Explaining the role of financial leverage speed of adjustment (SOA) during the firm life cycle

Hamed Salehi Saber[a], Yadolah Tariverdi[a,*], Afsaneh Tavangar[a], Amir Reza Keyghobadi[a]

[a]Department of Economics and Accounting, Central Tehran Branch, Islamic Azad University, Tehran, Iran

(Communicated by Ali Jabbari)

Abstract

This paper analyzes differences in speed of adjustment (SOA) across three life cycle stages of European listed firms: introduction, growth, maturity, decline, and fall. Dickenson's model based on cash flow has been used to divide different periods. For this purpose, the role of four determinants of profitability and intangible assets, growth opportunities, and size on SOA was investigated using the GMM (generalized torque) method. For this purpose, 153 firms listed firms on the Tehran Stock Exchange in the ten years 2009-2019 were selected, and data were analyzed by Stata and Eviews software. The results do not support by trade-off theory (TOT) and pecking order theory (POT) because according to these theories, the SOA of financial leverage is not completed during different stages of the life cycle. Higher speed in the introduction stage provides a different analysis than the growth stage. In addition, results show a lower increase in costs for firms that change from growth to maturity than for firms that change from introduction to growth.

Keywords: Capital structure,Target leverage, Firm's life cycle,Speed of adjustment, GMM method.

1. Introduction

Financial structure SOA is different based on the related transaction costs to the required changes to obtain the new capital structure among firms [3, 4].

The mentioned costs are impressed by some of the firm traits such as growth opportunities and profitability. One theory explaining the firm capital structure is the life cycle theory. According to this theory, the firm has different capabilities during various stages of its life by which different acts and performances are expressed in each stage. Therefore, firms maintain the different combinations of resources in various

stages of their life cycles to provide the growth condition by combination and management of these resources. The obtained results from researches show that firms use different structures of capital in various life cycles [5, 6]. In this regard, the issue of current capital structure adjustment toward the optimum point and SOA toward the target has been signified after the determination of the capital structure target point. In addition, capital structure SOA and the effect of some factors were evaluated on it in [7].

In [8, 9, 10] researches, nonetheless, this question is not answered in these studies what is the effect of the firm ability to move toward capital optimum structure based on the stage of the life cycle, and how the beneficiaries groups analyze the obtained data from various steps of their life cycles. Thus, the main question of this research is whether the financial leverage SO is significantly different in various stages of firms' life cycles?

2. Capital structure SOA

Firms have always modified and adjusted their capital based on the internal and external changes permanently to maintain the financial health of the firm and maximize its value [11]. Based on the dynamic trade-off theory that is originated from this view, firms can adjust their leverage ratio only when the benefits of this adjustment are higher than its costs [12].

The most important results ted with this theory is the issue of firms' movements speed toward dynamic trade-off. Investigating the leverage SOA (capital structure) toward the target (optimal leverage ratio) is so important issue. Estimation of SOA is an investigation of two mutual hypotheses. First, whether firms have a target leverage ratio based on trade-off theory prediction or not? Second, whether firms adjust their leverage toward the target? Leverage SOA can show the real importance of target leverage and the consequences of deviation from it [14].

Various factors influence the leverage SOA and capital structure SOA. Based on the prediction of trade-off theory and pecking order theory, two competing theories in the capital structure field, two factors of deviation from target leverage, and lack of adjustment of financial status are the most important factors on the leverage SOA.

2.1. The effective factors on the capital structure SOA

2.1.1. Assets structure

Authorities believe that one of the very important factors on firms' debts is the type of assets that maintain the firms because the financial debt costs of firms depend on the type of assets in the assets structure. The assets structure of a firm includes tangible and intangible assets. Theoretically and based on trade-off theory, tangible assets particularly non-commercial ones can be used as debt securities. The more firms have tangible assets, the less risk they will have for lenders. In addition, the liquidity value of the tangible assets is more and the probability of lower pricing of the firm while bankruptcy reduces. As a result, lenders are more interested to pay loans

Authors in [15, 16] believe that the high volume of tangible assets in firms increases their abilities to guaranteed bond issuance. The references [17] and [18] state that an increase in fixed assets increases the financial leverage of firms because it is considered a better guarantee for lenders. Based on the pecking order model, the higher a firm's tangible assets, the less information asymmetry is between management and its external investors, and these firms are more interested to issue equity. Therefore, this model predicts the negative relationship between the observance of assets and debt ratio [20]. The author in [26] believes that since stock agency costs are high if firms have assets that have collateral value, these firms should use debt to finance them because it will bring lower agency costs for them. Based on pecking order theory (POT), firms with a lot of intangible assets face a lot of information asymmetry issues that will bring a lot of agency costs for them [22]. Financial supply by debt is a method to reduce agency costs because debt

issuance contains positive symbols for the market than equity issuance [26]. Moreover, [23] suggests that a higher debt level reduces managers' tendency to have activities with personal profit for them and this increases the bankruptcy costs because lenders often restrict the use of funds for certain projects if their payment debt is collateral [24]. If there are restrictions on the use of funds for management, the conflict of interests between shareholders and creditors, and the costs of representing the firm are reduced.

2.1.2. Growth opportunities

The effect of growth opportunities on the firm's SOA is ambiguous theoretically. Firms with high growth are probably newly-born and fresh. In addition, they may have limited internal cash and low and profitability and rely on the foreign financial supply to fulfil their growth opportunities budget. These firms can easily adjust their leverage by frequently referring to a combination of debt and equity through frequent referring to foreign capital markets [25]. On the other hand, many firms with low growth reached maturity and become rich and profitable based on liquidity. If these firms do not rely on the foreign financial supply as much as firms with high growth, they will face lower asymmetrical information and agency problems which lead to lower SOA cost toward target leverage. Moreover, firms with low growth and high leverage, many find more profits in a quick return to the target leverage to prevent financial turbulence and potential bankruptcy costs.

2.1.3. Profitability

The profitable firms most probably have high accumulated profit available that may not face severe limitations of (internal) financial supply and can issue securities with the minimum cost. Firms with high profitability most probably use leverage adjustment and financial flexibility. As a result, they will adjust and move toward target leverage more quickly. Alternatively, firms with low profitability intend to have limited external cash. As a result, they face uncertainty and financial limitations preventing the quick adjustment of leverage. These relationships show that profitability has a positive effect on SOA. Of course, there is an opposite prediction in this field, firms with low profitability usually have high leverage that was predicted by pecking order theory and dynamic trade-off theory suggested by the previous empirical results [17, 21]. Since high leverage leads to big financial crisis costs, firms with low profitability imply the negative effect of profitability on SOA [12].

2.1.4. Size

Big firms usually reach maturity and have high fixed assets, profitability, and financial flexibility. These firms usually have deputation in the debt market and better accessibility to the capital markets. Thus, costs of foreign financial supply are negligible for the large firm which shows higher SOA [25]. Alternatively, large firms have a minimum cash flow, financial crisis costs, and debt covenants. Hence, they have lower foreign pressure and motives to adjust the capital structure implying the slower SOA [27].

3. Background

Hashemi and Keshavarzmehr in [15] investigated several effective characteristics on capital structure SOA, including tangible fixed assets, profitability, and deviation from the target leverage, by the inference that firms face different adjustment costs according to their specific characteristics and so move toward their target leverage with different SOA. Based on the obtained results, firms with lower profitability and deviation from the target leverage move faster toward their target leverage, but the obtained results from the variable of tangible fixed assets show similar SOA [28].

Ramesheh et al. in [24] understood that capital structure SOA is higher in over-leverage firms facing with cash deficit. Moreover, they showed that profitability and opportunities for growth have a positive and significant relationship with capital structure SOA.

Thao Nguyen et al. in [21] studied government ownership and SOA toward target leverage and provided witnesses of a transitional economy. This article examines the effect of government ownership in SOA toward target leverage in various levels of capital structure using a quantitative regression method and 5374 observations of year-firm of Vietnam in 2000-2016. These findings show that these effects are different on SOA depending on the different leverage levels. This relationship is negative for agencies with low leverage and positive for agencies with high power. However, it is negligible in the central field of leverage distribution. Moreover, the negative effects are higher than the positive effects [28].

Zhang and Zhao in [29] examined the question, whether imbalance facilitates cash flow of the leverage SOA of Chinese firms? In addition, he provided pieces of evidence for the dynamic panel threshold model. The asymmetrical effect of cash flow is studied on the firms' leverage adjustments in this article. They used a dynamic panel threshold model and estimated it by GMM approach. They showed that Chinese firms have leverage targets which are adjusted by 25.9% average speed using data of 1054 Chinese firms in 2004-2016. Moreover, firms with higher cash flow can adjust more quickly with the target leverage than firms with lower cash flow. They found evidence that liquidity imbalances facilitate leverage adjustment by reducing adjustment costs. These findings provide new insights into leverage adjustment and corporate cash flow management [9].

J. Fitzgerald and J. Ryan in [25] studied the effect of firm characteristics on the SOA of target leverage. This research estimated SOA in sub-samples of England firms using a dynamic panel estimator to respond to the need to study the heterogeneity of SOA to target leverage in a way that reflects the nature of the lever deficit. A significant acceleration was observed in SOA with target leverage using the firm characteristics to identify the agencies that are targeted at different costs of diversion and leverage adjustment. The results show that small firms with high growth and low dividends experience quicker SOA than their peers with low growth and high dividends [27].

4. Research hypotheses

Main hypothesis: Profitability, size, tangible fixed assets level, and growth opportunities have a direct effect on SOA of financial leverage.

The Secondary hypotheses:

The first hypothesis: profitability, size, tangible fixed assets level, and growth opportunities have a direct effect on SOA of financial leverage in the introduction stage.

The second hypothesis: profitability, size, tangible fixed assets level, and growth opportunities have a direct effect on SOA of financial leverage in the growth stage.

The third hypothesis: profitability, size, tangible fixed assets level, and growth opportunities have a direct effect on SOA of financial leverage in the maturity stage.

The fourth hypothesis: profitability, size, tangible fixed assets level, and growth opportunities have a direct effect on SOA of financial leverage in the decline stage.

The fifth hypothesis: profitability, size, tangible fixed assets level, and growth opportunities have a direct effect on SOA of financial leverage in the fall stage.

5. Methodology

This research is applied based on objective classification. This research is causal based on nature and method. In addition, this is semi-experimental and ex-post factor research based on research design. The methodology is deductive-inductive reasoning i.e. librarian method, other websites, and articles were used in the research background and theoretical bases in data collection and comparative framework to confirm or reject hypotheses deductively. The statistical population of this research includes all the listed firms in

Tehran Stock Exchange. The research period is 2011-2019. In this research, 154 firms in this period i.e. 1232-year-firm will be studied that were clustered based on Dickenson's method (2011) life cycles.

6. Research models and variables

Financial leverage SOA based on target leverage:

Based on the effective work of [11] who offered a model to select dynamic capital structure based on SOA, target leverage changed to an important concept in the capital structure research. Firms change the leverage only when the obtained profits from these transactions cover their costs due to the costs of adjustments. Thus, firms move toward their target leverage with different speeds according to their real leverage position than target leverage as well as the adjustments costs [7].

Based on research [10] two cases should be considered in the used regression model to estimate SOA:

1. Target leverage change chronically.
2. Deviation from target leverage will not be compensated quickly [28].

The adjusted model of the target from [19] design was used in this research that firms consider the cost of the transaction and calculate their target debt level as a function of determinant factors of capital structure when they change their debts level. This model tests the speed of leverage debt speed ($D_{it}-1$) toward the target (D^*it).

$$(D_{it}-D_{it-1}) = \alpha\,(D^*_{it}-D_{it-1}) + \mu_i + e_{it}$$

Transaction costs prevent firms from the complete debt adjustment toward the target level. Therefore, the coefficient of α is varied between 0 and 10 and has a reverse relationship with SOA costs. Firms completely adjust their leverage to the desired level ($\alpha = 1$)

$$D_{it} = \alpha D^*_{it} + (1-\alpha)\,D_{it-1}$$

[32] and [15] proposed $PROF_{it}$ as the profitability of firm i in year t, $GROWTH_{it}$ as the growth opportunities of firm, $TANG_{it}$ as the ratio of tangible fixed asset of firm i in year t, and $SIZE_{it}$ as the firm i size in year t in the target debt determination model.

$$D^*_{it} = \alpha_0 + \alpha_1 PROF_{it} + \alpha_2 GROWTH_{it} + \alpha_3 TANG_{it} + \alpha_4 SIZE_{it} + \mu_{it}$$

$$D_{it} = \alpha\lceil\alpha_0 + \alpha_1 PROF_{it} + \alpha_2 GROWTH_{it} + \alpha_3 TANG_{it} + \alpha_4 SIZE_{it} + \mu_{it}\rceil D^*_{it} + (1-\alpha)\,D_{it-1}$$

$$D_{it} = \alpha\alpha_{0+}\alpha a_1 PROF_{it} + \alpha\alpha a_2 GROWTH_{it} + \alpha a_3 TANG_{it} + \alpha a_4 SIZE_{it} + \mu_{it}.$$

In which, D_{it} is the i_{th} firm leverage in year t. a is an independent clause and α is an estimated coefficient by the exploratory analysis.

6.1. Separating the firms life cycles stages

Dickenson's method was used in this research to separate the life cycle stages in which the new pattern was made using positive and negative signs for classes of cash flows (three operational classes, investment, and financial supplement). In this method, the allocation of each cash flow pattern to the life cycles (including introduction, growth, maturity, decline, and fall) is as Table 1.

Table 1: separating life cycle stages

Predicted signs	1	2	3	4	5	6	7	8
	introduction	growth	maturity	decline	decline	decline	fall	fall
Net cash flow of operational activities	-	+	+	-	+	+	-	-
Net cash flow of investment activities	-	-	-	-	+	+	+	+
Net cash flow of financial supply activities	+	+	-	-	+	-	+	-

The relevant tests to variables reliability and Dicky Fuller test were provided to measure the durability before the research hypotheses test. Before the test estimation, Im, Pesaran and Shin (IPS) test was used to ensure the results are not fabricated, insecure, and variables durability manner. H0 of this test was designed about the lack of reliability whose results are shown in Table 2.

Table 2: reliability test of research variables

Variable	Im, Pesaran and Shin (IPS)	Sig. level
Growth opportunities	-6.23483	0.0000
Profitability	-4.50394	0.0000
Size	-2.69964	0.0035
Tangible fixed assets	-4.41672	0.0000

Results in 5% error level show that variables are reliable and do not have a unit root.

7. Durability test

Dickey-Fuller Test (ADF) was used and reported in this research for the durability of research variables. Are variables are durable in vector regression and the generalized torques whose findings are shown in Table 3. In this test, H0, stating that the variable is durable if the p-value is significant in 95%, is rejected. Therefore, it shows the variable durability.

Table 3: results of Dickey Fuller Test (ADF) for variables durability

Variable	Fusher Chi-2	Sig. level
Growth opportunities	507.127	0.0000
Profitability	456.061	0.0000
Size	390.066	0.0035
Tangible fixed assets	406.034	0.0000

The descriptive data of research variables are shown in Table 4.

Table 4: the relevant descriptive statistics to the research variables

	Growth opportu- nities	Profitability	Size	Tangible fixed assets
Sample vol- ume	1534	1534	1534	1534
Mean	1.5606	0.1796	14.2219	0.2549
Median	1.3519	0.1607	13.9936	0.2105
Standard de- viation	0.68082	0.14504	1.59202	0.17801
Minimum	0.49	-1.04	10.10	0.00
Maximum	6.53	0.70	19.77	0.93

The number of firms of the population after filters is 153 for 10 financial years of 2009-2018. The number of data in the ideal mode for each variable is 1534. As observed, this is mutual for all variables. The mean is the most principal and sable central index.

The obtained results from the research hypotheses are as follows:

8. Findings

Hypothesis 1: profitability, size, level of the tangible fixed assets, and growth opportunities of firm have a direct effect on financial leverage SOA.

Table 5: results of estimating financial leverage SOA for the stage of firms' introduction

Variable	Coefficient	St.d	T-value	p-value
financial leverage SOA (-1)**	0.012269	0.001985	6.179767	0.0000
Size	0.022034	0.000448	49.14486	0.0000
Profitability	-0.219738	0.023872	-9.204824	0.0000
Growth op- portunities	-0.006831	0.004216	-1.620226	0.1058
Tangible fixed assets	-0.067882	0.014915	-4.551343	0.0000
J-statistic				21.33476
Instrument rank				29

** (-1) shows lag of the dependent variable in the model that was as an independent variable used in the GMM method. As it is inferred from Table 5, based on the obtained coefficients in the introduction stage, the role of profitability and tangible fixed assets have a negative and significant effect on financial leverage SOA. However, size has a positive and significant effect on financial leverage SOA. In addition, growth showed a negative effect that is not of course significant.

Due to the dynamic panel regression, torque conditions are provided in the absence of special serial correlation in perturbation sentences. As a result, Arellano and Bond (1991) in [1] state that the perturbation sentences should be AR(1) but not AR(2). In this case, the perturbation sentence will be steady and independent but if sentences have process perturbation of AR(2). It means that the torque conditions were not satisfied (Green [13], Baltagi [2]). The observations of Arellano and Bond are shown in Table 6.
Table 6: Results of Arellano and Bond test for the first secondary hypothesis

Prob > z	Z-value	
0.0000	5.515	AR(1)
0.9306	08715	AR(2)

As it is observed, the AR(1) estimator is significant in 95% error level. If the AR(2) estimator is not significant, it means perturbation sentences are AR(1) type but not AR((2)). Therefore, perturbation sentences have steady and independent distribution.

9. B-Sargan test

This test is as:

Pval=@chisq (J-Statistic, P-K)

In which, K is the number of the estimated variables and P shows tools rank. The results of the Sargan test show the validity of the selected tools in a way that no significant correlation was between the errors of elements and the used tools. According to the results of the Valed test, having 2 distributions with an equal degree of freedom to the number of explanatory variables minus the constant element, H0 based on being zero of all coefficient at 1% error level is rejected which shows that all explanatory variables have a non-zero coefficient and affect the dependent variable (target leverage). Sargan's test value is 22.31 showing that H0, based on the validity of the defined tool variable, is not rejected in the model. Therefore, the defined tool variable is a proper variable for model estimation. Sargan test for the first model is as follows:

Table 7: results of Sargan test or the first secondary hypothesis

Sargan value	Degree of freedom	Probability
3.929034	5	0.5597

Results of the Sargan test show the validity of the selected tool in a way that no significant correlation is between the error elements and the used tools.

Hypothesis 2: profitability, size, tangible fixed assets level, and growth opportunities of the firm have a direct effect on the financial leverage SOA in the growth step.

Table 8: results of estimating financial leverage SOA for growth step of firms

Variable	Coefficient	St.d	T-value	p-value
financial leverage SOA (-1)**	0.010886	0.008682	1.253946	0.2102
Size	-0.037000	0.022327	-1.657228	0.0978
Profitability	0.023210	0.090829	0.255541	0.7984
Growth opportunities	0.019242	0.002241	8.585562	0.0000
Tangible fixed assets	0.153694	0.089785	1.711808	0.0873
J-statistic				37.06665
Instrument rank				36

** (-1) shows a lag of the dependent variable in the model that was as an independent variable used in the GMM method. As it is inferred from Table 8, based on the obtained coefficients in the growth stage, only the growth opportunities influence leverage SOA by a positive and significant coefficient, and other variables of research are not significant. Since more than 2 variables are not significant, the researcher hypothesis is rejected. The observations of Arellano & Bond are shown in Table 9.

Table 9: results of Arellano & Bond test for the second secondary hypothesis

Prob > z	Z-value	
0.0040	-2.8787	AR(3)
0.7810	-27795	AR(4)

As it is observed, the AR(3) estimator is significant in 95% error level but the AR(4) estimator is not significant. Therefore, perturbation sentences are AR(3) type, not AR(4) type. Therefore they have steady and independent distribution.

B-Sargan test

The value of the Sargan test is 36.99 showing that shows H0 based on the validity of the defined tool variables in the model is not rejected. Therefore, the defined tool variable is a proper variable to estimate the model. Sargan test for the growth stage is as follows:

Table 10: results of Sargan test for the second secondary hypothesis

Sargan value	Degree of freedom	Probability
56.93671	43	0.0755

Results of Sargan test show the validity of the selected tools in a way that there is no significant correlation between the error elements and the used tools.

Hypothesis 3: Profitability, size, tangible fixed assets level, and growth opportunities of the firm has a direct effect on the financial leverage SOA in the maturity step.

Table 11: results of estimating financial leverage SOA for maturity step of firms

Variable	Coefficient	St.d	T-value	p-value
financial leverage SOA (-1)*	0.189747	0.030708	6.179044	0.0000
Size	-0.058067	0.020417	-2.843986	0.0046
Profitability	-0.093319	0.067328	-1.386035	0.1661
Growth opportunities	0.011318	0.002646	4.277978	0.0000
Tangible fixed assets	0.514110	0.079383	6.476341	0.0000
J-statistic				37.06665
Instrument rank				36

As it is inferred from Table 11, based on the obtained coefficients in the maturity stage, size has a negative and significant effect on leverage SOA, growth opportunities and tangible fixed assets show a positive and significant effect, and profitability in the maturity stage does not influence financial leverage SOA significantly. Arellano & Bond observations are shown in Table 12.

Table 12: results of Arellano & Bond test for the third secondary hypothesis

Prob > z	Z-value	
0.0000	6.1779-	AR(5)
0.265	2.2182	AR(6)

As it is observed, the AR(5) estimator is significant in 95% error level but the AR(6) estimator is not significant. Therefore, perturbation sentences are AR(5) type, not AR(6) type. Therefore they have steady and independent distribution.

B-Sargan test: The value of the Sargan test is 45.02 showing that shows H0 based on the validity of the defined tool variables in the model is not rejected. Therefore, the defined tool variable is a proper variable to estimate the model. Sargan test for maturity stage is as follows:

Table 13: results of Sargan test for the third secondary hypothesis

Sargan value	Degree of freedom	Probability
104.3356	43	0.0855

Results of the Sargan test show the validity of the selected tools in a way that there is no significant correlation between the error elements and the used tools.

Hypothesis 4: Profitability, size, tangible fixed assets level, and growth opportunities of the firm has a direct effect on the financial leverage SOA in the decline step.

Table 14: results of estimating financial leverage SOA for decline step of firms

Variable	Coefficient	St.d	T-value	p-value
financial leverage SOA (-1)**	0.027293	0.004459	6.121085	0.0000
Size	-0.014948	0.002909	-5.139161	0.0000
Profitability	-0.315663	0.017720	-17.81441	0.0000
Growth opportunities	0.022213	0.000263	84.43491	0.0000
Tangible fixed assets	-0.113182	0.011634	-9.728332	0.0000
J-statistic				37.06665
Instrument rank				36

As it is inferred from the results of Table 14, based on the obtained coefficients in the decline stage, size, profitability, and tangible fixed assets level has a negative and significant effect on leverage SOA, growth opportunities show the positive and significant effect. Arellano & Bond observations are shown in Table 15.

Table 15: results of Arellano & Bond test for the fourth secondary hypothesis

Prob > z	Z-value	
0.0001	3.8865 -	AR(7)
0.2724	1.0975	AR(8)

As it is observed, the AR(7) estimator is significant in 95% error level but the AR(8) estimator is not significant. Therefore, perturbation sentences are AR(7) type, not AR(8) type. Therefore they have steady and independent distribution.

B-Sargan test

The value of the Sargan test is 30.16 showing that shows H0 based on the validity of the defined tool variables in the model is not rejected. Therefore, the defined tool variable is a proper variable to estimate the model. Sargan test for decline stage is as follows:

Table 16: results of Sargan test for the fourth secondary hypothesis

Sargan value	Degree of freedom	Probability
59.82919	43	505.0

Results of the Sargan test show the validity of the selected tools in a way that there is no significant correlation between the error elements and the used tools.

Hypothesis 5: Profitability, size, tangible fixed assets level, and growth opportunities of the firm has a direct effect on the financial leverage SOA in the fall step.

Table 17: results of estimating financial leverage SOA for fall step of firms

Variable	Coefficient	St.d	T-value	p-value
financial leverage SOA (-1)**	0.004752	0.004575	1.038673	0.3033
Size	-0.017959	0.010716	-1.675859	0.0991
Profitability	-0.396970	0.089107	-4.454993	0.0000
Growth op-portunities	0.023250	0.001706	13.63241	0.0000
Tangible fixed assets	0.011130	0.049787	0.223553	0.8239
J-statistic				37.06665
Instrument rank				36

As it is inferred from the results of Table 17, based on the obtained coefficients in the fall stage, profitability and growth opportunities influence leverage SOA. In addition, profitability has a negative effect, and growth opportunities have a positive effect on financial leverage SOA in the fall stage. Since more than 2 variables are not in sig. level, the researcher's hypothesis is rejected. Arellano & Bond observations are shown in Table 18.

Table 18: results of Arellano & Bond test for the fifth secondary hypothesis

Prob > z	Z-value	
0.042	1.8509 -	AR(9)
0.2386	1.1785	AR(10)

As it is observed, the AR(9) estimator is significant in 95% error level but the AR(10) estimator is not significant. Therefore, perturbation sentences are AR(9) type, not AR(10) type. Therefore they have steady and independent distribution.

B-Sargan test

The value of the Sargan test is 30.16 showing that shows H0 based on the validity of the defined tool variables in the model is not rejected. Therefore, the defined tool variable is a proper variable to estimate the model. Sargan test for the first model is as follows:

Table 19: results of Sargan test for the fifth secondary hypothesis

Sargan value	Degree of freedom	Probability
18.67193	43	0.9997

Results of the Sargan test show the validity of the selected tools in a way that there is no significant correlation between the error elements and the used tools. However, since more than 2 variables are not in big level, the researcher hypothesis is rejected

10. Discussion and conclusion

The summary of the obtained results by analysis of the effective variables on leverage SOA is shown in Table 20. Table 20: summary of the relevant results to the main hypothesis of research based on GMM method

fall	decline	maturity	growth	introduction	
0.004752	0.027293	0.189747	0.010886	0.012269	SOA

As is seen in Table 20, SOA is high, low, high, low, and low in its various stages. The previous SOA means lower significant transaction costs. With higher growth, the exchange firms usually increase their investment to reach higher growth. Therefore, they reduce their asymmetrical information and prevent

access to the capital markets. Our theory does not support TOT and POT theory because financial leverage SOA is not completed in various steps of the life cycle. After all, higher speed in the introduction stage than the growth stage provides a different analysis. Lower SOA in firms, that change life cycle stages based on the other cases from growth to decline and fall stages, is based on higher asymmetrical information and relevant transaction costs to the strategy changing. As a result, the new strategies make friction in market costs and capital structure. In addition, our results show a lower increase in costs for firms changing from growth to maturity than firms changing from introduction to growth. This result is based on the approval of groups who mention the debt adjustment who reduce or increase the debts and consider the asymmetrical costs of all debt adjustment types [3]. Thus, POT is supported because of SOA reduction while changing the life cycle stage and based on more severe effects by changing from introduction to the growth stage than changing from the growth to the maturity stage. This shows the positive result of using this criterion in debt replacement. In [14] founded that firms on up of target leverage with extra finance can adjust the capital with the maximum speed for the first time by a combination of the components of trade-off theory (distance from the target leverage) and pecking order theory (POT). It is worthwhile to notify that he considered the assets constant in the calculation of the SOA and assumes that capital structure is adjusted only by reduction or increase of debts. This assumption contradicts real-world observations and provides torque conditions of results. The findings of this research are important for researchers because they show that the firms' classification ratio in various stages of the life cycle state the interpretation of results by considering the effective factors on the capital structure of target and SOA. Hence, the researcher should pay more attention to the sample selection because analysis of this group in various stages of the life cycle will lead to a non-significant or non-sustainable coefficient whose behaviour change during the life cycle while selecting a sample based on various stages of the life cycle prevent these consequences and help to identify the origin of some combined effects in the literature of capital structure. On the other hand, beneficiaries should be aware of various stages of a firm life cycle and identify the superior condition which limits or make the relevant decisions to the capital structure desired.

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