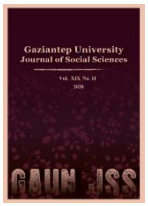

GAZİANTEP UNIVERSITY
JOURNAL OF SOCIAL SCIENCES

Journal homepage: http://dergipark.org.tr/tr/pub/jss

Araştırma Makalesi ● Research Article

Does Life-Cycle Stage Affect Companies' Revenue Predictability? Evidence from Borsa Istanbul

Yaşam Döngüsü Şirketlerin Hasılat Tahmin Edilebilirliğini Etkiler mi? Borsa İstanbul Bulguları

Gökberk CAN [a]* Samet GÜNAY [b]

[a] Yrd. Doç. Dr, College of Business Administration, American University of the Middle East, Egalia / KUWAIT
ORCID: 0000-0003-2158-7253
[b] Yrd. Doç. Dr, College of Business Administration, American University of the Middle East, Egalia / KUWAIT
ORCID: 0000-0002-1047-5638

MAKALE BİLGİSİ

Makale Geçmişi:
Başvuru tarihi: 18 Kasım 2021
Kabul tarihi:2 Mart 2022

Anahtar Kelimeler:
Yaşam döngüsü aşaması,
Borsa İstanbul,
Hasılat tahmin edilebilirliği

ÖZ

Yaşam döngüsü, bir şirketin içinden geçtiği iç ve dış koşulları tanımlar. İç koşullar, bir şirketin yönetsel yetenekleri ve bilgi birikimidir. Dış çevre ise kişi başına düşen GSYİH, ekonomik gelişmeler, sermaye piyasası derinliği ve şirketin sunduğu mal ve hizmetlere olan talep olarak tanımlanır. Bu koşullara bağlı olarak bir şirket emsallerinden daha erken bir aşamaya geçebilir. Ayrıca, bir yaşam döngüsü, bir şirketin yönetimsel ve finansal faaliyetlerine işaret eder. Bu çalışmada, yaşam döngüsü ile gelir öngörülebilirliği arasındaki ilişki test edilmiştir. Gelir öngörülebilirliği üç yıllık hasılatın standart sapmasının ortalama toplam varlıklara bölünmesiyle elde edilmiştir. Yaşam döngüsü tahminimiz, Dickinson'ın (2011) nakit akışı modeline dayanmaktadır. Hansen vd. (2018), giriş, büyüme, olgunlaşma, durgunluk ve düşüş aşamaları için sırasıyla 0, 0,25, 0,50, 0,75 ve 1 atadık. Modelimizi tahmin etmek için firma/yıl sabit etkiler regresyonunu kullandık. Ampirik kanıtlarımız, hasılat oynaklığı azaldıkça şirketlerin hasılat tahmin edilebilirliğinin arttığına işaret ediyor. Sağlamlık testimiz (robustness test), yaşam döngüsünde ilerleme ile net ve faaliyet karındaki oynaklığın azaldığını ve öngörülebilirliğinin arttığını göstermektedir. Elde edilen sonuçlar, Borsa İstanbul'da işlem gören şirketlerin performans göstergelerinin (hasılat, faaliyet karı ve net kar) yaşam döngüsündeki ilerlemeyle daha öngörülebilir hale geldiğini göstermektedir.

ARTICLE INFO

Article History:
Received November 18, 2021
Accepted March 02, 2022

Keywords:
Life-cycle stage,
Borsa Istanbul,
Revenue predictability

ABSTRACT

Life-cycle stage identifies internal and external conditions that a company goes through. Internal conditions are a company's managerial abilities and know-how. External environment such as GDP per capita, economical developments, capital market depth, and demand on the goods and services provided by the company. A company can reach to a further stage earlier than its peers depending on these conditions. Also, a life-cycle stage signals a company's managerial and financial activities. In this paper we test the relationship between life-cycle stages and revenue predictability. We used three-year revenue divided by average total assets as the revenue predictability. Our life-cycle estimation is based on Dickinson's (2011) cash-flow proxy model. Instead of using dummy variables and omitted the category with least observations, following Hansen et al. (2018), we assigned values of 0, 0.25, 0.50, 0.75, and 1 for the stages of introduction, growth, mature, shake-out, and decline, respectively. We used firm/year fixed effects regression to estimate our model. Our empirical evidence points out that companies' revenue predictability increases as the revenue volatility decreases. Our robustness test shows that net and operating income predictability increases as the volatility decreases when they move forward in the life-cycle stage. Our results show that Borsa Istanbul-listed companies' performance indicators (revenue, operating income, and net income) become more predictable as they move forward in their life-cycle stage.

* *Sorumlu yazar/Corresponding author*.
e-posta: Gokberk.can@aum.edu.kw

Introduction

Fluctuations in economic activities may generate cyclical patterns as expansion and contractions in the economic output. Similar stages can also be observed in the industry and firm levels. Depending on the magnitude and length of these patterns, firms may face different extents of impacts. These effects may vary across the lifetime of the companies due to the nexus between market developments and firm integration, corporate governance and financial management strategies. At the same time, the companies' response to these influences would be a significant factor in enhancing their probability of survival.

Like the market itself, firms evolve from infancy to maturity and in this period, various financial and accounting variables display different responses to this process. For example, depending on its current stage; revenue, operating cash flow, capital expenditures and the extent of leverage may considerably vary for a startup and mature business. These reactions can also be monitored in stock prices as the share value may incorporate the available information about the company and the intrinsic value of a share is the present value of its future cash flows. The nexus here can differ across the firms in the domain of life cycle positions. For instance, while the aggregate market reaction can remain the same or do not have significant changes, a particular industry or firm(s) may display abnormal responses to the market developments depending on the stages of their life-cycles. As reported in her seminal paper Dickinson (2011) states that investors are prone to undervalue mature firms as they don't entirely reflect the information relevant to these firms' cash flow patterns. It means that even rational investors may be biased in the evaluation of firms in different stages of their lifespan.

Considering the intrinsic share price definition given above, it can be stated that uncertainties can lead the variability witnessed in share value in generating free cash flows by the companies. As aforementioned, due to the varying capabilities/capacities of the firms placed in different phases, the life cycle stages of the companies can induce other economic characteristics. For example, while the firms in the growth phase strive to break even and displays rapid revenue increases to solidify their stance in the market; a mature business may become the target of the investors for mergers and acquisitions potentially due to their relatively stronger cash positions and sustainable profit growth and higher brand awareness. Therefore, it can be suggested that firms in growth and maturity phases may follow different priorities and have different agendas. These elements may bring about distinctions in capital structure decisions and dividend policies. For instance, as DeAngelo et al. (2006) stated, their long-term debt becomes insignificant once the mature firms do not pay a dividend. Thus, it is evident that varying strategies due to the life cycle stages may also affect net income variability as a component of free cash flows in different degrees.

In this study, we examine life-cycle stage-revenue volatility for the BIST-listed non-financial companies as an element of free cash flows. Unlike the current literature, this study provides evidence regarding the vital items generating operating cash flows and their variability conditional to their life cycle stages. Empirical identification of this relationship would enhance investors' performance and bring better forecast accuracy for the firm managers. Especially as an emerging economy, such as Turkey, determining the nexus between revenue volatility and life cycle stage would enlighten the way of policymakers to offer a more secure and functional platform for investors, especially for the entrepreneurs who seek to launch a startup. In this regard, appropriate actions taken by policymakers would lower the instability of the revenues of these companies exposed to high variability stemming from their life-cycle stage.

Literature Review and Hypothesis Development

Abdullah and Mohd-Saleh (2014) examine the impact of firms' lifecycle on conservatism for a sample from Malaysia. Results indicate that the conservatism effect differs over the life cycle stages of the firms employed in the study. By considering the life cycle stages, Park and Chen (2006) attempt to capture differences between underlying economics such as production function, risk and investment opportunity set and test if accounting conservatism affects the value-relevance. Esteve-Pérez et al. (2018) analyze the age and productivity variables as determinants of the industry life cycle for Spanish firms with ten or more employees. According to the results, firm productivity has a weaker linkage with firms' hazard rate for the companies in the mature stage. However, productivity has a significant and negative effect in the intermediate stage. de Oliveira and Girão (2018) seek for efficiency in the Brazilian equity market by examining organizational lifecycle impact on the forecast accuracy. Results display lower performance for the companies in the birth and decline stages. For the companies from the electrical and machinery industry of Taiwan, Yang and Shyu (2019) analyze the time, firm and group effects on firm performance changes under various life cycle stages. Results reveal the presence of a negative impact of financial institutional investors during the decline stage.

Budiarso et al. (2019) examine 212 firms from Indonesia Stock Exchange to reveal the connection between dividend policy and life cycle and catering theories. According to the authors' findings, there is a statistically significant relationship between mature firms and dividend payments due to their ability to generate free cash flows. Dickinson (2011) introduces a proxy through cash flow patterns to estimate firm life cycle. The model identifies persistence and convergence patterns of profitability regarding cash flows. As reported, the proxy utilized outperforms other alternative proxies used in the literature, such as age. Anthony and Ramesh (1992) suggest that the stock market's reaction to revenue growth and capital investment is a function of the firm life cycle stage. Additionally, according to the authors, the relationship is not controlled by the firm size effect and risk differences. Bellone et al. (2008) state that the elements of firm survival have different effects depending on the life cycle stage for French manufacturing companies. Bhattacharya et al. (2019) present evidence from cash flow-based life cycle proxy in examining the tendency of firms to pay dividend. Results indicate the success of this proxy regarding dividend payout policy when a firm shift from one phase to another. Bravo (2019) presents evidence for the significant interactions between a firm's beta a life cycle stages. According to the empirical investigation, a firm's beta is prone to decline as the company develops from the introduction to maturity stages. As reported, the cost of equity is minimized at the last stage.

Chang and Ma (2019) attempt to explore if the managerial efficiency is connected to presence of Chinese firms that listed on financial stability index in the context of life cycle hypothesis. Results show that although managerial efficiency is lessened at the mature stage, the company’s financial stability becomes more consistent. Chen et al. (2016) explore the measures to assist investors in determining the best value-relevant indicators about the firm value evaluation under the consideration of various life cycle stages. Results display that the employed measures present varying performance across the firm's life cycle stages. Chen et al. (2010) show that employment life cycle stages increase the accrual model's explanatory power and reduce both type I and type II errors in an investigation conducted for Chinese companies. Coulton and Ruddock (2011) examine the nexus between dividend payout policy and corporate life cycle stages of Australian firms. Results follow the proposition of life cycle theory and show a significant relationship between consistent dividend payments and shareholders’ equity proportion that is earned not contributed. Dickinson et al. (2018) investigate the function of

accounting data on the earnings predictions considering the role of life cycle stage of the companies. Results reveal that market values depend on both accounting information and earnings forecasts and are conditional on firms' life cycle stages to varying extents.

$H1_0$: Life-cycle stages does not affect revenue volatility (Expected sign for $H1_1$ is -)

Research Design

Sample

We used BIST-listed non-financial companies' data between the years 2005 and 2020. To calculate the revenue volatility, we used the current year and two previous years. We utilized 2005 and 2006 only to establish our dependent variable for 2007, thus 2005 and 2006 are not in the analysis. Following the BIST the classification, we excluded holdings from our data set because they are classified listed under financial institutions. We utilized comprises 231 companies, 14 years, and 2,738 observations in an unbalanced panel data set. We used two different resources to obtain the data. We downloaded financial variables and establishment dates. We downloaded the institutional ownership data from the Central Securities Depository (CSD). The industry classification of BIST was utilized. We present research sample and observation distribution per year and industry in Tables 1 and 2, respectively.

Table 1: Research Sample

1	Number of Companies Listed in BIST	519
2	Less: Financial Institutions	(126)
3	Total Non-Financial Companies	393
4	Less: Companies with Missing Data	(154)
5	Total Number of Available Companies	239
6	Less: Companies with less than three year observations	(8)
7	Total Number of Companies Used	231
8	Number of Years	14
9	Total Number of Possible Observations	3,234
10	Observations Dropped	(496)
11	Total Number of Observations	2,738

Table 2: Observations per Year and Industry

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Per Year**
2007	0	0	1	2	4	113	2	0	11	5	10	148
2008	0	0	1	4	4	113	3	0	12	5	10	152
2009	0	0	1	5	4	112	3	0	12	6	11	154
2010	0	0	2	5	5	115	4	0	12	7	12	162
2011	0	1	2	6	6	122	5	0	14	6	14	176
2012	1	1	3	6	6	131	5	1	14	7	19	194
2013	1	3	4	5	6	137	5	1	14	8	19	203
2014	1	3	5	5	8	142	5	1	14	8	21	213
2015	2	3	6	6	8	145	5	1	14	8	21	219
2016	2	2	6	6	8	152	5	1	14	8	19	223
2017	2	2	6	6	8	152	5	1	15	8	18	223
2018	1	3	6	6	8	152	5	1	15	9	21	227
2019	2	3	5	6	7	150	5	1	14	9	20	222

2020	2	2	5	6	8	151	5	1	15	8	19	222
Per Ind.	14	23	53	74	90	1,887	62	9	190	102	234	2,738

1. Administrative and Support Service Activities, 2. Agriculture, Forestry and Fishing 3. Construction and Public Works 4. Education, Health, Sports and Other Social Services 5. Electricity Gas and Water 6. Manufacturing 7. Mining and Quarrying 8.Professional, Scientific and Technical Activities 9.Technology 10. Transportation Storage and Telecommunication 11.Wholesale and Retail Trade, Restaurants and Hotels

Research Model

We constructed our research model following the previous literature. To estimate the life-cycle stage effect on the revenue volatility, we calculated three year volatility of revenue for each observation. Our life-cycle measure is based on Dickinson's (2011) cash flow proxies. Majority of the companies are from manufacturing industry and including the differences among the industries, there are many unobserved firm-level characteristics that will affect the tested relationship. We used fixed effects on firm/year level to capture the unobserved effects of years and firms. Table 3 presents the variable construction.

$$SALESDEV_{it} = \beta_0 + \beta_1 CYC_{it} + \beta_2 INST_{it} + \beta_3 OCF_{it} + \beta_4 CSTI_{it} + \beta_5 ROA_{it} + \beta_6 CAPEX_{it} + \beta_7 SIZE_{it} + \beta_8 Q_{it} + \beta_9 TANG_{it} + \beta_{10} AGE_{it} + \beta_{11} LEV_{it} + \beta_{12} DIV_{it} + \beta_{13} REVGR_{it} + \text{Years and Firms Fixed} \quad (1)$$

Table 3: Variable Construction

Variable	Definition	Source
SALESDEV	Standard Deviation of three-year Sales Revenue divided by Three-Year Average of Total Assets	Eikon
CYC	Assigned a value of 0, 0.25, 0.5, 0.75 or 1 for introduction, growth, mature, shake-out, and decline stages (Hansen et al., 2018) proposed by (Dickinson, 2011) in the period t.	Eikon
INST	Percentage of Institutional Ownership in the period t.	CSD
OCF	Operating Cash Flow divided by total assets in the period t.	Eikon
CSTI	Sum of Cash Holdings and Short-Term Investments divided by total assets in the period t.	Eikon
ROA	Net Income divided by total assets in the period t.	Eikon
CAPEX	Capital expenditures divided by total assets in the period t.	Eikon
SIZE	Natural logarithm of total assets in the period t.	Eikon
Q	Market capitalization divided by total assets in the period t.	Eikon
TANG	Net Property, Plant, Equipment divided by total assets in the period t.	Eikon
AGE	Natural logarithm of December 31 of fiscal year less date of incorporation.	Eikon
LEV	Total debt divided by Total Assets in the period t.	Eikon
DIV	1 if the company paid dividends in the period t.	Eikon
REVGR	Change in the revenue from year t-1 to t divided by revenue in year t-1	Eikon

Variable of Interest

Using all categories as dummy variables causes the dummy variable trap. As one of categories will not be reported by R, we preferred the methodology proposed by Hansen et al (2018). Following the authors, we assigned 0, 0.25, 0.50, 0.75, and 1 for introduction, growth, mature, shake-out, and decline stages, respectively.

Econometric Analysis

Descriptive Statistics

Table 4 reports the descriptive statistics for variables. Extreme values were confirmed with financial statements published on PDP. Tables 5 report the t-test of differences of means for life-cycle stages. We observed statistically significant difference between decline and other stages. Table 6 presents the correlation matrix of the dependent and independent variables. Statistical significance is presented in brackets. The highest correlation (0.57) occurred between institutional ownership and size. The lowest correlation (-0.37) is between cash holdings and short terms investments and tangibility.

Table 4: Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
MIN	0.00	0.00	0.00	0.00	-1.06	-1.60	0.00	15.10	0.01	0.00	6.60	0.00	0.00	-1.00
1Q	0.05	0.25	0.01	0.09	-0.01	-0.01	0.01	18.39	0.38	0.17	9.08	0.05	0.00	0.00
MEAN	0.15	0.40	0.10	0.37	0.06	0.03	0.06	19.69	1.09	0.33	9.38	0.25	0.37	0.28
3Q	0.18	0.50	0.14	0.63	0.12	0.08	0.07	20.79	1.15	0.47	9.75	0.38	1.00	0.28
MAX	1.55	1.00	0.89	0.99	7.51	6.80	1.18	24.85	61.21	0.98	10.35	7.24	1.00	128.89
STDEV	0.16	0.26	0.12	0.31	0.20	0.18	0.09	1.78	2.04	0.21	0.51	0.29	0.48	3.34

1. SALESDEV 2. CYC 3. INST 4. OCF 5. CSTI 6. ROA 7. CAPEX 8. SIZE 9. Q 10. TANG 11. AGE 12. LEV 13. DIV 14. REVGR

Table 5: Differences of Means for SALESDEV

Group 1	Mean	Group 2	Mean	t-value
Introduction	0.16	Growth	0.14	1.47
Introduction	0.16	Mature	0.15	0.95
Introduction	0.16	Shake-Out	0.14	1.40
Introduction	0.16	Decline	0.10	3.58***
Growth	0.14	Mature	0.15	-0.77
Growth	0.14	Shake-Out	0.14	0.88
Growth	0.14	Decline	0.10	2.84***
Mature	0.15	Shake-Out	0.14	0.77
Mature	0.15	Decline	0.10	3.34***
Shake-Out	0.14	Decline	0.10	2.52**

Table 6: Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1													
2	-0.04	1												
	(0.04)													
3	0.06	0.08	1											
	(0.00)	(0.00)												
4	0.05	0.18	0.15	1										
	(0.01)	(0.00)	(0.00)											
5	0.03	0.13	0.13	0.19	1									
	(0.14)	(0.00)	(0.00)	(0.00)										
6	0.08	0.12	0.13	0.70	0.23	1								
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)									
7	0.03	-0.14	0.11	0.07	-0.04	-0.02	1							
	(0.08)	(0.00)	(0.00)	(0.00)	(0.06)	(0.32)								
8	0.00	0.07	0.57	0.13	0.11	0.11	0.11	1						
	(0.89)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)							
9	0.06	0.03	0.04	0.07	0.15	0.05	0.03	-0.13	1					
	(0.00)	(0.08)	(0.03)	(0.00)	(0.00)	(0.01)	(0.11)	(0.00)						
10	-0.21	-0.05	0.00	0.02	-0.28	-0.10	0.11	0.05	-0.07	1				
	(0.00)	(0.02)	(0.95)	(0.40)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)					
11	-0.09	0.09	0.18	0.07	0.03	0.09	-0.03	0.33	-0.03	0.11	1			
	(0.00)	(0.00)	(0.00)	(0.00)	(0.10)	(0.00)	(0.07)	(0.00)	(0.13)	(0.00)				
12	0.01	-0.14	-0.04	0.03	-0.19	-0.17	0.13	0.11	-0.10	0.14	0.00	1		
	(0.57)	(0.00)	(0.07)	(0.10)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.84)			
13	0.05	0.11	0.33	0.16	0.16	0.20	0.00	0.37	0.04	-0.09	0.18	-0.15	1	
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.92)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)		
14	0.16	-0.04	-0.02	-0.06	-0.01	0.00	0.05	-0.02	0.00	0.00	-0.03	0.00	-0.03	1
	(0.00)	(0.05)	(0.30)	(0.00)	(0.68)	(0.91)	(0.01)	(0.20)	(0.82)	(0.81)	(0.15)	(0.79)	(0.17)	

1. SALESDEV 2. CYC 3. INST 4. OCF 5. CSTI 6. ROA 7. CAPEX 8. SIZE 9. Q 10. TANG 11. AGE 12. LEV 13. DIV 14. REVGR

Main Estimation

Table 7 reports the results for the main estimation. Standard errors are robust on firm-year level (Zeileis, 2004; Zeileis & Hothorn, 2002). Due to the high standard deviation, we only winsorized revenue growth (REVGR) with 1% and 99%. Our empirical analysis showed that companies' revenue volatility decreases as the companies move forward in their life-cycle (coefficient -0.03 | t-statistic -2.79). Our result points out that companies' revenue predictability increases as the revenue volatility decreases. Our main estimation also showed that institutional ownership (0.09 | 4.92), capital expenditures (0.11 | 2.68), and revenue growth (0.10 | 7.22) increase the revenue volatility.

Table 7: Main Estimation Results

Variables	β	t-value
CYC	-0.03	-2.79**
INST	0.09	4.92***
OCF	-0.02	-0.63
CSTI	-0.03	-0.86
ROA	0.03	0.93
CAPEX	0.11	2.68**
SIZE	-0.01	-1.51
Q	0.00	0.83
TANG	-0.04	-1.46
AGE	0.03	0.90
LEV	-0.05	-2.49*
DIV	0.01	0.74
REVGR	0.10	7.22***
Units	231	
Years	14	
Observations	2,738	
F-Statistic	13.76***	
Adjusted R^2	0.54	
Years Fixed	Yes	
Firms Fixed	Yes	
*p < 0.1; **p < 0.05; ***p < 0.01.		

Robustness Test

Table 8 reports our robustness test for the main estimation results. Our variable of interest did not result materially different. BIST listed companies net (-0.01 | -1.98) and operating (-0.02 | -2.92) incomes volatility decrease as they move forward in their life-cycle stages. Our result point out that companies' net and operating income predictability increases as the volatility decreases when they move forward in the life-cycle stage. The analysis points out that operating cash flow increases net (0.09 | 2.28) and operating (0.11 | 2.47) incomes' volatility. Our robustness test also shows that increased size (for EARNDEV -0.03 | -4.19, for OPINCDEV -0.03 | -4.04) and divided payments (for EARNDEV -0.01 | -2.78, for OPINCDEV -0.01 | -2.44) decrease income volatility. Age and cash holdings resulted statistically significant only in net (0.04 | 2.29) and operating (-0.04 | -2.17) incomes, respectively. Our robustness analysis test shows that companies' net income volatility increases with age (0.04 | 2.29). Also,

our empirical point out that operating income volatility decreases with increased cash holdings (-0.04 | -2.17).

Table 8: Results for Robustness Tests

Variables	EARNDEV		OPINCDEV	
	β	**t-value**	**β**	**t-value**
CYC	-0.01	-1.98**	-0.02	-2.92***
INST	0.00	0.53	0.01	0.55
OCF	0.09	2.28**	0.11	2.47**
CSTI	-0.02	-0.91	-0.04	-2.17**
ROA	0.09	1.73*	0.08	1.40
CAPEX	0.01	0.44	0.00	0.09
SIZE	-0.03	-4.19***	-0.03	-4.04***
Q	0.00	1.30	0.00	0.93
TANG	-0.01	-0.66	-0.02	-1.00
AGE	0.04	2.29**	0.02	1.02
LEV	0.02	0.50	-0.03	-0.60
DIV	-0.01	-2.78***	-0.01	-2.44**
REVGR	0.01	2.20**	0.01	2.21**
Units	231			
Years	14			
Obs.	2,738			
F-Statistic	11.69***		7.58***	
Adjusted R^2	0.49		0.38	
Years Fixed	Yes			
Firms Fixed	Yes			

*p < 0.1; **p < 0.05; ***p < 0.01.

Conclusion

Life-cycle stages affect a company's activities, investments, and performance. Measuring a company's life-cycle stage is not easy because there are different approaches in the business literature. There are biological and activity-based definitions. This paper analyzes the revenue predictability of companies in different life-cycle stages. Our measure of revenue predictability is three-year standard deviation of revenue divided by average of total assets. We estimated each company's life-cycle stage using Dickinson's (2011) cash-flow proxy-based model. After the stage estimation, we followed Hansen et al. (2018) for assigning values of of 0, 0.25, 0.50, 0.75, and 1 for introduction, growth, mature, shake-out, and decline, respectively. Instead of using dummy variables and omitted the category with least observations, we were able to use our full sample. Our data set covers 2,738 observations constructed with 231 non-financial firms from Borsa Istanbul for the period between 2005 and 2020. The data from 2005 and 2006 were used to construct the dependent variable.

We used firm/year fixed effects regression to estimate our model. Our empirical evidence points out that companies' revenue predictability increases as the revenue volatility decreases. Our main estimation also showed that institutional ownership, capital expenditures, and revenue growth increase the revenue volatility. As a robustness test, we replaced our dependent variable with operating income and net income volatility. Our robustness test shows that net and operating income predictability increases as the volatility decreases when they

move forward in the life-cycle stage. The analysis points out that operating cash flow increases both incomes' volatility. Our robustness test also shows that increased size and divided payments decrease income volatility.

Our research contributes to the business literature by providing about the performance predictability of companies. Our results show that BIST-listed companies performance indicators (revenue, operating income, and net income) become more predictable as they move forward in their life-cycle stage. Empirical identification of this relationship would enhance investors' performance expectation and help them to make better decisions before the earnings announcements. This study has limitations. We did not evaluate the impact of corporate governance and executives-related variables on the revenue volatility. Also, data set is based on an emerging market. For a future research, the impact of accounting quality, audit firm-level variables, and changes through cycles can be analyzed.

References

Abdullah, A. A., & Mohd-Saleh, N. (2014). Impact of Firms' Life-cycle on Conservatism: The Malaysian Evidence. *Procedia - Social and Behavioral Sciences*, *145*, 18–28. https://doi.org/10.1016/j.sbspro.2014.06.007

Anthony, J. H., & Ramesh, K. (1992). Association between accounting performance measures and stock prices. A test of the life cycle hypothesis. *Journal of Accounting and Economics*, *15*(2–3), 203–227. https://doi.org/10.1016/0165-4101(92)90018-W

Bellone, F., Musso, P., Nesta, L., & Quéré, M. (2008). Market selection along the firm life cycle. *Industrial and Corporate Change*, *17*(4), 753–777. https://doi.org/10.1093/icc/dtn025

Bhattacharya, D., Chang, C.-W., & Li, W.-H. (2019). Stages of firm life cycle, transition, and dividend policy. *Finance Research Letters*. https://doi.org/10.1016/j.frl.2019.06.024

Bravo, S. (2019). The corporate life cycle and the cost of equity. *Journal of Business Valuation and Economic Loss Analysis*, *14*(1), 1–14. https://doi.org/10.1515/jbvela-2018-0009

Budiarso, N. S., Subroto, B., Sutrisno, T., & Pontoh, W. (2019). Dividend catering, life-cycle, and policy: Evidence from Indonesia. *Cogent Economics and Finance*, *7*(1), 1–15. https://doi.org/10.1080/23322039.2019.1594505

Chang, H. Y., & Ma, C. A. (2019). Financial flexibility, managerial efficiency and firm life cycle on firm performance: An empirical analysis of Chinese listed firms. *Journal of Advances in Management Research*, *16*(2), 168–180. https://doi.org/10.1108/JAMR-06-2017-0072

Chen, F., Lam, K., Smieliauskas, W., & Ye, M. (2016). Auditor Conservatism and Banks' Measurement Uncertainty during the Financial Crisis. *International Journal of Auditing*, *20*(1), 52–65. https://doi.org/10.1111/ijau.12055

Chen, X., Yang, W., & Huang, D. (2010). Corporate life cycle and the accrual model: An empirical study based on Chinese listed companies. *Frontiers of Business Research in China*, *4*(4), 580–607. https://doi.org/10.1007/s11782-010-0112-1

Coulton, J. J., & Ruddock, C. (2011). Corporate payout policy in Australia and a test of the life-cycle theory. *Accounting and Finance*, *51*(2), 381–407. https://doi.org/10.1111/j.1467-629X.2010.00356.x

de Oliveira, A. S., & Girão, L. F. de A. P. (2018). Accuracy in Earnings Forecast and Organizational Life Cycle Stages : Evidences in the Brazilian Capital Market. *Journal of Education and Research in Accounting*, *12*(1), 115–138.

DeAngelo, H., DeAngelo, L., & Stulz, R. M. (2006). Dividend policy and the earned/contributed capital mix: a test of the life-cycle theory. *Journal of Financial Economics*, *81*(2), 227–254. https://doi.org/10.1016/j.jfineco.2005.07.005

Dickinson, V. (2011). Cash Flow Patterns as a Proxy for Firm Life Cycle. *The Accounting Review*, *86*(6), 1969–1994. https://doi.org/10.2308/accr-10130

Dickinson, V., Kassa, H., & Schaberl, P. D. (2018). What Information Matters to Investors at Different Stages of a Firm's Life Cycle? *Advances in Accounting Journal*, *42*, 22–33.

Esteve-Pérez, S., Pieri, F., & Rodriguez, D. (2018). Age and productivity as determinants of firm survival over the industry life cycle. *Industry and Innovation*, *25*(2), 167–198. https://doi.org/10.1080/13662716.2017.1291329

Hansen, J. C., Hong, K. P., & Park, S. H. (2018). Accounting conservatism: A life cycle perspective. *Advances in Accounting*, *40*(January), 76–88. https://doi.org/10.1016/j.adiac.2017.10.001

Park, Y., & Chen, K. H. (2006). The effect of accounting conservatism and life-cycle stages on firm valuation. *Journal of Applied Business Research*, *22*(3), 75–92. https://doi.org/10.19030/jabr.v22i3.1428

Yang, C. S., & Shyu, J. (2019). Do institutional investor and group, firm and time effects matter in enterprise performance in the corporate life cycle? *Cogent Business and Management*, *6*(1), 1–18. https://doi.org/10.1080/23311975.2019.1606473

Zeileis, A. (2004). Econometric Computing with HC and HAC Covariance Matrix Estimators. *Journal of Statistical Software*, *11*(10), 1–21. https://doi.org/10.18637/jss.v011.i10

Zeileis, A., & Hothorn, T. (2002). Diagnostic Checking in Regression Relationships. *R News*, *2*(3), 7–10. https://cran.r-project.org/doc/Rnews/.