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The Moderator Effect of Institutional Ownership on the Relationship between Cash Holdings of Life-Cycle Stages: Evidence from Borsa Istanbul

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Abstract: *This paper investigates how moving forward in a life-cycle stage affects a company's cash holdings. Additionally, this research examines how institutional ownership affects a company's cash holdings. We further test whether this ownership moderates the relationship between cash holdings and life-cycle stages or not. The empirical analysis is based on a sample of 1,305 observations in an unbalanced panel data set from 227 Turkish non-financial companies between 2015 and 2020. According to our analysis, moving forward through life-cycle stages has an increasing effect on cash holdings, and increased institutional ownership positively affects cash-holding behavior. Our robustness test also showed that increased foreign ownership increases the cash holdings as the companies move forward in their life cycle stages. On the other hand, local institutional ownership decreases cash holdings behavior. This paper implies that companies reaching their decline stage will hold more cash. The investors of these companies may expect fewer investments, thus growth opportunities from these firms because instead of utilizing these funds, the management will prefer to keep these funds unused.*

Keywords: Cash Holdings, Firm Life-Cycle, Panel Data Analysis, Life-Cycle Stages, Corporate Finance

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1. Introduction

Corporate cash holding is one of the most critical topics in the corporate finance literature. Research in finance argued that accumulating cash is irrelevant when capital markets are perfect. Companies can instantly access the market and raise free external funds (Opler et al., 1999; Guizani, 2017). Nevertheless, capital markets are imperfect and external financing is costly. Companies tend to hold more cash as a safety net for difficult times to minimize uncertainty and continue their operations and investments (Opler et al., 1999; La Rocca & Cambrea, 2019). In this case, companies should set the level of cash reserves to consider a trade-off between the marginal cost associated with holding cash against its expected benefits (Opler et al., 1999). Studies investigating the determinants of cash holdings in the literature suggested firm-level variables. Size (Al-Najjar & Clark, 2017), leverage (Ozkan & Ozkan, 2004), profitability (Opler et al., 1999), dividend payment (Drobetz & Grüninger, 2007), capital expenditure (Bates et al., 2009), and cash flows levels (Ferreira & Vilela, 2004) are the most critical factors affecting cash holding. However, cash holding decisions are an essential component of corporate strategies and policies and, in the literature, it is known that these

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corporate orientations differ significantly as the company moves from one life cycle stage to another (Smith et al., 1985; Lester et al., 2003; Hasan et al., 2015).

Companies progress through a predictable series of stages as they grow. The strategic decisions (Lester et al., 2003, 2008; Hasan et al., 2015), including cash holding decisions, are different in each stage. Thus, we expect that cash holdings are significantly linked to the life cycle stages. The literature on the effect of the life cycle on cash holdings is rare and presents mixed results for a very limited number of countries (Alzoubi, 2019; Chireka, 2020; Rehman et al., 2021). Therefore, in this study, we aim to fill this gap and test the effect of the life cycle on cash holding in Turkey, one of the most important emerging markets. A company's life cycle is hard to identify as there are different life-cycle models with a different number of stages proposed in the literature. Determining an appropriate measure has always been a complex process. Most available measures suppose companies follow a monotonic pattern when moving from one life cycle stage. However, this is not always true as companies can move forward and backward between the life cycle stages and enter the decline stage from any other stage. Accordingly, in this study, we choose Dickinson's (2011) life cycle model that enables companies to move dynamically through their life cycle stages. This model uses a combination of cash flow signs as a life cycle proxy and identifies five stages (introduction, growth, maturity, shake-out, and decline).

Corporate governance quality influences firms' cash holding behavior (Al-Najjar & Clark, 2017; Al-Hadi et al., 2020). Family, local, and foreign institutional ownership are corporate governance indicators, and there is diversified evidence about the ownership structure's effect on the firm's cash holdings behavior (Liu, 2011; Chang et al., 2014, Nguyen & Rahman, 2020). Finance policies like dividend payment (Harford et al., 2008; Moin et al., 2020) and capital expenditures (Ağca & Mozumdar, 2008) also affect a company's cash holdings. Dittmar and Mahrt-Smith (2007) report that firms with better governance invest their excess cash reserves into more profitable investments than poorly governed counterparts. The authors also state that firms with poor governance value decrease due to wrong investment decisions. Institutional ownership reduces agency costs by creating a monitoring system on the efficiency of spending excessive cash holdings and the effectiveness of investments (Nikolov & Whited, 2014; Chang et al., 2014; Chang et al., 2016; Al-Najjar & Clark, 2017; Loncan, 2018;).

Faff et al. (2016) suggest that life cycle theory presents a pattern of the firm characteristics of each life cycle stage. Companies in the introduction stage will face competition and the need for increased capital expenditures; thus, financing will primarily depend on the debt (Dickinson, 2011). Firms in the growth stage will have higher profit margins, but their need for capital expenditures and debt will continue (Spence, 1977; Dickinson, 2011). Firms tend to restructure their capital, debt loses priority in the financial management when they reach maturity, and financing will primarily depend on the cash flow from operating activities (Dickinson, 2011; La Rocca et al., 2011). According to Hasan and Habib (2017), shake-out is a transition stage from maturity to decline, and in this stage, expected signs of cash flow activities are unclear. Different than the other stages, in the shake-out stage, a firm may show different policies of performance and finance. At the decline stage, the firm will have lost its market share due to the decline in product/service attraction, decreasing profitability and investments, and increasing cash holdings (Yang & Shyu, 2019).

This paper investigates how moving forward in a life-cycle stage affects a company's cash holdings. Additionally, this research examines how institutional ownership affects a company's cash holdings. We test whether or not this ownership moderates the relationship between cash holdings and life-cycle stages. The empirical analysis is based on a sample of 1,305 observations in an unbalanced panel data set from 227 Turkish companies between 2015 and 2020. Following Dickinson (2011), in our study, we identified five life cycle stages (introduction, growth, mature, shake-out, and decline) using each observation's cash flow patterns. Then, we assigned 0, 0.25, 0.5, 0.75, and 1 to those five stages, respectively (Hansen et al., 2018).

The results suggest that Borsa Istanbul (BIST) listed companies hold more cash as they move forward in their life-cycle stages. Results also indicate that total institutional ownership is not a significant determinant of cash holdings decisions of BIST companies. Our robustness analysis showed that foreign (local) institutional ownership increases (decreases) the cash holding behavior, and moderating effect is

larger and in the same direction. Further findings state that tangibility and leverage decrease cash holdings. At the same time, the change in operating cash flows, market capitalization, and dividend payments have an opposite effect on cash holding in BIST companies. Furthermore, we found that dividends-paying companies hold more cash than their non-payer peers. This study contributes to the literature on corporate cash holdings behavior by combining the life cycle stages and institutional ownership in testing corporate cash holdings.

The remainder of the paper is organized as follows: Section 2 provides a literature review and develops research questions. Section 3 describes the research design. Section 4 presents the econometric analysis. Section 5 concludes the paper.

2. Literature Review and Research Questions

2.1. Theoretical Framework

Understanding cash holding determinants in companies has always been an interesting topic that deserves investigation. The literature suggests that the cash holding behavior is explained based on three theories: the trade-off, the pecking order, and the free cash flow (Jensen, 1986). The trade-off theory (Miller & Orr, 1966) states that companies should weigh the costs against the benefits when fixing the cash holding level (Opler et al., 1999). Based on this argument, companies hold cash for two main reasons. The first one is related to the transaction cost motive, suggesting that holding cash reduces external financing costs and liquidates non-cash-assets into cash. The second reason relates to the precautionary motive that companies hold cash reserves as a safety measure to finance their future and unpredictable costs and investments. The pecking order theory (Myers & Majluf, 1984) stipulates that companies hold cash because they prefer to finance their investments exclusively using internal funds. Once their internal resources are used up, they prefer to issue debt first and then issue equity as the last option. The free cash flow theory (Jensen, 1986) suggests that companies hold cash for agency motives. Managers are expected to act in the interest of the shareholders. On the other hand, they may prefer to maximize their wealth and serve their interests rather than shareholders. In this regard, they tend to hold more cash to increase the total assets in their control.

Several empirical studies on cash holding behavior in companies were conducted at the international level, showing that firm-level variables are crucial determinants of this behavior. Previous work highlights that, among others, the level of leverage (Opler et al., 1999; Ozkan & Ozkan, 2004; Ferreira & Vilela, 2004; Al-Najjar & Clark, 2017), size of the company (Al-Najjar & Clark, 2017; Ozkan & Ozkan, 2004), cash flows levels (Opler et al., 1999; Dittmar et al., 2003; Ferreira & Vilela, 2004; Bates et al., 2009), capital expenditure (Opler et al., 1999; Bates et al., 2009), profitability (Al-Najjar & Clark, 2017; Ferreira & Vilela, 2004; Opler et al., 1999), and dividend payments (Opler et al., 1999; Dittmar et al., 2003; Ozkan & Ozkan, 2004; Drobetz & Grüninger, 2007) affect the cash levels considerably held by companies. In many of these studies, the relationship between the abovementioned variables and cash holdings is mixed. The same variable can positively or negatively affect cash holdings depending on the country or context.

2.2. Life Cycle and Cash Holdings

It is noteworthy that other firm-level factors may influence companies' cash reserves. The literature shows that cash policies are noticeably linked to companies' strategic choices, which vary substantially across life-cycle stages (Faff et al., 2016). Companies in different life-cycle stages generally follow different motives in their cash policies. When growing, each company passes through various stages of transition, known as life cycle stages. The literature provides a variety of models and measures for the life cycle (Quinn & Cameron, 1983; Levie & Lichtenstein, 2010). That is why identifying which life cycle a company belongs to is complex. Most of the measures available in the literature are based on the assumption that companies follow a sequential trend when moving from one life cycle stage to another (Dickinson, 2011). They should move forward from first entering the market until the decline. According to Dickinson (2011), this assumption is not valid as companies may follow different patterns during their life. Thus, she proposed a model that allows

companies to move forward and backward through their life-cycle stages. This model identifies five life cycle stages (introduction, growth, mature, shake-out, and decline) based on operating, investing, and financing cash flows. In our study, we choose to use the model proposed by Dickinson (2011) to identify the life cycle stages of BIST-listed companies.

Alzoubi (2019) tested the hypothesis of how companies change their cash holding policies during their life cycle stages, using a sample of non-financial listed companies from the Amman Stock Exchange. His study shows that companies in the introduction and growth stages do not hold cash, while they tend to hold a reduced amount of cash in the maturity and decline stages. Eulaiwi et al. (2020) utilized the sample of Gulf Cooperation Council countries (Bahrain, Kuwait, Oman, Qatar, United Arab Emirates, and Saudi Arabia) between 2005 and 2016. The authors analyzed the investment board's impact on the cash holdings of life cycle stages. The authors' empirical evidence show that existence of investment board increases (decreases) in growth and maturity (in introduction, shake-out, and decline) stages. Chireka (2020) investigated the impact of companies' life cycles on cash holding behavior for a sample of listed South African companies. This study's findings suggest that companies' cash holding policies do not depend on the life cycle stages. Rehman et al. (2021) tested a sample of Chinese listed companies to examine the change of cash holdings across the life cycle stages. Results highlight that the highest (lowest) cash levels are observed in companies in the growth (decline) stages. The findings also show that companies undergo dynamic cash adjustment and all the phases of their life cycle.

2.3. Institutional Ownership and Cash Holdings

Chung and Zhang (2011) point out that increased institutional ownership results in a better governance structure; thus, institutional investors' monitoring and exit costs decline. Liu (2011) finds that cash holdings are significantly higher at non-family firms than in family-owned counterparts. The author mentions that family firms' ability to supply cash is the leading cause of the findings. The authors state that other corporate governance measures do not explain this relationship. Belghitar and Khan (2013) point out that small and medium-sized enterprises in the United Kingdom with institutional ownership hold more cash than non-institutional owned counterparts. The authors claim ownership structure is the only variable to explain the cash holdings behavior in firms with high market capitalization. In a similar study, Chang et al. (2014) find that local institutional investors with long-term holdings reduce (increase) excess cash holding in firms with lower (higher) capitalization. Lin et al. (2016) use a Chinese sample to identify that institutional ownership increases the value of excess cash holdings when the government is the controlling shareholder. Ward et al. (2018) report that the higher marginal value of corporate cash holdings is associated with increased institutional ownership monitoring. Loncan (2018) states that foreign institutional ownership decreases the cash holdings and increases the cash holdings' contribution to market capitalization. The author claims that foreign institutional ownership positively affects firms' financing structure and contributes to a value-enhancing and more efficient cash policy. La Rocca and Cambrea (2019) indicate that institutional investors positively affect cash holdings on the firms' performance measured. The authors' empirical evidence shows that institutional investors prefer to invest in companies with higher cash holdings, and by reducing agency problems, they protect the value of cash. Using a sample between 2003 and 2016, Jebran et al. (2019) report that principal-principal conflicts increase Chinese-listed firms' cash holdings. The authors' empirical evidence showed that institutional ownership reduces the positive relationship between principal-principal conflicts and cash holdings. Nguyen and Rahman (2020) point out that better governance increases cash holdings. The authors claim that companies with better governance have better investment decisions because they do not depend on excess liquidity. These investments result in higher profitability and increased market capitalization. Using a sample of Gulf Cooperation Council firms between 2005 and 2013, Al-Hadi et al. (2020) find a moderating effect of institutional ownership on the relationship between the board investment committee's voluntary formation and cash holding reserves.

2.3. Cash Holdings Studies in Turkey

Abdioğlu (2016) measured corporate governance quality with board size, board independence, CEO duality, and interlocked directors. The author indicates that cash holding indirectly relates to corporate governance quality. The author mentions that cash holding is higher in firms with low governance quality. Kutlu-Furtuna (2017) states that companies set their cash holdings level with the industry average. The author states that companies assess the benefits and cost of cash holding, which aligns with the trade-off theory. Topaloglu (2018) reported a significant negative relationship between cash holdings level and capital expenditures, leverage, and liquidity. The author also mentions that profitability (measured with return on equity) significantly increases the cash holdings. Aras et al. (2019) report that firm size and liquid asset substitution significantly increase the cash holding levels of Turkish companies. On the other hand, the authors' analysis shows that market capitalization significantly reduces cash holdings. Kuzucu (2021) used Granger causality to test the causality between stock liquidity and cash holdings. The author's empirical evidence shows a bidirectional causality between cash holdings and stock liquidity. Kuzucu (2021) claims that the causality from cash holding to stock liquidity is stronger than the causality from the reverse direction. Tekin et al. (2021) found that BIST-listed companies adjust their cash holding faster during the Global Financial Crisis, utilizing declining loan supply and increasing interest costs during times of crisis.

As mentioned earlier, the results observed in the studies are inconclusive and show that the impact of life cycle stages on cash holdings differs from country to country. We expect that the diversity of economic environments and contextual factors will influence this relationship. Therefore, in this study, we investigate how moving forward in a life-cycle stage affects a company's cash holdings in Turkey, one of the most important emerging markets. Accordingly, we developed the following hypotheses:

$H1_0$: Moving forward in a life-cycle stage does not affect a company's cash holdings. (Expected sign for $H1_1$: +)

$H2_0$: Institutional ownership does not affect a company's cash holdings. (Expected sign for $H2_1$: +)

$H3_0$: Institutional ownership does not moderate cash holdings during life-cycle stages. (Expected sign for $H3_1$: +)

3. Research Design

3.1. Sample

Our data set comprises non-financial BIST-listed companies' data between 2013 and 2020. We utilized 2013 and 2014 data to construct operating cash volatility for 2015. Our data subject to analysis is between 2015 and 2020. Our data set does not include financial institutions (BIST classifies holdings under financial institutions). We used Eikon to obtain financial data and the Central Securities Depository (CSD, whose Turkish official name is Merkezi Kayıt Kuruluşu Anonim Şirketi) to download the institutional ownership. There are 227 companies, six years, and 1,305 observations in an unbalanced panel data set. Table 1 presents the research sample construction.

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	(12)
7.	Total Number of Companies Used	227
8.	Number of Years	6
9.	Total Number of Possible Observations	1,362
10.	Observations Dropped due to Missingness	(57)
11.	Total Number of Observations	1,305

We used BIST classification to present our sample per year and industry. Table 2 presents observation distribution per year and industry.

Table 2. Observations per Year and Industry

	2015	2016	2017	2018	2019	2020	Total Obs. per Industry
Administrative and Support Service Activities	1	2	2	1	2	2	**10**
Agriculture, Forestry and Fishing	2	2	2	3	3	2	**14**
Construction and Public Works	6	6	6	6	5	5	**34**
Education, Health, Sports and Other Social Services	6	6	6	6	6	6	**36**
Electricity Gas and Water	8	8	8	8	7	8	**47**
Manufacturing	139	146	149	150	148	149	**881**
Mining and Quarrying	5	5	5	5	5	5	**30**
Professional, Scientific and Technical Activities	1	1	1	1	1	1	**6**
Technology	14	14	15	15	14	15	**87**
Transportation Storage and Telecommunication	8	8	8	9	9	8	**50**
Wholesale and Retail Trade, Restaurants and Hotels	18	18	17	20	19	18	**110**
Total Obs. per Year	**208**	**216**	**219**	**224**	**219**	**219**	**1,305**

3.2. Research Model

We developed our research models following the previous literature and our research questions. We test H_1 and H_2 with Equation 1. To test H_3, we added an interaction between life-cycle stages and institutional ownership and constructed Equation 2. As presented in Table 2, most observations are in the manufacturing industry. There are significant qualitative differences among the industries. We added fixed effects on the industry/year level to our models to capture the unobserved effects of years and industries. Table 3 presents the variable construction.

$$\begin{aligned}\text{CSTI}_{it} = {} & \beta_0 + \beta_1\text{CYC}_{it} + \beta_2\text{INST}_{it} + \beta_3\text{OCFDEV}_{it} + \beta_4\text{ROA}_{it} + \beta_5\text{CAPEX}_{it} + \beta_6\text{SIZE}_{it} + \beta_7\text{Q}_{it} \\ & + \beta_8\text{TANG}_{it} + \beta_9\text{LIST}_{it} + \beta_{10}\text{LEV}_{it} + \beta_{11}\text{DIV}_{it} + \beta_{12}\text{REVGR}_{it} + \beta_{13}\text{REQ}_{it} + \beta_{14}\text{WACC}_{it} \\ & + \text{Years and Industry Effects}\end{aligned} \quad (1)$$

$$\begin{aligned}\text{CSTI}_{it} = {} & \beta_0 + \beta_1\text{CYC}_{it} + \beta_2\text{INST}_{it} + \beta_3\text{CYC*INST}_{it} + \beta_4\text{OCFDEV}_{it} + \beta_5\text{ROA}_{it} + \beta_6\text{CAPEX}_{it} \\ & + \beta_7\text{SIZE}_{it} + \beta_8\text{Q}_{it} + \beta_9\text{TANG}_{it} + \beta_{10}\text{LIST}_{it} + \beta_{11}\text{LEV}_{it} + \beta_{12}\text{DIV}_{it} + \beta_{13}\text{REVGR}_{it} + \beta_{14}\text{REQ}_{it} + \beta_{15} \\ & + \text{Years and Industry Effects}\end{aligned} \quad (2)$$

Table 3. Variable Construction

Variable	Definition	Source	Supporting Literature	Expected Sign
CSTI	Sum of Cash Holdings and Short-Term Investments divided by total assets in the period t.	Eikon		NA
CYC	Assigned a value of 0, 0.25, 0.5, 0.75, or 1 for the stages of introduction, growth, mature, shake-out, and decline in period t. (Dickinson, 2011; Hansen et al., 2018).	Eikon	Rehman et al. (2021)	+
INST	Institutional ownership divided by total ownership in the period t.	CSD	Nguyen & Rahman (2020)	+
OCFDEV	Standard Deviation of three-year Operating Cash Flow divided by Three-Year Average of Total Assets	Eikon	Guizani (2020)	+
ROA	Net Income divided by total assets in the period t.	Eikon	AlNajjar & Belghitar (2011)	-

Table 3. Variable Construction (Continued)

Variable	Definition	Source	Supporting Literature	Expected Sign
CAPEX	Capital expenditures divided by total assets in the period t.	Eikon	Guizani (2020)	-
SIZE	Natural logarithm of total assets in the period t.	Eikon	AlHadi et al. (2020)	-
Q	Market capitalization divided by total assets in the period t.	Eikon	Dittmar & Mahrt-Smith (2007)	+
TANG	Net Property, Plant, Equipment divided by total assets in the period t.	Eikon	La Rocca & Cambrea (2019)	-
LIST	Natural logarithm of December 31 of fiscal year less date of public listing.	Eikon	AlHadi et al. (2020)	-
LEV	Total debt divided by Total Assets in the period t.	Eikon	Ozkan & Ozkan (2016)	-
DIV	Dummy variable, 1 if the company paid dividends in the period t.	Eikon	Loncan (2018)	-
REVGR	Change in the revenue from period t-1 to t divided by revenue in period t-1	Eikon	Harford et al. (2008)	-
REQ	Retained earnings divided by contributed capital in period t	Eikon	Myers & Majluf (1984)	-
WACC	The weighted-average cost of capital in period t.	Eikon	Ramezani (2011)	+

3.3. Measurement of Life-Cycle Stages

We used Dickinson's (2011) cash flow proxies as a life-cycle measure. According to the author, a firm's life cycle stage can be identified using the cash flow statement. Dickinson (2011) states that the combination of each cash flow activity (operating, investing, and financing) sign indicates where the firm is located in its life cycle. Following the methodology, we identified each firm's cash flow activity sign in period t and assigned their life-cycle stage. Following Hansen et al. (2018), we assigned 0, 0.25, 0.5, 0.75, and 1 for introduction, growth, mature, shake-out, and decline stages, respectively. We present Dickinson's (2011) methodology in Table 4. Dickinson (2011) states that firm characteristics differ in each life cycle stage, and this change is reflected in their cash flows from activities (operating, investing, and financing). Following the author, we used companies' cash flow statements. Based on the cash flow's sign (positive or negative) on each activity (operating, investing, and financing), we estimated the life cycle stage of each year. The methodology is based on a combination of the cash flow signs. For example, if a company's operating cash flow is positive and other activities have negative signs, we marked that observation as a "mature stage."

Table 1. Life Cycle Determination using Dickinson (2011)

Cash Flow Type	1	2	3	4	4	4	5	5
Operating	-	+	+	-	+	+	-	-
Investing	-	-	-	-	+	+	-	+
Financing	+	+	-	-	+	-	+	-
1. Introduction, 2. Growth, 3. Mature, 4. Shake-Out, 5. Decline								

4. Econometric Analysis

4.1. Descriptive Statistics

Table 5 reports the descriptive statistics for dependent and independent variables. Tabulated descriptive statistics are not winsorized. The mean and standard deviation of CSTI are 0.10 and 0.13, respectively.

Table 5. Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Min	0.00	0.00	0.00	0.00	-1.53	0.00	15.10	0.01	0.00	5.16	0.00	0.00	-1.00	-80.98	2.46
1Q	0.02	0.25	0.09	0.03	-0.01	0.01	18.81	0.37	0.15	8.12	0.07	0.00	0.02	-0.05	7.26
Med.	0.06	0.50	0.30	0.05	0.03	0.03	19.95	0.66	0.29	8.90	0.25	0.00	0.17	0.31	9.01
Mean	0.10	0.41	0.37	0.07	0.03	0.05	20.07	1.19	0.32	8.61	0.28	0.35	0.34	-0.06	9.56
3Q	0.14	0.50	0.63	0.08	0.09	0.06	21.16	1.20	0.45	9.17	0.42	1.00	0.32	0.58	11.57
Max	0.79	1.00	0.99	2.26	0.52	1.09	24.85	61.21	0.98	9.46	2.30	1.00	128.89	34.48	28.69
St.Dev	0.13	0.25	0.31	0.09	0.12	0.09	1.83	2.64	0.22	0.75	0.26	0.48	3.68	3.58	3.21

1. CSTI 2. CYC 3. INST 4. OCFDEV 5. ROA 6. CAPEX 7. SIZE 8. Q 9. TANG 10. LIST 11. LEV 12. DIV 13. REVGR 14. REQ 15. WACC

In our untabulated results, our variance inflation factor (VIF) values are less than 5. Table 6 shows the correlation matrix of the variables. The highest and lowest correlation coefficient of CSTI is with ROA (0.38) and TANG (-0.31). The highest correlation is between SIZE and INST (0.57). The correlation between CSTI and TANG is also the lowest among all the variables. CYC has the highest correlation (0.11) with INST and WACC. On the other hand, the variable has the lowest correlation (-0.14) with LEV. INST has the lowest correlation (-0.13) with OCFDEV.

Table 6. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	0.14	1.00													
	(0.00)														
3	0.16	0.11	1.00												
	(0.00)	(0.00)													
4	0.07	0.02	-0.13	1.00											
	(0.01)	(0.53)	(0.00)												
5	0.38	0.10	0.18	-0.14	1.00										
	(0.00)	(0.00)	(0.00)	(0.00)											
6	-0.04	-0.12	0.11	0.06	0.01	1.00									
	(0.13)	(0.00)	(0.00)	(0.02)	(0.75)										
7	0.12	0.05	0.57	-0.18	0.14	0.08	1.00								
	(0.00)	(0.09)	(0.00)	(0.00)	(0.00)	(0.01)									
8	0.13	0.01	0.01	0.05	0.07	0.03	-0.15	1.00							
	(0.00)	(0.77)	(0.63)	(0.10)	(0.01)	(0.32)	(0.00)								
9	-0.31	-0.02	-0.03	-0.16	-0.20	0.08	0.05	-0.06	1.00						
	(0.00)	(0.40)	(0.33)	(0.00)	(0.00)	(0.00)	(0.06)	(0.02)							
10	0.00	0.07	0.23	-0.09	0.04	0.00	0.32	0.03	0.08	1.00					
	(0.99)	(0.01)	(0.00)	(0.00)	(0.16)	(0.94)	(0.00)	(0.36)	(0.00)						
11	-0.24	-0.14	-0.05	0.20	-0.51	0.13	0.16	-0.12	0.24	0.07	1.00				
	(0.00)	(0.00)	(0.06)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)					
12	0.17	0.07	0.34	-0.10	0.33	-0.02	0.34	0.03	-0.13	0.15	-0.19	1.00			
	(0.00)	(0.01)	0.00	(0.00)	(0.00)	(0.55)	(0.00)	(0.24)	(0.00)	(0.00)	(0.00)				
13	-0.02	-0.03	-0.03	0.14	-0.02	0.00	-0.05	0.00	-0.03	0.01	-0.01	-0.03	1.00		
	(0.52)	(0.27)	(0.32)	(0.00)	(0.55)	(0.93)	(0.06)	(0.99)	(0.25)	(0.77)	(0.63)	(0.24)			
14	0.01	0.06	0.04	0.02	0.01	-0.02	0.00	0.01	0.03	0.04	-0.04	0.04	0.00	1.00	
	(0.62)	(0.05)	(0.11)	(0.49)	(0.66)	(0.46)	(0.94)	(0.70)	(0.37)	(0.13)	(0.19)	(0.20)	(0.95)		
15	0.22	0.11	-0.01	0.02	0.26	-0.01	-0.03	0.16	-0.19	0.08	-0.44	0.01	-0.02	0.02	1.00
	(0.00)	(0.00)	(0.64)	(0.51)	(0.00)	(0.82)	(0.22)	(0.00)	(0.00)	(0.01)	(0.00)	(0.61)	(0.46)	(0.53)	

1. CSTI 2. CYC 3. INST 4. OCFDEV 5. ROA 6. CAPEX 7. SIZE 8. Q 9. TANG 10. LIST 11. LEV 12. DIV 13. REVGR 14. REQ 15. WACC

Table 7 reports the t-test for means of differences. We did not observe any significance between "introduction & decline," "growth & mature," and "growth & shake-out."

Table 7. Differences of Means between Groups for Dependent Variable

Group 1	Mean	Group 2	Mean	t-value
Introduction	0.05	Growth	0.12	-7.45***
Introduction	0.05	Mature	0.11	-8.52***
Introduction	0.05	Shake-Out	0.14	-6.45***
Introduction	0.05	Decline	0.06	-0.21
Growth	0.12	Mature	0.11	1.09
Growth	0.12	Shake-Out	0.14	-1.59
Growth	0.12	Decline	0.06	2.45**
Mature	0.11	Shake-Out	0.14	-2.41**
Mature	0.11	Decline	0.06	2.11**
Shake-Out	0.14	Decline	0.06	3.14***

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

4.2. Results

We tested our model for effect decision for panel data regression and presented it in Table 8. First, we ran the F test for the existence of individuals. The test resulted in 1% significance, meaning that units significantly affect the dependent variable. As a secondary step, we ran our model with the Breusch-Pagan Lagrange Multiplier test for a decision between pooled or random effects. The test was significant at 1%. For a decision between random and fixed effects, we utilized the Hausman test, resulting in 1%. Our tests showed that fixed effects are appropriate for the regression analysis. We also tested our data set for the panel data assumptions. According to the Im-Pesaran-Shin test, units in the sample are stationary. We utilized Durbin Watson and Breusch-Pagan LM Test for autocorrelation and heteroscedasticity, respectively. Both tests were statistically significant (Durbin Watson 5%, Breusch-Pagan LM 1%). We utilized the Arellano estimator for heteroscedasticity and autocorrelation consisted standard errors. We ignored the cross-dependence because our data set is a micro panel.

Table 8. Panel Data Tests

Test Purpose	Test Type	Test Value	p-value	Test Result
Heteroscadicity	Breusch Pagan Test	223,2829	0,00	There is heteroscadicity in the model.
Serial Correlation	Durbin Watson	1,9027	0,04	There is a serial correlation among the variables.
Unit root test	Im-Pesaran-Shin	-56,3545	0,00	Units are stationary.
Existence of Individual Effects	F Test	14,1772	0,00	There are individual effects in the data.
Pooled or Random Effect Selection	Breusch-Pagan Lagrange Multiplier Test	35,3589	0,00	The random effect model is selected over pooled effects
Random or Fixed Effect Selection	Hausman Testi	177,0724	0,00	The fixed effect model is selected over random effects

All continuous variables are winsorized at most 1% and 99% cut points (Gomez, 2020). Table 9 reports the analysis of our main estimation. Standard errors are robust on the industry/year level and reported in the brackets (Zeileis & Hothorn, 2002; Zeileis, 2004; Zeileis et al., 2020). Panel A provides the results with no effect. Panel B shows the regression results with year effects. Panel C reports the regression results with industry effects. Panel D reports the industry/year effects. We provide our interpretation based on industry/year effects analysis. Also, further tests are based on industry/year effects. Our empirical evidence

indicates that BIST-listed companies' cash holding behavior increases when they move forward in their life-cycle stages. Our results align with the life cycle theories stating that companies tend to invest less and hold more cash when they reach the end of the life cycle stage (Mueller, 1972; Wernerfelt, 1985). Supported by differences in means (Table 7), companies in the introduction and decline stages have the lowest cash average. The increase in average starts with the growth stage and reaches the highest in the shake-out companies. According to our analysis, total institutional ownership is insignificant in cash holdings behavior. The life cycle stage (CYC) variable resulted in a coefficient of 0.0237 with 5% significance. The interaction variable (CYC*INST) has a coefficient of 0.1124 with 1% significance. The evidence points out that institutional ownership does not moderate cash holding downwards; instead, it positively affects cash holding behavior as companies move forward to later stages. The result implies that institutional owners prefer to hoard cash when the companies reach their decline stage in the life cycle. Our results show significant differences from the literature. Chireka (2020) did not find any relationship between life cycle stages and cash holding behavior in South Africa. Contrary to our findings, Rehman et al. (2021) claim that the lowest cash levels occur in the decline stage in the Chinese sample. Alzoubi (2019) also report a similar result from Jordan's Amman Stock Exchange. Eulaiwi et al. (2020) point out that cash holdings will be higher in the introduction, shake-out, and decline stages. We assume that differences in results are primarily caused by country-level factors such as economic development and political stability. Also, companies experienced significant political and economic crises in Turkey, which may affect their financial management to a more conservative style.

Table 9 also shows that companies with increased operating cash-flow volatility and weighted-average cost of capital tend to hold more cash. The results also point out that profitability, market capitalization, and size increase the cash holding of BIST-listed companies. Our analysis shows that dividends-paying companies hold more cash than their non-payer counterparts. On the other hand, companies with increased tangibility hold less cash.

Table 9. Main Estimation Results

	Dependent Variable = CSTI							
Variables	**PANEL A**		**PANEL B**		**PANEL C**		**PANEL D**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
CYC	0.0380***	-0.0007	0.0379***	-0.0021	0.0234**	-0.008	0.0237**	-0.0089
	(0.0121)	(0.0168)	(0.0121)	(0.0168)	(0.0114)	(0.0163)	(0.0115)	(0.0163)
INST	0.0174	-0.0371**	0.018	-0.0388**	0.0163	-0.0279	0.0177	-0.0284
	(0.0125)	(0.0189)	(0.0127)	(0.0191)	(0.0114)	(0.0176)	(0.0116)	(0.0178)
CYC*INST		0.1327***		0.1379***		0.1079***		0.1124***
		(0.0422)		(0.0424)		(0.0383)		(0.0386)
OCFDEV	0.2208***	0.2241***	0.2214***	0.2251***	0.1723**	0.1745**	0.1731**	0.1757**
	(0.0686)	(0.0686)	(0.0682)	(0.0681)	(0.0710)	(0.0710)	(0.0709)	(0.0708)
ROA	0.4162***	0.4177***	0.4172***	0.4188***	0.3988***	0.4008***	0.3983***	0.4005***
	(0.0478)	(0.0480)	(0.0481)	(0.0482)	(0.0484)	(0.0486)	(0.0484)	(0.0486)
CAPEX	-0.1078**	-0.1095**	-0.1134**	-0.1160**	-0.1300**	-0.1309**	-0.1304**	-0.1319**
	(0.0535)	(0.0536)	(0.0534)	(0.0533)	(0.0553)	(0.0554)	(0.0549)	(0.0549)
SIZE	0.0107***	0.0102***	0.0105***	0.0100***	0.0062**	0.0058**	0.0058**	0.0054**
	(0.0028)	(0.0028)	(0.0029)	(0.0029)	(0.0026)	(0.0026)	(0.0026)	(0.0026)
Q	0.0071***	0.0069***	0.0062***	0.0060***	0.0075***	0.0073***	0.0064***	0.0063***
	(0.0021)	(0.0021)	(0.0021)	(0.0021)	(0.0021)	(0.0020)	(0.0021)	(0.0021)
TANG	-0.1131***	-0.1148***	-0.1121***	-0.1138***	-0.1100***	-0.1118***	-0.1093***	-0.1112***
	(0.0131)	(0.0130)	(0.0131)	(0.0130)	(0.0148)	(0.0147)	(0.0149)	(0.0147)
LIST	-0.0092**	-0.0080*	-0.0091**	-0.0078*	-0.0051	-0.0039	-0.0051	-0.0038
	(0.0044)	(0.0043)	(0.0044)	(0.0044)	(0.0047)	(0.0047)	(0.0047)	(0.0047)
DIV	-0.0085	-0.0094	-0.0084	-0.0094	0.0028	0.002	0.003	0.0022
	(0.0088)	(0.0088)	(0.0089)	(0.0089)	(0.0077)	(0.0077)	(0.0077)	(0.0077)

Table 9. Main Estimation Results (Continued)

Variables	Dependent Variable = CSTI							
	PANEL A		PANEL B		PANEL C		PANEL D	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LEV	0.0002	0.0013	0.0083	0.0097	0.0253	0.0262	0.0306	0.0317
	(0.0199)	(0.0196)	(0.0205)	(0.0202)	(0.0219)	(0.0217)	(0.0230)	(0.0228)
REVGR	-0.0182*	-0.0166*	-0.016	-0.0145	-0.0238**	-0.0225*	-0.0220*	-0.0207*
	(0.0095)	(0.0095)	(0.0099)	(0.0099)	(0.0120)	(0.0119)	(0.0123)	(0.0122)
REQ	0.0021	0.0021	0.0022	0.0023	0.0025	0.0026	0.0027	0.0027*
	(0.0016)	(0.0016)	(0.0015)	(0.0015)	(0.0017)	(0.0017)	(0.0017)	(0.0017)
WACC	0.0028**	0.0028**	0.0042**	0.0041**	0.0029**	0.0028**	0.0039**	0.0038**
	(0.0013)	(0.0013)	(0.0017)	(0.0017)	(0.0013)	(0.0013)	(0.0016)	(0.0016)
Units	227							
Years	6							
Obs.	1,305							
F-Stat.	35.5234	33.9665	26.6009	25.9313	30.6767	29.8453	25.6528	25.1578
Adj. R^2	0.2704	0.2750	0.2717	0.2766	0.3533	0.3561	0.3541	0.3572
Year Eff.	No	No	Yes	Yes	No	No	Yes	Yes
Ind. Eff.	No	No	No	No	Yes	Yes	Yes	Yes

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

4.3. Robustness Test

To verify the results, we tested our results with two robustness tests. In our first test, we used local and foreign institutional ownership to test how specific institutional ownership types affect the BIST-listed firms' cash holding behavior. We split our sample into two using the median of ownership types in our second. Table 10 reports the evidence for the first robustness test. Standard errors are robust on the industry/year level and reported in the brackets (Zeileis, 2004; Zeileis et al., 2020; Zeileis & Hothorn, 2002). We ran Equations 1 and 2 by replacing total institutional ownership with foreign and local institutional ownership. Our first robustness test shows that BIST-listed companies' cash holding behavior increases when they reach the decline stage. We observed material differences in statistical significance and coefficients between total and institutional ownership types. The coefficient of foreign institutional ownership and its moderating effect is higher than total institutional ownership. On the other hand, local institutional ownership resulted in a negative coefficient, and the variable's interaction with CYC resulted insignificant with a lower positive coefficient. We did not observe material differences except for SIZE with local institutional ownership. Our empirical evidence showed that SIZE positively affects the cash holdings when the local institutional ownership is considered.

Table 10. Robustness Test for Institutional Ownership Types

Variables	Dependent Variable = CSTI			
	(1)	(2)	(3)	(4)
CYC	0.0210*	0.0065	0.0269**	0.0193
	(0.0114)	(0.0129)	(0.0114)	(0.0140)
INSTFOR	0.0674***	0.0123		
	(0.0128)	(0.0253)		
CYC * INSTFOR		0.1271**		
		(0.0532)		
INSTLOC			-0.0417***	-0.0595***
			(0.0118)	(0.0201)
CYC * INSTLOC				0.0434
				(0.0444)

Table 10. Robustness Test for Institutional Ownership Types (Continued)

Variables	Dependent Variable = CSTI			
	(1)	(2)	(3)	(4)
OCFDEV	0.1761**	0.1755**	0.1772**	0.1784**
	(0.0705)	(0.0707)	(0.0706)	(0.0707)
ROA	0.4058***	0.4075***	0.4031***	0.4033***
	(0.0483)	(0.0484)	(0.0484)	(0.0485)
CAPEX	-0.1572***	-0.1579***	-0.1295**	-0.1293**
	(0.0564)	(0.0560)	(0.0553)	(0.0555)
SIZE	0.0015	0.0013	0.0082***	0.0082***
	(0.0025)	(0.0025)	(0.0024)	(0.0024)
Q	0.0050**	0.0049**	0.0065***	0.0065***
	(0.0021)	(0.0021)	(0.0020)	(0.0021)
TANG	-0.1054***	-0.1066***	-0.1077***	-0.1081***
	(0.0148)	(0.0147)	(0.0150)	(0.0150)
LIST	-0.0049	-0.0041	-0.0043	-0.0041
	(0.0046)	(0.0046)	(0.0047)	(0.0047)
DIV	0.0016	0.0007	0.0042	0.0042
	(0.0076)	(0.0076)	(0.0076)	(0.0076)
LEV	0.0434*	0.0440*	0.0303	0.0303
	(0.0230)	(0.0229)	(0.0230)	(0.0229)
REVGR	-0.0206*	-0.0203*	-0.0215*	-0.0211*
	(0.0122)	(0.0122)	(0.0124)	(0.0124)
REQ	0.0024	0.0024	0.0031*	0.0031*
	(0.0017)	(0.0016)	(0.0017)	(0.0017)
WACC	0.0042**	0.0042***	0.0041**	0.0041**
	(0.0016)	(0.0016)	(0.0017)	(0.0017)
Units	227			
Years	6			
Observations	1,305			
F-Statistic	26.7579	26.1329	26.0290	25.1755
Adjusted R2	0.3642	0.3664	0.3576	0.3574
Year Eff.	Yes			
Ind. Eff.	Yes			

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

Table 11 presents the results of the second robustness test. Panel A, B, and C of Table 11 are for the total, foreign, and local ownership samples, respectively. Each panel's first and second column shows the sample for ownership type greater and less than the median, respectively. We observed a positive coefficient for the life-cycle stage variable except for foreign institutional ownership less than the median. Other than local institutional ownership, our empirical evidence showed a positive and significant relationship between cash holdings and life-cycle stages for the "greater than median" sample. Our robustness test verifies our main estimation; we can state that institutional ownership positively affects cash holdings when companies move forward in their life-cycle stages. Our second robustness test also showed that OCFDEV significantly increases the cash holdings reserves only for firms with institutional ownership lower than the median. We also observed material differences between the main estimation results and the second robustness test when the sample is divided based on the median.

Table 11. Robustness Test Results Using Ownership Types' Median

	Dependent Variable = CSTI					
Variables	**PANEL A**		**PANEL B**		**PANEL C**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
CYC	0.0763***	-0.0034	0.0547***	0.0132	0.0508***	0.0122
	(0.0172)	(0.0139)	(0.0207)	(0.0129)	(0.0166)	(0.0166)
INST	-0.0200	0.0688				
	(0.0212)	(0.0533)				
INSTFOR			0.0591***	0.1527		
			(0.0168)	(0.3475)		
INSTLOC					-0.0639***	-0.2005***
					(0.0166)	(0.0166)
OCFDEV	0.1832	0.2000**	0.1185	0.2703***	0.1990*	0.1848*
	(0.1136)	(0.0825)	(0.0989)	(0.0888)	(0.1112)	(0.1112)
ROA	0.3250***	0.3674***	0.4924***	0.3019***	0.3275***	0.4066***
	(0.0719)	(0.0640)	(0.0858)	(0.0606)	(0.0752)	(0.0752)
CAPEX	-0.084	-0.0748	-0.2617***	0.0066	-0.1013	-0.1168
	(0.0886)	(0.0792)	(0.0690)	(0.0888)	(0.1022)	(0.1022)
SIZE	0.0111***	-0.0047	0.0034	-0.0069	0.0031	0.0114***
	(0.0032)	(0.0044)	(0.0033)	(0.0042)	(0.0031)	(0.0031)
Q	0.0039	0.0068***	0.0024	0.0064**	0.0106**	0.0063
	(0.0030)	(0.0025)	(0.0026)	(0.0032)	(0.0053)	(0.0053)
TANG	-0.1673***	-0.0878***	-0.1518***	-0.0865***	-0.1488***	-0.0681***
	(0.0245)	(0.0192)	(0.0276)	(0.0183)	(0.0209)	(0.0209)
LIST	-0.0185**	0.0051	-0.0032	0.0019	0.0073	-0.0140**
	(0.0076)	(0.0057)	(0.0076)	(0.0061)	(0.0069)	(0.0069)
DIV	-0.0027	0.0173	-0.0107	0.0118	-0.014	0.0333***
	(0.0112)	(0.0114)	(0.0115)	(0.0105)	(0.0109)	(0.0109)
LEV	0.0577*	0.0054	0.0831**	-0.0079	0.0377	0.0181
	(0.0309)	(0.0315)	(0.0337)	(0.0281)	(0.0382)	(0.0382)
REVGR	-0.0024	-0.0176	-0.0156	-0.0099	-0.022	-0.0069
	(0.0132)	(0.0140)	(0.0183)	(0.0118)	(0.0154)	(0.0154)
REQ	0.0011	0.003	0.0023	0.0002	0.0054	0.0031
	(0.0025)	(0.0022)	(0.0028)	(0.0018)	(0.0035)	(0.0035)
WACC	0.0017	0.0038*	0.0057**	0.0002	0.0018	0.0048*
	(0.0024)	(0.0022)	(0.0025)	(0.0020)	(0.0025)	(0.0025)
Units	145	145	167	158	161	145
Years			6			
Observations	652	653	634	671	710	595
F-Statistic	20.8823	12.6658	20.2598	10.5630	9.0871	23.1622
Adjusted R2	0.4519	0.3416	0.4688	0.2927	0.2421	0.5197
Years Eff			Yes			
Ind. Eff.			Yes			

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

5. Conclusion

Companies progress through a predictable series of stages as they grow. Their activities and operations, including cash holding decisions, are different in each stage. Thus, we expect that cash holdings are significantly linked to the life cycle stages. The literature on the life cycle effect on cash holdings is rare and presents mixed results for a very limited number of countries. Therefore, in this study, we aim to fill this gap and test the effect of the life cycle on cash holding in Turkey, one of the most important emerging markets. A company's life cycle is hard to identify as there are different life-cycle models with a different number of stages proposed in the literature. Determining an appropriate measure has always been a complex process. Most available measures suppose companies follow a monotonic pattern when moving from one

life cycle stage. However, this is not always true as companies can move forward and backward between the life cycle stages and enter the decline stage from any other stage. Accordingly, in this study, we choose Dickinson's (2011) life cycle model that enables companies to move dynamically through their life cycle stages. This model uses a combination of cash flow signs as a life cycle proxy and identifies five stages (introduction, growth, maturity, shake-out, and decline).

Corporate cash holding is one of the essential topics in the corporate finance literature. The studies investigating the determinants of cash holdings suggested that firm-level variables, such as size, leverage, tangibility, dividend payment, capital expenditure, and cash flow levels, are the most critical factors affecting cash holding. However, cash holding decisions are essential for corporate strategies and policies. Family, local, and foreign institutional ownership is an indicator of corporate governance, and diversified evidence about the ownership structure's effect on the firm's cash holdings behavior. This paper investigates how moving forward in a life-cycle stage affects a company's cash holdings. This research examines how institutional ownership affects a company's cash holdings. We test whether or not this ownership moderates the relationship between cash holdings and life-cycle stages. The empirical analysis is based on a sample of 1,305 observations in an unbalanced panel data set from 227 Turkish companies over six years. Following Dickinson (2011), in our study, we identified five life cycle stages (Introduction, growth, mature, shake-out, and decline) using each observation's cash flow patterns. Then, we assigned 0, 0.25, 0.5, 0.75, and 1 to those five stages, respectively (Hansen et al., 2018).

Our empirical evidence indicates that BIST-listed companies' cash holding behavior increases when they reach the decline stage. According to our analysis, institutional ownership increasingly affects cash holding. Our results also show that institutional ownership does not moderate cash holding downwards, signaling that companies moving forward in their life cycle stage hold more cash than their counterparts in the earlier stages. Increased institutional ownership creates a positive on the cash holding behavior. To verify the results, we tested our results with two robustness tests. In our first test, we used local and foreign institutional ownership to test how specific institutional ownership types affect the BIST-listed firms' cash holding behavior. We split our sample into two using the median of ownership types in our second. Our first robustness test shows that BIST-listed companies' cash holding behavior increases when they reach the decline stage. We observed material differences in statistical significance and coefficients between total and institutional ownership types. On the other hand, local institutional ownership resulted in a negative coefficient with a 10% statistical significance. The variable's interaction with the life cycle stage was insignificant, with a lower positive coefficient. Except for local institutional ownership, our empirical evidence showed a positive and significant relationship between cash holdings and life-cycle stages for the "greater than median" sample. Our robustness test verifies our main estimation; we can state that institutional ownership positively affects cash holdings when companies move forward in their life-cycle stages.

This study contributes to the literature on corporate cash holdings behavior by combining the life cycle stages and institutional ownership in testing corporate cash holdings. Our provides implications for researchers, investors, and policymakers. This paper shows that companies tend to hold more cash as they move forward in their life cycle stages. This study has some limitations. We did not use any corporate governance data other than institutional ownership. We did not evaluate the personal qualities of the executives, such as gender, education, tenure, and managerial diversity. This paper implies that companies reaching their decline stage will hold more cash. The investors of these companies may expect less investments, thus growth opportunities from these firms because instead of utilizing these funds, the management will prefer to keep these funds unused. Future research can focus on the macroeconomic factors that affect life cycle stages, moderating and mediating effects of corporate governance, qualifications of top management, and diversity in the board of directors.

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References

Abdioğlu, N. (2016). Corporate cash holdings and corporate governance quality in Turkey. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, ICAFR 16 Özel Sayısı, 802-811.

Ağca, Ş., & Mozumdar, A. (2008). The impact of capital market imperfections on investment-cash flow sensitivity. *Journal of Banking and Finance*, 32(2), 207-216.

Al-Hadi, A., Eulaiwi, B., Al-Yahyaee, K. H., Duong, L., & Taylor, G. (2020). Investment committees and corporate cash holdings. *North American Journal of Economics and Finance*, 54, 101260.

Al-Najjar, B., & Clark, E. (2017). Corporate governance and cash holdings in MENA: Evidence from internal and external governance practices. *Research in International Business and Finance*, 39, 1-12.

Aras, G., Kutlu-Furtuna, O., & Tezcan, N., (2019). The determinants of corporate cash holdings: Does country's legal regime matter? Evidence from BRIC and Turkey. *Journal of Economics, Finance and Accounting*, 6(4), 192-205.

Alzoubi, T. (2019). Firms' life cycle stage and cash holding decisions. *Academy of Accounting and Financial Studies Journal*, 23(1), 1-8.

Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why do U.S. firms hold so much than they used to? *Journal of Finance*, 64(5), 1985-2021.

Belghitar, Y., & Khan, J. (2013). Governance mechanisms, investment opportunity set and SMEs cash holdings. *Small Business Economics*, 40(1), 59-72.

Chang, K., Kang, E., & Li, Y. (2014). Local long-term institutions, growth and cash holdings. *Applied Economics Letters*, 21(6), 387-390.

Chang, K., Kang, E., & Li, Y. (2016). Effect of institutional ownership on dividends: An agency-theory-based analysis. *Journal of Business Research*, 69(7), 2551-2559.

Chireka, T. (2020). Corporate life cycle and cash holding decisions: A South African study. *Investment Management and Financial Innovations*, 17(4), 102-110.

Chung, K. H., & Zhang, H. (2011). Corporate governance and institutional ownership. *Journal of Financial and Quantitative Analysis*, 46(1), 247-273.

Dickinson, V. (2011). Cash flow patterns as a proxy for firm life cycle. *The Accounting Review*, 86(6), 1969-1994.

Dittmar, A., & Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings. *Journal of Financial Economics*, 83(3), 599-634.

Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003). International corporate governance and corporate cash holdings. *The Journal of Financial and Quantitative Analysis*, 38(1), 111-133.

Drobetz, W., & Grüninger, M. C. (2007). Corporate cash holdings: Evidence from Switzerland. *Financial Markets and Portfolio Management*, 21(3), 293-324.

Eulaiwi, B., Al-Hadi, A., Hussain, S. M., & Al-Yahyaee, K. H. (2020). Investment Committee, Corporate Cash Holdings and Corporate Life Cycle. *International Review of Finance*, 20(3), 757-769.

Faff, R., Kwok, W. C., Podolski, E. J., & Wong, G. (2016). Do corporate policies follow a life-cycle? *Journal of Banking and Finance*, 69(April), 95-107.

Ferreira, M. A., & Vilela, A. S. (2004). Why do firms hold cash? Evidence from EMU countries. *European Financial Management*, 10(2), 295-319.

Furtuna, Ö. K. (2017). Nakit bulundurma düzeyinin sektörel analizi: Borsa İstanbul'da işlem gören reel sektör firmaları üzerine bir uygulama. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 13(3), 615-630.

Gomez, M. (2020). *Statar: Tools inspired by "Stata" to manipulate tabular data* (0.7.3). https://cran.r-project.org/web/packages/statar/index.html (Access Date: 24.02.2022).

Guizani, M. (2017). The financial determinants of corporate cash holdings in an oil rich country: Evidence from Kingdom of Saudi Arabia. *Borsa Istanbul Review*, 17(3), 133-143.

Hansen, J. C., Hong, K. P., & Park, S. H. (2018). Accounting conservatism: A life cycle perspective. *Advances in Accounting*, 40(January), 76-88.

Harford, J., Mansi, S. A., & Maxwell, W. F. (2008). Corporate governance and firm cash holdings in the U.S. *Journal of Financial Economics*, 87(3), 535-555.

Hasan, M. M., & Habib, A. (2017). Firm life cycle and idiosyncratic volatility. *International Review of Financial Analysis*, 50, 164-175.

Hasan, M. M., Hossain, M., Cheung, A. W. K., & Habib, A. (2015). Corporate life cycle and cost of equity capital. *Journal of Contemporary Accounting and Economics*, 11(1), 46-60.

Jebran, K., Chen, S., & Tauni, M. Z. (2019). Principal-principal conflicts and corporate cash holdings: Evidence from China. *Research in International Business and Finance*, 49, 55-70.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, 76(2), 323-329.

Kuzucu, N. (2021). Causality relationship between stock liquidity and corporate cash holdings. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 17(1), 102-114.

La Rocca, M., & Cambrea, D. R. (2019). The effect of cash holdings on firm performance in large Italian companies. *Journal of International Financial Management and Accounting*, 30(1), 30-59.

La Rocca, M. L., La Rocca, T. L., & Cariola, A. (2011). Capital structure decisions during a firm's life cycle. *Small Business Economics*, 37(1), 107-130.

Lester, D. L., Parnell, J. A., & Carraher, S. (2003). Organizational life cycle: A five-stage empirical scale. *The International Journal of Organizational Analysis*, 11(4), 339-354.

Lester, D. L., Parnell, J. A., Crandall, W., & Menefee, M. (2008). Organizational life-cycle and performance among SMEs - Generic strategies for high and low performers. *International Journal of Commerce and Management*, 18(4), 313-330.

Levie, J., & Lichtenstein, B. B. (2010). A terminal assessment of stages theory: Introducing a dynamic states approach to entrepreneurship. *Entrepreneurship: Theory and Practice*, 34(2), 317-350.

Lin, T. J., Tsai, H. F., Imamah, N., & Hung, J. H. (2016). Does the identity of multiple large shareholders affect the value of excess cash? Evidence from China. *Pacific Basin Finance Journal*, 40(Part A), 173-190.

Liu, Y. (2011). Founding family ownership and cash holdings. *Journal of Financial Research*, 34(2), 279-294.

Loncan, T. (2018). Foreign institutional ownership and corporate cash holdings: Evidence from emerging economies. *International Review of Financial Analysis*, 71, 101295.

Miller, M. H., & Orr, D. (1966). A model of the demand for money by firms. *Quarterly Journal of Economics*, 80(3), 413-435.

Moin, A., Guney, Y., & El Kalak, I. (2020). The effects of ownership structure, sub-optimal cash holdings and investment inefficiency on dividend policy: Evidence from Indonesia. In *Review of Quantitative Finance and Accounting* (Vol. 55). Springer US. https://doi.org/10.1007/s11156-019-00862-z

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187-221.

Nguyen, P., & Rahman, N. (2020). Institutional ownership, cross-shareholdings and corporate cash reserves in Japan. *Accounting and Finance*, 60(S1), 1175-1207.

Nikolov, B., & Whited, T. M. (2014). Agency conflicts and cash: estimates from a dynamic model. *Journal of Finance*, 69(5), 1883-1921.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1), 3-46.

Ozkan, A., & Ozkan, N. (2004). Corporate cash holdings: An empirical investigation of U.K. companies. *Journal of Banking and Finance*, 28(9), 2103-2134.

Quinn, R. E., & Cameron, K. (1983). Organizational life cycles and shifting criteria of effectiveness: Some preliminary evidence. *Management Science*, 29(1), 33-51.

Ramezani, C. A. (2011). Financial constraints, real options and corporate cash holdings. *Managerial Finance,* 37(12), 1137-1160.

Rehman, A. U., Ahmad, T., Hussain, S., & Hassan, S. (2021). Corporate cash holdings and firm life cycle: Evidence from China. *Journal of Asia Business Studies*, 15(4), 625-642.

Smith, K. G., Mitchell, T. R., & Summer, C. E. (1985). Top level management priorities in different stages of the organizational life cycle. *The Academy of Management Journal*, 28(4), 799-820.

Tekin, H. , Polat, A. Y. & Muğaloğlu, E. (2021). Küresel finansal kriz ve nakit tutma ayarlama hızı. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi*, 9(4), 1099-1110.

Ward, C., Yin, C., & Zeng, Y. (2018). Institutional investor monitoring motivation and the marginal value of cash. *Journal of Corporate Finance*, 48, 49-75.

Wernerfelt, B. (1985). The dynamics of prices and market shares over the product life cycle. *Management Science*, 31(8), 928-939.

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.

Zeileis, A. (2004). Econometric computing with HC and HAC covariance matrix estimators. *Journal of Statistical Software*, 11(10), 1-21.

Zeileis, A., & Hothorn, T. (2002). Diagnostic checking in regression relationships. *R News*, 2(3), 7-10.

Zeileis, A., Köll, S., & Graham, N. (2020). Various versatile variances: An object-oriented implementation of clustered covariances in R. *Journal of Statistical Software*, 95(1), 1-36.