



Profitability and Leverage: Different Effects of Negative Profits?

Iswadi Bensaadi^{1*}, Adnan², Wahyuddin Albra³

^{1,3} Faculty of Economics and Business, Universitas Malikussaleh, Indonesia

² Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia

^{*}) Corresponding Author: iswadi@unimal.ac.id

Abstract

Objective – This study aims to examine the effect of profitability on leverage in firms with negative profits and the sensitivity of the COVID-19 pandemic in explaining the effect of profitability on leverage.

Design/Methodology – This study uses unbalanced panel data for 660 firm-year observations over 4 (four) years from 2018 to 2021 on non-financial service firms. Two-stage least square regression was utilized to examine the effect of profitability on leverage.

Results – Consistent with several previous studies, this study indicates that profitability negatively affects leverage and has similar results in firms with negative profits. Another finding is that the COVID-19 pandemic is not sensitive to explaining the effect of profitability on leverage. Both the pre-COVID-19 pandemic and during the COVID-19 pandemic, profitability has a similar effect on leverage.

Research limitations/implications – This study is conducted over a short period, only four years. The study provides a new perspective on the effect of profitability on leverage in companies with negative profits and the pecking order theory in explaining the relationship between profitability and leverage in the Indonesian context.

Novelty/Originality – This study examines the effect of profitability on leverage in firms with negative and positive profits using a two-stage least square (2SLS) in the Indonesian context.

Keywords: Internal financing, leverage, negative profit, profitability

1. Introduction

The issue of financial decisions in firms continues, especially concerning the choice of financing sources. Firms always face choosing between internal and external financing sources. There are two main theories for making corporate financial decisions. First, the trade-off theory stipulates that the firm's capital structure is determined by the tax benefits extracted by the firm. When the tax benefits outweigh the debt costs, companies choose debt financing over internal financing. In such conditions, the increase in profits will encourage firms to use more debt. Second, the pecking order theory assumes that the hierarchy of sources of firms' financing starts with self-financing, non-risk debt issuance, risky debt issuance, and equity issuance as the final source (Adair & Adaskou, 2015). In this context, the firm's profit becomes the primary source of the firm's financing, so firms that earn higher profits (firms with more profit) choose to use less debt to finance new investments or other activities.

Previous studies on the effect of profitability on leverage have been carried out and still give mixed results. Some studies found a negative profitability-leverage relationship (Adair & Adaskou, 2015; Mishra & Dasgupta, 2019). Other studies documented positive relationships (Richard & Oluwatosin, 2014) and no significant relationship (Fadilla & Asih, 2022). In subsequent studies, Kalantonis et al. (2021)

examined the effect of financial performance (ROA) on leverage by considering economic sentiment by using accounting information showing that accounting performance negatively affected leverage. Another study about the determinant of capital structure indicates that profitability negatively affected the leverage in firms in an Islamic equity index, both in developed countries, developing countries, and countries with a majority Muslim population (Kahya et al., 2020). Fan et al. (2012) revealed that profitability positively affected leverage in various countries.

This study is substantial for several reasons; first, this study examines the effect of profitability on leverage in firms with negative and positive profits that are still rare, and this study fills that gap. Firms with negative profits are more difficult to access sources of financing through debt. Firms will rely on higher internal financing sources when it is hard to obtain internal financing (Vermeulen, 2021). Second, this study examines the sensitivity of the COVID-19 pandemic to access to external financing. In times of crisis, firms will rely more on internal financing compared to external so that the effect of profitability on leverage during a crisis will be more sensitive than during a booming economic period. Finally, this study examines the profitability effect on leverage using a two-stage least square (2SLS). The past study documented that leverage is an endogenous variable (Mishra & Dasgupta, 2019). Empirical evidence on the use of 2SLS in explaining the effect of profitability on leverage in Indonesia is still limited.

This study investigates the effect of profitability on leverage, the influence of profitability on leverage in firms with negative profits, and the sensitivity of the COVID-19 pandemic in explaining the profitability effect on leverage. The structure of this study consists of a literature review, theoretical framework, hypothesis development, research method, results and discussions, conclusions, implications, and limitations.

2. Literature Review, Theoretical Framework, and Hypothesis Development

This section reviews relevant empirical studies that examine the profitability effect on leverage. Adair & Adaskou (2015) studied the relationships between profitability and leverage by testing the trade-off and pecking order theory. The data used in their study were 2,370 French SMEs datasets during 2002-2010. The empirical finding shows that profitability significantly and negatively affected leverage.

Similarly, Mishra & Dasgupta (2019) studied the profitability effect on leverage in 400 companies in developed and developing countries from 1990 to 2016 and found that profitability (ROA) significantly and negatively affected leverage in both developed and developing countries. A study In 30 developed and 26 developing countries during 2004-2018, with 28.543 firms-years observation (Kahya et al., 2020), indicated a negative and significant relationship between profitability and leverage.

Consistent with the above studies, Kalantonis et al. (2021) analyzed profitability-leverage relationships on 154 companies listed on the Athens Stock Exchange Market from 2005 to 2018 and documented that profitability negatively and significantly influenced leverage. Agustin & Ardini (2019) and Fadilla & Asih (2022) researched the effect of profitability on leverage In Indonesia. Agustin & Ardini (2019) examined the influence of return on assets on debt policy on 18 food and stock firms listed on the Indonesian Stock Exchange for 2013-2017 and proved that return on assets significantly and negatively affected debt policy. Fadilla & Asih (2022) researched the Indonesian Sharia Bank Demang Palembang Branch with the findings that return on assets had no significant effect on debt.

2.1 Endogeneity Issues

Previous studies have addressed the influence of profitability or firm size on leverage, and a few past studies have investigated the reciprocal relationship between firms' performance (profitability) or firm size and leverage. Mishra & Dasgupta (2019) examined the endogeneity issues on the debt using the Durbin-Wu-Hausman test. The

empirical finding indicated that leverage and profitability influenced each other. Endogeneity problem leads to bias and inconsistent parameter estimation (Bensaadi et al., 2021; Shyu, 2011). Therefore, the OLS regression will not be appropriate if an endogeneity variable exists in the estimation model.

The three sources of endogeneity are unobserved heterogeneity, simultaneity, and dynamic endogeneity (Ullah et al., 2018). Unobserved heterogeneity arises when many unobservable factors affect the dependent and independent variables (Wintoki et al. 2012). In cross-sectional regression, unobserved heterogeneity may result in the level of association between the independent variables and the error term, which leads to biased estimation results (Hu & Izumida, 2008). The error term in the endogeneity bias cannot be observed, and results in no direct statistical way can be tested that the endogenous variable is correlated with the error term (Ullah et al., 2018). Simultaneous problems occur when two variables have a reciprocal influence on each other (Mishra & Dasgupta, 2019). The independent variable is a function of the dependent variable or the expected value of the dependent variable. Dynamic endogeneity occurs when the value of the current dependent variable is influenced by the value of the previous dependent variable (lagged dependent variable). Dynamic endogeneity is resolved to make the lagged dependent variable an independent variable.

In contrast to several previous studies, this study uses a panel data set over four years allowing researchers to examine cross-sectional and within-firm variations in relationships between profitability, firm size, and leverage. The firm's size is considered an endogenous variable (Kahya et al. 2020). The researcher uses two-stage least squares (2SLS) to overcome the endogeneity problem to provide the best results when the system includes endogenous variables.

2.2 Profitability and Leverage

The trade-off theory argues that the optimum capital structure will be achieved when the firm obtains a balance between the tax benefits of debt and the cost of debt (Kalantonis et al., 2021). When the tax benefits outweigh the cost of capital and the potential for bankruptcy, firms will use more debt to finance new investments or other company activities. Therefore, the trade-off theory assumes a negative relationship between leverage and bankruptcy costs and a positive relationship with the marginal tax rate (Aggarwal & Kyaw, 2010). This opinion leads to the conclusion that there is a positive relationship between profitability and leverage.

(Myers, 1984) developed a pecking order theory assumption that firms choose debt financing when needed. Thus, retained earnings are the firm's first financing option to fund new investments. If external financing is necessary, the firm will prioritize financing with lower risk and last with a high-risk financing source. (Mayer, 1990) provides empirical evidence in eight developed countries' hierarchical sources of corporate financing; first, from retained earnings, followed by debt, and finally, equity (issuing new shares). Firms that choose self-financing will restrict the distribution of dividends to increase cash flow and reduce the cost of capital by restricting access to loans (Adair & Adaskou, 2015). Thus, based on the pecking order theory, firms have lower debt when profits are higher (more profitable) and focus on paying out investment opportunities (Aggarwal & Kyaw, 2010). A firm with large profits has a high free cash flow. Therefore, it will reduce dependence on financing through debt.

Some studies were conducted on the profitability-leverage relationship. Kalantonis et al. (2021) researched 154 firms that traded their shares on the Athens Stock Exchange Market (ASE) from 2005 to 2018, using fixed effect estimation that high profits reduce the firm's dependence on external funding. A study by Kahya et al. (2020) on firms in the Islamic equity index in developed and developing countries during 2004-2018 proved that profitability negatively affected leverage in both developed and developing countries. The findings of Antoniou et al. (2008) indicate that leverage decreased as the firms' profitability increased. Several other studies also

indicated that profitability negatively influenced leverage (Adair & Adaskou, 2015; Agustin & Ardini, 2019; Kayo & Kimura, 2011; Mgbada et al., 2022).

H1: Firms with higher profits will prioritize internal financing and reduce debt.

Firms with negative earnings have poor performance prospects. This firm will have difficulty getting financing through debt. Firms with negative profits rely more on internal financings, such as selling investments in financial instruments and other long-term assets or issuing additional new shares. Findings in Germany, France, Italy, and Spain document that firms with weak financial positions have difficulty accessing external financing and thus will rely more on internal liquidity (Vermeulen, 2021). Firms with the potential for bankruptcy will affect debt (Kahya et al., 2020). The declining ability of firms to access credit sources encourages firms to rely on internal funding sources (Kalantonis et al., 2021). This finding indicates that negative profits of firms reduce leverage.

H2: Firms with negative profits relying on internal financing sources will negatively affect leverage.

The crisis has an impact on corporate financing. The crisis affected the firm's leverage (Akbar et al., 2013) and the firm's investment fell significantly (Duchin et al. 2010). Firms find it hard to borrow more in times of crisis and rely more on internal financing and reducing debt. Thus, the COVID-19 pandemic influences the relationship between profitability and leverage. Kahya et al. (2020) proved that the leverage ratio of firms in developing countries continued to decline during the global crisis.

H3: The effect of profitability on leverage is more sensitive during the COVID-19 pandemic.

3. Research Method

3.1 Data and Sources

To examine the relationship between profitability and leverage, the required data is selected from services firms of non-financial firms listed on the Indonesian Stock Exchange. The research used an unbalanced panel data set during 2018-2021. Data of research variables are extracted from firms' annual reports and the IDX website, containing data on debt, assets, and earnings after taxes. There are 170 firms selected. Overall, there are 660 firm-year observations.

3.2 Variable Measurement

The dependent variable is leverage. Past studies used different indicators to measure leverage. Booth et al. (2001) used three separate indicators for leverage that consist of total debt ratio, long-term book debt ratio, and long-term market debt ratio. Kalantonis et al. (2021) measured leverage by non-current liabilities and loans divided by shareholder equity. This study follows Kahya et al. (2020), who measured leverage with a total debt ratio based on book value divided by total assets. The independent variable is profitability. This study uses net income after tax divided by total assets to measure profitability, in line with some past studies (Alipour, 2013; Kahya et al., 2020; Mishra & Dasgupta, 2019).

The firm size variable is used to control for size differences across firms and to account for the well-known size effect (Al-Saidi & Al-Shammari, 2015). Larger firms are better managed, relish higher economic benefits, and use up-to-date technology (Mishra & Dasgupta, 2019). Therefore, firm size should be positively related to leverage measured by the natural logarithm of total assets (Kalantonis et al., 2021).

3.3 Endogeneity Test

Before using the 2SLS estimation method, researchers determine the endogeneity problem to justify using 2SLS. The endogeneity test used one of the

explanatory variables as the dependent variable, and the dependent variable is used as an independent variable along with some other independent variables (Ullah et al., 2018). Firm size is suspected to be an endogenous variable. Therefore, researchers use company size (*f_size*) as the dependent variable to determine *res_f_size* with the model equation as follows:

$$F_size = f(Lev, Profit) \quad (1)$$

The residual value (*Res_f_size*) obtained is used to test the correlation between firm size and the residual firm size (*res_f_size*). If the firm size variable is significantly correlated (*p_value* < 0.1) with *res_f_size*, endogeneity exists, and OLS use will lead to biased and inconsistent results.

3.4 Estimation Methods

This study uses a two-stage least square (2SLS) to examine the effect of profitability and firm size on leverage. 2SLS is used because endogenous variables exist in the estimation model. The equation model used to examine the effect of profitability, negative and positive profitability on leverage is as follows:

$$LEV_{it} = \gamma_{10} + \gamma_{11}PROFIT_{it} + \gamma_{12}F_SIZE_{it} + \varepsilon_{it} \quad (2)$$

Furthermore, the equation model used to test the sensitivity of the COVID-19 pandemic in explaining the effect of profitability on leverage is as follows:

$$LEV_{it} = \gamma_{10} + \gamma_{11}(TP=1) + \gamma_{12}PROFIT_{it} + \gamma_{13}PROFIT_{it} * (TP=1) + \gamma_{14}F_SIZE_{it} + \varepsilon_{it} \quad (3)$$

Where *LEV_{it}* is leverage, *PROFIT_{it}* is profitability ratio proxied by ROA, *F_SIZE_{it}* is firm size, *TP=1* is the period during the COVID-19 pandemic (years 2020-2021), *Y* is the parameter to be estimated, and *ε* is the error term.

4. The Results and Discussions

4.1 Endogeneity Test Result

The results in Table 1 indicate that firm size has a significant positive correlation with *res_f_size* with a probability value < 0.01. Thus, it concludes that firm size is an endogenous variable, and the use of 2SLS is more appropriate when endogenous variables in the model are used. If the explanatory variable correlates with the residual (error term), the OLS estimation method leads to biased and inconsistent results (Ullah et al., 2018).

Table 1.
Correlation
between
explanatory
variables and error
terms

Correlation (t-statistic)	LEV	PROFIT	F_SIZE	RES_F _SIZE
LEV	1	-	-	-
PROFIT	-0.2270 (-5.9799)***	1	-	-
F_SIZE	0.2287 (6.0276)***	0.1922 (5.0255)***	1	-
RES_F_SIZE	-3.17E-14 -8.14E-13	9.70E-16 2.49E-14	0.9406 (71.0906)***	1

Note: *** *p* < 0.01

4.2 Descriptive statistics and correlation

Table 2 presents the descriptive statistics of all variables used in the analysis. The mean has a substantial role in explaining the effect of profitability and firm size on

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leverage. The average leverage in all samples is 0.4414, while its minimum and maximum values are 0.0091 and 0.9933, respectively (Panel A of Table 2). Panel B and C of Table 2 reveal that average leverage in firms with negative profit is higher than in firms with positive profit. The leverage ratio in firms with positive profit is more stable than with negative profit (standard deviations of 0.2092 vs. 0.2586). Panel D and E of Table 2 present that average leverage during the COVID-19 pandemic is higher than before the COVID-19 pandemic with higher variability (standard deviations of 0.2386 vs. 0.2178).

For the independent variable and all samples (Panel A of Table 2), the average profitability ratio is 0.0115 with a standard deviation is 0.0951, while its minimum value was -0.6761 and its maximum value was 0.4540. The average profitability ratio in firms with positive and negative profits are 0.0551 and -0.0767, respectively (Panel B and C of Table 2). Firms with negative profits have a higher standard deviation than firms with positive profits. The average profitability ratio before the COVID-19 pandemic is higher than during the COVID-19 pandemic (Panel D and E of Table 2), indicating that the firm is less effective in using assets to generate profit during the COVID-19 pandemic. Finally, for control variables, firm size in firms with positive profit is larger and has more stable variability than in firms with negative profit. Furthermore, the standard division of firms' size during the COVID-19 pandemic has more variability than before the COVID-19 pandemic (standard deviations of 1.9214 vs. 1.7364).

Variables	Mean	Median	Max.	Min.	Std.Dev
Panel A. All Sample					
LEV	0.4562	0.4414	0.9933	0.0091	0.2285
PROFIT	0.0115	0.0164	0.4540	-0.6761	0.0951
F_SIZE	28.8241	29.0932	34.6091	18.8141	1.8279
Panel B. Firms with Positive Profit (DPROFIT=1)					
LEV	0.4352	0.4268	0.9132	0.0191	0.2092
PROFIT	0.0551	0.0376	0.4540	2.56E-05	0.0571
F_SIZE	29.1377	29.3604	33.2557	21.8957	1.6885
Panel C. Firms with Negative Profit (DPROFIT=0)					
LEV	0.4988	0.4948	0.9933	0.0091	0.2586
PROFIT	-0.0767	-0.0437	-0.0004	-0.6761	0.0956
F_SIZE	28.1884	28.3761	34.6091	18.8141	1.9358
Panel D. Before COVID-19 pandemic (TP=0)					
LEV	0.4428	0.4366	0.9725	0.0136	0.2178
PROFIT	0.0248	0.0239	0.3162	-0.6761	0.0906
F_SIZE	28.8040	29.0535	33.0301	23.5872	1.7364
Panel E. During COVID-19 pandemic (TP=1)					
LEV	0.4702	0.4468	0.9933	0.0091	0.2386
PROFIT	-0.0023	0.0065	0.4540	-0.5032	0.09784
F_SIZE	28.8451	29.1374	34.6091	18.8141	1.9214

Table 2. Descriptive statistics of all variables

Table 3 provides the correlation between each variable used in the analysis. The profitability ratio negatively correlates with leverage (-0.2270). Firm size positively correlates with leverage and profitability ratio (0.2287 and 0.1922, respectively).

Correlation (t-statistics)	LEV	PROFIT	F_SIZE
LEV	1		
PROFIT	-0.2270 (-5.9799)***	1	
F_SIZE	0.2287 (6.0276)***	0.1922 (5.0255)***	1

Table 3. Correlation matrix among variables

Note: *** p<0.01

4.3 Hypothesis test results

The result of 2SLS regression reveals that profitability negatively and significantly affects leverage manifested from a negative beta coefficient (-0.6759) and p-value lower than 0.01 (Table 4). H1 (firms with higher profits will prioritize internal financing and reduce debt) is supported. In firms with negative profit, profitability also negatively and significantly affects leverage. H2 (firms with negative profits rely on internal sources of financing that will negatively affect leverage") is supported. The firm restricts the distribution of profits to shareholders to have more free cash flow for investment. Adair & Adaskou (2015) argue that firms that choose self-financing will restrict dividend distribution and access to loans. This result is consistent with some prior studies (Agustin & Ardini, 2019; Kahya et al., 2020; Kayo & Kimura, 2011; Mgbada et al., 2022). These studies suggest that firms avoid external financing when internal financing is sufficient for investment and other firm activities. This finding is also consistent with the study of Kalantonis et al., (2021) documented that high profits reduce the firm's dependence on external funding.

Table 4.
Estimation results
(Model 2)

Variables	All Sample (N=660)		Firms with Positive Profit (N=442)		Firms with Negative Profit (N=218)	
	Coeff.	t-Statistic	Coeff.	t-Statistic	Coeff.	t-Statistic
C	-0.5550	-4.1490***	-0.54425	-3.3669***	-0.57507	-2.3420**
PROFIT	-0.6759	-7.5830***	-0.78605	-4.8061***	-0.51969	-2.9702***
F_SIZE	0.0353	7.6218***	0.03510	6.3408***	0.03668	4.2440***
F-Stat		48.4776***		31.0415***		12.5768***
R ²		0.1285		0.1238		0.1047
Adj. R ²		0.1259		0.1199		0.0964

Note: ***, **, indicates estimated coefficient significant at 1% and 5% levels, respectively

Although profitability negatively affects leverage in firms with negative profit, these firms have more debt than firms with positive profit. It indicates that firms with negative profits still prioritize internal financing compared to the other way around. Firms consider a hierarchy of financing sources in financing new investments and select debt when needed. Corporate financing sources consist of retained earnings, debt, and new shares (Mayer, 1990). This finding is in line with Adair & Adaskou (2015) claimed that firms avoid external financing if they have internal financing sources and avoid issuing new shares if they can engage in debt financing. The findings of this study are inconsistent with research by (Vermeulen, 2021), which documents that firms with weak financial positions have difficulty accessing external financing and will depend more on internal liquidity. The findings of this study indicate that firms with negative profits can borrow more and choose to increase debt when they lose.

Table 5 model (3) presents the results of different effects of profitability on leverage for 2018-2019 (pre-COVID-19 pandemic period) and 2020-2021 (during the COVID-19 pandemic). However, the result shows no different effect of profitability on leverage before and during the COVID-19 pandemic (p-value of coefficient PROFIT*(TP=1) > 0.01). This finding can conclude that profitability similarly affects leverage between 2018-2019 and 2020-2021. Hence, H3 is not supported. As presented in Table 5, sub-sample before the COVID-19 pandemic (TP=0) and sub-sample during the COVID-19 pandemic (TP=1), profitability negatively and significantly affects leverage. Profitability negatively affects leverage during the COVID-19 pandemic, with higher leverage compared to the pre-covid. It is similar to the pecking order theory that companies prioritize internal financing to fund investment compared to external financing before and during the COVID-19 pandemic. This finding is irrelevant to the trade-off theory that argues a negative relationship between leverage and bankruptcy

costs and is positively related to the marginal tax rate (Aggarwal & Kyaw, 2010) and firm performance.

Finally, other findings are related to the control variables in Tables 4 and 5, which show that the control variables positively affect leverage. The firm size reveals that the growth of the firm and higher economic benefits will affect and increase the firm's leverage.

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Table 5. Estimation results of sensitivity analysis (model 3)

Variables	Different Effect, All Sample, (N=660) Model (3)	Sub-Sample Before COVID-19 pandemic (TP=0) (N=337)	Sub-Sample During COVID-19 pandemic (TP=1) (N=323)
	Coeff. (t-Statistic)	Coeff. (t-Statistic)	Coeff. (t-Statistic)
C	-0.5653 (-4.2171) ***	-0.6732 (-3.6067)***	-0.4600 (-2.3877)**
TP=1	0.0102 (0.6033)	-	-
PROFIT	-0.5579 (-4.3120) ***	-0.5693 (-4.5826)***	-0.7567 (-5.7836)***
PROFIT*(TP=1)	-0.2136 (-1.2054)	-	-
F_SIZE	0.0354 (7.6356) ***	0.0392 (6.0507)***	0.0321 (4.8311)***
F-Stat	24.6419***	25.0315***	23.2280***
R ²	0.1308	0.1303	0.1267
Adj. R ²	0.1254	0.1251	0.1213

Note: *** and ** indicate estimated coefficients significant at 1% and 5% levels, respectively.

5. Conclusion, Implication, and Limitation

This study examines the effect of profitability on leverage in 170 non-financial service companies in Indonesia and the influence of profitability on leverage in firms with negative profits. Based on the author's knowledge, the analysis of the negative effect of profitability on leverage is lacking. Lastly, it proves the sensitivity of the COVID-19 pandemic in explaining the influence of profitability on leverage. This study identifies the theory of capital structure by explaining the profitability effect on leverage using a pecking order theory.

The findings indicate that profitability negatively affects leverage in all samples and sub-samples. This finding proves that the pecking order theory can better explain the effect of profitability on leverage. Firms generally prioritize internal financing to finance new investments and other company activities. Firms with negative profits also rely on internal financing rather than external financing. The average leverage of firms with negative profits is higher than positive profits. It indicates that firms choose external financing when necessary. Another finding of this study is that the COVID-19 pandemic does not affect the choice of firm financing sources. The firm prioritizes internal financing in periods of growing economy and crisis.

The findings of this study have implications for firms and investors. For firms, this indicates that firm management only chooses external financing sources when needed. Internal financing sources are the primary choice for financing the firm. For investors, these reveal that they need to consider alternative investment decisions because firms prefer to hold firms' profits for investment rather than distribute them to shareholders. This study is conducted over a short period, only four years, 2018-2021. Further research can use a longer period to test the effect of profitability on leverage and consider dividends as a moderator variable in explaining the influence of profitability on leverage.

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