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Targeting Behavior among Indonesian Firms: Two-Step Partial Adjustment Model Analysis

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Abstract

In this research, we tested the heterogeneity of speed of adjustment toward target leverage among industries on the Indonesian stock exchange by using two-step partial adjustment model. The sample collected from 2007-2016 and consisted of firms in eight sectors, i.e. agriculture, mining, basic industries, miscellaneous, consumer goods, property and real estate, infrastructure, utilities and transportation as well as trade, services and investment sectors. Firms in the financial industry are excluded because the capital structure of firms in the financial industry reflects specific regulations and are not independent firms' policies. The results showed that speed of adjustment ranged from 61% - 45% for book leverage and 67% - 43% for market leverage. This significant speed of adjustment is consistent with trade-off theory, which states that firms have target leverage and when firms are deviated from the target, firms will make financial decisions that will close the gap between previous year's leverage and the target leverage of current period.

Perilaku Targeting Perusahaan-Perusahaan yang Listing di Bursa Efek Indonesia: Analisis dengan Two-Step Partial Adjustment Model

Abstrak

Dalam penelitian ini, kami menguji heterogenitas kecepatan penyesuian ke arah target leverage antar industri di bursa efek Indonesia dengan menggunakan two step partial adjustment model. Sampel dikumpulkan dari 2007-2016 dan terdiri dari perusahaan di delapan sektor, yaitu pertanian, pertambangan, industri dasar, aneka, barang konsumen, properti dan real estat, infrastruktur, utilitas dan transportasi serta sektor perdagangan, jasa, dan investasi. Perusahaan dalam industri keuangan dikecualikan karena struktur modal perusahaan di industri keuangan mencerminkan peraturan khusus dan bukan kebijakan perusahaan independen. Hasil penelitian menunjukkan kecepatan penyesuaian berkisar antara 61%-45% untuk book leverage dan 67%-43% untuk market leverage. Kecepatan penyesuaian yang signifikan ini konsisten dengan trade off theory yang menyatakan bahwa perusahaan memiliki target leverage dan ketika perusahaan terdeviasi dari target, perusahaan akan membuat keputusan finansial yang akan menutup gap antara previous year's leverage dan target leverage of current period.

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INTRODUCTION

One of the dominant and widely studied theories of capital structure is trade-off theory which states that firms have optimal leverage ratio that balances bankruptcy risk and tax benefits from debt financing. Firms will strive to balance costs and benefit associated with debt by maintaining leverage ratio at certain target level (Baxter, 1967; Kraus & Litzenberger, 1973; Jensen & Meckling, 1976; Fischer et al., 1989). However, in daily operation of firm, economic shock often occurs which causes actual leverage to be deviated from target leverage. When the firm's leverage is not at its target leverage, company bear not optimal condition, so firms will always try to return to the target leverage. This behavior is referred to as targeting behavior.

Previous researches show that targeting behavior is not homogeneous between firms; there is no single speed of adjustment suitable for all firms (Lemmon et al., 2008; Clark et al., 2009; Flannery & Hankins, 2013; Dang et al., 2014). Empirical estimation of speed of adjustment toward target leverage gives wide-ranging results between researches (Byoun, 2008; Lemmon, et al., 2008; Huang & Ritter, 2009; Cook & Tang, 2010; Elsas & Florysiak, 2011; Faulkender et al., 2012; Abdeljawad, Nor et al., 2013; Drobetz et al., 2014; Devos et al., 2017).

Some studies have found that firms move relatively fast toward target leverage (Flannery & Rangan, 2006; Lemmon et al., 2008), other studies have found that firms make adjustments at moderate speeds (Huang & Ritter, 2009) and there are also studies finding adjustments toward target leverage take place at a very slow pace (Fama & French, 2002). These differences in speed of adjustment are identified because of firms' specific characteristics including profitability, firm size, asset tangibility, growth opportunities, financial constraints (Byoun, 2008), deviation distance from the target (Mukherjee & Wang, 2013), macroeconomic factors (Huang & Ritter, 2009) business cycles (Korajczyk & Levy, 2003), and dividend (Cooper & Lambertides, 2018).

Trade-off theory also emphasizes inverse relationship between business risk and leverage. Consequently, we can argue that debt-equity choices vary between firms in different industries, since business risks usually vary between firms. Bradley et al. (1984) state that there is a strong relationship between industry classification and average level of ratio of firms with the aim of determining optimal capital structure under static trade-off theory.

Although empirical research that refers to issue of speed of adjustment towards the target leverage has been widely carried out, our study seeks to uncover the heterogeneity of speed of adjustment among firms in Indonesia based on industry groups. What makes this research different is that it compares the speed of adjustment among industries on Indonesian stock exchange rather than just looking at effect of industry groups to the speed of adjustment towards target leverage.

Trade-off Theory

Trade-off theory states that an optimal debt-equity ratio can be achieved by balancing tax advantages of funding with debt using financial distress costs that come from risk of bankruptcy and agency costs. Kraus and Litzenberger (1973) are the first to develop this classical theory and state that optimal leverage reflects trade-off between bankruptcy costs and tax benefits from debt usage.

According to static trade-off theory, capital structure decisions are based on firms' characteristics such as business risk and asset structure. Profitable firms with tangible assets face low distress costs so that they use more leverage in order to balance benefits of tax and distress costs. In other words, static trade-off theory emphasizes the existence of an inverse relationship between business risk and leverage (DeAngelo & Masulis, 1980; & Leland, 1994). Consequently, we can argue that debt-equity choices vary between firms in different industries, because business risks usually differ between firms.

Significant corporate bankruptcy cost leads firms' debt-equity choices inversely related to earning variability (Bradley et al., 1984). Furthermore, they stated that there is a strong relationship between industry classification and average level of firms' ratio aiming at determining optimal capital structure under static trade-off theory.

Dynamic trade-off theory is a dynamic model of capital structure. According to Myers (1984) dynamic trade-off theory is characterized by the fact that firms set a target debt-equity and gradually adjust their capital structure towards the target when a shock occurs. Some initial dynamic models analyze continuous time models with tax uncertainty, bankruptcy costs and transaction fee-free developed by Brennan and Schwartz (1984). In case of adverse shock, this model makes firms unable to rebalance their capital structure towards target debt-equity ratio without considering transaction costs.

Fischer et al. (1989) were one step forward by introducing bankruptcy costs in their dynamic trade-off model. Instead of reacting quickly to adverse shock in the absence of transaction costs, firms allow their capital structure to adjust (to drift) in a relatively long period of time. Firms tend to wait to make leverage adjustment until adjustment costs exceed missing values related to company capital structure that is not optimal.

There is a negative relationship between profitability and leverage in empirical observation. For example, Hovakimian et al. (2001) claim that high profitability is associated with low leverage and related to a higher opportunity for debt issuance rather than equity issuance. Frank and Goyal (2008) analyzes a large data panel and have found that data reflects a more drift-driven leverage adjustment than active rebalancing. This result is shown by the existence of transaction costs in the real world.

Speed of Adjustment toward Target Leverage

Speed of adjustment is considered the most important issue in contemporary capital structure research because it can help distinguish theories of capital structure (Frank & Goyal, 2004; Flannery & Rangan, 2006; Huang & Ritter, 2009) and dynamic behavior of firms that are not on target leverage is different (Xu, 2007). In estimating speed of adjustment, the implicit assumption that has been applied is that speed of adjustment towards the target of leverage is homogeneous between firms (Ozkan, 2001; Fama & French, 2002; Flannery & Rangan, 2006). However, this assumption is inconsistent with the dynamic trade-off theory argument which states that different deviated costs and costs of adjusting toward target leverage will result in different speed of adjustment estimation.

Previous researches show that targeting behavior is not homogeneous between firms; there is no single speed of adjustment suitable for all firms (Lemmon et al., 2008; Clark et al., 2009; Flannery & Hankins, 2013; Dang et al., 2014; Lotfaliei, 2018). This difference in speed of adjustment was identified because of firm specific characteristics (firm specific factors) including profitability, firm size, asset tangibility, growth opportunities, financial constraints (Byoun, 2008), deviation distance from the target (Mukherjee & Wang, 2013), macroeconomic factors (Huang & Ritter, 2009) and business cycles (Korajczyk & Levy, 2003).

METHOD

Partial adjustment model makes it possible to estimate speed of adjustment towards target leverage where target leverage varies over time and identify that deviation from target leverage does not disappear quickly. This research uses two-step partial adjustment model that describes partial (incomplete) adjustments towards target leverage depending on the characteristics of firms (Flannery & Rangan, 2006) using Robust Least Square. For the purpose of analysis in this research, two-step partial adjustment model is more flexible. Our study used Robust Least Square rather than GMM system since the ratio produced through Robust Least Square regression approach and the GMM system show similar distribution (Kuo et al., 2018).

First step is estimating the regression equation estimation of target leverage of each industry. Following previous researches, (Hovakimian et al., 2001; Fama & French, 2002; Flannery & Rangan, 2006; Kayhan & Titman, 2007) to estimate target leverage this research uses fitted value of regression observed leverage from a number of firms characteristics identified in the previous literature as important determinant of leverage, as a proxy for target leverage. Target leverage in this case differs from firms to firms, from year to year for the same firms because target is the function of firm's characteristics. In the second step an estimation of speed of adjustment is carried out of each industry.

The First Step: Estimating Target Leverage of Each Industry

$$Lev^*_{i,t} = \beta_1 + \beta_2 Growth_{i,t-1} + \beta_3 Profit_{i,t-1} + \beta_4 Tang_{i,t-1} + \beta_5 Size_{i,t-1} + \varepsilon_{i,t} \text{ (Equation 1)}$$

The definition for each variable is presented in Table 1. Equation 1 is formed for each industry because leverage behavior of each industry is different. So, there will be eight estimation equations for agricultural sector, mining sector, basic industry sector, miscellaneous sector, consumer goods sector, property and real estate sector, infrastructure, utilities and transportation sector and trade, services and investment sectors.

Industry characteristics used as predictors are market to book value (growth), profitability (prof), asset tangibility (tang) and firm size. The four variables influence leverage significantly (Rajan & Zingales, 1995) and are robustly related to leverage (Frank & Goyal, 2009). Regression equation formed is used to estimate target leverage of each firms. Fitted value from equation 1 will be used as target of leverage. Target leverage is a function of firms' characteristics. So, target leverage varies between firms and between times. Because the value of leverage is definitively bounded between 0 and 1, all values of fitted values for target leverage that are above 1 and below 0 are eliminated in order to be consistent with the definition (Mukherjee & Wang, 2013).

The Second Step: Estimating Speed of Adjustment towards Target Leverage

Equation 2 is used to examine the heterogeneity of the speed of adjustment among industries.

$$Lev_{i,t} - Lev_{i,t-1} = \delta(Lev^*_{i,t} - Lev_{i,t-1}) + \varepsilon_{i,t} \text{ (Equation 2)}$$

Measures the adjustment leverage made in the period t while measures the deviation of the target. Every firms will try to close the proportion of the gap where they are ($Lev_{\_i,t-1}$) and where they hope to be ($Lev^*_{i,t}$).

Table 1. Variable Definitions

Variable	Definition
MLev (market Leverage)	(long term debt + short term debt)/(long term debt + short term debt + market value of equity)
BLev (book leverage)	(Long term debt + short term debt)/total assets
Prof (profitability)	Earning before interest and tax/total assets
Size	Log (total assets)
Tang (tangibility)	(Property + plant + equipment)/total assets
Growth (market to book ratio)	(Total assets – book equity + market equity)/total assets

Data

Firms listed on the Indonesia Stock Exchange (IDX) between 2007-2016 are taken as sample for this research, firms in the financial industry are excluded because the capital structure of firms in the financial industry reflects specific regulations and are not independent firms' policies. The sample consisted of firms in eight sectors, i.e. agriculture, mining, basic industries, miscellaneous, consumer goods, property and real estate, infrastructure, utilities and transportation as well as trade, services and investment sectors. The number of firms of each industry is presented in Table 2. Data is obtained from the IDX database.

Table 2. Number of Firms per Industry

Industry	Number of firms
Agriculture	20
Basic industry	54
Consumer goods	31
Infrastructure, utilities and transportation	48
Mining	37
Miscellaneous	35
Property and real estate	53
Trade, services and investment	117
Total	395

RESULT AND DISCUSSION

The descriptive statistic for the variables is presented in Table 3. Descriptive statistic is used to determine behavior patterns of research data. Descriptive statistic for profitability shows that mean ranges from 0.243 to 0.036, with the largest data distribution being in trade, services and investment sectors with a standard deviation of 0.211 and the smallest data distribution is in property and real estate sectors at 0.069.

Asset tangibility shows the largest mean of tangibility which is 0.665 for infrastructure, utilities and transportation, while the lowest mean is 0.129 in property and real estate sectors. These data show that infrastructure, utilities and transportation sectors have the largest tangible assets compared to other sectors. The biggest standard deviation for tangibility is 0.211, which is in agricultural sector and the smallest is 0.138 in infrastructure, utilities and transportation sectors. These data show that agricultural sector has the largest data distribution for tangibility compared to other sectors and the smallest data distribution is in infrastructure, utilities and transportation sectors.

Descriptive statistic for firm size show that the largest mean is in agricultural sector with an average of 12.599 and the smallest mean is 11.933 in trade, services and investment sectors. The largest data distribution is in infrastructure, utilities and transportation sectors with a standard deviation value of 0.862. The smallest data distribution in agricultural sector with standard deviation value of 0.483.

For market to book ratio shows that the largest mean is in infrastructure, utilities and transportation sectors, which is equal to 0.744 and the

Table 3. Descriptive Statistic of Research Variables

Industry	Profitability		Tangibility		Size		Growth	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Agriculture	0.063	0.142	0.343	0.211	12.599	0.483	0.655	0.301
Basic industry	0.131	0.136	0.437	0.188	12.285	0.692	0.624	0.202
Consumer goods	0.243	0.153	0.361	0.161	12.406	0.634	0.644	0.189
Infrastructure, utilities and transportation	0.123	0.193	0.665	0.138	12.458	0.862	0.744	0.153
Mining	0.158	0.186	0.422	0.196	12.450	0.775	0.693	0.179
Miscellaneous	0.036	0.090	0.353	0.175	12.185	0.568	0.667	0.211
Property and real estate	0.045	0.069	0.129	0.149	12.371	0.619	0.639	0.224
Trade, services and investment	0.162	0.211	0.370	0.209	11.933	0.785	0.668	0.187

smallest one is in agricultural sector which is 0.483. Market to book ratio is the main proxy for growth and a high market to book ratio is generally used as a sign of more attractive growth options for firms in the future. Data show that infrastructure, utilities and transportation sectors have the highest growth compared to other sectors. While the distribution of data for market to book ratio is the largest in property and real estate sector with a standard deviation of 0.244 and the smallest data distribution is in the infrastructure, utilities and transportation sectors with a standard deviation of 0.153.

The research variables used to estimate target leverage have different effect among industries. The influence of each variable on target leverage is presented in Table 4. Growth has

Table 4. Target Leverage Estimated Regression

Market Leverage as proxy for leverage					
Industry	**Constant**				
Agriculture	- 0.819670 (-1.634371)	– 0.088795 (-1.945015)*	– 0.280432 (-2.929027)***	0.030187 (0.219720)	0.124958 (3.243752)***
Basic industry	0.588665 (2.181849)**	– 0.187645 (-0.372222)	– 0.076015 (-1.044294)	– 0.060645 (-1.566545)	0.003837 (0.175359)
Consumer goods	- 1.058497 (-1.943613)*	– 0.187645 (-4.189329)***	0.045741 (0.522253)	0.107238 (-1.566545)	0.145964 (3.334953)***
Infrastructure, utilities and transportation	0.382790 (1.849232)*	– 0.219382 (-4.189329)***	– 0.000294 (-0.007683)	0.255587 (0.356887)	0.030986 (1.753339)*
Mining	0.146747 (0.437141)	– 0.092749 (-2.746268)***	– 0.212063 (-3.057191)***	0.255587 (2.457993)**	0.046063 (1.753339)*
Miscellaneous	0.872062 (16.09679)***	– 0.130314 (-2.711459)**	– 0.040911 (-0.452094)	0.046706 (0.356887)	0.000385 (2.982100)***
Property and real estate	0.646461 (2.398561)**	– 0.148841 (-5.791306)***	– 0.255402 (-2.364963)**	– 0.016074 (-0.217780)	0.011723 (0.544307)
Trade, services and investment	0.889729 (2.737975)***	- 0.113480 (-4.094224)***	– 0.116140 (-2.223522)**	0.050273 (1.058563)	– 0.010368 (-0.385164)
Book Leverage as proxy for leverage					
Sectors	**Constant**				
Agriculture	- 0.333354 (- 0.735397)	– 0.035792 (-0.824348)	– 0.387974 (-4.288850)***	0.097448 (0.823503)	0.073758 (2.098937)**
Basic industry	0.048277 (0.214876)	0.204266 (4.792046)***	– 0.060104 (-1.054615)	– 0.023847 (-0.396545)	0.029007 (1.592306)
Consumer goods	0.430849 (0.214876)	– 0.177355 (-2.329109)*	– 0.033944 (-1.054615)	0.001541 (0.016997)	0.016256 (0.469937)
Infrastructure, utilities and transportation	0.107127 (0.514125)	0.135336 (2.451860)**	– 0.032775 (-0.808828)	0.048304 (0.694254)	0.031129 (1.818645)*
Mining	0.538373 (2.829779)***	0.025385 (1.406583)	– 0.107356 (-2.038600)**	0.023256 (-0.416417)	0.031129 (0.329088)
Miscellaneous	0.553496 (10.14525)***	– 0.065037 (1.628891)	– 0.065885 (-0.819183)	– 0.098884 (-0.678931)	0.000181 (2.446930)**
Property and real estate	0.235636 (0.685438)	0.084276 (2.889711)***	– 0.361962 (-0.819183)	0.149995 (2.204488)**	0.000181 (0.329088)
Trade, services and investment	0.064540 (0.302190)	0.087167 (4.5421957)***	– 0.130092 (-2.870140)**	0.004343 (0.100686)	0.032215 (1.836493)*

t-value in parentheses
*** significant at 1%
** significant at 5%
* significant at 10%

significant effect in almost all sectors (except in basic industry sector) for Market Leverage (MLev) as proxy for leverage, while tangibility only has a significant effect on mining sector. While for the Book Leverage (BLev) as proxy for leverage, growth is still a significantly influential variable (significant in 5 sectors) and tangibility is only significantly influential in property and real estate sector.

Table 5 shows descriptive statistic on target leverage for book leverage and market leverage from 8 industries on Indonesia Stock Exchange (IDX). For leverage measured by book leverage, actual leverage ranges from 0.45 (property) to 0.61 (infrastructure) with the largest standard deviation is 0.22 in miscellaneous industry. Whereas the target leverage ranges from 0.44 (property) to 0.61 (infrastructure) with the largest data distribution is 0.18 in miscellaneous industry. For leverage measured by market leverage, actual leverage ranges from 0.54 (consumer goods) to 0.68 (Miscellaneous) with the largest data distribution is 0.25 in trade, services and investment industry. While target leverage ranges from 0.57 (consumer goods) to 0.687 (property) with the largest data distribution is 0.194 in miscellaneous.

Table 6 shows the magnitude of deviation and speed of adjustment towards target of

Table 5. Leverage per Industry

Industry	Mlev				BLev			
	Actual		target		Actual		target	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Agriculture	0.658	0.213	0.655	0.187	0.543	0.178	0.543	0.146
Basic industry	0.594	0.186	0.590	0.145	0.518	0.186	0.515	0.162
Consumer goods	0.543	0.215	0.572	0.177	0.512	0.172	0.439	0.149
infrastructure	0.667	0.184	0.673	0.155	0.619	0.164	0.618	0.126
Mining	0.681	0.241	0.682	0.161	0.605	0.189	0.580	0.141
Miscellaneous	0.790	0.219	0.773	0.194	0.561	0.226	0.448	0.182
Property	0.668	0.223	0.687	0.170	0.456	0.181	0.444	0.145
Trade	0.684	0.256	0.682	0.193	0.514	0.208	0.481	0.181
Total sample	0.668	0.226	0.666	0.182	0.532	0.199	0.503	0.170

Table 6. magnitude of deviation and speed of adjustment

Industry	MLev				BLev			
	Deviation		Speed of Adjustment		deviation		Speed of Adjustment	
	Mean	SD	Coef.	z stat	Mean	SD	Coef.	z stat
Agriculture	0.0002	0.093	0.49	9.327***	0.1119	0.142	0.40	6.3482***
Basic industry	-0.0001	0.099	0.57	13.567***	0.0002	0.076	0.56	13.405***
Consumer goods	-0.0302	0.118	0.42	9.079***	0.0783	0.105	0.39	8.4805***
infrastructure	-0.0011	0.086	0.43	11.934***	0.0034	0.095	0.42	10.594***
Mining	0.0268	0.146	0.58	10.943***	-0.0028	0.102	0.23	6.4899***
Miscellaneous	-0.0023	0.099	0.20	6.1672***	0.0897	0.079	0.47	10.940***
property	-0.0166	0.173	0.45	12.706***	0.0099	0.102	0.35	11.449***
Trade	-0.0045	0.162	0.23	11.727***	0.0273	0.113	0.28	13.889***
Total sample	-0.0043	0.138	0.38	30.272***	0.0276	0.107	0.33	27.807***

*** significant at 1%

leverage for each industry. For market leverage, the mean of magnitude of deviation ranges from -0.0302 (consumer goods) to 0.0268 (mining) and six industries are under leverage when market leverage is used to proxy the leverage. For book leverage, the mean of magnitude of deviation ranges from -0,0028 in Mining to 0.1119 in Agriculture.

The speed of adjustment for market leverage as proxy for leverage, the highest speed of adjustment (58%) occurs in Mining and the lowest speed of adjustment (20%) occurs in the Miscellaneous. For book leverage, the highest speed of adjustment (56%) occurs in the Basic Industry and the lowest speed (23%) occurs in the Mining. The speed of adjustment towards the target for eight industry groups ranges from 20% to 58% for Market Leverage and ranges from 23% to 56% for Book leverage.

Compare to speed of adjustment in developed countries, the speed of adjustment of industries in Indonesian Stock Market are higher. However, speed of adjustment identified in the Indonesian capital market is comparable to speed of adjustment in other developing capital markets. For example in the Spanish capital market with speed of adjustment up to 80% (Miguel & Pindado, 2001), speed of adjustment in Thailand Capital Market is 57% (Haron et al., 2013) and speed of adjustment in the South African capital market is 80.2% (Ramjee & Gwatidzo, 2012).

The capital market of developing countries is characterized by the existence of complex information asymmetry than that of in developed countries (Stiglitz, 1989). This shows that the high speed of adjustments in capital markets of developing countries might indicate that firms do not consider debt financing as a disciplinary mechanism for manager.

The heterogeneous speed of adjustment between industries documented in this research shows that there is a different adjustment costs between firms which is derived from industry-specific characteristic differences that cause heterogeneity of speed of adjustment.

CONCLUSION AND RECOMMENDATION

Estimating speed of adjustment using sub-samples with similar characteristics will reduce estimation bias. As a result, SOA estimation between different subsamples will increase the accuracy of research results (Cook & Tang, 2010). The results of this research indicate heterogeneity of speed of adjustment between firms produced by using both book leverage and market leverage. This heterogeneity is driven by characteristic differences in industries where firms in the same industry face the same pressure that affects their financing decisions. Heterogeneity between firms also reflects heterogeneity in asset types, business risks, technology and regulations.

Relatively high speed of adjustment shown by firms in Indonesia indicates that firms in Indonesia show targeting behavior and support trade-off theory, where firms have optimal capital structure and when the actual capital structure is deviated from the optimal point firms will do rebalancing towards the optimal point. Overall, the results of this research support the literatures stating that there is heterogeneity in speed of adjustment towards target leverage based on industry-specific characteristics. The results of this research also support the existence of a trade-off theory in the decision making of capital structure of firms in the Indonesian capital market.

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