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STUDYING THE RELATIONSHIP BETWEEN COMPANY LIFE CYCLE AND COST OF EQUITY

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Abstract

In the present study attempted to study relationship between life cycle of company and the cost of equity in capital market of Iran. In this study, three hypotheses are developed according to the assumptions and theoretical foundations of research and also the impact of the life cycle of the company on cost of equity is examined. It should be noted that the variables such as assets, stock market value, systematic risk, financial leverage and indicator of bankruptcy is considered as a control variable. Study period is 7-year (from 2007 to 2014) and listed companies in stock exchange of Tehran-Iran is considered as statistical population and statistical sample includes 100 companies and the number of observations is equal to 700 companies. The results of research show that there is negative relationship between the company's life cycle (growth period) and cost of equity. The results also show that there is positive relationship between company life cycle in maturity period and the cost of equity and there isn't significant relationship between the life cycle of the company in decline period and the cost of equity

Keywords: The Cost of Equity, Life Cycle of Company, Cost of Capital

1. Introduction

In economic theory and life cycle management, companies and institutions are divided into steps. Institutions and companies according to each stage of its economic life follow policy (Bushee& et al, 2010). According to this theory, companies at different stages of the life cycle in term of financial and economic have certain behaviors, this means that financial and economic characteristics of company influenced by a life cycle that company is located in it (Azizkhani & et al, 2010). Company life cycle theory suggests that companies like living organisms that pass a series of predictable patterns and significantly in the development of resources, capabilities, strategy, structure, and performance according to stages related to development are different (Armstrong & et al, 2011). According to life-cycle theory, companies in the early years establish because of profitable investment opportunities prefer that distribute less profitable between shareholders (DeAngelo & et al, 2010). As time goes and with increasing financial resources, companies usually increase dividend payments to its shareholders. Life-cycle theory offers some of the parameters, guidelines and diagnostic tools to assess the transition of company from one stage to the next stage. Therefore, understanding the nature of the life cycle can help to company in a more efficient use of valuable resources to achieve an early stage of development and maintain (Khodamipour & et al, 2013).

However, some companies are not considered predetermined program to its cost of equity and only for the financial decisions adopted by financial management, without any specific plan attempted to restructuring the company's capital. Although these companies may succeed in the short term, but eventually in financing necessary for their activities are encountered with major problems (Osta & Gheitasi, 2012). The concept of cost of equity has assigned the highest important in studies of accounting and finance. Providing the financial resources required are one of the most important components of any economic activity; that can be funded these resources from equity or debt. In this regard, financial managers in company are ensuring the best combination of financial resources or in other words the capital structure (Setayesh & et al, 2013).
Many researches and tests have been done about issue of equity and now also have continued theoretical research and empirical studies about it. In this study, samples of companies in Tehran Stock Exchange with different cost of equity is studied and are analyzed using the scale of Dixon life cycle cost of equity in the growth, maturity and decline.

2. Problem of Statement

Due to the inefficiency of capital market in Iran, life cycle analysis and cost of equity seems necessary as two important and influential factor in the dividends and the value of stock market companies as well as factors influencing future stock returns in the market (Izadinia & et al, 2013). So aim of this study is to evaluate the impact of life cycle and cost of equity in companies listed in Tehran Stock Exchange. With regard to the subjects mentioned, this study seeks to answer the question that could life cycle of company be factors influencing cost of capital and future stock returns and research model is presented as follows:

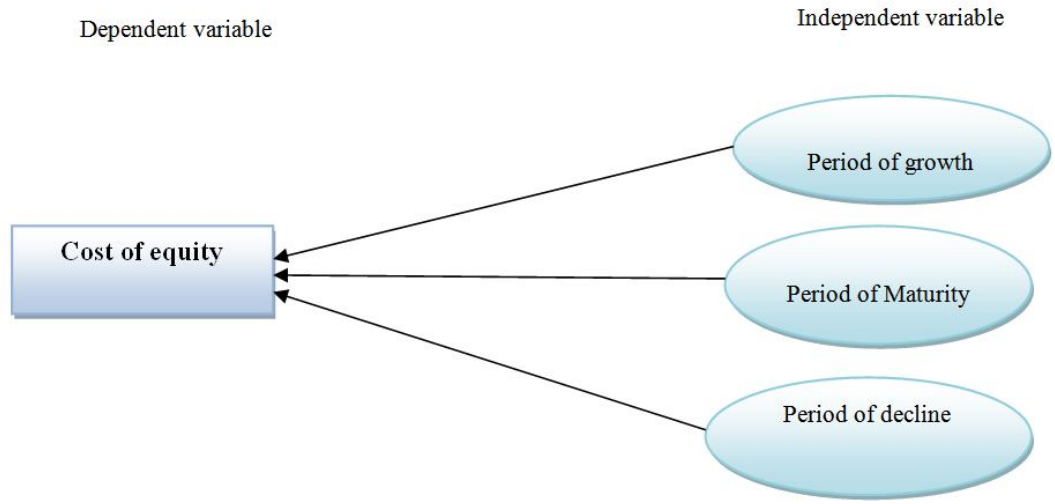

Figure 1: Conceptual model of research

According to model research, hypotheses are presented as follows:
1. There is significant relationship between company life cycle (growth period) and cost of equity
2. There is significant relationship between company life cycle (maturity period) and cost of equity
3. There is significant relationship between company life cycle (decline period) and cost of equity

3. Research Methodology

This study is applied research with emphasis on correlation and analytical. Study period is 7-year (from 2007 to 2014) and listed companies in Stock Exchange of Tehran-Iran are considered as statistical population and statistical sample includes 100 companies and the number of observations is equal to 700 companies. In this study, method of sampling is census. The data for this study was extracted from blog and database of Tehran Stock Exchange. In this study to test the impact of the company's life cycle on cost of equity is used multivariate regression model. About the existence or absence of a significant relationship between independent and dependent variables (test the significance of the correlation coefficient) is used paired t-test and to demonstrate the impact of independent variables on the dependent variable (showing proportion of the changes of dependent variable caused by the independent variable) is used the coefficient of determination R^2.

4. Research Findings

4.1. Examining for normality of the dependent variable

The Kolmogorov-Smirnov test is used to study normality of the dependent variable. The null hypothesis and the alternative hypothesis are written as following:

$$\begin{cases} H_0: & \text{The data of dependent is normal.} \\ H_1: & \text{The data of dependent isn't normal.} \end{cases}$$

Table 1: Kolmogorov-Smirnov test for normality of the dependent variable

variable	year	number	Normal parameters		Most extreme different			Kolmogorov-smirnov z	sig
			mean	Std. deviation	absolute	positive	negative		
R	2007	100	1119	1219	0.18	0.18	-0.18	1.81	0.003
	2008	100	1073	1069	0.21	0.21	-0.17	2.09	0.000
	2009	100	1098	1284	0.23	0.23	-0.21	2.27	0.000
	2010	100	991	1201	0.23	0.23	-0.20	2.26	0.000
	2011	100	968	1151	0.20	0.19	-0.20	2.00	0.001
	2012	100	1005	1198	0.23	0.23	-0.20	2.26	0.000
	2013-2014	100	1279	1602	0.21	0.18	-0.21	2.14	0.000

Probability values for the dependent variable in all years are less than 0.05. Therefore, the null hypothesis (normality of variables) is rejected for this variable.

Continued Table 2: Kolmogorov-Smirnov test for normality of the dependent variable

Variable	year	Number	Normal parameters		Most extreme different			Kolmogorov-smirnov z	sig
			mean	Std. deviation	absolute	positive	negative		
LnR	2007	100	6.55	1.06	0.07	0.05	-0.07	0.73	0.666
	2008	100	6.58	0.92	0.06	0.04	-0.06	0.59	0.873
	2009	100	6.53	0.99	0.05	0.05	-0.05	0.51	0.955
	2010	100	6.33	1.21	0.09	0.06	-0.09	0.90	0.399
	2011	100	6.23	1.33	0.09	0.05	-0.09	0.91	0.383
	2012	100	6.27	1.32	0.10	0.06	-0.10	1.00	0.275
	2013-2014	100	6.36	1.52	0.09	0.07	-0.09	0.92	0.371

But the probability logarithm of this variable in the years 2007 and 2014 are respectively 0.67, 0.87, 0.96 and … and 0.37 That all is more than 0.05. This means that logarithmic distribution of this variable according to prediction (parameters of skewness and kurtosis close to zero) is normal.

So to meet the valid of model it is necessary that is used from logarithm of the dependent variable instead of main variables.

4.2. Examining correlation coefficient between variables

The correlation coefficient (Pearson correlation coefficient) is used to prove the linearity of the relationship. The correlation between the variables is written as following the null hypothesis and the alternative hypothesis.

$$\begin{cases} H_0 : \rho_{XY} = 0 \\ H_1 : \rho_{XY} \neq 0 \end{cases}$$

Pearson correlation matrix has been calculated in the table below and its results are as follows:

Pearson correlation amount as presented in the following table: between LnR and growth is equal to 0.18 (significant and positive), with maturity is equal to -0.17 (significance and negative), with the decline is equal to -0.05 (meaningless), with Size is equal to 0.07 (positive and significant at the level of 90%), with bm is equal to 0.60 (positive and significant), with Beta is equal to 0.002 (meaningless), with Loss is equal to -0.13 (significance and negative), with LEV is equal to -0.12 (significance and negative) and value of correlation between LnR and ZScore is equal to -0.02 (meaningless).

Table 3: The correlation coefficient for the relationship between the variables

Correlations

		LnR	growth	Maturity	Decline	SIZE	bm	Beta	LOSSt	LEV	ZSCORE
LnR	Pearson Correlation	1	.176**	-.168**	-.051	.073	-.603**	.002	-.133**	-.119**	-.022
	Sig. (2-tailed)		.000	.000	.178	.053	.000	.962	.000	.002	.563
	N	700	700	700	700	700	700	700	700	700	700
growth	Pearson Correlation	.176**	1	-.687**	-.430**	.032	-.157**	.026	-.099**	-.054	.009
	Sig. (2-tailed)	.000		.000	.000	.397	.000	.494	.009	.157	.809
	N	700	700	700	700	700	700	700	700	700	700
Maturity	Pearson Correlation	-.168**	-.687**	1	-.321**	.008	.136**	-.019	.063	-.006	.116**
	Sig. (2-tailed)	.000	.000		.000	.835	.000	.623	.094	.866	.002
	N	700	700	700	700	700	700	700	700	700	700
Decline	Pearson Correlation	-.051	-.430**	-.321**	1	-.069	.050	.009	.051	.087*	-.152**
	Sig. (2-tailed)	.178	.000	.000		.068	.186	.822	.178	.021	.000
	N	700	700	700	700	700	700	700	700	700	700
SIZE	Pearson Correlation	.073	.032	.008	-.069	1	.022	.122**	-.034	.010	-.023
	Sig. (2-tailed)	.053	.397	.835	.068		.557	.001	.371	.794	.540
	N	700	700	700	700	700	700	700	700	700	700
bm	Pearson Correlation	-.603**	-.157**	.136**	.050	.022	1	.015	.131**	.234**	-.052
	Sig. (2-tailed)	.000	.000	.000	.186	.557		.692	.001	.000	.172
	N	700	700	700	700	700	700	700	700	700	700
Beta	Pearson Correlation	.002	.026	-.019	.009	.122**	.015	1	.047	-.057	-.019
	Sig. (2-tailed)	.962	.494	.623	.822	.001	.692		.217	.134	.618
	N	700	700	700	700	700	700	700	700	700	700
LOSSt	Pearson Correlation	-.133**	-.099**	.063	.051	-.034	.131**	.047	1	.254**	-.129**
	Sig. (2-tailed)	.000	.009	.094	.178	.371	.001	.217		.000	.001
	N	700	700	700	700	700	700	700	700	700	700
LEV	Pearson Correlation	-.119**	-.054	-.006	.087*	.010	.234**	-.057	.254**	1	-.136**
	Sig. (2-tailed)	.002	.157	.866	.021	.794	.000	.134	.000		.000
	N	700	700	700	700	700	700	700	700	700	700
ZSCORE	Pearson Correlation	-.022	.009	.116**	-.152**	-.023	-.052	-.019	-.129**	-.136**	1
	Sig. (2-tailed)	.563	.809	.002	.000	.540	.172	.618	.001	.000	
	N	700	700	700	700	700	700	700	700	700	700

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.3. Panel Analysis

In analyzing panels, data were collected as cross section-time series. This means that data collected for different sections (in here: companies) be over time. Topics of panel analysis there are three models: without fixed effects model (integrated model), with fixed effects and random effects that different tests is used to determine the appropriate model. Following briefly is referred to this test:

4.3.1. The process of selecting an appropriate model

Process of model selection is as follows:

First step: Existence of effects opposite model without effects of test (test of Limmer or Chow).

At this step, hypothesis testing is as follows:

$$\begin{cases} H_0: & \text{Integrated model is appropriate} \\ H_1: & \text{Model with the effects is appropriate} \end{cases}$$

If the value of possibility to test above be less than 0.05, the null hypothesis is rejected in 95% confidence level. This means that model with fixed and random effects is appropriate and otherwise null hypothesis is not rejected in 95% confidence level, this means that integrated model is appropriate.

Second step: model is tested with random effects against model with fixed effects (Hausman test).
If model used be model with effects, the next question is: is appropriate whether the model with fixed effects or model with random effects? To answer this question model with random effects against model with fixed effects is tested using the Hausman test.

The null hypothesis and the alternative hypothesis in this test are as follows.

$$\begin{cases} H_0: & \text{Models with random effects are appropriate.} \\ H_1: & \text{Model with fixed effects are appropriate} \end{cases}$$

If the value of possibility to test above be less than 0.05, the null hypothesis is rejected in 95% confidence level. This means that model with fixed effects is appropriate and otherwise null hypothesis is not rejected in 95% confidence level, this means that model with random effects are appropriate.

4.4. Model Selection
As previously mentioned, first appropriate model among the models (integrated model, model with fixed effects or random effects model) is selected. Results of Chow and Hausman test are presented to determine the appropriate model in the following table:

Table 4: Chow test and Hausman test to select the appropriate model

models	Chow test or Limmer				Hausman test			result
	Effects test	value	df	sig	Chi – square value	df	sig	
First model	F	3.73	(99,593)	0.000	29.51	7	0.000	Model with fixed effects
	Chi – square	338.71	99	0.000				
Second model	F	3.76	(99,593)	0.000	30.68	7	0.000	Model with fixed effects
	Chi – square	340.75	99	0.000				
Third model	F	3.62	(99,593)	0.000	28.48	7	0.000	Model with fixed effects
	Chi – square	331.11	99	0.000				

Probability value of Chow test in above models is less than 0.05. Thus model used has separate effects for the companies.
Probability value of Hausman test for all three models is less than 0.05 (Their value is 0.000). Therefore model used is the model with fixed effects. Following this model is used to study hypotheses.

The first processing: model with fixed effects
In this part Panel analysis is used to evaluate and estimates of overall model.
Assumed model is as follows:

$$Ln(R_{it}) = \beta_0 + \beta_1 D_{B\log hit} + \beta_2 SIZE_{it} + \beta_3 BM_{it} + \beta_4 Beta_{it} + \beta_5 LOSS_{it} + \beta_6 LEV_{it} + \beta_7 ZSCORE_{it} + \varepsilon_{it}$$

In this model, the null hypothesis and the alternative hypothesis are as follows:

$$\begin{cases} H_0 : \beta_1 = \beta_2 = \ldots = \beta_7 = 0 \\ H_1 : \beta_i \neq 0 \;\; i = 1,2,\ldots,7 \end{cases}$$

$$\begin{cases} H_0 : \text{There isn't a significant model.} \\ H_1 : \text{There is a significant model.} \end{cases}$$

Results of panel analysis are shown in the following table:

In the following table is estimated model with fixed effects. Value of sig is equal to 0.000. This value is less than 0.05. Therefore, the null hypothesis in the 95% confidence level is rejected. This means that model at the level of 95% is significant. The coefficient of determination is equal to 0.62. This means that around 62 percent of the dependent variable is explained by the independent variables and control. The amount of Durbin-Watson statistic is equal to 1.72.

Table 5: Parameter estimation of model

parameters	Value of Coefficient	t-value	Probability value	Result	VIF
constant	6.559	4.858	0.000	Significant and positive	-
growth	-0.265	-3.686	0.000	Significant and negative	1.03
SIZE	0.013	0.129	0.897	Meaningless	1.02
bm	-0.150	-4.615	0.000	Significant and negative	1.09
Beta	0.050	1.527	0.127	Meaningless	1.03
LOSSt	-0.561	-2.926	0.004	Significant and negative	1.10
LEV	0.105	0.485	0.628	Meaningless	1.14
ZSCORE	0.00023	2.034	0.042	Significant and positive	1.03
F value		**9.19**	**Probability value of F**		**0.000**
R^2		**0.62**	**Durbin Watson**		**1.72**

The t-value for growth is equal to -3.69 (significant and negative meanwhile the value of dependent variable in growth companies is less than other companies), for size is equal to 0.13 (meaningless), for bm is equal to -7.82 (significant and negative), for Beta is equal to 1.53 (meaningless), for LOSSt is equal to -2.93 (significant and negative), for LEV is equal to 0.48 (meaningless) and for ZSCORE is equal to 2.03 (significant and positive). The t-value for the width of the origin is equal to 4.86 that are in the region of rejecting the null hypothesis at 95% confidence level. This means that width of the origin is significant.

The second processing: model with fixed effects

Assumed model is as follows:

$$Ln(R_{it}) = \beta_0 + \beta_1 D_{ROSHDt} + \beta_2 \mathrm{SIZE}_{it} + \beta_3 \mathrm{B}M_{it} + \beta_4 \mathrm{B}eta_{it} + \beta_5 LOSS_{it} + \beta_6 LEV_{it} + \beta_7 ZSCORE_{it} + \varepsilon_{it}$$

In this model, the null hypothesis and the alternative hypothesis is as follows:

$$\begin{cases} H_0 : \beta_1 = \beta_2 = \ldots = \beta_7 = 0 \\ H_1 : \beta_i \neq 0 \quad i = 1,2,\ldots,7 \end{cases}$$

$$\begin{cases} H_0 : & \text{There isn't a significant model.} \\ H_1 : & \text{There is a significant model.} \end{cases}$$

Results of panel analysis are shown in the following table:

Assumed model is as follows:

$$Ln(R_{it}) = \beta_0 + \beta_1 D_{B\log hit} + \beta_2 \mathrm{SIZE}_{it} + \beta_3 \mathrm{B}M_{it} + \beta_4 \mathrm{B}eta_{it} + \beta_5 LOSS_{it} + \beta_6 LEV_{it} + \beta_7 ZSCORE_{it} + \varepsilon_{it}$$

In this model, the null hypothesis and the alternative hypothesis are as follows:

$$\begin{cases} H_0 : \beta_1 = \beta_2 = \ldots = \beta_7 = 0 \\ H_1 : \beta_i \neq 0 \quad i = 1,2,\ldots,7 \end{cases}$$

$$\begin{cases} H_0 : & \text{There isn't a significant model.} \\ H_1 : & \text{There is a significant model.} \end{cases}$$

Results of panel analysis are shown in the following table:

In the above table is estimated model with fixed effects. Value of sig is equal to 0.000. This value is less than 0.05. Therefore, the null hypothesis in the 95% confidence level is rejected. This means that model at the level of 95% is significant. The coefficient of determination is equal to 0.62. This means that around 62 percent of the dependent variable is explained by the independent variables and control. The amount of Durbin-Watson statistic is equal to 1.72. Values close to 2 indicate lack of autocorrelation of residuals that shows one of the assumptions of regression analysis (Therefore, there isn't autocorrelation between residuals)

Table 6: Parameter estimation of model

parameters	Coefficients	t value	sig	result	VIF
constant	6.130	4.532	0.000	Significant and positive	-
Maturity	0.241	3.400	0.001	Significant and positive	1.03
SIZE	0.031	0.323	0.747	Meaningless	1.02
bm	-0.145	-4.321	0.000	Significant and negative	1.09
Beta	0/046	1/379	0.168	Meaningless	1.03
LOSSt	-0.569	-2.964	0.003	Significant and negative	1.10
LEV	0.120	0.554	0.580	Meaningless	1.14
ZSCORE	0.00020	1.801	0.072	Meaningless	1.03
F		**9.14**	**sig**		**0.000**
R^2		**0.62**	**Durbin Watson**		**1.72**
Adjusted R Square		**0. 544**			

The t-value for mature is equal to 3.4 (significant and positive this means that amount of the dependent variable in companies of mature stage is more than other companies), for SIZE is equal to 0.32 (meaningless), for bm is equal to -8.03 (significant and negative), for Beta is equal to 1.38 (meaningless), for LOSSt is equal to -2.96 (significant and negative), for LEV is equal to 0.60 (meaningless) and for ZSCORE is equal to 1.80 (meaningless). The t-value for the width of the origin is equal to 4.53 that are in the region of rejecting the null hypothesis at 95% confidence level. This means that width of the origin is significant.

The third processing: model with fixed effects

Assumed model is as follows:

$$Ln(R_{it}) = \beta_0 + \beta_1 D_{OFOLt} + \beta_2 SIZE_{it} + \beta_3 \mathrm{BM}_{it} + \beta_4 \mathrm{Beta}_{it} + \beta_5 LOSS_{it} + \beta_6 LEV_{it} + \beta_7 ZSCORE_{it} + \varepsilon_{it}$$

In this model, the null hypothesis and the alternative hypothesis are as follows:

$$\begin{cases} H_0 : \beta_1 = \beta_2 = \ldots = \beta_7 = 0 \\ H_1 : \beta_i \neq 0 \;\; i = 1,2,\ldots,7 \end{cases}$$

$$\begin{cases} H_0 : & \text{There isn't a significant model.} \\ H_1 : & \text{There is a significant model.} \end{cases}$$

Results of panel analysis are shown in the following table:

In the following table is estimated model with fixed effects. Value of sig is equal to 0.000. This value is less than 0.05. Therefore, the null hypothesis in the 95% confidence level is rejected. This means that model at the level of 95% is significant. The coefficient of determination is equal to 0.61. This means that around 61 percent of the dependent variable is explained by the independent variables and control. The amount of Durbin-Watson statistic is equal to 1.72.

Table 7: Parameter estimation of model

parameters	Coefficients	t value	sig	Result	VIF
constant	6.315	4.625	0.000	Significant and positive	-
Decline	-0.046	-0.476	0.635	Meaningless	1.03
SIZE	0.027	0.275	0.784	Meaningless	1.02
bm	-0.159	-4.865	0.000	Significant and negative	1.09
Beta	0.050	1.508	0.132	Meaningless	1.03
LOSSt	-0.582	-3.007	0.003	Significant and negative	1.10
LEV	0.132	0.601	0.548	Meaningless	1.14
ZSCORE	0.00020	1.720	0.086	Meaningless	1.03
F		**8/87**	**sig**		**0/000**
R^2		**0/61**	**Durbin Watson**		**1/72**

The t-value for decline is equal to -0.48 (meaningless), for size is equal to 0.27 (meaningless), for bm is equal to -8.00 (significant and negative), for Beta is equal to 1.51 (meaningless), for LOSSt is equal to -3.00 (significant and negative), for LEV is equal to 0.60 (meaningless) and for ZSCORE is equal to 1.72 (meaningless). The t-value for the width of the origin is equal to 4.62 that are in the region of rejecting the null hypothesis at 95% confidence level. This means that width of the origin is significant.

Table 8: Summary of results (confirm or reject hypotheses)

Hypotheses	Result
There is negative relationship between company life cycle (growth period) and cost of equity	Confirmed
There is positive relationship between company life cycle (maturity period) and cost of equity	Confirmed
There is significant relationship between company life cycle (decline period) and cost of equity	Rejected

5. Conclusion and Recommendations

The results of research show that there is negative relationship between the company's life cycle (growth period) and cost of equity. The results also show that there is positive relationship between company life cycle in maturity period and the cost of equity and there isn't significant relationship between the life cycle of the company in decline period and the cost of equity. Thus, according to content expressed and results obtained the following suggestions are offered:

1) Shareholders and investors who want to enter the capital market and investment in the company's stock must be aware that company is in which life cycle steps, because in the process growth and maturity companies to meet the deficit financing use issuing equity method and investors should try to invest according to their investment objective.
2) Corporate managers should consider the financial performance of companies in steps of growth and maturity and decline and by specifying their company's life cycle follow from capital structure of companies that have high financial performance.
3) It is recommended to shareholders that if amount of annual dividend is important for them, invest in companies in growth stage and maturity because this companies more dividends.

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