



THE RELATIONSHIP BETWEEN CASH GAP AND PROFITABILITY: AN EMPIRICAL STUDY FROM TURKEY

DOI: 10.17261/Pressacademia.2018.956

JBEF- V.7-ISS.3-2018(7)-p.288-294

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Date Received: July 1, 2018

Date Accepted: September 20, 2018

To cite this document

Vuran, B., Adiloglu, B. (2018). The relationship between cash gap and profitability: an empirical study from Turkey. Journal of Business Economics and Finance (JBEF), V.7(3), p.288-294.

Permanent link to this document: <http://doi.org/10.17261/Pressacademia.2018.956>

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ABSTRACT

Purpose- Cash gap or cash conversion cycle refers to the time interval between the date when a company pays cash out for the inventory it purchases and the date it receives cash from customers for the same inventory. That interval must be financed. Management of cash conversion cycle is vital issue in corporate financial management since it directly affects the profitability of the firms. The purpose of this study is to analyze the relationship of cash gap and corporate profitability.

Methodology- The data set includes all manufacturing firms listed in Borsa Istanbul (BIST) for the year 2017. The financial sector firms are excluded since their financial statements have different aspects. Regression and correlation analyses are conducted to examine the relationship between the cash gap and profitability.

Findings- The results of the study evaluate how cash conversion cycle affects the profitability and show if there is a statistical significance between profitability the cash conversion cycle.

Conclusion- Managers of the companies that handle the cash conversion cycle correctly and keep each different component (accounts receivables, accounts payables, inventory) to an optimum level can create profits and seems successful from the views of investors. The study also contributes to the literature on the issue of relationship between cash gap and the firm's profitability.

Keywords: Cash gap, working capital management, profitability, Borsa Istanbul, cash cycle.

JEL Classification: G30, G32, M41

1. INTRODUCTION

Cash gap or cash conversion cycle refers to the time interval between the date when a company pays cash out for the inventory it purchases and the date it receives cash from customers for the same inventory. Management of cash conversion cycle is vital issue in corporate financial management since it directly affects the profitability of the firms. The longer the time lag, the larger the investment in working capital. However, corporate profitability might decrease with the cash conversion cycle, if the costs of higher investment in working capital rise faster than the benefits of holding more inventories and /or granting more trade credit to customers.

The time between paying and receiving cash (the gap) needs to be financed in some way. It can either come from cash generated inside the firm or borrowings from financial institutions. If the firm uses the cash generated within the business it limits the possibilities of investing that cash in other areas. And, of course, borrowing money costs more money in the form of interest. So it will be an advantage for every firm to keep the cash gap as small as possible. Even though it is rare, there are some companies who actually have a negative cash gap. That is ideal case. But it depends on the type of business the company operating in.

There are some implementations for the companies to be considered to reduce the cash gap to the fewest number of days. These are;

- Billing immediately on completion of job.
- Considering the billing on a more frequent interval.
- Giving a one percent or two percent discount for those who pay early.
- Charging interest for those who pay late.
- Systematically tracking over due receivables and actively pursuing collections.
- Reducing inventory by using low inventory trigger points.
- Buying inventory on consignment and paying only when sold.
- Negotiating longer payment terms from vendors.

The purpose of this study is to analyze the relationship of cash gap and corporate profitability of Turkish manufacturing companies operating in Borsa Istanbul for the year 2017. The rest of the paper is organized as follows: Section 2 provides a detailed survey of past studies. Section 3 explains the data (variables employed) and methodology while the results are presented in Section 4. Finally, Section 5 gives the conclusion.

2. LITARATURE REVIEW

Lazaridis and Tryfonidis (2006) conducted a cross sectional analysis by using 131 firms listed on Athens Stock Exchange for the period 2001-2004. They found statistically significant relationship between profitability measured through gross profit margin and cash conversion cycle and its components (accounts receivables, accounts payable, inventory). Garcia and Martinez (2007) tested the effect of working capital management on SME profitability using panel data methodology by 8,872 observations covering the period 1996-2002. The results demonstrated that managers could create value by reducing inventory level and shortening the cash conversion cycle improves the firm's profitability. Mathuva (2009) examined the influence of working capital management components on corporate profitability by using 30 listed firms on Nairobi Stock Exchange for the periods 1993-2008 using pooled ordinary least square (OLS) and the fixed effect regression models. He found that there is a highly significant negative relationship between average collection period and profitability, and there is a highly significant positive relationship between the days in inventory, average payment period and profitability.

Gill, Biger and Mathur (2010) examined 88 American firms listed on NYSE for the period for 2005-2007. They found statistically significant relationship between the cash conversion cycle and profitability measured through gross profit margin. Ebben and Johnson (2011) investigated the relationship between cash conversion cycle and levels of liquidity, invested capital, and performance in small firms over time. In a sample of eight hundred and seventy-nine small U.S. manufacturing firms and eight hundred and thirtythree small U.S. retail firms, cash conversion cycle was found to be significantly related to all three of these aspects. Firms with more efficient cash conversion cycles were more liquid, required less debt and equity financing, and had higher returns. The results also indicated that small firm owners/managers may be reactive in managing cash conversion cycle. The study highlighted the significance of cash conversion cycle as a proactive management tool for small firm owners. Napompech (2012) studied the effects of working capital management on profitability using regression analysis based on a panel sample of 255 companies listed on Stock Exchange of Thailand from 2007 through 2009. The results revealed a negative relationship between the gross operating profits and inventory conversion period and the receivables collection period.

Uwuigbe, Uwuigbe and Ben-Caleb (2012) empirically investigated the relationship between cash management and profitability in listed manufacturing companies in Nigeria. Cash conversion cycle is used as the measure for cash management. Current ratio, debt ratio and sales growth were used as control variables. The study utilized secondary data while Pearson's correlation and regression analysis were used in analyzing the data for a sample of 15 listed manufacturing companies in Nigeria between 2005-2009. The results of the empirical findings showed that there is a strong negative relationship between cash conversion cycle and profitability of the firms. It meant that as the cash conversion cycle increased it led to decreasing profitability of the firms. The study therefore recommends that managers can create a positive value for the shareholders by reducing the cash conversion cycle to a possible minimum level and also accounts receivables should be kept at an optimal level.

Muscettola (2014) studied the impacts and all the influences of the cash conversion cycle on the profitability of firms. Using data from an extensive sample of Italian manufacturing firms (4,226 Italian SMEs), the study was concerned about evaluating how cash conversion cycle affected the profitability. Results showed that average receivables period was having significantly positive association with profitability indicating that it was not necessary that always the moral of the story must be: lesser the cash conversion cycle, greater the profitability. The study took EBITDA on net sales as measures of profitability to represent dependent variables.

Akinyomi (2014) examined the relationship between cash management and profitability in the Nigerian manufacturing firms. Correlation and regression analysis were carried out. The results revealed a positive and significant relationship between CCC and ROE on one hand and a nonsignificant negative relationship between CCC and ROA. From the results of the study, it was recommended that future researchers should expand the scope of their studies to include multiple sectors of the economy. Zakari and Saidu (2016) empirically tested the effect of cash conversion cycle on corporate profitability (ROA) of the firms listed on Nigerian Stock Exchange using multiple regression analysis for the period from 2010 to 2014. The findings indicated significant positive relationship between cash conversion cycle and corporate profitability.

3. DATA AND METHODOLOGY

This study aims to investigate the relationship between the length of cash conversion cycle (cash gap) and corporate profitability of Turkish manufacturing companies. The formula to compute the cash gap is given below.

$$\text{Cash Gap (in days)} = \text{Receivables Period} + \text{Days in Inventory} - \text{Payables Period}$$

The data used in this study is obtained from financial statements of corporations which are taken from www.kap.gov.tr website. The sample is comprised of 168 manufacturing companies listed in Borsa Istanbul. Multiple regression analysis is conducted for the year 2017. Table 1 exhibits the definition of the data.

Table 1: Data Set

	Variable Name	Calculation
Dependent Variables	Return on Asset (ROA)	EBIT / Total Assets
	Return on Equity (ROE)	NPAT / Total Equity
Independent Variables	Cash Conversion Cycle (CCC)	Average Collection Period + Days in Inventory – Average Payment Period
	Current Ratio	Current Assets / Current Liabilities
	Debt Ratio	Total Debt / Total Assets
	Growth in Total Assets	(Total Assets _{t+1} / Total Assets _t) -1

Growth in total assets is used as the proxy for firm growth. Current ratio, debt ratio, firm growth are used as control variables. The descriptive statistics for the sample are reported in Table 2. All variables are calculated using financial statement values. Hence, they are relied on “book values” as of the date of the financial reports.

Table 2: Descriptive statistics of the variables

	N	Minimum	Maximum	Mean	Standart Deviation
Return on Asset (ROA)	168	-0,11	0,37	0,0873	0,0788
Return on Equity (ROE)	168	-0,92	0,86	0,0902	0,2139
Cash Conversion Cycle (CCC)	168	0,25	8,02	1,7051	1,1782
Current Ratio	168	0,00	2,21	0,2723	0,2350
Debt Ratio	168	-0,18	1,30	0,2062	0,1922
Growth in Total Assets	168	-89,00	462,85	113,23	95,9899

Table 3 provides Pearson Correlation for the variables. It is intrinsically used to see the sign of multicollinearity between the independent variables. Although another test is used to detect multicollinearity more seriously, in the first instance, pearson correlation can also give an idea for the existence of multicollinearity.

Table 3: Pearson Correlation Statistics

ROA		ROA	ROE	Current Ratio	Debt Ratio	gtotal_assets
	Pearson Correlation	1	0,586**	0,265**	0,048	0,202**
	Sig. (2-tailed)		0,000	0,000	0,538	0,008
	N	168	168	168	168	168
ROE	Pearson Correlation	0,586**	1	0,236**	-0,122	0,210**
	Sig. (2-tailed)			0,02	0,113	0,006
	N	168	168	168	168	168
Current Ratio	Pearson Correlation	0,265**	0,236**	1	-0,482**	-0,072
	Sig. (2-tailed)	0,000	0,002		0,000	0,353
	N	168	168	168	168	168
Debt Ratio	Pearson Correlation	0,048	-0,122	-0,482**	1	0,027
	Sig. (2-tailed)	0,538	0,113	0,000		0,724
	N	168	168	168	168	168
gtotal assets	Pearson Correlation	0,202**	0,210**	-0,072	0,027	1
	Sig. (2-tailed)	0,08	0,06	0,353	0,724	
	N	168	168	168	168	168

** Correlation is significant at the 0,001 level (2-tailed).

It is important to examine the correlation coefficient between independent variables. As it is shown in Table 3, there is 48,2 % correlation between current ratio and debt ratio and it is significant at 1 %. There seems to be multicollinearity but the existence of multicollinearity is examined by using VIF statistics in further section. The correlation matrix table reveals also positive and moderate correlation between ROA and ROE, since they are dependent variables this correlation is not meaningful.

4. FINDINGS

In order to investigate the effect of cash conversion cycle on the corporate profitability multiple regression analysis has been performed for 168 companies for the year 2017. The regression analysis finds out the effect and the relationship of explanatory variables with profitability of companies. In this study ROA and ROE are the dependent variables and regression model is conducted for these variables separately.

Model I: Dependent Variable ROA

In the first model, return on asset (ROA) is used for the profitability measure for the companies and it is the dependent variable for the first model. This model aims to explain the effect of above-mentioned variables on corporate profitability. Before presenting the regression outputs, the assumptions of regression analysis are tested. In order to actually be usable in practice, assumptions of linear regression should be conformed. Table 4 displays the results of model summary.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Durbin-Watson
1	0,419	0,175	0,155	0,07241	2,030

Durbin Watson test is a measure of autocorrelation in residuals of regression analysis. As it is seen in Table 4, since the Durban Watson test statistic is 2, there is no autocorrelation in residuals. The R-Square, coefficient of determination, indicates how well the model fits the data. It indicates the proportion of variance in the dependent variable that is explained by the independent variables. In this model, it is seen that 17.5 % of change in ROA is explained by the independent variables in the model.

The second step of the regression analysis is ANOVA table. The significance F is the probability that the null hypothesis in the regression model cannot be rejected. In other words, it indicates the probability that all the coefficients in our regression output are actually zero. Table 5 shows the ANOVA results.

Table 5: ANOVA Results

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	0,183	4	0,046	8,725	0,000
Residual	0,860	164	0,05		
Total	1,043	168			

ANOVA results reveal that significance of F statistic is lower than 5 % which indicates that the model is meaningful.

To understand which independent variables should be added in the regression model, it is better to analyze the next table.

Table 6: Coefficients of the model

Model	Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics			
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Constant	0,014	0,018		0,754	0,452		
Current Ratio	0,028	0,006	0,420	5,084	0,000	0,735	1,360
Debt Ratio	-0,073	0,027	-0,217	-2,672	0,008	0,760	1,316
gtotal_assets	0,087	0,029	0,211	2,954	0,004	0,984	1,017
CCC	0,000	0,000	-0,128	-1,721	0,087	0,906	1,104

The variance inflation factor (VIF) identifies correlation between independent variables and the strength of that correlation. A value of 1 indicates that there is no correlation between this independent variable and any others. It can be concluded that there is no multicollinearity between the independent variables.

Table 6 also gives the result of the model to form the regression equation. The regression model can be written as follows:

$$ROA = 0,014 + 0,028 \text{ Current Ratio} - 0,073 \text{ Debt Ratio} + 0,087 \text{ gtotal_assets}$$

As it is seen in the table; cash conversion cycle is not a significant variable on the profitability of manufacturing companies as measured by return on asset.

Model II: Dependent Variable ROE

In the second model, return on equity (ROE) is used for the profitability measure for the companies and it is the dependent variable for the second model. As it is employed in the first model, before presenting the regression outputs, the assumptions of regression analysis are tested. Table 7 exhibits the results of second model in which ROE is used as dependent variable.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Durbin-Watson
1	0,333	0,111	0,089	0,20415	2,114

As it is seen in Table 7, Durban Watson test statistic is nearly 2, so there is no autocorrelation in residuals. The R-Square indicates that 11,1 % of change in ROE is explained by the independent variables of the model.

Table 8 displays the ANOVA results. ANOVA results reveal that the significance of F statistic is lower than 5 % and this indicates that the model is meaningful.

Table 8: ANOVA Results

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	0,854	4	0,213	5,122	0,001
Residual	6,835	164	0,042		
Total	7,689	168			

Table 9 gives the result of the model to form the regression equation.

Table 9: Coefficients of the model

Model	Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics			
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Constant	-0,020	0,051		-0,399	0,691		
Current Ratio	0,047	0,016	0,261	3,044	0,003	0,735	1,360
Debt Ratio	-0,014	0,077	-0,016	-0,184	0,855	0,760	1,316
gtotal_assets	0,247	0,083	0,222	2,991	0,003	0,984	1,017
CCC	0,000	0,000	-0,062	-0,801	0,424	0,906	1,104

By using the data in Table 9, the regression model can be written as follows:

$$ROE = -0,020 + 0,047 \text{ Current Ratio} + 0,247 \text{ gtotal_assets}$$

As it is seen in the table; cash conversion cycle is not a significant variable on the profitability of manufacturing companies as measured by return on equity.

5. CONCLUSION

Regression analysis generates an equation to describe the statistical relationship between one or more predictor variables and the response variable. Regression analysis is used to produce an equation that will predict a dependent variable using one or more independent variables. The purpose of this study is to analyze the relationship of cash gap and corporate profitability. Regression and correlation analyses are conducted to examine the relationship between the cash gap and profitability. The data set includes all manufacturing firms listed in Borsa Istanbul (BIST) for the year 2017. It is found in this study that; there is a positive significant relationship between ROA and current ratio, debt ratio and growth rate in total assets for 5 % significance and positive relationship with cash conversion cycle for 10 % significance level. But the coefficient of CCC is near to zero. There is a positive significant relationship between ROE and current ratio and growth rate in total assets for 5 % significance level. There is no relationship between CCC and ROE. A possible further research can be done for larger periods by comparing Turkish companies with the companies from other countries. It is also recommended that future researchers should expand the scope of their studies to include multiple sectors.

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