

“Effects of Working Capital Management on Profitability for a Sample of European Firms”

Erasmus University Rotterdam
Faculty of Economics of Business
Department of Economics

Supervisor: S. Gryglewicz

Name: H.J. Beernink

Exam number: 256376

E-mail address: h.j.beernink@hotmail.com

Preface

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Abstract

The objective of this paper is to find empirical evidence for the relation between working capital management and corporate profitability for a sample of large European firms. A second objective is to find evidence that the relation between working capital management and corporate profitability is affected by country effects. For this paper a panel of 224 European firms, consisting of the non-financial firms of the FTSEurofirst 300 Index, was collected for the period 1996-2008. The results show that only the number of days inventory the average time it takes firms to sell their products has a significant relationship with corporate profitability, suggesting that less profitable firms decrease their number of days inventory. Furthermore there is no real evidence that country effects add explanatory value to the regression models used in this paper's research. This paper contributes to previous studies on the subject because unlike previous studies that focused on firms from individual countries, this paper focuses on a sample of firms from different countries.

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1 Introduction

In recent years working capital as part of short-term asset management has become a more important subject for firms, in meeting their cash requirement levels, as the financial crisis lowered the willingness of banks to extend loans to firms (Seifert and Seifert 2009). In a recent survey among Dutch financial managers 78% of the respondents said the importance of working capital management had improved in the last six months (Asyx and Accenture Working Capital Survey 2009). For managers of firms there are two main objectives concerning the management of their firms (Tewolde 2002). First they want to maximize the profitability of the firm, maximizing the value for the shareholders of the firm. Second they want to minimize the liquidity risk of the firm. Liquidity risk is the risk that firms do not have enough cash or other short-term assets to satisfy their financial obligations, which can cause difficulties for firms in maintaining their corporate activities. Tewolde (2002) states this profitability versus risk trade-off reflects both the management of working capital, which consists of short-term assets, and the corporate decisions concerning long-term profitability targets for firms. In short this trade-off suggests that when managers manage their working capital efficiently they have less cash stocked in the firm, which can then be paid out to the shareholders increasing their wealth.

Guarcia-Teruel and Martinez-Solano (2007) show for a large sample of Spanish small and medium-sized firms that short-term assets represent a large part of the firm's balance sheet while Deloof (2003) shows that for a large sample of Belgian firms working capital attributes to a considerable part of the total firm's assets, suggesting that the way working capital is managed can have a significant influence of a firm's profitability. A common measure for working capital management is the cash conversion cycle, which reflects investments in inventory and customer accounts and the amount of credit firms accept from suppliers. In short the cash conversion cycle measures the amount of days a firm needs from the moment raw materials are bought until the moment their final products are sold. Studies on the effect of the cash conversion cycle on corporate profitability have been carried out for firms of several countries: Sin and Soenen (1998) for US firms, Deloof (2003) for Belgian firms, Lazaridis and Tryfonidis (2006) for Greek firms, Guarcia-Teruel and Martinez-Solano (2007) for Spanish firms and Raheman and Nasr (2007) for Pakistani firms.

The aim for some of the studies above was not only to find relationships between working capital and profitability, but also to analyze the causalities between working capital management and profitability. Deloof (2003) argues that firms that want to maximize their value have an optimal level of working capital and evaluate the trade-off between risk involved with making changes in working capital levels and the profitability they expect. Positive effects are that a large inventory reduces the change of getting out of stock losing potential sales, while flexible accounts receivable allow customers to get products even when they cannot pay for them as well as giving them time to properly check the product's quality before paying (Deloof, 2003). However, a disadvantage of a large inventory and flexible accounts receivable, is that it keeps cash in working capital of a company which than cannot be used for other purposes possibly influencing a firm's overall productivity (Peterson and Rajan, 1997). A third component of working capital is the trade debt of a firm or the accounts payable. Not having to pay immediately gives a firm time to check the quality of a product, but it also gives firms the opportunity to use the saved cash for other short-term financing needs. The profitability of a firm can benefit from a longer cash conversion cycle for it can increase the sales of a firm. On the other hand a longer cash conversion cycle can decrease a firm's profitability when the costs of keeping cash in working capital are larger than the benefits of higher sales (Deloof 2003).

1.1 Research Introduction

This paper will try to extend on previous literature on the relation between working capital management and profitability. Previous studies done are based on samples of firms in individual countries. In this paper a sample of companies from different countries is used to research possible country effects on the relation of working capital management and profitability. Furthermore the three constituents of the cash conversion cycle, instead of researching their relation with corporate profitability individually, will be used in models together. The three components of the cash conversion cycle are the number of days inventory, the number of days accounts payable and the number of days accounts receivable. In Table 1 these three components are shown and are shortly described. The number of days inventory is a measure for how long inventories are held in the company, or how long it takes firms to sell their products. The number of days accounts payable is a measure for how long firms take to pay their customers. The number of days accounts receivable is a measure for how long it takes firms to collect payments from their customers.

Table 1

The three constituents of the cash conversion cycle

No. Of Days Inventory	<i>The average number of days it takes firms to sell their products.</i>
No. Of Days Accounts Payable	<i>The average number of days it takes firms to pay their bills.</i>
No. Of Days Accounts Receivable	<i>The average number number of days it takes firms to collect payments form their customers.</i>

Notes:

The three constituents of the cash conversion cycle are shown and briefly described.

Table 2 briefly compares the results from this paper’s research with the results of Deloof (2003). Deloof (2003) finds significant negative relations between working capital and profitability. This suggests that by decreasing the inventory and accounts receivable firms can improve their profitability. It also suggests that less profitable firms have higher accounts payable. This paper however finds no relation between the number of days accounts payables and days account receivable and profitability. It does find a positive relation between the number of days inventory and profitability.

Table 2

Brief results on the relation between working capital management and corporate profitability

	Gross Operating Income	
	Deloof (2003)	This paper
No. Days Inventory	<i>negative relation</i>	<i>positive relation</i>
No. Days Accounts Payable	<i>negative relation</i>	<i>zero</i>
No. Days Accounts Receivable	<i>negative relation</i>	<i>zero</i>

Notes:

Shown are the results of the relationships between the three constituents of the cash conversion cycle and corporate profitability, for the OLS regression models of Deloof (2003) and this paper, with gross operating income as dependent measure for profitability. Zero means the relationship was not significant.

2 Research Question and Hypotheses Testing

2.1 Research Question

The main research question to be analyzed in this paper is:

“Is there evidence for country effects in the relation between working capital management and corporate profitability?”

The main target of this research question is to analyze if the relation between working capital management and corporate profitability differs between countries. The results of this research can add to the discussion whether results of previous studies on the relation between working capital management and profitability are country unique results, or can be expanded to other countries. To answer the research question two goals are set. The first goal is to closely follow Deloof (2003)’s research and compare this paper’s results to his findings to generate general assumptions on the relation between working capital and profitability for this paper’s sample of firms. The second goal is to compare the results of the regression models with country effects and without country effects to see if there is evidence that firms from different countries have different relations between working capital management and profitability.

2.2 Hypotheses Testing

To be able to analyze and draw conclusions from this paper’s research and to answer the main research questions, four testable hypotheses are made¹. The first three hypotheses concern the relations of the three constituents of the cash conversion cycle with corporate profitability. The fourth hypothesis concerns the additional value controlling for country effects in the regression models has on the results of this paper’s research.

Hypothesis 1

Deloof (2003) finds a negative relation between the number of days inventory and gross operating income, which is his measure for profitability.

¹ Based on Raheman and Nasr (2007)

This is consistent with his view that managers can increase corporate profitability by optimizing the number of days inventory.

The first hypothesis of this paper is as follows:

H₀₁: There is no relationship between the number of days inventory and corporate profitability.

H₁₁: There is a possible relationship between the number of days inventory and corporate profitability. Firms that lower inventories are expected to have a higher corporate profitability or vice versa.

Hypothesis 2

Deloof (2003) finds a negative relation between the number of days accounts payable and gross operating income. This is consistent with his view that less profitable firms delay the payments to their suppliers.

The second hypothesis of this paper is as follows:

H₀₂: There is no relationship between the number of days accounts payable and corporate profitability.

H₁₂: There is a possible relationship between the number of days accounts payable and corporate profitability. Firms that better manage their accounts payable are expected to have a higher corporate profitability or vice versa.

Hypothesis 3

Deloof (2003) finds a negative relation between the number of days accounts receivable and gross operating income. This is consistent with his view that firms can increase their profitability by decreasing their accounts receivables

The third hypothesis of this paper is as follows:

H₀₃: There is no relationship between the number of days accounts receivable and corporate profitability.

H₁₃: There is a possible relationship between the number of days accounts receivables and corporate profitability. Firms that better manage their accounts receivables are expected to have a higher corporate profitability and vice versa.

Hypothesis 4:

Measured by the adjusted R^2 's of the models, Deloof (2003) finds that his data better fit the models with fixed *within* the firm effects, than with his *between* firms effects OLS models.

Based on these results there are two expectations due to this paper's addition of control variables for country effects. First it is expected the addition of country effects will make the data better fit the models resulting in higher adjusted R^2 's for the regression models. Second, since the difference between *within* firm effects and *between* firm effects is substantially large it is expected that the addition of country effects will not lead to different results than Deloof (2003).

The fourth hypothesis of this paper is as follows:

H_{04} : *The addition of country effects has no additional explanatory value to the relationship between working capital management and corporate profitability for firms.*

H_{14} : *There possibly are country effects when researching the relationship between working capital management and corporate profitability.*

3 Methodology

3.1 Data Collection

The data collected are from the non-financial firms that are constituents of the FTSEurofirst 300 Index. This index constitutes of the 300 largest European firms in the FTSE Developed Europe Index, ranked by market capitalization.² The reasons data from firms of this index were chosen are: the index constitutes of firms from different countries, the data are available, the income statements of the firms are reliable, and the firms of the index are public firms and have incentives to optimize their profit to maximize their shareholders' value and to show profits to make their shares more attractive (Lazaridis and Tryfonidis 2006).

After excluding financial firms (defined by SIC codes starting with 6)³, and firms without data or data missing, the final sample of firms consists of 224 firms. The financial statements for the firms, for the period 1996-2008, were obtained with the Thomson One Banker database⁴.

² www.ftse.com

³ www.osha.gov The standard industrial classification (SIC) manual on the site of the United States Department of Labor defines division H, the industries with a SIC code starting with 6, as Finance, Insurance and Real Estate.

The length of the period was chosen for its availability of data and because a large number of years provides for a larger final dataset. The dataset was checked for the presence of obvious erroneous outliers which were excluded from the dataset. The final dataset however still has many outlying values left for most variables, but since there are many outliers and they are to represent actual financial income statements, they are kept in the dataset with the assumption that these outliers represent realistic values. When analysing the results of this paper's regressions it should be taken in consideration that these outlying values can have a large effect on the overall results.

3.2 The Variables

As stated before, Deloof (2003) studies the relation between working capital management and corporate profitability. He calculates the variable for the cash conversion cycle as (*number of days accounts receivable + number of days inventory – number of days accounts payable*). The measures for profitability he uses are gross operating income and net operating income. Closely following Deloof (2003) the measures used for this paper's research follow below.

3.2.1 Measurements of Profitability

In Table 3 are shown the proxies for corporate profitability and their calculations, which are used for this paper's research. Like Deloof (2003) gross operating income and net operating income are used as dependent variables. As an additional measure this paper also uses margin as a measure for profitability, which is measured as the natural logarithm of the margin. Although the research of this paper uses listed European firms, and thus a profitability measure based on stock market value is possible⁵, it is considered beyond the scope of this paper.

3.2.2 Measurements of Working Capital

In Table 3 are shown the proxies for the measurements of working capital and their calculations.

⁴ Thomson One Banker provides for an Excel add-on for access to its database, enabling retrieving data from several financial databases.

⁵ Luo et al. (2009) find evidence that stocks of firms that improved the efficiency of their working capital tend to outperform firms with decreased efficiency of their working capital in the following year.

The number of days inventory is a measure for the average number of days inventories are held by the company. The number of days accounts payable represents the average time a company takes to pay its suppliers. The number of days accounts receivable represents the average time it takes a company to get payments from its customers. As an additional measure the lagged number of days payable is added, which is defined as last year's number of days accounts payable. This is done because Deloof (2003) suggests that profitability affects the number of days accounts payable and not *vice versa*. With this additional variable this paper wants to find if the number of days accounts payable influences profitability, by suggesting that if it does there should possibly be a relation between the number of days accounts payable and next year's profitability.

3.2.3 Measurements of Control Variables

In Table 3 are also shown the measures for control and their calculations. Size, sales growth, the financial debt ratio, variability of net operating income and the ratio of fixed financial assets to total assets are used as control variables. Financial assets are mainly shares in other firms and fixed financial assets are mainly shares in affiliated firms with the purpose of them contributing to the firm's activities. For some firms a large part of their total assets are financial assets. This is the reason that the return on assets is not used as a measure of profitability, for it would be an inadequate measure for the operating activities of a firm (Deloof 2003).

Table 3
The Variables

<i>Proxies for Profitability</i>	
Gross Operating Income	$(Sales - CostOfGoodsSold + DepreciationDepletion\&Amortization) / (TotalAssets - InvestmentAdv.ToSubsidiaries - (CurrentAssets - TotalInventories))$
Margin	$Ln(Sales - CostOfGoodsSold)$
Net Operating Income	$(Sales - CostOfGoodsSold) / (TotalAssets - InvestmentAdv.ToSubsidiaries - (CurrentAssets - TotalInventories))$
<i>Proxies for Working Capital</i>	
No. Days Inventories	$(TotalInventories * 365) / CostOfGoodsSold$
No. Days Accounts Payable	$(AccountsPayable * 365) / CostOfGoodsSold$
No. Days Accounts Receivable	$(NetTradeReceivables * 365) / Sales$
No. Days Accounts Receivable t-1	<i>Previous year's No. of Days Accounts Payable</i>
<i>Proxies for Control Variables</i>	
Financial Debt	$(TotalDebt / TotalAssets)$
Fixed Financial Assets	$(InvestmentAdv.ToSubsidiaries / TotalAssets)$
Size	$Ln(Sales)$
Sales Growth	$(This\ Year's\ Sales - Previous\ Year's\ Sales) / Previous\ Year's\ Sales$
Variability	$(Sales - CostOfSales) / (TotalAssets - NetTradeReceivables - (CurrentAssets - TotalInventories))$

Notes:

In this table are shown the proxies used for this paper's research and how they are calculated. Gross Operating Income, Margin and Net Operating Income are proxies for corporate profitability. No. of Days Inventories, No. of Days Accounts Payables and No. of Days Accounts Receivables are proxies for working capital. Financial debt, Fixed Financial Assets, Size, Sales Growth and Variability are proxies for the control variables.

3.2.4 Industry and Country Effects

In addition to the independent and dependent variables, dummies are used to control for industry and country effects. The industry dummies are based on the 1-digit SIC codes for industries⁶. Leaving out the financial firms (SIC codes starting with 6) there are eight industry dummies used representing eight industry groups. The four country dummies used are based on Table 3 of Dittmar et al. (2003). The common law dummy is a measure differentiating between common law (English law) based countries and civil law (Romano-Germanic) based countries, and is based La Porta et al. (1998). The external capital dummy is based on the stock market capitalization held by minority shareholders. It differentiates between countries with high and low external capital to GNP ratios and is based La Porta et al. (1997). The private credit dummy is based on the credit provided to non-government owned firms by financial intermediaries. It differentiates between countries with a high level of private credit and a low level of private credit and is based on Levine et al. (2000). The shareholders' rights dummy differentiates between countries with a high level of shareholders' rights protection and a low shareholders' rights protection and is based on La Porta et al. (1998). In the case of Luxembourg, for which there are no values to attribute dummy variables to, this paper assumes Luxembourg to be most equal to Belgium and as such Luxembourg has the same values for the country dummy variables as Belgium.

3.3 The Regression Models

To add insight to the relationship between corporate profitability and working capital management regression analysis are done. Three regression models with a measure for corporate profitability as dependent variable are estimated. All models have as independent variables measures for working capital management, control variables and industry and country dummies. To provide for sensible coefficients the three measures for working capital management are scaled by one hundred. The regressions are estimated with OLS-models (unbalanced datasets) and fixed effects models (panel datasets) and are controlled for heteroskedasticity effects using White's Correction (Deloof 2003). For all regression models the Hausman Test was performed (Guarcia-Teruel and Martinez-Solano 2007).

⁶ www.osha.gov

The Hausman Test tests the null hypothesis that there are no fixed effects in the model and the panel data can be regressed with random effects and the model can be estimated by GLS.

For all regression models the null hypothesis was rejected so fixed effects regressions were done. To prevent multicollinearity problems due to high correlations between variables, some variables are left out of the regression models. Excluded from the models with gross operating income are industry dummy 4 and the common law dummy which showed high correlations with other variables. For this regression model variation inflation factors were calculated as an additional control for multicollinearity (Lazaridis and Tryfonidis 2006), which confirmed industry dummy variable 4 and the common law dummy as possible poorly estimated regression coefficients. Due to their high correlations with other variables industry dummy 4 and the common law dummy are also excluded from the other two regression models. Additionally in the model with margin as dependent variable, size as a variable is left out due to high correlation with other variables, which causes that the margin is now not scaled for size which increases the size bias. For these two other models the variables were not controlled for their variation inflation factors, for they are assumed to be possible causes for multicollinearity based on the confirmative tests done for the first regression model. For all regression models also OLS and fixed effects regressions are done with the lagged number of days accounts payable replacing the number of days accounts payable for these two variables cannot be used together for they are highly correlated.

3.4 Reversed Causality

A disadvantage of the analysis done in this paper is although relations between variables can be researched, it stays unclear what the directions of the causalities are. Deloof (2003) finds a negative relation between working capital management and profitability. Although he assumes that profitability is mostly affected by working capital management, he states that it is possible that profitability affects working capital management to some extent instead. Deloof (2003) indeed offers alternative causalities for the relations between inventory and the accounts receivable and profitability. However he does not think there is an alternative causality for the relation between profitability and the accounts payable, hence the inclusion the lagged number of days accounts payable in this paper's regression models. To shed light on possible causality problems Guarcia-Teruel and Martinez-Solano (2007) apply robust tests for the presence of endogeneity. They find that the number of days accounts payable loses significance when they control for endogeneity.

They conclude that reversed causality can have a distinctive influence on the results of previous studies done about the relation between working capital management and corporate profitability.

4 Results

4.1 Descriptive Statistics

In Table 4 are shown the descriptive statistics of the collected variables for a total of 2912 observations of 224 firms. Gross operating income is on average 58.8% of (total assets – financial assets) and has a median of 45.9%. Margin is on average 8.0 with a median of 7.9. Since margin is measured as a natural logarithm this number means actual margins of around three billion euros. It can be concluded that the margins of the firms of this dataset are very high, and although the variable margin has been controlled for size using its natural logarithm is still likely to be subject to size bias with a heavy right tail.

Table 4 also shows that firms on average need 85.4 days to sell their stocks, 107.9 days to pay their bills and 106.0 days to collect payments from their customers. The maximum values for the number of days inventory, the number of days accounts payable and the number of days accounts receivable however are very high (784.5, 1730.0 and 289.7 days respectively). Looking to the companies used in this paper, very high (and low) values for the constituents of the cash conversion cycle are mostly from companies with non- or less tangible products or from companies for which long-term projects are common. Since these values are representations of actual financial income statements and this paper does not differentiate between firms with tangible and non-tangible products, these high values are left in the datasets used in this paper even though they have a considerable influence on the average values and overall results. The median values of 59.1 days, 64.9 days and 58.5 days respectively therefore thus seem more realistic values.

Table 4

Descriptive Statistics

224 European Non-financial Firms, 1996-2008: 2912 Firm-year observations

	<i>Mean</i>	<i>Std. Dev.</i>	<i>Minimum</i>	<i>Median</i>	<i>Maximum</i>
Gross operating income	0.588	0.519	-0.500	0.459	4.000
Margin	8.019	1.471	0.781	7.959	11.289
Net operating income	0.524	0.612	-2.408	0.383	5.548
No. of days inventory	85.415	97.972	0.000	59.145	784.462
No. of days accounts payable	107.921	167.498	0.000	64.940	1730.020
No. of days accounts payable t-1	105.966	157.008	0.000	63.613	1730.020
No. of days accounts receivable	63.338	40.480	0.000	58.474	289.705
Financial debt	0.259	0.154	0.000	0.247	0.940
Fixed financial assets	0.021	0.098	0.000	0.000	2.637
Size	2.180	0.219	-0.443	2.205	2.594
Sales growth	0.114	0.239	-1.000	0.074	2.482
Variability	0.221	0.337	0.005	0.116	3.401

Notes:

Gross operating income is $(\text{sales} - \text{cost of sales} + \text{depreciation \& amortization}) / (\text{total assets} - \text{financial assets})$. Margin is the natural logarithm of $(\text{sales} - \text{cost of sales})$. Net operating income is $(\text{sales} - \text{cost of sales}) / (\text{total assets} - \text{financial assets})$. No. of days inventory is $(\text{inventories} \times 365) / \text{cost of sales}$. No. of days accounts payable is $(\text{accounts payable} \times 365) / \text{cost of sales}$. No. of days accounts payable t-1 is the lagged no. of days accounts payable. No. of days accounts receivable is $(\text{accounts receivable} \times 365) / \text{sales}$. Financial debt is $\text{financial debt} / \text{total assets}$. Fixed financial assets is $\text{fixed financial assets} / \text{total assets}$. Size is the natural logarithm of sales. Sales growth is $(\text{this years' sales} - \text{previous years' sales}) / \text{previous years' sales}$. Variability is the standard variation of net operating income $(\text{sales} - \text{cost of sales}) / (\text{total assets} - \text{financial assets})$ over the 1996-2008 period.

Since this paper also controls for country effects, in Table 5 are shown the descriptive statistics for the individual countries. The averages for gross operating income for the individual countries do not vary much from the overall average as seen in Table 4, except for Greece, that has an average of 99.3%. This is probably not a representative value for the country average since Greece has only 39 observations, which means that there are only three Greek firms of the total of 224 firms. Looking to the number of days inventory Denmark, Luxembourg, Italy and Switzerland have median values of over 100, meaning that in these countries firms need on average more than 100 days to sell their products. Looking to the number of days accounts payable France, Italy, Portugal and Spain median values over 100 suggesting that in these countries firms take on average more than 100 days to pay their bills.

Looking to the number of days accounts receivable France, Italy and Spain have the largest median values (80.7, 92.7 and 84.7 respectively) suggesting that in these countries firms have to wait longest to get payments from the customers.

Table 5
Descriptive statistics per country
17 European countries: 2912 total observations

Austria	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.356	7.410	0.271	28.324	74.464	77.324	43.158	0.359	0.000	2.124	0.078	0.067
Median	0.368	7.446	0.269	29.723	40.485	40.672	42.957	0.397	0.000	2.115	0.076	0.043
Maximum	0.746	8.639	0.572	57.878	225.569	225.569	73.672	0.595	0.000	2.317	0.577	0.119
Minimum	0.112	6.295	0.083	3.379	9.435	9.435	20.693	0.108	0.000	1.969	-0.299	0.039
Std. Dev.	0.174	0.696	0.133	14.582	70.452	73.501	14.350	0.151	0.000	0.089	0.185	0.037
Observations	39											
Belgium	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.544	7.392	0.499	58.602	82.927	78.758	48.795	0.223	0.001	2.159	0.077	0.234
Median	0.532	7.483	0.449	41.417	65.908	61.552	61.119	0.232	0.000	2.162	0.078	0.193
Maximum	1.093	9.198	1.632	349.623	369.856	369.856	112.482	0.535	0.019	2.300	0.744	0.493
Minimum	0.149	4.610	0.096	6.826	25.783	25.783	7.054	0.007	0.000	1.990	-0.334	0.030
Std. Dev.	0.264	0.999	0.326	49.516	53.964	52.080	29.823	0.131	0.004	0.085	0.135	0.153
Observations	78											
Denmark	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.588	9.495	0.523	138.425	69.810	68.185	57.068	0.209	0.006	2.353	0.169	0.124
Median	0.483	9.885	0.395	69.524	63.335	59.531	52.100	0.215	0.000	2.350	0.096	0.130
Maximum	1.360	11.077	1.387	425.741	114.460	114.460	156.548	0.449	0.048	2.538	0.664	0.207
Minimum	0.000	5.615	0.084	10.998	38.692	38.692	24.447	0.023	0.000	2.025	-0.026	0.031
Std. Dev.	0.296	1.339	0.301	139.109	20.814	21.269	27.817	0.133	0.013	0.113	0.166	0.068
Observations	52											
Finland	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.821	7.742	0.748	41.874	48.899	51.111	48.744	0.222	0.024	2.202	0.065	1.073
Median	0.348	7.861	0.214	33.722	42.394	44.649	53.458	0.232	0.000	2.210	0.018	0.426
Maximum	3.396	9.802	5.471	95.947	110.435	110.435	80.066	0.439	0.148	2.383	0.536	3.401
Minimum	0.155	5.802	-1.903	9.672	20.472	20.472	0.000	0.011	0.000	2.047	-0.668	0.039
Std. Dev.	0.912	1.160	1.831	22.198	24.410	25.855	21.344	0.126	0.041	0.093	0.195	1.380
Observations	52											
France	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.532	7.963	0.466	98.245	111.050	110.155	80.698	0.275	0.012	2.204	0.094	0.217
Median	0.419	8.118	0.363	61.439	91.899	91.107	68.523	0.252	0.000	2.238	0.063	0.096
Maximum	4.000	10.607	5.548	784.462	579.164	579.164	276.674	0.914	0.854	2.484	1.716	1.543
Minimum	-0.500	4.535	-1.811	0.000	11.623	0.000	0.000	0.000	0.000	1.734	-0.562	0.017
Std. Dev.	0.543	1.236	0.637	121.322	80.894	80.101	50.812	0.159	0.057	0.138	0.192	0.314
Observations	598											
Germany	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.667	8.647	0.556	72.597	53.901	52.555	62.814	0.235	0.006	2.266	0.080	0.164
Median	0.530	8.564	0.419	64.402	46.706	46.252	58.693	0.238	0.000	2.258	0.057	0.087
Maximum	3.064	10.644	2.759	320.502	194.272	192.133	223.528	0.594	0.158	2.485	0.752	1.073
Minimum	0.068	6.052	-2.408	0.490	15.742	15.742	2.297	0.000	0.000	1.948	-0.483	0.028
Std. Dev.	0.507	1.080	0.535	48.560	25.169	22.862	32.595	0.151	0.019	0.122	0.141	0.217
Observations	351											
Great Britan	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.537	7.519	0.463	81.858	87.469	87.129	46.847	0.245	0.040	2.114	0.171	0.214
Median	0.421	7.521	0.350	56.544	49.347	50.001	39.302	0.227	0.000	2.157	0.088	0.133
Maximum	2.536	10.607	4.064	512.221	1040.251	1040.251	289.705	0.940	0.799	2.520	2.482	1.560
Minimum	-0.003	0.781	-2.041	0.000	1.873	0.000	0.000	0.000	0.000	0.376	-0.749	0.018
Std. Dev.	0.368	1.484	0.431	91.893	113.917	119.550	36.870	0.149	0.084	0.240	0.350	0.265
Observations	611											
Greece	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.993	7.132	0.947	25.903	49.902	49.535	46.616	0.251	0.012	2.094	0.171	0.340
Median	0.604	7.356	0.530	18.669	39.020	39.020	43.937	0.279	0.003	2.115	0.130	0.129
Maximum	3.466	8.060	3.217	86.757	153.822	153.822	107.312	0.543	0.099	2.181	0.694	0.851
Minimum	-0.010	5.758	0.216	0.449	3.179	3.362	2.473	0.000	0.000	1.900	-0.066	0.041
Std. Dev.	0.914	0.749	0.901	25.402	45.126	44.645	34.898	0.132	0.023	0.072	0.175	0.368
Observations	39											
Ireland	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.530	6.952	0.559	36.695	40.218	41.095	29.729	0.319	0.020	2.059	0.209	0.801
Median	0.542	7.006	0.365	44.470	40.119	40.940	32.608	0.331	0.011	2.098	0.248	0.801
Maximum	1.313	8.813	2.332	65.687	79.582	79.582	55.541	0.439	0.071	2.298	0.371	1.281
Minimum	0.000	4.429	-1.000	0.582	13.187	13.187	3.820	0.033	0.000	1.640	-0.168	0.320
Std. Dev.	0.266	1.446	0.928	24.702	12.490	12.230	20.479	0.094	0.022	0.205	0.130	0.490
Observations	26											

Italy	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.438	8.189	0.386	106.464	319.827	303.302	92.727	0.331	0.045	2.161	0.080	0.093
Median	0.324	7.932	0.296	63.962	205.658	191.878	87.966	0.323	0.000	2.147	0.058	0.072
Maximum	1.278	10.741	1.146	571.351	1730.020	1730.020	175.815	0.733	2.637	2.450	1.230	0.267
Minimum	-0.500	5.122	-0.692	13.748	47.413	47.413	33.873	0.005	0.000	1.834	-1.000	0.005
Std. Dev.	0.336	1.235	0.271	112.060	329.306	308.401	33.471	0.144	0.241	0.160	0.197	0.078
Observations	169											
Luxembourg	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.394	7.200	0.343	115.732	137.901	149.459	55.345	0.251	0.110	2.085	0.152	0.202
Median	0.308	7.169	0.262	107.349	90.423	87.146	57.585	0.230	0.000	2.099	0.109	0.143
Maximum	1.667	9.811	1.339	427.221	727.318	727.318	88.907	0.522	2.164	2.429	1.046	0.429
Minimum	-0.111	1.778	0.048	0.000	38.778	38.778	12.505	0.009	0.000	1.574	-0.451	0.094
Std. Dev.	0.358	1.311	0.264	98.188	143.253	156.731	19.909	0.141	0.415	0.173	0.264	0.138
Observations	52											
Netherlands	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.806	8.390	0.654	63.661	53.731	52.300	51.008	0.263	0.024	2.250	0.054	0.307
Median	0.674	8.538	0.529	50.228	54.696	53.998	51.813	0.242	0.000	2.243	0.042	0.309
Maximum	4.000	10.871	3.825	363.518	131.247	131.247	138.734	0.598	0.839	2.538	0.825	1.079
Minimum	0.147	5.804	-0.618	0.000	2.481	0.000	5.137	0.000	0.000	1.896	-0.460	0.084
Std. Dev.	0.697	1.210	0.695	64.374	25.805	25.475	22.139	0.144	0.080	0.125	0.173	0.258
Observations	169											
Norway	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.500	10.100	0.475	46.019	49.554	49.682	52.594	0.251	0.000	2.422	0.072	0.209
Median	0.483	9.941	0.442	51.722	47.838	47.428	55.242	0.245	0.000	2.404	0.069	0.128
Maximum	0.809	11.289	2.167	102.588	104.818	104.818	72.535	0.459	0.000	2.594	0.722	0.511
Minimum	0.266	8.513	0.180	5.436	24.892	24.892	34.196	0.014	0.000	2.329	-0.519	0.086
Std. Dev.	0.140	0.873	0.262	28.244	14.779	14.854	9.572	0.107	0.000	0.071	0.203	0.156
Observations	65											
Portugal	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.141	6.778	0.164	30.290	143.556	208.538	43.339	0.368	0.011	2.038	0.197	0.045
Median	0.110	6.841	0.131	20.490	51.984	54.029	53.691	0.374	0.000	2.128	0.102	0.052
Maximum	0.410	8.193	0.388	138.234	1410.507	1410.507	79.449	0.705	0.117	2.264	0.686	0.078
Minimum	-0.026	5.340	0.034	9.492	19.048	19.048	7.503	0.150	0.000	1.705	-0.204	0.005
Std. Dev.	0.109	0.897	0.100	29.834	331.919	426.735	20.626	0.131	0.026	0.186	0.221	0.029
Observations	65											
Spain	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.355	7.257	0.347	56.128	254.573	222.190	84.652	0.320	0.006	2.096	0.170	0.172
Median	0.243	7.306	0.205	36.205	120.331	116.366	74.084	0.315	0.000	2.118	0.127	0.079
Maximum	2.543	10.090	2.410	381.715	1607.283	1265.416	283.648	0.820	0.086	2.395	1.130	0.561
Minimum	-0.051	4.465	-0.976	2.933	21.724	21.724	2.683	0.000	0.000	1.713	-1.000	0.018
Std. Dev.	0.354	1.310	0.435	62.662	365.446	267.921	57.110	0.202	0.016	0.185	0.256	0.173
Observations	182											
Sweden	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.864	10.340	0.800	79.822	55.343	53.660	63.562	0.216	0.026	2.430	0.069	0.202
Median	0.618	10.370	0.557	77.080	50.157	49.118	68.206	0.232	0.000	2.433	0.073	0.112
Maximum	2.805	11.286	3.685	181.532	176.628	176.628	132.581	0.491	0.228	2.536	0.455	0.703
Minimum	0.139	7.946	0.139	5.682	12.714	12.714	4.544	0.000	0.000	2.282	-0.413	0.068
Std. Dev.	0.645	0.601	0.683	41.828	22.513	22.374	28.436	0.116	0.051	0.054	0.132	0.198
Observations	104											
Switzerland	GOI	Margin	NOI	DI	DP	DPt-1	DR	FDR	FFAR	S	SG	VAR
Mean	0.864	8.010	0.856	150.388	85.269	85.454	63.814	0.201	0.007	2.095	0.090	0.231
Median	0.720	7.825	0.681	105.347	59.425	60.682	63.164	0.180	0.000	2.175	0.057	0.157
Maximum	4.000	11.095	5.295	708.512	1043.272	1043.272	143.033	0.600	0.227	2.452	1.372	1.432
Minimum	-0.001	4.091	-0.002	0.000	0.000	0.000	0.000	0.000	0.000	-0.443	-0.573	0.049
Std. Dev.	0.596	1.460	0.729	140.171	122.483	123.434	20.475	0.130	0.028	0.402	0.238	0.287
Observations	260											

Notes:

GOI is gross operating income. Margin is Ln(margin). NOI is net operating income. DI is no. of days inventory. DP is no. of days accounts payable. DPt-1 is the lagged no. of days accounts payable. DR is no. of days accounts receivable. FDR is financial debt. FFAR is fixed financial assets. S is size. SG is sales growth. SG is sales growth. VAR is variability. All descriptive statistics are measured per individual country for all observed firm-years per country over the 1996-2008 period.

4.2 Pearson Correlation Matrices

In Table 6 is shown the Pearson Correlation Matrix for the variables included in the regression model with gross operating income, margin and net operating income as dependent variables. For pairs of variables the correlation, which is a measure of the degree of linear relationship, is shown (Lazaridis and Tryfonidis 2006). A disadvantage of the Pearson Correlation Matrix is that although it shows linear relations between variables it does not show which variable influences the other (Deloof 2003). Like Deloof (2003) this paper finds positive correlations between the number of days inventory, days accounts payable and days accounts receivable. Different from Deloof (2003) this paper finds that the number of days inventory and accounts receivables are positively correlated with gross operating income. This suggests that less profitable firms due to lower sales hold lower inventories, and that firms with higher profitability grant more trade credit to their customers (Deloof and Jegers 2003). The negative correlation between gross operating income and the number of days accounts payable is consistent with the view firms that have lower profits extend the payments to their suppliers. Table 6 however shows different correlations for the other two models. Margin as dependent variable like Deloof (2003) has negative correlations with the three working capital measures, while net operating income as dependent variable has a negative correlation with the days inventory and positive correlations with the number of days accounts payable and receivable. Although the Pearson correlation matrices alone are not enough to draw final conclusions on, it is evident the correlations between the three measures for profitability and the measures for working capital management are not uniform.

Table 6
Pearson Correlation Coefficients
224 European Non-financial Firms, 1996-2008: 2912 Firm-year observations

	<i>Gross operating income</i>	<i>Margin</i>	<i>Net operating income</i>	<i>No. of days inventory</i>	<i>No. of days accounts payable</i>	<i>No. of days accounts payable t-1</i>	<i>No. of days accounts receivable</i>	<i>Financial debt</i>	<i>Fixed financial assets</i>	<i>Size</i>	<i>Sales growth</i>	<i>Variability</i>
Gross operating income	1.000											
Margin	0.078	1.000										
Net operating income	0.735	0.021	1.000									
No. of days inventory	0.068	-0.001	0.067	1.000								
No. of days accounts payable	-0.053	-0.172	-0.034	0.144	1.000							
No. of days accounts payable t-1	-0.050	-0.189	-0.024	0.109	0.859	1.000						
No. of days accounts receivable	0.014	-0.026	-0.009	0.116	0.331	0.310	1.000					
Financial debt	-0.293	0.035	-0.236	-0.160	0.069	0.074	-0.012	1.000				
Fixed financial assets	-0.018	0.033	-0.034	-0.009	-0.026	-0.027	-0.033	0.043	1.000			
Size	0.033	0.785	-0.023	-0.092	-0.261	-0.279	-0.024	0.028	0.019	1.000		
Sales growth	-0.012	-0.168	0.062	0.042	0.113	0.160	0.021	-0.030	0.004	-0.117	1.000	
Variability	0.366	-0.183	0.365	0.015	-0.006	0.002	-0.013	-0.155	-0.022	-0.130	0.107	1.000

Notes:

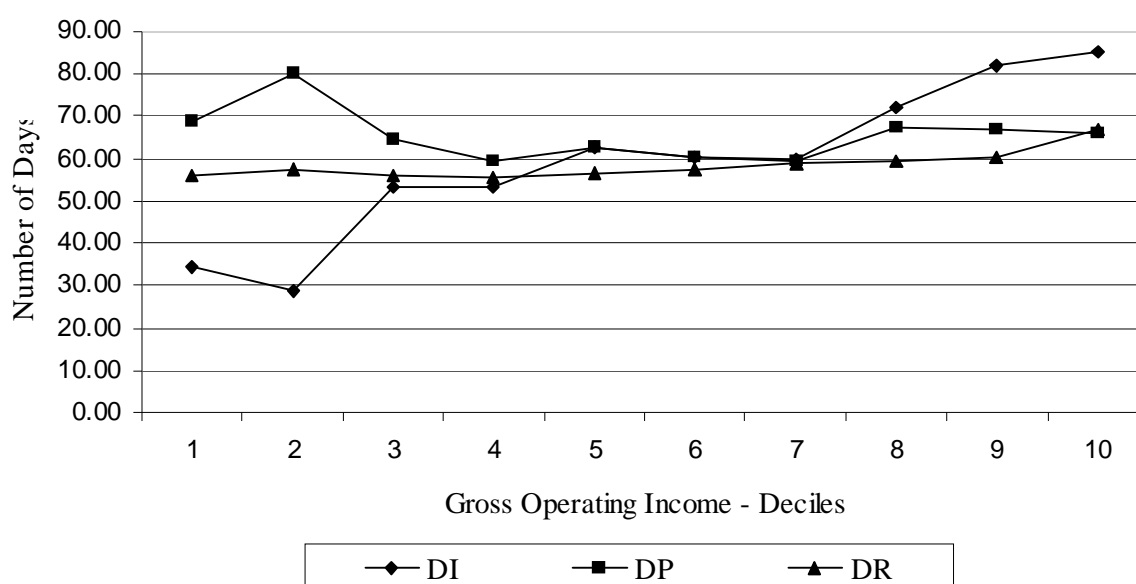
Gross operating income is (sales – cost of sales + depreciation & amortization) / (total assets – financial assets). Margin is the natural logarithm of (sales – cost of goods sold). Net operating income is (sales – cost of sales) / (total assets – financial assets). No. of days inventory is (inventories x 365)/cost of sales. No. of days accounts payable is (accounts payable x 365)/cost of sales. No. of days accounts payable t-1 is the lagged no. of days accounts payable. No. of days accounts receivable is (accounts receivable x 365)/sales. Financial debt is financial debt/total assets. Fixed financial assets is fixed financial assets/total assets. Sales growth is (this years' sales – previous years' sales)/previous years' sales. Variability is the standard variation of net operating income (sales – cost of sales)/(total assets – financial assets) over the 1996-2008 period.

4.3 Number of Days versus Profitability Deciles

In the Figures 1 to 3 are shown the median number of days inventory, the number of days accounts payable and the number of days accounts receivable portioned by gross operating income, margin and net operating income respectively. Based on the results shown in these Figures there is evidence that firms that are less profitable have lower number of days inventory. This is consistent with theory that says that firms with lower profitability due to lower sales decrease their inventory level. There is no evidence that firms that are less profitable pay their bills later. There is no evidence that firms that better collect payments from their customers have higher profits or that profitable firms extend the trade credit to their customers.

Figure 1

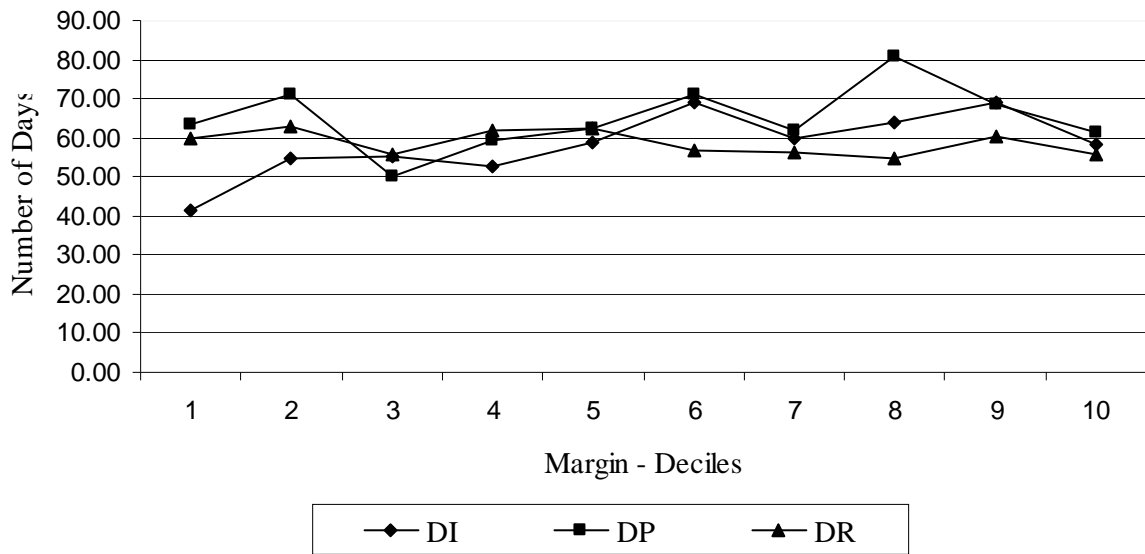
Median of No. of Days Inventory, No. of Days Accounts Payable and No. of Days Accounts Receivable, partitioned by Gross Operating Income (224 European Non-financial Firms, 1996-2008: 2912 Firm-year Observations)



Notes: DI is the No. of Days Inventory. DP is the No. of Days Accounts Payable. DR is the No. of Days Accounts Receivable.

Figure 2

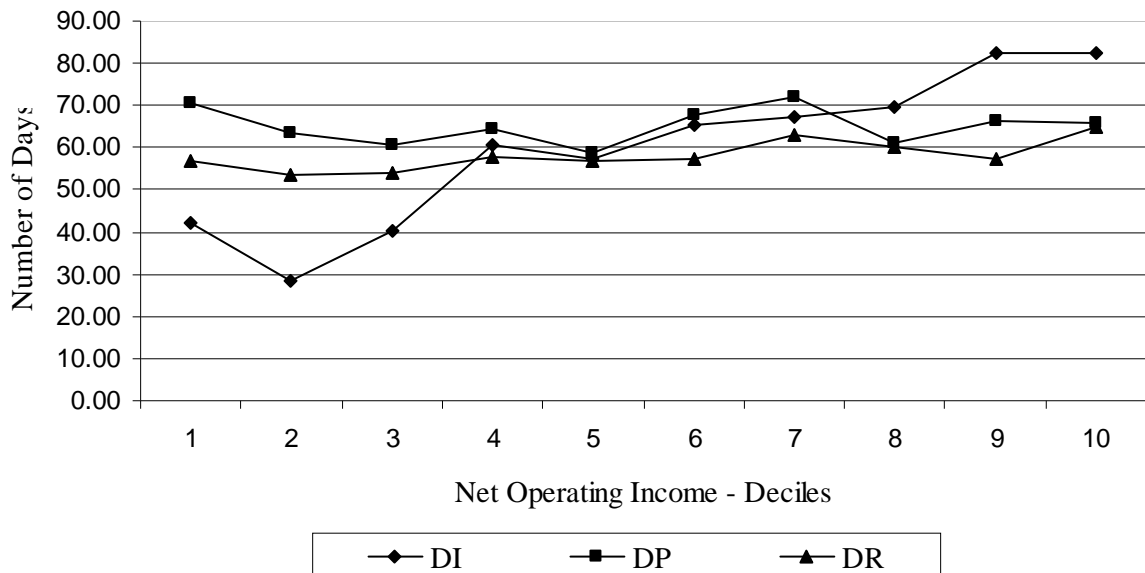
Median of No. of Days Inventory, No. of Days Accounts Payable and No. of Days Accounts Receivable, partitioned by Margin (224 European Non-financial Firms, 1996-2008: 2912 Firm-year Observations)



Notes: DI is the No. of Days Inventory. DP is the No. of Days Accounts Payable. DR is the No. of Days Accounts Receivable.

Figure 3

Median of No. of Days Inventory, No. of Days Accounts Payable and No. of Days Accounts Receivable, partitioned by Net Operating Income (224 European Non-financial Firms, 1996-2008: 2912 Firm-year Observations)



Notes: DI is the No. of Days Inventory. DP is the No. of Days Accounts Payable. DR is the No. of Days Accounts Receivable.

4.4 Results Regression Models

In table 7 are shown the results of the regression analysis with gross operating income as dependent variable. The number of days inventory shows a positive relation with gross operating income for both OLS regressions, suggesting that less profitable firms decrease their number of days inventory. The coefficient for the number of days inventory of regression (3) for example is 0.033, which means that when gross operating income which is a percentage, decreases with 0.033 percentage points this is associated with a decrease of one day for the number of days inventory. The number of days accounts payable and receivable are not significant, suggesting there is no relation with gross operating income. Noteworthy of regression (2) and (4) however is that using the lagged number of days accounts payable adds significance to the number of days accounts receivable. Looking to the adjusted R^2 's, the adjusted R^2 's of the fixed effects regressions do not differ much from Deloof (2003) who finds an adjusted R^2 of around 0.73, while the adjusted R^2 's of the OLS regressions are 0.12 percentage points higher than Deloof (2003), who finds an adjusted R^2 of around 0.22, which could suggest the addition of country effects adds explanatory value to the regression models.

In Table 8 are the results of the regressions with margin as dependent variable. The number of days inventory is significant for all regressions, showing positive relations in the fixed effects models and negative relations in the OLS models. These results suggest that when regressing for within firm effects, firms with lower profitability hold lower inventories and that when regressing for between firm effects firms that improve their number of days inventory can improve their profitability. To give some economic sense to the coefficients of Table 8, the coefficient of the number of days inventory of regression (3) for example means that a decrease of the number of days inventory of one day is associated with an increase of margin of 0.086 (which is measured as the natural logarithm of margin). For example for the firm A2A Spa, which is one of the firms used for this paper, a decrease of the number of days inventory of one day in the year 1996 is associated with an actual increase of margin of 15 million euros (margin is 5.12). For the year 2008 however it is associated with an actual increase of 161 million euros (margin is 7.49). The number of days accounts payable and the lagged number of days accounts payable are significant for all regressions, showing a negative relation with margin. This suggests that firms increase their days accounts payables when they have lower profitability.

The negative relation between the lagged number of days payable and margin might suggest that previous year's number of days accounts payable affects this year's profitability, however it is most likely that firms in anticipation of a lower profit in the next year already increase their number of days accounts payable. The number of days accounts receivable is significant for both OLS regressions, showing a positive relation, which suggest that more profitable firms extend their trade credit. The adjusted R^2 's are 0.91 for the fixed effects regressions and 0.20 for the OLS regressions. The adjusted R^2 's of the fixed effects are higher than those of Deloof (2003) suggesting that the data of the fixed effects models fit the models better with margin as dependent variable. The adjusted R^2 's of the OLS regressions are only slightly lower than Deloof (2003). Since Deloof (2003) does not use margin as a measure for profitability no remarks can be made about possible country effects.

In table 9 are shown the results for the regressions with net operating income as dependent variable. The number of days inventory is significant for all regressions, showing a negative relation in the fixed effects models and a positive relation in the OLS models. The negative relation in the fixed effects regressions suggests that firms can increase profitability by decreasing their number of days inventory. To give economic sense to the relation for example, the coefficient of regression (1) means that a decrease of the number of days inventory by one day is associated with an increase of net operating income, which is a percentage, by 0.047 percentage points. The positive relations in the OLS regressions suggest that less profitable firms hold smaller inventories. The number of days accounts receivable is significant for both OLS regressions showing a negative relation, which suggests that firms can increase their profitability by decreasing the number of days accounts receivable. The lagged number of days accounts payable is significant for the OLS regression, showing a positive relation. This might suggest that increasing the number of days accounts payable increases next year's profit, however since it is unclear what the causality is between the lagged number of days accounts payable and profitability, this positive relation is insufficient for a determinative conclusion. The adjusted R^2 's are 0.57 for the fixed effects regressions and 0.26 for the OLS regressions. The adjusted R^2 's for the fixed effects regressions are lower than Deloof (2003), while those of OLS regression a little bit higher. Since Deloof (2003) does not show the results of his regression model with net operating income, the adjusted R^2 's of this paper's model with net operating income cannot be compared to his and no remarks can be made about possible country effects.

Table 7
The Determinants of Corporate Profitability
224 European Non-financial Firms, 1996-2008: 2912 Firm-year Observations

<i>Dependent variable:</i>	Gross Operating Income			
	<i>Fixed effects</i>		<i>OLS with dummies</i>	
	1	2	1	2
No. of days inventory	-0.008 (0.461)	-0.007 (0.523)	0.034 (0.002)***	0.033 (0.002)***
No. of days accounts payable	0.010 (0.094)	- -	0.006 (0.268)	- -
No. of days accounts receivable	0.041 (0.061)	0.042 (0.043)***	-0.052 (0.060)	-0.057 (0.037)***
Financial debt	-0.517 (0.000)***	-0.515 (0.000)***	-0.599 (0.000)***	-0.600 (0.000)***
Fixed financial assets	0.036 (0.822)	0.036 (0.820)	0.082 (0.642)	0.084 (0.634)
Size	0.168 (0.000)***	0.173 (0.000)***	0.164 (0.000)***	0.172 (0.000)***
Sales growth	-0.103 (0.000)***	-0.108 (0.000)***	-0.043 (0.202)	-0.048 (0.154)
Variability	- -	- -	0.468 (0.000)***	0.467 (0.000)***
No. of days accounts payable t-1	- -	0.012 (0.121)	- -	0.010 (0.055)
Adjusted R-squared	0.75	0.75	0.34	0.34

Notes:

p -values (robust for heteroskedasticity) in parentheses. OLS-regressions include 7 industry dummies and 3 country dummies (results not reported). Gross operating income is $(\text{sales} - \text{cost of sales} + \text{depreciation \& amortization}) / (\text{total assets} - \text{financial assets})$. No. of days inventory is $(\text{inventories} \times 365) / \text{cost of sales}$. No. of days accounts payable is $(\text{accounts payable} \times 365) / \text{cost of sales}$. No. of days accounts payable t-1 is the lagged no. of days accounts payable. No. of days accounts receivable is $(\text{accounts receivable} \times 365) / \text{sales}$. Financial debt is $\text{financial debt} / \text{total assets}$. Fixed financial assets is $\text{fixed financial assets} / \text{total assets}$. Size is the natural logarithm of sales. Sales growth is $(\text{this years' sales} - \text{previous years' sales}) / \text{previous years' sales}$. Variability is the standard variation of net operating income $(\text{sales} - \text{cost of sales}) / (\text{total assets} - \text{financial assets})$ over the 1996-2008 period.

Table 8
The Determinants of Corporate Profitability
224 European Non-financial Firms, 1996-2008: 2912 Firm-year Observations

<i>Dependent variable:</i>	Margin			
	<i>Fixed effects</i>		<i>OLS with dummies</i>	
<i>Regression model:</i>	1	2	1	2
No. of days inventory	0.068 (0.000)***	0.064 (0.002)***	-0.086 (0.001)***	-0.092 (0.000)***
No. of days accounts payable	-0.038 (0.000)***	-	-0.122 (0.000)***	-
No. of days accounts receivable	-0.049 (0.198)	-0.054 (0.172)	0.168 (0.024)***	0.166 (0.024)***
Financial debt	0.065 (0.519)	0.055 (0.000)***	0.103 (0.574)	0.107 (0.558)
Fixed financial assets	-0.989 (0.050)***	-0.988 (0.050)***	0.692 (0.407)	0.680 (0.413)
Size	-	-	-	-
Sales growth	0.148 (0.144)	0.168 (0.109)	-0.482 (0.000)***	-0.434 (0.001)***
Variability	-	-	-0.571 (0.000)***	-0.569 (0.000)***
No. of days accounts payable t-1	-	-0.048 (0.000)***	-	-0.138 (0.000)***
Adjusted R-squared	0.91	0.91	0.20	0.20

Notes:

p -values (robust for heteroskedasticity) in parentheses. OLS-regressions include 7 industry dummies and 3 country dummies (results not reported). Margin is the natural logarithm of (sales – cost of sales). No. of days inventory is (inventories x 365)/cost of sales. No. of days accounts payable is (accounts payable x 365)/cost of sales. No. of days accounts payable t-1 is the lagged no. of days accounts payable. No. of days accounts receivable is (accounts receivable x 365)/sales. Financial debt is financial debt/total assets. Fixed financial assets is fixed financial assets/total assets. Sales growth is (this years' sales – previous years' sales)/previous years' sales. Variability is the standard variation of net operating income (sales – cost of sales)/(total assets – financial assets) over the 1996-2008 period.

Table 9
The Determinants of Corporate Profitability
224 European Non-financial Firms, 1996-2008: 2912 Firm-year observations

<i>Dependent variable:</i>	Net Operating Income			
	<i>Fixed effects</i>		<i>OLS with dummies</i>	
	1	2	1	2
No. of days inventory	-0.047 (0.005)***	-0.049 (0.006)***	0.033 (0.003)***	0.032 (0.003)***
No. of days accounts payable	-0.002 (0.786)	- -	0.008 (0.153)	- -
No. of days accounts receivable	0.002 (0.969)	0.001 (0.983)	-0.082 (0.017)***	-0.089 (0.009)***
Financial debt	-0.388 (0.000)***	-0.393 (0.000)***	-0.499 (0.000)***	-0.500 (0.000)***
Fixed financial assets	-0.072 (0.186)	-0.071 (0.177)	-0.022 (0.753)	-0.019 (0.781)
Size	-0.066 (0.493)	-0.056 (0.538)	0.033 (0.529)	0.044 (0.386)
Sales growth	0.101 (0.103)	0.099 (0.118)	0.130 (0.045)***	0.123 (0.054)
Variability	- -	- -	0.544 (0.000)***	0.544 (0.000)***
No. of days accounts payable t-1	- -	0.004 (0.660)	- -	0.015 (0.047)***
Adjusted R-squared	0.57	0.57	0.26	0.26

Notes:

p-values (robust for heteroskedasticity) in parentheses. OLS-regressions include 7 industry dummies and 3 country dummies (results not reported). Net operating income is $(\text{sales} - \text{cost of sales}) / (\text{total assets} - \text{financial assets})$. No. of days inventory is $(\text{inventories} \times 365) / \text{cost of sales}$. No. of days accounts payable is $(\text{accounts payable} \times 365) / \text{cost of sales}$. No. of days accounts payable t-1 is the lagged no. of days accounts payable. No. of days accounts receivable is $(\text{accounts receivable} \times 365) / \text{sales}$. Financial debt is $\text{financial debt} / \text{total assets}$. Fixed financial assets is $\text{fixed financial assets} / \text{total assets}$. Size is the natural logarithm of sales. Sales growth is $(\text{this years' sales} - \text{previous years' sales}) / \text{previous years' sales}$. Variability is the standard variation of net operating income $(\text{sales} - \text{cost of sales}) / (\text{total assets} - \text{financial assets})$ over the 1996-2008 period.

4.5 Results Additional Regressions

Next to the mentioned analyses, a number of additional analyses were done in order to find possible evidence for a relation between working capital management and corporate profitability, and possible evidence for country effects.

4.5.1 Regressions on Country Groups

In Table 10 are shown the results of regressions on firms grouped by countries, based on common country effects. The regression models used are the regression models as described in paragraph 3.3, except that due to the low observations per group it was not possible to control for industry effects. The purpose of these regressions is to find additional evidence of country effects in the relation between working capital management and corporate profitability. Noteworthy results are that in the group with Austria the number of days payable is positively related with profitability for all regressions. This positive relation suggests that firms in these countries can improve their profitability by paying their bills later. However since it is unclear what the causalities are between the number of days accounts payable and profitability, it is possible that other factors cause this positive relation. Also in the group with Austria the number of days accounts receivable is negative for all OLS regressions, suggesting that in these countries firms extend their trade credit when their profitability increases. In the group with Belgium the adjusted R^2 's of the OLS regressions with gross operating income are higher than Deloof (2003)'s. This is noteworthy since Deloof (2003) bases his findings on an a sample of Belgian firms, however it must be noted that all but one group have a higher adjusted R^2 for the regression model with gross operating income. In the group with France and the group with the Netherlands the number of days accounts payable is negative for all regressions suggesting that in these countries firms that are less profitable pay their bills later. In the group with Great Brittan the number of days inventory is negative for all regressions, suggesting that in these countries firms can increase profitability by improving their number of days inventory. Concerning these results one should take in mind however that because of the low number of observations per group, the results can be biased due to outlying values. Looking to the adjusted R^2 's of the regression models with gross operating income all groups, except the group with Great Brittan, have a higher adjusted R^2 than Deloof (2003) which is 0.22.

Comparing these results with the adjusted R^2 of the regression model in Table 7, it shows that for all groups, except the group with Great Brittan, the adjusted R^2 's higher as well. These results suggest that other factors than country effects cause the differences in the adjusted R^2 's.

Table 10

Regressions on firms grouped by country effects

224 European Non-financial Firms, 1996-2008: 2912 Firm-year observations

Country Group		DI		DP		DR		AR2	
		Fixed	OLS	Fixed	OLS	Fixed	OLS	Fixed	OLS
<i>Austria</i>	GOI	z	z	p	p	n	p	0.88	0.43
	Margin	p	z	p	p	z	p	0.95	0.19
	NOI	n	z	p	p	z	p	0.75	0.23
	Observations	390							
<i>Belgium</i>	GOI	p	z	z	p	z	z	0.72	0.42
	Margin	p	p	z	n	z	z	0.85	0.19
	NOI	z	z	z	p	z	z	0.70	0.44
	Observations	390							
<i>Finland</i>	GOI	z	n	z	p	z	z	0.82	0.46
	Margin	z	z	z	n	z	p	0.93	0.57
	NOI	z	z	z	z	z	z	0.09	0.05
	Observations	117							
<i>France</i>	GOI	z	z	p	n	z	z	0.75	0.36
	Margin	z	z	p	n	n	n	0.93	0.12
	NOI	n	n	z	n	z	n	0.65	0.35
	Observations	845							
<i>Great Brittan</i>	GOI	z	p	z	z	n	z	0.66	0.20
	Margin	z	p	n	n	z	z	0.88	0.17
	NOI	z	p	z	z	z	z	0.38	0.08
	Observations	637							
<i>Netherlands</i>	GOI	z	n	n	n	p	p	0.77	0.52
	Margin	z	z	n	z	z	n	0.96	0.25
	NOI	z	z	n	z	z	p	0.77	0.50
	Observations	429							
<i>Sweden</i>	GOI	z	p	z	z	z	z	0.84	0.79
	Margin	z	z	z	p	n	p	0.75	0.36
	NOI	z	p	z	z	z	z	0.89	0.85
	Observations	104							

Notes:

GOI is gross operating income. Margin is the Ln(Margin). NOI is net operating income. DI is no. of days inventory. DP is no. of days accounts payable. DR is no. of days accounts receivable. AR2 is adjusted R-squared. Country groups are based on common country effects. Country group Austria consists of Austria and Germany. Country group Belgium consists of Belgium, Denmark, Greece, Luxembourg and Italy. Country group France consists of France, Norway and Spain. Country group Great Brittan consists of Great Brittan and Ireland. Country group Netherlands consists of The Netherlands and Switzerland. Country group Sweden consists of Sweden.

4.5.2 Additional Regressions

Below follow additional regressions done that were not mentioned in the text and with the results not shown:

- The regression models (3) as shown in the Tables 7, 8 & 9 were regressed with OLS without dummies controlling for country effects. The results do not differ much from the results with country effects, except for the number of days inventory that is now significant for all regressions, suggesting that the relation between profitability and the days inventory is better explained without country effects. The adjusted R^2 's of the regressions have decreased, but only by very small numbers. The lower adjusted R^2 's could mean that the models lose explanatory value with the exclusion of country effects, however it can also be caused by the exclusion of three variables in general. Compared to Deloof (2003) the adjusted R^2 's for the regressions with gross operating income and net operating income are higher.
- For all three measures for profitability OLS regressions were done, with and without country effects, with the cash conversion cycle as variable, measured as (number of days inventory + number of days accounts receivable – number of days accounts payable), with the control and dummy variables. The cash conversion cycle is only significant for the models with margin as a measure for profitability, showing a positive relation which suggests that firms with lower profitability hold less cash in working capital. The adjusted R^2 's of the models without country effects are again only slightly lower that with country effects. Compared to Deloof (2003) both with and without country effects the adjusted R^2 's for the models with gross operating income and net operating income are higher.

- For all three measure for profitability fixed effects regressions were done with the cash conversion cycle as variable. Again this variable was only significant for the model with margin as profitability measure, showing a positive relation. The adjusted R^2 's are as expected higher than in the OLS regression models, the adjusted R^2 of the model with margin as measure for profitability as high as 0.91, suggesting that the variation in margin is explained very well by the variations in the model with cash conversion cycle as a independent variable. Compared to Deloof (2003) the adjusted R^2 's of the models with gross operating and margin are higher.
- An altered dataset was formed excluding additional outliers or non-realistic values. For all three measures for working capital management the zero's were excluded and the values above the overall country highest medians from Table 5. The altered dataset consisted of 1672 unbalanced observations, so no fixed effects models were possible and only the OLS (3) regressions were done. The results of the regressions with the altered dataset differ much from the results of the regressions from the normal dataset. In the model with gross operating income as dependent variable the number of days inventory loses significance, while the number of days accounts payable and receivable are now significant, showing a positive and a negative relation respectively. The model with margin loses significance for the days inventory and the number of days accounts receivable, while the number of days accounts payable now shows a positive relation with the margin. The model with net operating income as dependent variable now has now significant relations for all three measures of working capital management, with the number of days accounts payable now showing a positive relation. For all three regression models the adjusted R^2 's are slightly lower than those of the models of the normal dataset, indicating that the models of the altered dataset have a little less explanatory value explaining the variation of the dependent variables.

5 Conclusions

For many firms working capital investments make out a large part of their short-term assets. An improved management of this working capital can be expected to have an important influence on the corporate profitability of firms, although profitability can also affect working capital management decisions. Previous studies show a negative relation between working capital management and corporate profitability suggesting that firms can increase shareholders' value by decreasing the amount of cash locked up in working capital. In this paper the relation between working capital management and corporate profitability was studied for a sample of European firms. One must however take in mind that the firms used for this paper's dataset are the largest public firms of Europe and it is very well possible that the size of the firms and their easier access to capital from the market causes a lower need to optimize their working capital levels. Additionally since this paper does not differentiate between firms with tangible and non-tangible products, and firms with long and short cash conversion cycles, the datasets used have quite a large number of outlying values which have a significant influence on the results. When interpreting the results of this paper it should therefore be taken in consideration that although the conclusions correctly represent the analyses of the data of this paper's firms, it is questionable whether the conclusions are representative for other samples of firms.

The main research question of the paper was to research if there is evidence for country effects in the relation between working capital management and corporate profitability. Two goals were set to answer this research question. The first goal was to closely follow Deloof (2003)'s research and compare his findings to this paper's findings. The second goal was to compare the results of the regression models with and without country effects. Table 11 shows the main results of the regression models following Deloof (2003).

Table 11
Overview of the most important results of the regression analyses

	No. Days Inventory		No. Days Payable		No. Days Receivable		Adjusted R-squared	
	<i>Fixed Effects</i>	<i>OLS</i>	<i>Fixed Effects</i>	<i>OLS</i>	<i>Fixed Effects</i>	<i>OLS</i>	<i>Fixed Effects</i>	<i>OLS</i>
Gross Operating Income	zero	positive	zero	zero	zero	zero	0.75	0.34
Margin	positive	negative	negative	negative	zero	positive	0.91	0.20
Net Operating Income	negative	positive	zero	zero	zero	negative	0.57	0.26

Notes:

Shown are the main results of the three regression analyses following Deloof (2003). Zero means there is no relationship between the variables. Also shown are the adjusted R²'s of the regression models.

To be able to answer the research question four testable hypotheses were prepared. The first hypothesis is that there is no relationship between the number of days inventory and corporate profitability. The regression models show there is a relation between the number of days inventory and profitability, showing positive and negative relations in different models. Additionally Figure 1 shows a positive relation between the number of days inventory and profitability, suggesting that the firms of this paper's sample hold lower inventories when their profitability decreases. Therefore the H_{01} of the first hypothesis is rejected. The second hypothesis is that there is no relation between the number of days accounts payable and corporate profitability. The number of days accounts payable is only significant in the regression model with margin as dependent variable showing a negative relation and in three country groups showing both positive and negative relations. Together with the results of Figure 2, there is not enough evidence for a relation between the number of days accounts payable and profitability so the H_{02} of the second hypothesis is accepted. The third hypothesis is that there is no relation between the number of days accounts receivable and corporate profitability. The number of days accounts receivable is only significant for the OLS regressions with margin and net operating income as dependent variable, showing a positive and a negative relation respectively, and for the OLS regressions of one country group showing positive relations. Together with the results of Figure 3, there is not enough evidence for a relation between the number of days accounts receivable and profitability so the H_{03} of the third hypothesis is accepted. The fourth hypothesis is that the addition of country effects has no additional explanatory value to the relationship between working capital management and corporate profitability. The three regression models described in Tables 7, 8 and 9 as expected all have higher goodness-of-fit statistics (adjusted R^2 's) with fixed effects models. This is also the case when regression models are used with the cash conversion cycle as a measure for working capital management. The OLS regression models without country effects do not show different results than the models described in Table 7, 8 and 9. As expected the adjusted R^2 's of the regressions models do not differ much from Deloof (2003)'s.

Additional regressions with firms grouped by country effects show that for all country groups except one, the adjusted R^2 's are higher than Deloof (2003) suggesting that other factors than the country effects cause these higher R^2 's. Based on these results this paper finds no evidence that the addition of country effects adds explanatory value to the regression models and the H_{04} of the fourth hypothesis is accepted.

Since the first hypothesis is rejected it cannot be concluded that working capital management has no relation with corporate profitability, however the significant relation of the number of days inventory with profitability is leveled out when regressions are done with the cash conversion cycle as measure for working capital management. In any case the results of this paper's regression analyses differ from Deloof (2003)'s findings. Since the fourth hypothesis is rejected it can further be concluded that the addition of country effects has no additional explanatory value. This suggests that the relation between working capital and corporate profitability has to do with firm specific characteristics that are not country bound.

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