of the different variables of the type III total partial sum of squares of the respective model

Variable	Book Leverage							Market Leverage						
	(a_1)	(b_1)	(c_1)	(d_1)	(e_1)	(f_1)	(g_1)	(a_2)	(b_2)	(c_2)	(d_2)	(e_2)	(f_2)	(g_2)
Firm FE	1.00		0.98		0.95	0.83	0.79	1.00		0.85		0.79	0.65	0.60
Year FE		1.00	0.02			0.08	0.10		1.00	0.15			0.18	0.21
Tangibility				0.25	0.00		0.00				0.03	0.00		0.00
Growth				0.08	0.00		0.00				0.38	0.10	0.02	0.02
Profitability				0.10	0.01	0.01	0.01				0.06	0.04	0.01	0.02
Size				0.02	0.01	0.07	0.09				0.05	0.02	0.11	0.11
Earnings Volatility				0.04	0.00		0.00				0.05	0.02	0.01	0.02
Liquidity				0.48	0.03	0.01	0.01				0.38	0.00		0.00
Non Debt Tax Shield				0.01	0.00		0.00				0.00	0.00		0.00
Stock Return				0.02	0.00		0.00				0.05	0.03	0.02	0.02
Adjusted R^2	.673	.026	.673	.331	.685	.740	.735	.452	.056	.532	.271	.551	.688	.688

Table 3: Variance Decomposition of Book Leverage and Market Leverage

Firm fixed effects alone, as displayed in above table, which represents the model specification a_1 and a_2 capture 67% of the variation in book leverage and 45% of the variation in market leverage. While time fixed effect capture only 3% and 6% variation in book leverage and market leverage respectively. It implies that when both firm FE and year FE are included in the model specification, firm fixed effect remains dominant in capturing variation effect.

Model specification d_1 and d_2 used the important capital structure determinants indicated by several authors and these variables were able to explain only 33% and 27% of the book leverage variation and market leverage variation respectively. From those factors liquidity was responsible for the most of the variation in book leverage and growth and liquidity responsible for the most of the variation in market leverage.

The results show that book leverage and market leverage both contain an important unobserved firm specific component that is not fully captured by exsisting determinants. This shows that the majority of total variation in book leverage and market leverage comes from the cross-sectional differences as opposed to the time series differences. These findings are in line with the studies of Flannery & Rangan (2006); Lemmon, Roberts & Zender (2008); Matemilola, Bany-Ariffin & McGowan (2013) who confirmed that the majority of variation of leverage comes from cross sectional differences rather than time series differences. It shows that after incorporating unobservable effect which is considered as firm fixed effect in this study, the importance of observable determinants in explaining the variation in book leverage have relatively low. As explianed by Lemmon, Roberts & Zender (2008) if much of the explanatory power of exsisting determinants comes from cross sectional variation than time series variation, the importance of these determinants will necessarily fall as the firm fixed effect removes all such variations. Therefore, it suggests that after accounting for firm fixed effects, there are no additional variables with significant explanatory power to explain variation of capital structure. However, this results does not mean the determinants are not important in the cross section of capital structure. It simply indicates that the within firm time variation in these determinants on average much smaller than their cross sectional variation which is machanically absorbed by the firm fixed effects (Parsons & Titman, Empirical Capital Structure: A Review, 2008).

The findings of the study reveal that the determinants of capital structure are not effective in capturing variability effect. Furthermore, these findings suggest that theories based on volatile factors are insufficient or even unlikely to offer explanations for the heterogeneity in capital structures in a time-series study. This is because an important time-invariant component seems to be missing in several specifications. Furthermore, Parsons & Titman, (2008) and Graham & Leary, (2011) also highlight significant firm fixed effect in firm's capital structure and implied need to identify time-invariant determinants of leverage.

As explained by Lemmon, Roberts & Zender, (2008), While interpreting the results of the variance decomposition, one has to be aware of the consequences of using fixed-effect model. A firm fixed effect inserts firm dummies for each firm to account unobservable effect which is time invarient. Therefore, if determinants of capital structure (tangibility, profitability, size, growth, earnings volatility, liquidity, non debt tax sheild and stock return) explains cross sectional variation, since the fixed effect estimator remove this cross sectional variation leaving only the time series variation. As a result the importance of these determinants will decline and the results of this study confirmed it. Model specification d_1 able to explain about 33% of variation of book leverage and model d_2 able to explain about 27% of variation of market leverage. When include same determinants in model specification a_1 and a_2, leads to an increase of adjusted R^2 only from 2% and 10% respectively. This confirms that most of the explanatory power of determinants of capital strucure stems from the cross sectional variation, which is removed by using firm fixed effect.

Finally the results of the study together with the prior literature suggest the majority of the variation of leverage driven by the unobservable effect or in otherwords firm specific effects which are time invariant. These effects could include managerial incentives, productivity, managerial behavior on risk and skill or factors which are specific to the firm.

5. Concluding Remarks

The notion of this study is unobservable effect on capital structure. Therefore the research design was set in order to identify the impact from unobservable effect on capital structure in Sri Lankan firms filing the gap in research problem. The problem arises due to two main findings of the prior studies. First, researchers have identified that if the study is not accounted for the unobservable effect into the model then it will lead to bias the empirical results. Second, recent studies have argued that the unobservable effect explains majority of the variation of leverage rather than the identified determinants of capital structure.

Firstly, the study concluded that statistical significance of the effects depend greatly on the model specification and the results illustrate that when model specification is changed, the determinants of book leverage and market leverage also changed. Also estimated magnitudes are very sensitive to the specification.

This study finds that profitability, size and liquidity as significant determinants of book leverage; while growth, profitability, size, earnings volatility and stock return as significant determinants of market leverage. In line with the pecking order theory, profitability and both book leverage and market leverage has negative relationship. Size is positively related with both book leverage and market leverage and it conserves the trade off- theory and agency theory which are expected positive relationship. Strengthening the agency theory, pecking order theory and free cash flow theory, this study also finds that liquidity is negatively related to book leverage. In line with the agency theory, this study have identified that growth and market leverage have a negative relationship while earnings volatility and market leverage have a positive relationship. And also as expectation of market timing theory, the study finds that stock return and market leverage have a negative relationship.

Finally, variance decomposition analysis leads to the conclusion that there are unobserved effect which are not captured by the existing determinants, but which have an enormous impact on a firm's capital structure. Further the very low explanatory power of the time fixed effects support the fact that most of the variation of capital structure is explained by the time-invariant factors. Therefore the more work should be done to identify the factors which cause to unobservable effect rather than studying the determinants of capital structure which are identified by the previous studies.

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Appendices

Appendix 1

	Variables	Indicator	Measurement
Dependent Variables	**Book Leverage**	Total Debt Book Value of Equity	TD / TD + Book Value of Equity
	Market Leverage	Total Debt Market Equity	TD / TD + Market Value of Equity
Independent Variables	**Unobservable Effect**	Firm Fixed Effect	Firm dummies
	Determinants of Capital Structure	Tangibility	TGFA / TA
		Growth Opportunity	BV of TA – BV of Equity + Market Equity / BV of TA
		Firm Size	Log of Total Assets
		Profitability	EBIT / TA
		Earnings Volatility	Standard deviation of the first difference in the Earning before interest and tax
		Non Debt Tax Sheild	Depreciation/TA
		Liquidity	Current Assets / Current Liabilities
		Stock Return	stock return formula (Appendix 2)
	Time Effect	Time Fixed Effect	Time Dummies
Note: BV = Book Value EBIT = Earnings before Interest and Tax TD = Total Debts TGFA = Total Gross Fixed Assets TA = Total Assets			

Table 4: Operationalization

Appendix 2: Formulas and Equations used to the study

- Stock Return Formula

$$R_{i,t} = \frac{\left[\left[\dfrac{Pc}{Pc + R_r P_r}\right](1 + R_r + Sr + D_r + B_r)\right]P_{i,t} - P_{i,0}}{P_{i,0}} \times 100$$

Where,

$R_{i,t}$ = Return of the i th share in the month t. , $P_{i,t}$ = Price of the i th share at the end of month t., $P_{i,o}$= Price of the i th share at the beginning of the month t., $D_{i,t}$ = Dividend paid on the company i th share in the month concerned (DPS) S_r = Split ratio, B_r = Bonus ratio, P_C = The stock price immediately before the ex-right date, R_r = Right ratio, P_r = Right price which is the price at which the shareholder can buy the new share

- Restricted F Test

$$= \frac{(R_{UR}^2 - R_R^2)/m}{(1 - R_{UR}^2)/(n - k)}$$

Where,
R_{UR}^2 = R^2 value obtained from the unrestricted model, R_R^2 = R^2 value obtained from the restricted model
m = number of linear restrictions (1 in this study), k = number of parameters in the unrestricted model
n = number of observations