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Working Capital Management impact on Profitability

Empirical study based on Portuguese firms

Author: João Nogueira Serrasqueiro

Advisor: Professor Ricardo Reis

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Abstract

The main objective of this dissertation is to understand the impact of working capital management on profitability. This study comes in a period where managers are trying to push up the businesses activities and management policies are changing, aiming to adapt to the new economic context.

The working capital management appears with relevance in several studies given the importance of the short-term policies in the value creation for the shareholders. In the literature are present several studies aiming to test the efficiency of working capital management and the relation with the profitability in the firms. The authors have been studying working capital by testing within the management policies, the size of the firm, the industry and geographical impact on the profitability.

The core difference of this dissertation comparing with the previous studies is the role of working capital management and the impact in profitability of Portuguese firms, how firms in Portugal are managing working capital and what relevance does it bring to actual performance.

In front of the recent economic difficulties and the struggling in credit finance experienced by Portuguese companies, the working capital management can be an important source of credit through an efficient management of the current assets and liabilities.

The study will be developed under descriptive and empirical statistics and the data will be collected from Bloomberg for the period 2002-2006 in an annual basis. From the initial raw data will be excluded the data outliers and firms without complete information. In order to proceed correctly through the analysis, some control variables will be added and some tests will be carried out.

The data will be treated and disposed in panel data to provide an intuitive analysis and interpretation to the reader. This dissertation will follow some papers and previous studies which tested similar hypothesis but in different countries with different economic-cultural aspects.

Resumo

O principal objectivo desta dissertação é compreender o impacto da gestão do Fundo de Maneio na rentabilidade das empresas. Este estudo aparece numa fase em que os gestores estão focados em mudar a actividade económica que se tem vivido nos últimos tempos.

A gestão de Fundo de Maneio surge com relevância em diversos estudos dada a importância da gestão de curto prazo na criação de valor para as diferentes partes relacionadas com as empresas. Foram realizados diversos estudos que testam a eficiência da gestão de fundo de maneio e respectivo impacto na rentabilidade das empresas. Dos diferentes estudos envolvidos neste tema, os que mais se destacam envolvem características onde os autores têm estudado o fundo de maneio relacionando com as políticas de gestão, com a dimensão das empresas e a divisão geográfica.

A principal diferença desta dissertação ao comparar com os estudos anteriores focados no mesmo tema é o facto de os resultados empíricos serem baseados em empresas Portuguesas o que, até à data de hoje, ainda não tinha sido realizado. Este estudo foca-se em como as empresas em Portugal gerem o fundo de maneio e que relevância essa gestão, tem para a performance dessas empresas.

As actuais dificuldades vividas em Portugal no que está relacionado com a actividade económica e a dificuldade na obtenção de empréstimos e linhas de crédito suscitam questões para os gestores em como financiar as actividades assim como deverá ser feita a gestão dos actuais recursos das empresas

Desta forma, este estudo procura relacionar através do uso da estática descritiva e empírica de como a gestão de fundo de maneio influencia o retorno das empresas e de que forma as politicas mais agressivas ou mais conservativas se relacionam com as dificuldades económicas vividas em Portugal.

A base de dados será a Bloomberg e os dados serão usados numa base anula e formarão uma amostra de 3360 empresas entre 2002 e 2006, constituindo assim um número de observações de grande dimensão para que as conclusões possam ser bem sustentadas. Alguns dados serão excluídos de forma a preservar a robustez dos modelos e evitar alguns erros de análise. Serão adicionadas algumas variáveis de controlo de forma a imputar os devidos efeitos nas variáveis em estudo.

O estudo empírico será realizado em *panel data* o que permite atribuir individualidade a cada empresa durante os anos em estudo. Serão seguidas algumas linhas de raciocínio suportados por alguns *papers* e estudos cuja as hipóteses testadas são semelhantes ao objectivo do presente trabalho.

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Abbreviations

SME- Small and medium enterprises

EBIT- Earnings before Interests and Taxes

ROA – Return on Assets

GDP – Gross Domestic Product

GDPGR – Gross Domestic Product Annual Growth

TA – Total Assets

FA – Financial Assets

SGR- Sales Growth

DAR –Number of days of Accounts Receivable

DAP- Number of Days of Accounts Payable

DINV – number of Days of Inventory

CCC –Cash Conversion Cycle

DSAP – Number of days Sales of Accounts Payable

DSINV - Number of days Sales of Inventory

NTC – Net Trade Cycle

DSO – Days Sales Outstanding, same as DAR

DPO - Days Payable Outstanding, same as DAP

DIO – Days Inventory Outstanding, same as DINV

OLS – Ordinary Least Squares

RER-Random Effects Regression

FER –Fixed Effects Regression

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1. Introduction

In the literature there are several studies related with the financing alternatives for firms as a way to help managers in their decisions. Some are discussed in order to give information for actual and future professionals about empirical evidences (Garcia-Teruel, 2006) (Nazir and Afza, 2003) and others studies just base their conclusions on past theories (Shin and Soenen, 1998). Many managers search for information about the value creation and how to do it.

I will refer to current versus non-current management, in the sense that using current liabilities as a financing mechanism and non-current when equity or long term liabilities (such as loans) as primarily used as financing tools. The non-current management is a solid and relevant source of profitability for the firms and this is why, most of the managers focus on long term management decisions. Therefore, the subjects related with the short-term financial management were during many years overlooked, since it was not recognized as a potential source of value creation. In my opinion the short term perspective was mostly targeting pure working capital flows in order to maintain the operations in course.

The literature shows the importance of working capital management, referring that the short-term management as a source of information about the companies. In fact, when looking at the working capital, managers can absorb a lot of information about the market and specifically about the customers, the companies and the suppliers. The monitoring of the working capital allows for a better liquidity management and therefore allows for the better allocation of the short-term resources. The liquidity management is a source of stability, support for the profitability of the companies, and a potential source of value creation for shareholders, while constituting an alternative source of financing.

The different stakeholders seek the success of the companies and if an efficient working capital management leads to better results and higher profitability, these policies should be promoted and understood closer in order to leverage the internally generated funds.

The working capital management has been addressed by many authors as well as the relation of these management policies and the corporate profitability. Ross (2002) points out the relationship between working capital management and profitability by referring one of most important indicator of a firm's profitability is the assets turnover, "The link between the firm cash cycle and its profitability can be

easily seen by recalling that one of the basic determinants of profitability and growth for a firm is its total assets turnover” (Ross et al, 2002:648).

In this study the working capital management and the impact on profitability will be analyzed empirically for Portuguese firms. Different authors evidences (Garcia-Teruel, 2006) (Deloof, 2003) have analyzed this issue in other contexts, but never for Portugal. The analysis will be made by disaggregating the working capital into the three main components and these parts will be explored in order to understand their individual impact on the profitability. It was suggested by many authors (Nazir and Afza, 2003) to use a measure of efficiency of the working capital and to look for possible impacts on profitability. Given this, the hypothesis tested is if there is a positive impact on profitability by decreasing the current assets (Receivables and Inventories) and/or by increasing the current liabilities (Payables).

In the following sections I will briefly describe some previous studies about the working capital management and its impact on profitability in different countries and then I will apply similar methods to study the same impact in Portugal. A lot of this work is based on previous research done for the Belgium and Spanish realities, which I now apply to Portugal. In particular, Deloof (2003) studied in detail the impact of working capital management in profitability in Belgium SMEs. The proximity in size and characteristics between the Belgium companies and the Portuguese SMEs make this study particularly adaptable to the reality in Portugal. Garcia-Teruel (2006) developed a similar study for Spain and, in my opinion, the cultural proximity between the two Iberian countries makes this analysis also quite appealing to the Portuguese reality. This analysis will start with the collection of data and will be followed by statistical analysis of the empirical evidences to extract conclusions about the working capital management in Portugal.

2. Concept description and Literature review

2.1 Working capital management concept

In the development of the normal business, managers have the task to decide what will be the perfect capital structure that will better fit in the firms' needs. Managers tend to underestimate the working capital management and commonly look on long term perspective, focusing on long-term investments. The short-term financial management had been forgotten or avoided by managers, but recent studies (ALShubiri, 2011) have been proving the importance of the management between current assets and current liabilities. When financial needs arise, claiming for long term debt is preferable instead of changing the cash management policies in the firms. During several years, working capital management was neglected (Darun, 2008) because of the excessive effort required to change short-term policies comparing with increment profit.

There are several authors (Weinraub and Visscher, 1998) supporting the importance working capital management referring to the importance of the management of the short-term needs and the importance of the financial slack for firms. When the working capital needs are positive, it is a necessary investment in working capital and the managers will have to capture funds and incur in incremental capital costs. If the working capital needs are negative, then the firms are getting credit from the suppliers. Emery (1998) suggests an integration of the short-term management with the long-term policies. This integration allows the improvement of the financial flexibility, market conditions and growth strategies, "The amount and timing of a company's intra-year cash flow surpluses and shortages largely depend on the results of the operations although short-term policy also has an effect. These policies guide decisions about how much financial slack is required to meet unexpected requirements for cash and decisions about the use of permanent versus temporary financing. This means a short-term financial plan must integrate principles and practice just as a long-term financial plan does." (Emery, 1998)

Since the subprime crisis, the firms witnessed a deteriorating environment where managers were forced to take rigid measures, cutting costs and delaying investments in order to respond to the decrease in demand and the consequent reduction in production. At this level, the cash and the working capital were under higher monitoring and control. Working capital management has been changing and common policies and usual trends had to be adapted to the new economic conditions. Due to rapid

changes in economy, firms are reacting and the working capital management is one of the most important issues to lead with.

Working capital management also became an important topic because firms have been exploring different ways to finance their activities since in the past years the cost of long term debt increased and the new costs levels were difficult to afford. " *Working capital management is relevant in the way it influences the firm profitability and risk*" (Smith, 1980).

2.1 Components of The Working Capital

The working capital can be disaggregated into three major components and it is recurrent to measure these components in periods of time, normally days.

The current assets can be framed into Number of Days of Accounts Receivable (DAR) and Number of Days of Inventory (DINV) and on the side of the current liabilities the Number of Days of Accounts Payable (DAP) can be found. These three components will be explored in the next paragraphs as well as the measures of efficiency of the working capital currently used in the literature.

Receivables

The delay between sales and the correspondent cash-inflow, originate the accounts receivable. Accounts receivable stands for the amount the clients have to pay to the firm on a current basis and are related with the operating activities. A higher figure of accounts receivable, means higher short-term loans given by the firm to the customers.

Companies which facilitate trade credit to customers have more number of days of accounts receivable (DAR) meaning higher investment in working capital, but companies which receive the payments from the customers close to the moment on which they deliver the product/service, have less cash invested in working capital (*ceteris paribus*). Commonly, the level of investment in working capital depends on the type of strategy of the firms which is driven by the advantages and disadvantages of the cash tied up to the receivables.

When suppliers are allowing the customers to pay later, they usually are providing lower cost loans to customers than they can get from other creditors. This is also consistent with the fact that suppliers can usually conduct better credit evaluation of the customers than, say, financial institutions.

Payables

Accounts payable stand for an obligation to pay in a short-term period. Normally they refer to transactions to suppliers in the operational activities which were not already paid. They correspond to the amount due to suppliers starting from the moment the company receives the material and ending in the exact moment the company pays for these materials. Fishman and Love (2001) found *“firms in countries with less developed financial markets use informal credit provided by their suppliers to finance growth”*.

The numbers of days of accounts payable (DAP) increase as debt to suppliers increases. Since companies can get cheap financing by delaying payments, they can engage in deliberately delaying the payment to suppliers as far as they can, using this financial opportunity to invest in other activities and get higher returns

Inventory

Inventories are goods or materials waiting to be sold and to be converted in cash in the short run.

More investment in inventories means more cash tied up waiting to generate returns. Inventory management deals with a variety of risks which can increase costs and impact on the short-term management. The relevant costs are commonly classified as physical storage costs and management costs. The physical storages costs depend essentially in the nature of the product and the stage of the product. The inventory management costs can also be related to coordination and control, an dmay include costs related to theft, depletion and shrinkage of goods, order size, length of the production process and the availability credit from the suppliers.

Inventory increases lead to higher number of days of inventory (DINV). Normally, companies try to mitigate as much as possible the cash tied up in inventories but sometimes, as part of the business, companies have a lot of cash invested in inventories since the product need to mature long periods to be finished and ready to be sold.

Given the components of the working capital, I can now understand the measures of working capital efficiency presented in the previous empirical studies. One of the most popular measures is the cash conversion cycle which is referred by many authors as a measure of operational liquidity, computed as the difference between operating cycle and the DAP. The **operating cycle** is the sum of the DINV plus

DAR. Thus, one can look at the cash conversion cycle as “the time lag between the expenditure for the purchases (...) and the collection of sales” (Deloof,2003:2). In other words, the cash conversion cycle measures the time lag that a cash outflow takes to be converted into a higher cash inflows, “the longer the time lag, the greater the investment in working capital, and thus, the financing needs of the firm will be greater. Interest expense will be also higher, which leads higher default risk and lower profitability.” (Charitou, Elfani and Lois, 2010:63)

Another popular measure of the working capital efficiency is the net trade cycle (NTC) which is the measure of cash conversion cycle in percentage of the total sales. (Shin Soenen,1998:38)

The working capital management is in summary, a balance between the three components presented. This concept goes through the financial and strategic approach of the firms in their supply chains (Padachi, 2006). There are certain balances and agreements between buyers and sellers which facilitate the business to both these sides. The relationship between buyers and sellers will close in agreements where both parties will try to minimize the costs; a common strategy can be observed when the buyer accepts early delivery and incurs in storage costs and the supplier accepts delayed payment and incurs in opportunity costs (Weinraub and Visscher, 1998). On the side of the buyer, the days in inventory increase as soon as the product is on his side and the days in accounts payable increase also on the side of the short-term liabilities. On the other side, the seller incurs in opportunity costs by not collecting the cash earlier but at the same time the storage costs decreased with the delivery of the product. In a business activity where the product is specialized, the storage costs are huge and the marginal increment of each day in inventory is sometimes unaffordable for the firms. In this situation, firms try to split storage costs between buyers and sellers in order to sustain the activities (Fisman, and Love 2001).

2.2 Working capital as a market information source

The components of working capital are also, on their own, important indicators of quality of the products and financial conditions in the supply chain as they can disclose the quality assurance of the supplier. For instance when firm X buys a product from firm Y, the lag time between the delivery and the payment of the product, allows firm X to learn about supplier’s product before paying, and at the same time firm Y learns about buyer’s X financial condition. Deloof (2002) states in his study “delaying payments to suppliers allows a firm to assess the quality of the products bought and can be an inexpensive and flexible source of financing for the firm. On the other hand, late discount of invoices can be very costly if the firm is offered a discount for early payment.”

2.4 Working capital: Efficiency and Profitability

The efficiency in the working capital management context is frequently measured with the cash conversion cycle (CCC) and the Net Trade Cycle (NTC), as referred previously. Both concepts aim to express, in time, the incidence of cash-outflows and cash-inflows in the operations of the firms in maximizing the period during which cash is on the side of the firm. Hence, it is possible to relate efficiency and profit with the cash related relationship between a firm, its customers and its suppliers. Deloof (2003) argues that “firms may have an optimal level of working capital that maximizes their value. On the one hand, large inventory and a generous trade credit policy may lead to higher sales, larger inventory reduces the risk of a stock-out. Trade credit may stimulate sales because it allows customers to assess product quality before paying” (Long, Malitz and Ravid, 1993; and Deloof and Jegers, 1996). Shin and Soenen(1998) after studying listed American firms, concluded managers could create value by achieving a realistic minimum for the net trade cycle suggesting “The shorter the NTC, the higher the present value of the net cash flow generated by assets” (Shin and Soenen, 1998:38). A higher present value of the net cash-flow generated by assets will allow firms to reduce its debt which leads to a decrease in the cost of debt and as consequence it will be value created for the shareholders.

2.5 Working Capital Management Policies

The working capital management policies have direct impact on the supply chain and on the relations between the firms the suppliers and the customers. Therefore, managers have to be aware of the impact of such policies in the corporate profitability. Both strategies are commonly used in order to satisfy the conditions of the business between the firm, the buyers and suppliers. In what is related with these policies, Garcia-Teruel (2006) explains two major strategies of working capital management, “The aggressive and conservative policies differ in the balance between weight of Current Assets and Liabilities”. Weinraub (1998) goes in line with Garcia-Teruel (2006) defining the strategies, “Aggressive asset management results in capital being minimized in current assets versus long-term investments.” and on the other side “a more conservative policy places a greater proportion of capital in liquid assets”. Weinraubc (1998) explains that the aggressive strategy “has the expectation of higher profitability but greater liquidity risk” instead of the conservative strategy which leads to “the sacrifice of some profitability” but lower risk. The author also recommends a methodology for the computation of the level of aggressiveness and found that “to measure the degree of aggressiveness the current asset to total asset ratio is used, with a lower ratio meaning a relatively more aggressive policy.” A more

conservative policy “uses higher cost of capital but postpones the principal repayment of debt, or avoids it entirely by using equity, the total current liability to total asset ratio is used to measure the degree of aggressiveness financing policy, with a high ratio being relatively more aggressive” (Weinraub and Visscher, 1998:11)

AlShubiri (2001) also explores the implications of the two strategies. For this author the conservative approach is related to “permanent capital being used to finance all permanent assets requirements and also to meet some or all of the seasonal demands”, the ratio of current assets in the total assets is high and it is reflected in lower expected profitability and lower risk. “This type of policy will also increase the company’s net working capital situation but the firm will be short of funds to be used in other productive sectors”.

The conservative approach requires cash to be tied up in current assets increasing the opportunity cost. This approach implies that the company’s financing is going to be done at a relatively higher cost but at a lower risk. This decrease in profitability is done to avoid the risk of being faced with liquidity problem, which could result from a payment request from the suppliers. This method implies a structure of capital where the current assets are mainly financed with long-term liabilities.

The aggressive approach asks for a different balance-sheet structure. In this method “the company finances all of its fixed assets with long term capital but part of its permanent current assets with short-term credit” (Van Horne, 1980). Under this policy, the firm has low or no long term capital invested in the current assets.

Comparing the two strategies, the aggressive approach requires lower working capital investment and expects higher profitability with a higher risk implied. “A company that uses more short-term source of finance and less long-term source of finance will incur less cost but with a corresponding high risk. This has the effect of increasing its profitability but with a potential risk of facing liquidity problem should such short-term source of finance be withdrawn or renewed on unfavorable terms” (AlShubiri, 2011).

2.6. Previous information from empirical studies

Garcia-Teruel analyzed 8872 small and medium enterprises in Spain during the period 1996-2002. The reason was the particular importance of the working capital for the non-large firms since access to financial loans are difficult, “most of these companies’ assets are in the form of current assets” and the main source of external finance is through current liabilities. The author found SMEs should be aware of

the working capital management since the impact on profitability is significant, “they can also create value by reducing their cash conversion cycle to a minimum, as far as reasonable.” (Garcia-Teruel, 2006). In the other hand, the results in the studies focusing on larger firms (Shin and Soenen, 1998; Deloof, 2003) went in a different direction than one on the medium and small sized firms. Garcia-Teruel (2006) after analyzing Spanish firms, stated the relevance of working capital management on small and medium-sized enterprises given the heaviness of the current assets to total assets, as well as, current liabilities to total liabilities, in this specific context. Adding to this, Nazir and Afza (2009) concluded there is a negative relationship between the degree of aggressiveness of the working capital management and profitability (Volatile economic conditions in Pakistan) and Padachi (2006) found while studying Mauritanian small manufacturing firms, the working capital need an organization change over time and small firms should assure good synchronization between assets and liabilities.

In contrast, Howorth and Westhead (2003) explained that small firms are not a homogeneous group in working capital management routines. Howorth and Westhead focused their study only on the small firms in United Kingdom justifying the sample with the hypothesis that the working capital is more important for small firms than for the other firms. Which was according with Peel who stated small firms “Are generally associated with higher proportion of current assets relative to large firms, less liquidity, volatile cash flows and reliance on short-term debt” (Peel et al.,200).

Deloof (2003) proved most of the firms dedicate huge cash amounts invested to working capital and it has a real impact in firms profitability measures. The results refer to a shareholder value creation by reducing the number of Days of Accounts Receivable (DAR) and number of Days of Inventory (DINV). Deloof (2003) also states a negative relation between the number of Days of Accounts Payable (DAP) and profitability, concluding that less profitable firms wait longer to pay to their clients. The author also introduced measures of efficiency of the working capital, Cash Conversion Cycle. This measure was also supported by Padachi and Garcia-Teruel in their studies. Both authors referred the cash conversion cycle as a measure of working capital management efficiency (Deloof, 2003; Padachi,2006; Garcia-Teruel, 2007), defined by the Lag time between cash outflows and cash inflows in the short-term perspective. Adding to these studies, Gentry, Vaidyanathan and Lee (1990) even suggest a weighted conversion cycle, but they were unable to provide such a detailed average for lack of sufficient information.

Weinraub and Visscher (1998) explored the impact of the working capital profitability across different industries. Their study contributed to the literature in the sense that it found that the different working capital and the asset management policies across industries were clearly stable over periods. Filbeck and

Krueger (Mid-American Journal of Business, 2005) explored a different perspective providing insight to working capital performance over time and across industries. The conclusions reveal that there are macroeconomic factors, which impact the working capital policies and the most important are the changes in interest rates, rates of innovation and competition.

ALShubiri (2011) investigated different policies of working capital management and their respective effect on risk management. The author's main findings were the negative relationship between profitability and the level of aggressiveness of the working capital policy, "The firms yield negative returns if they follow an aggressive working capital policy", confirming the conclusions of Carpenter and Johnson (1983).

This analysis gives an insight of how working capital is managed in Portugal and it adds to the literature as research contribution for the short-term financial management, which provides empirical evidences for managers to explore the working capital management and the respective impact on profitability.

3. Research Methodology

The purpose of this paper is to explain profitability using variables related to working capital as explanatory variables. I will run simple regressions to test the hypothesis that efficient working capital management leads to increased profitability, using a sample of Portuguese firms before the financial crisis (2002-2006).

3.1 Data

The data was collected from the Bloomberg data base and it was necessary to make some adjustments with specific criteria in order to get trustful and robust data. Initially I collected the information of all "country domicile" Portuguese firms present in the Bloomberg data base, including "listed", "unlisted", "private" and "public" country domicile Portuguese firms. I removed the financial, government and diversified firms from the initial data base. The financial firms were removed since the observations for components of working capital were presented with some industry specificities. The government and diversified sectors were removed because of the undefined activities in many of these businesses. The firms with missing values between 2002 and 2006 were also removed as well as the outliers firms presenting values with large difference from the mean of the sector. The final selection was composed by 3360 Portuguese firms for the period 2002-2006, with the composition presented in the Table 1.

Table 1

Table 1 presents the weight of each sector in the total of the firms observed for this study.

Sector	
Utilities	2,5%
Energy	2,1%
Consumer, non-cyclical	28,5%
Consumer, cyclical	28,1%
Communications	2,9%
Basic Materials	5,5%
Industrial	28,9%
Technology	1,5%
Total	100,0%

3.2 Variables

As suggested by Nazir and Afza (2009) the impact of the working capital in profitability is measured by the Return on Assets, as expressed by the Earnings before Interest and Taxes over the Total Assets (EBIT/Total Assets).

Concerning other possible measures of profitability, the gross operating income was excluded given the scarcity of data. In relation to profitability measurements based on stock market valuation, similarly to Deloof (2003) in Belgium, in Portugal only a limited number is listed on a stock exchange". As such, just like Deloof (2003) I decided to exclude these measurements in this study.

In what concerns the explanatory variables, they were chosen according with the working capital components and the macro and microeconomic factors that could influence the Returns on Assets.

Starting with the disaggregation of the working capita I can find, the number of days accounts receivable (DAR), number of days of inventory (DINV) and the number of days accounts payable (DAP). These three variables explain the working capital and are fractions of the variable, Cash Conversion Cycle (CCC). The calculation of the CCC is given by the sum of the DAR plus DINV minus DAP which results in the measure of working capital efficiency as explained previously. What follows is a more detailed description of these four variables and their calculations.

The Number of Days of Accounts Receivable (DAR) presented in formula (A) stands for the average time lag (in days) that the firm allows the customers to pay after the sale of the product takes place. In other words, this variable represents the number of days the firm takes to collect the payments from the customer. The company has the cash tied up as long as the customer does not pay and it is translated into more investment in working capital from the firm's side (*ceteris paribus*).

$$\text{Number of Days of Accounts Receivable (DAR)} = \frac{\text{Accounts Receivable}}{\text{Sales}} \times 365 \quad (\text{A})$$

The Number of Days of Accounts Payable (DAP) presented in expression (B) follows the same logic explained in the DAR. It measures the time (on average) the firm takes to pay to the suppliers. The higher the number of days accounts payable, the later the firm is paying (*ceteris paribus*) and the more it is financing itself from its suppliers.

$$\text{Number of days of Accounts Payable (DAP)} = \frac{\text{Accounts Payable}}{\text{Purchases}} \times 365 \quad (\text{B})$$

The number of days of inventory (C) is the time on average the firm holds the stock. When the DINV is higher, the firm has more cash invested in working capital (*ceteris paribus*).

$$\text{Number of Days of Inventories (DINV)} = \frac{\text{Inventories}}{\text{Purchases}} \times 365 \quad (\text{C})$$

Like it was referred, the Cash Conversion Cycle encloses the three previous variables, giving the metric that expresses “the length of time, in days, that it takes for a company to convert resource inputs into cash flows” Padachi(2006)

$$\text{Cash Conversion Cycle} = \text{DAR} + \text{DINV} - \text{DAP} \quad (\text{D})$$

Several authors, like Garcia–Teruel (2007), Deloof (2003) and Padachi (2006), refer to the Cash Conversion Cycle as a measure of working capital efficiency, while other authors (for example, Shin and Soenen (1998)) support Net Trade Cycle as a preferred measurement for efficiency in working capital. The difference between the Net Trade Cycle (NTC) and the Cash Conversion Cycle is that NTC uses Sales in the denominators of all variables, namely DAR, DAP and DINV, which turns the latter two into Days Sales Accounts Payable (DSAP) and Day Sales Inventory outstanding (DSINV). In CCC, Sales is used only for DAR and Purchases is used for DAP and DINV.

Since this study main focus is not the different types of efficiency of the working capital, it was decided only to focus on the Cash Conversion cycle (CCC) given the nature of the variables. In my opinion, DAP and DINV are more appropriate than DSAP and DSINV since the first two variables include the purchases as a denominator which is in the same nature that payables and inventories.

Besides the explanatory variables of the working capital, several control variables are needed to isolate the intended effects. I used standard control variables as suggested by Nazir and Afza (2009) and Padachi (2006): **SIZE** as given by the logarithm of the Total Assets; **DEBT** as the debt divided by total Assets; **GDPGR** is the GDP yearly growth in Portugal for the year 2002-2006; **SGR** is the yearly sales growth given by Sales at t minus Sales at t-1 divided by Sales at t-1. I also control for the weight of financial assets in total assets **FA** in order to avoid possible influence of this nature of assets in the total assets. As suggested by Deloof (2003) "financial assets, which are mainly shares in other firms, are part of total assets."

3.3 Panel Data methodology

This study analyses the working capital management impact on profitability on firms in Portugal using panel data methodology. The panel data allows the tracing of different variables within a time period. In this study there are different variables being studied in a yearly metric, for different companies between 2002 and 2006.

The panel data methodology benefits from numerous qualities including the effects cross-section and time series data, "greater capacity for capturing the complexity of human behavior than a single cross-section or time series data [...] Controlling the impact of omitted variables. It is frequently argued that the real reason one finds (or does not find) certain effects is due to ignoring the effects of certain variables in one's model specification which are correlated with the included explanatory variables." (Cheng Hsiao, 2006)

Panel data contain information on the individual and inter-temporal dynamics giving the possibility to "allow to control the effects of missing or unobserved variables. Generating more accurate predictions for individual outcomes by pooling the data rather than generating predictions of individual outcomes using the data on the individual in question simplifying computation and statistical inference."

The multiple observations also allows for “measurement errors can lead to under-identification of an econometric model” (e.g. Aigner et al. 1984).

The analysis with panel data can be made through different regression models, the Pooled Ordinary Least Squares Regression, the random Effects regression and the fixed effects regression models. At this stage it is important to know what model more suitable to the study.

The following equations are the regressions used in order to explain the working capital management impact on profitability. The variables are specific to firms or macroeconomic indicators extracted from Bloomberg for the 2002-2006 period for 3360 Portuguese firms. The dependent variable is the **ROA** given by the Earnings before interests and taxes divided by the total assets. **DAR** is the ratio of Accounts Receivable divide by Revenues times 365. **DAP** is the ratio of Accounts Payable divided by Purchases time 365. **DINV** is the ratio of Inventories divided by Revenues times 365. **CCC** is the result of **DAR** plus **DINV** minus **DAP**. **SIZE** is a proxy to the size of the firms, calculated as the logarithm of the Total Assets. **FA** is the Financial Assets divided by the total Assets. **DEBT** is a measure of leverage obtain as the debt divided by total Assets. **GDPGR** is the GDP yearly growth in Portugal. **SGR** is the yearly sales growth given by Sales t minus Sales $t-1$ divided by Sales $t-1$.

As such, I will test the hypothesis that working capital management has a positive impact on the profitability using the following regressions:

$$ROA_{it} = \beta_0 + \beta_1 DAR_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GDPGR_{it} + \beta_5 SGR_{it} + \beta_6 FA_{it} + a_{it} + u_{it} \quad (1)$$

$$ROA_{it} = \beta_0 + \beta_1 DAP_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GDPGR_{it} + \beta_5 SGR_{it} + \beta_6 FA_{it} + a_{it} + u_{it} \quad (2)$$

$$ROA_{it} = \beta_0 + \beta_1 DINV_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GDPGR_{it} + \beta_5 SGR_{it} + \beta_6 FA_{it} + a_{it} + u_{it} \quad (3)$$

$$ROA_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 SIZE_{it} + \beta_3 DEBT_{it} + \beta_4 GDPGR_{it} + \beta_5 SGR_{it} + \beta_6 FA_{it} + a_{it} + u_{it} \quad (4)$$

In equation (2) it is expected that **DAP** positively impacts profitability with all other variables serving as control variables for factors influencing **ROA**. On the other hand, for the remaining equations, **DAR**, **DINV** and **CCC** (by construction) should impact negatively **ROA**.

In the pooled regression were pooled all 3360 Portuguese firms, running the Ordinary Listed Squares (OLS) regression model. The major problem of this model is the impossibility to distinguish individual

effect of particular firms. This means the model denies the heterogeneity that may exist among the firms.

A fixed and a random effect models were also used to capture this heterogeneity or individuality among the 3360 different firms. In these cases the models do not take into consideration the possible variation during the period 2002- 2006, except for the part captured by the GDP growth variable.

3.4 Robustness tests

In order to guarantee the correct relation between the explanatory variables and the dependent variable it is necessary to carry out robustness tests. Endogeneity problems in this context can lead to undesirable impacts in the final conclusions. In fact, when I am studying the impact of the working capital management in profitability one should have in mind that profitability can lead to different policies of working capital, but since this reverse effect is not the main focus of this study, it should be controlled. Deloof (2003) recognizes, the possibility of his final results be biased due to endogeneity problems. Garcia-Teruel (2006) also points out the risk of the days account receivables, days accounts payables and the days in inventories be influenced by the dependent variable. The author refers in the study that indeed, the negative relation between profitability and the number of days of inventory (DINV) can, as a title of example, be explained by the falling sales lead to a stock level increase of the firm. Less profitable firms tend also to pay later to the suppliers, which mean higher number of days in accounts payable (DAP) when the profit is lower. In order to avoid this endogeneity problem, Garcia-Teruel suggested to test the models with instrumental variables, using the first lag of the variables DAR, DAP, DINV and CCC as instrument. I used a similar approach.

Further tests were performance to filter out problems in the various regression equations.

Hausman-test was done to ascertain the consistency of the estimators. Given the test's results and I prefer to use a fixed effect regression as a solution for the inconsistency.

Similarly the F-test also failed in the fit of the model in all 4 regressions, which also indicates the fixed effect regression to be more appropriate. And finally I also tested for heteroscedasticity, using the Breusch-Pagan model, and also here the regressions failed to pass the test, which suggests the usage of random effects model for all 4 regressions.

The tests were run performing standard software STATA routines for the Fixed Effects and Random Effects regression using the 2002-2006 sample of the 3360 Portuguese firms collected in Bloomberg. All tests were run at a level of 5% of significance level. Table 2 summarizes these conclusions.

Table 2

The table presents the hypothesis associated with Hausman-Test, F-Test and Breusch-Pagan Test for each regression equation

	Hausman-Test	F-test	Breusch-Pagan Test
H₀	Random Effects Regression	Pooled Regression	Pooled Regression
H₁	Fixed Effects Regression	Fixed Effects Regression	Random Effects Regression

4. Empirical Results

5.1 Descriptive analysis

For the better understanding of the firms presented in the sample, it is reasonable to explore the different weights of each sector in the total number of firms observed. It will be briefly described the core activities and the reason for performance variations for each sector although it will not be deeply explored once this is not the main purpose of the study.

Gas, electric and water firms are firms in the **utility** sector as well as its integrated providers. This type of business requires significant infrastructure and higher investments and often uses debt to finance these investments. Thus, due to high leverage level of this sector, the exposition to the interest rates variations becomes an issue to consider by the managers in this type of activity. Generally, the performance of these sectors increases when interest rates are decreasing.

Energy firms are firms which the core activity is to produce or supply energy, including firms in the exploration of oil or gas reserves and integrated power firms. In Portugal this sector activity is represented by a reduced number of firms with high market shares. The performance in the sector

depends on the supply and demand for worldwide energy and not only of the in Portugal own demand and supply. In fact, this sector is very sensitive to political events and oil prices.

The **consumer cyclical sector** is highly correlated with business cycle and economic conditions and these factors should be taken in consideration for the present study. Thus, the performance of this sector depends on these external factors and in periods of recession, the demand for these goods and services decreases, and it increases in periods of economy expansion. Consumer cyclical businesses are normally related with luxurious products with an elastic demand.

On the other hand there is the **non-cyclical consumer** (goods and services) sector where the business is not highly dependent on external factors. The demand in this sector is almost constant, the firms have business related with farming operations, manufacturers and food productions.

The activity of the **basic materials** is related with the development of the raw materials and chemical products. The cost of the materials, which depends on the economic phases, will impact directly in the performance of the sector. The basic materials sector is sensitive to changes in the business cycle. Because the sector supplies materials for construction, it depends on a strong economy.

The **industrial** sector is presented with major weight in the sample, 28,9% of the firms activities are in the industrial sector. This activity is related to the production of goods used in construction and manufacturing. The sector also incorporates firms in cement and metal fabrication, construction and industrial machinery. The demand and supply is directly related with the level of construction and the respective investment in the sector, in economic retractions the level of the investment reduces and this sector is widely affected.

The number of firms with higher weight in the sample taken for the empirical analysis, are the consumer cyclical, the consumer non-cyclical and the industrial business, which reflects the major distribution of the Portuguese industry.

Table 3

This table presents the Mean, Standard deviation (Stdev) and the number of observations for each variable considered in the models. The variables are specific to firms or macroeconomic indicators extracted from Bloomberg for the 2002-2006 period in 3264 Portuguese firms sample. The dependent variable is the ROA given by the Earnings before interests and taxes divided by the total assets. DAR is the ratio of Accounts Receivable divide by Revenues times 365. DAP is the ratio of Accounts Payable divided by Purchases time 365. DINV is the ratio of Inventories -divided by Revenues times 365. CCC is the result of DAR plus DINV minus DAP. SIZE is a proxy to the size of the firms, calculated as the logarithm of the Total Assets. FA is the Financial Assets divided by the total Assets. DEBT is a measure of leverage obtain as the debt divided by total Assets. GDPGR is the GDP yearly growth in Portugal. SGR is the yearly sales growth given by Sales t minus Sales t-1 divided by Sales t-1

	ROA	CCC	DAR	DAP	DINV	SIZE	DEBT	FA	GDPGR	SGR
Mean	2,65	30,22	94,12	183,18	122,45	2,57	15,56	0,08	0,68	5,10
Stdev	9,24	426,55	97,92	413,53	291,62	1,18	16,52	0,15	0,90	361,15
Observations	14351	14170	14442	14399	14466	14671	14671	14654	14671	14702

In this section the description of these figures is useful to get in contact with the reality of the variables studied in the models. The analysis will be made on the average of the sample's period (2002-2006) and dispersion of the variables used is presented for the whole sample.

At a first glance, one can look at the number observations between variables and easily find a range within the 14150 and 14700 observations for all variables, meaning that some data was not available for some years or that some firms just closed their activity during some periods in the sample. The observations aggregate listed, unlisted, private or public Portuguese firms (country domicile) for the average between of the 2002-2006 sample period as referred before (using Bloomberg's nomenclature).

On average the gross domestic product grew 0,68% each year, which reveals a positive economic curve trend in Portugal between 2002 and 2006.

The sales grew on average 5,10% per year, which goes in line with the positive trends that have been followed by the gross domestic product of the country. Considering the Financial Assets (FA), the

percentage of these assets in the total assets of the firms is on average 8% which reveals that financial assets do not have an important impact on the firms' total assets.

In what concerns the leverage ratio computed as the total debt over the total assets, on average 15,6% of the firms' assets are financed through debt.

Concerning the measurement of the cash conversion cycle (CCC), it expresses that the lag time between the cash inflow and the cash outflow of the firms' operations is on average approximately one month (30,22 days). In this sample the CCC is positive, meaning that companies have to invest in the working capital that will be financed with credit provided by financial institutions which as a consequence leads to the exposure of the real economy to the capital markets.

The cash conversion cycle is disaggregated in its three components and, in this sample, the firms wait on average 94,12 days (DAR) to receive cash related with the operations, have inventories for 122,45 days (DINV) and pay to their suppliers in 183,18 days (DAP). In theory, for a whole closed economy the DAP and DAR should offset each other, since the paying terms of some firms will be the receiving terms of the others. In that case, the CCC should equal to the DINV.

However, in our sample, the DAP is on average higher than DAR by circa 3 months. Our sample does not include the paying and receiving terms of a substantial portion of the economy, namely the final consumers, who normally pay immediately. This would decrease the overall average of DAR.

On the other side, the DAP levels are considerable higher in relation to the other components meaning that Portuguese firms are delaying their payments to their suppliers. There are a few possible explanations for this result in our sample: First, I am using a relatively open economy in this sample. A substantial number of missing paying terms refer to foreign suppliers and missing receiving terms refer to importers. It could be the case that the reason for the difference we observe from the theoretical results stems from these paying terms. However, Portugal's main trading partners originate from countries in the EU. It is likely that the importers paying terms are better than the domestic paying terms, which will help in our results, but it is highly questionable that Europeans suppliers allow the typical long paying terms we observe in this sample. As such, the open economy explanation must be dismissed. The other reason that can justify such DAP levels can be the fact that in the domestic markets the firms are not paying in the required periods to the firms outside the sample. The firms I am not including in the sample are usually smaller and firms. This means that the paying terms to these firms are horribly long and this practice can strongly affect the production efficiency of these firms in Portugal. Additionally, I also have to keep in mind that I am not including the worst payer of the country: the

Portuguese State. These two issues together should emphasize how much of a problem this topic of delaying payments is for the Portuguese economy.

These results show that Portuguese firms use the trade credit to finance their activities but in the other hand do not allow delayed payments in the same proportion. Part of the credit that come from delay in payments is used to pay costs with stocks that in the sample are relatively higher when comparing with the other components of the working capital.

Multivariate analysis

5.2.1 Correlation matrix analysis

The Pearson correlation matrix shows the correlation between the variables present in the model. When analyzing the correlation table one can realize there is a negative and significant correlation between Profitability (ROA) and the number of days of accounts receivable (DAR). This result is consistent with the Deloof (2003) main findings that collecting payments from customers earlier will impact positively in profitability.

Along with Paddachi (2006) there is a significant negative correlation between days in accounts payable (DAP) and corporate profitability. Such relation reveals that later payments to the suppliers have a negative impact on profitability.

There is also a significant negative correlation between the number of days of inventory (DINV) and corporate profitability (ROA), which goes in parallel with Gacia-Teruel (2007), increasing the number of days of inventory will decrease corporate profitability meaning that keeping products in stock less time will improve the return on assets (ROA).

All cash conversion cycle components are individually significant correlated with ROA. Padachi (2006) and Deloof (2003) figured out negative significance correlation between Cash Conversion Cycle and the ROA. Despite of the previous results goes in accordance with the authors results, in this study the Cash Conversion Cycle does not have significant correlation with the corporate profitability contrasting with the previous research.

Table 4

This table presents the Pearson correlation matrix of the variables included in the models. The variables are specific to firms or macroeconomic indicators extracted from Bloomberg for the 2002-2012 period, in the 3360 firms' sample. The dependent variable is the ROA given by the Earnings before interests and taxes divided by the total assets. DAR is the ratio of Accounts Receivable divide by Revenues times 365. DAP is the ratio of Accounts Payable divided by Purchases time 365. DINV is the ratio of Inventories divided by Revenues times 365. CCC is the result of DAR plus DINV minus DAP. SIZE is a proxy to the size of the firms, calculated as the logarithm of the Total Assets. FA is the Financial Assets divided by the total Assets. DEBT is a measure of leverage obtain as the debt divided by total Assets. GDPGR is the GDP yearly growth in Portugal. SGR is the yearly sales growth given by Sales t minus Sales t-1 divided by Sales t-1

Variables	ROA	DAR	DAP	DINV	CCC	SIZE	DEBT	GDPGR	SGR	FA
ROA	1									
DAR	-0,0853***	1								
DAP	-0,061***	0,21***	1							
DINV	-0,055***	0,0847***	0,2625***	1						
CCC	0,007	0,0405***	-0,7437***	0,4214***	1					
SIZE	-0,0472***	0,1346***	0,1918***	0,1399***	-0,0581***	1				
DEBT	-0,1459***	0,0528***	-0,0439***	0,0234***	0,0712***	0,0142*	1			
GDPGR	-0,0322***	0,0531***	0,0326***	0,0179**	-0,0117	0,0403***	-0,002	1		
SGR	-0,0038	-0,0077	-0,0016	-0,0042	-0,0024	-0,0179**	0,0003	-0,0128	1	
FA	0,1241***	-0,1046***	0,0078	-0,0581***	-0,07***	-0,1193***	-0,1829***	0,0151*	-0,0025	1

***Significance at 1% level; ** Significance at 5% level; *significance at 10% level

5.2.2 Regression Analysis

After the tests to find the most appropriate regression model for this study, the Fixed-Effects regression was selected. This regression model can raise some problems which require a specific control when used. One of the problems is the possible existence of endogeneity. According to Deloof (2003) main findings there were some doubts raised in the effect of DAR, DAP, DINV and CCC in the corporate profitability. The presence of endogeneity brings up the reverse-effect impact, which means in this study, that ROA have influence in the explanatory variables and if this happens the conclusions from the

Fixed –Effects regression model cannot be taken as valid argument. In this specific case it is possible that the firms' profitability impacts the working capital management and leads managers to choose different policies. A firm with lower profitability will probably have more days in accounts payable given the lower capacity to pay to their suppliers. To avoid this situation I controlled the Fixed Effects Regression (FER) model with instrumental variables, as a method solve the possible reverse relation between variables in the models. The instrumental variables used were the first lag of DAR, DAP, DINV and CCC according with the methodology chosen by Garcia-Teruel (2007). Table 5 presents the Fixed-Effects regression models running in STATA for the 2002-2006 sample period, while Table 6 further corrects for possible endogeneity problems in the models.

In Table 5 the models **1,2,3** and **4** are all significant at 5% significance level. The table presents these models regressed in the Fixed Effects Model (FER). The Return on Assets of the Portuguese firms decreases as the lag time of number of Days Accounts Receivable (DAR), Number of Days of Accounts Payable (DAP) and the number of Days of Inventory (DINV) increases. The results found by Deloof (2003) and Garcia-Teruel (2007) explain the same impacts of the working capital components in the corporate profitability, which reinforces the importance of the working capital management for firms.

On one side the increase the time limit for clients to make their payments leads to credit easiness and, as consequence, to the improvement of the sales volume. On the other side the effect of a more restrict policy to narrow the deadline for payments will lead to an improvement of the return of assets. In the end, the effect of the restrictive policies will prevail over the credit facility to clients in what concerns the positive impact on profitability.

Increasing one day lag time in the payments to suppliers will impact negatively the profitability on 0,0009174. Deloof (2003) suggest that the explanation for these results is related with the fact that usually less profitable firms pay latter to their suppliers. The negative impact on profitability could be explained by the high cost to the suppliers when giving credit that will lead to prejudice the relationship and decrease transactions between the both parts. The cost to the firm of not using the discounts of prompt payment given by suppliers can also be implicit in the negative impact on profitability but the dependent variable does not include financial costs, which allow excluding this last hypothesis.

The firm's profitability decreases also with the increase in the number of days of the inventories. As expected, this means that keeping inventories less time reduces costs and has a positive impact on corporate profitability.

The integration of the number of days accounts receivable, days accounts payable and days of inventory is explained with the cash conversion cycle which is significant with a level of 10% of significance regression 4. Deloof (2003) also found a positive relation between the cash conversion cycle and the impact in profit, but the results in this study points out that lengthening the cash conversion cycle, will impact negatively the corporate profitability. When the cash conversion cycle (CCC) increases the number of days of accounts receivable and inventories in relation to the number of days of accounts payable, higher CCC means that firms wait longer to get their cash from operations converted.

Concerning the control variables SIZE, GDPGR and FA are significant. The remaining control variables, DEBT and SGR are not significant individually for the explanation of the dependent variable. Although, all the variables grouped are significant to explain the corporate profitability.

The variable SIZE was calculated by the logarithm of sales as suggested by Garcia-Teruel (2007) and has a negative relation with profitability going against the theory that “larger firms seems to favor the generation of profitability” Garcia-Teurel (2007). In this sample, smaller firm’s reports higher corporate profitability. The sales growth has a positive impact on profitability, meaning that firms growing in their operational activities have a positive effect in the ROA.

Table 5

This table presents the Fixed-Effects regression. The variables are specific to firms or macroeconomic indicators extracted from Bloomberg for the 2002-2006 period in 3264 Portuguese firms sample. The dependent variable is the ROA given by the Earnings before interests and taxes divided by the total assets. DAR is the ratio of Accounts Receivable divided by Revenues times 365. DAP is the ratio of Accounts Payable divided by Purchases times 365. DINV is the ratio of Inventories divided by Revenues times 365. CCC is the result of DAR plus DINV minus DAP. SIZE is a proxy to the size of the firms, calculated as the logarithm of the Total Assets. FA is the Financial Assets divided by the total Assets. DEBT is a measure of leverage obtained as the debt divided by total Assets. GDPGR is the GDP yearly growth in Portugal. SGR is the yearly sales growth given by Sales t minus Sales $t-1$ divided by Sales $t-1$

	1	2	3	4
DAR	-0,0090327*** -9,62			
DAP		-0,0009174*** -3,68		
DINV			-0,0019718*** -5,58	
CCC				-0,0004381* -1,81
SIZE	-2,764506*** -11,31	-2,69642*** -11,42	-2,754173*** -11,74	-2,753453*** -11,48
DEBT	0,0007372 0,11	-0,0058332 -0,89	-0,0044445 -0,69	-0,0073494 -1,11
GDPGR	-0,2649072*** -4,11	-0,2846622*** -4,64	-0,2878698*** -4,71	-0,2872624*** -4,66
SGR	-0,00000171 -0,9	-0,00000158 -0,78	-0,00000161 -0,79	-0,00000157 -0,77
FA	-2,974098*** -4,5	-2,02983*** -3,09	-1,917114*** -2,93	-2,024045*** -3,05
C	11,04256*** 17,23	10,2294*** 16,64	10,43592*** 17,02	10,26579*** 16,37
R-squared (within)	0,0259	0,018	0,0198	0,0165

***Significance at 1% level; ** Significance at 5% level; *significance at 10% level

Table 6 presents the models in study but with the correction for endogeneity suggested in Deloof (2003). The substantial difference is visible in the regression **4** where the cash conversion cycle loses the significance at a level of 10% comparing with model **4** in Table 5. This correction reinforces the idea that when the three components of working capital are integrated and studied as a single variable, this variable is not significant to explain the corporate profitability. This analysis induces the idea that firms do not focus in the management of the working capital balancing the different components in simultaneous but focus their management in the components individually.

This raises the doubt of the effect of the cash conversion cycle in the corporate profitability since the correction of the endogeneity points at no significant explanation. Thus, it is possible that corporate profitability (ROA) may have influence in the behavior of CCC. As referred before the cash conversion cycle is used as a measure of efficiency of the working capital management but in this analysis this measure of efficiency shall not be considered given the lack of significance of in the model. Concerning this analysis, the results confirm the doubts of Deloof's (2003) results that a reverse effect could be biasing the analysis, and so there are no conclusions that can be stated about the model **4**.

Despite this difference, models **1**, **2** and **3** remain significant in their total explanation of the ROA as well as the explanatory variables (DAR, DAP and DINV) remain also significant. Days accounts receivable (DAR) explain the corporate profitability, with a level of significance at 1%, meaning that each day that firm's wait for receiving cash will lead to subsequent a negative impact of 0,0103473 in the ROA (*ceteris paribus*), confirming Deloof(2003) and Garcia-Teruel's(2007) main findings. As well as DAR, the days in accounts payable have a negative impact in the corporate profitability with 1% in significance level. Number of Days of Inventories has also a negative impact in ROA with a level of significance of 1%, meaning that each day in inventories will impact negatively the corporate profitability in 0,0019846 (*ceteris paribus*).

Table 6

This table presents the Fixed-Effects regression with instrumental variables in order to correct possible endogeneity problems. The variables are specific to firms or macroeconomic indicators extracted from Bloomberg for the 2002-2006 period in 3264 Portuguese firms sample. The dependent variable is the ROA given by the Earnings before interests and taxes divided by the total assets. DAR is the ratio of Accounts Receivable divide by Revenues times 365. DAP is the ratio of Accounts Payable divided by Purchases times 365. DINV is the ratio of Inventories divided by Revenues times 365. CCC is the result of DAR plus DINV minus DAP. SIZE is a proxy to the size of the firms, calculated as the logarithm of the Total Assets. FA is the Financial Assets divided by the total Assets. DEBT is a measure of leverage obtain as the debt divided by total Assets. GDPGR is the GDP yearly growth in Portugal. SGR is the yearly sales growth given by Sales t minus Sales t-1 divided by Sales t-1. The instrumental variables used were the first lag of DAR, DAP, DINV and CCC.

	1	2	3	4
DAR	-0,0103473*** -4,48			
DAP		-0,0012505*** -3,63		
DINV			-0,0019846*** -3,1	
CCC				0,000524 1,48
SIZE	-1,882859*** -5,38	-1,777065*** -5,15	-1,838421*** -5,33	-1,845875*** -5,3
DEBT	0,0042715 0,56	-0,001964 -0,26	-0,0014337 -0,19	-0,0029775 -0,39
GDPGR	-0,3498133*** -5,62	-0,3498875*** -5,76	-0,3584825*** -5,91	-0,3523271*** -5,77
SGR	0,0049268*** 4,27	0,0046215*** 4,11	0,0047943*** 4,25	0,0044852*** 3,97
FA	-2,114102** -2,27	-2,261819** -2,49	-2,177031** -2,39	-2,277122** -2,49
C	8,505345*** 9,1	7,614386*** 8,38	7,785243*** 8,55	7,589181*** 8,27
R-squared (within)	0,0179	0,0168	0,0165	0,0153

***Significance at 1% level; ** Significance at 5% level; *significance at 10% level

5. Conclusion

This empirical study reports the impact of the different components of the working capital management in corporate profitability for Portuguese firms in the period 2002-2006. The results consistently confirm the hypothesis that managers should care about different components of working capital in order to manage it efficiently once these different components do have an impact on corporate profitability.

The present study is a useful tool for additional research about working capital management and the impact on profitability and it gives also insight information to financial managers about how the components of working capital are impacting in corporate profitability in order to help in an efficient management of the short-term assets and liabilities.

As suggested by Deloof (2003) and Padachi (2006), the efficiency measure considered is the Cash Conversion cycle instead of the Net Trade Cycle.

The results obtained indicate that the number of days of accounts receivable (DAR) significantly explains corporate profitability, with a level of significance at 1%, meaning that each day that firms' give credit to their customers will impact negatively the ROA (*ceteris paribus*), which goes in accordance to Deloof (2003) and Garcia-Teruel's (2007) main findings.

The number of days of inventories also has a negative impact in ROA showing that each additional day in inventories will impact negatively the corporate profitability (*ceteris paribus* condition).

Additionally the number of days of accounts payable also significantly impacts the profitability positively at 1% significance level.

The cash conversion cycle which aggregate all the three components of the working capital management show conclusions that differ from some previous research. This variable is not significant in the model, meaning that the balance of working capital components in simultaneous is not significant to explain the corporate profitability. The lack of support for this results hinges on endogeneity issues, which is consistent with Deloof (2003) analysis. In theory, one day more in the cash conversion cycle means that firms wait longer to get their cash from operations converted and have one more day of cash tied up in the working capital. As referred before the cash conversion cycle is used as a measure of

efficiency of the working capital management but in this analysis this measure of efficiency shall not be considered given the lack of significance of in the model

6. Final comments

This study is a research contribution for the short-term financial management which provides empirical evidences for managers to explore the working capital management and the respective impact on profitability. This analysis is focused in a single country giving an insight of how working capital is managed in Portugal and the relation of each variable with the return on profitability.

There were some limitations during this analysis specific to the sample and the data used in order to get robust and consistent models. The data available in Bloomberg was very restrictive and there was also a lot of missing information specifically in the most recent years which forced me to reduce my sample period in order to avoid substantial sample selection problems induced by survival bias with the recent financial and economic crisis in Portugal. The sample and the period therefore represent a limitation for the analysis since only firms with available data were considered and so there is still some survival bias in the sample, as a small percentage of firms were excluded because they closed their activity during the period analyzed.

The creation of value for the shareholders depend on the several factor in which the working capital management can be included. There have been several studies supporting the idea that the continued attention to the accounts receivable, accounts payable and inventories can be a source of value added for firms and as consequence a value creation for shareholders.

The limitations in this analysis can be explored and further improvements will add new literature for the short-term financial management area. The results points out that the cash conversion cycle (CCC) is not significant to explain corporate profitability for endogeneity issues and I suggest in future studies the incorporation of different measures of working capital management efficiency like the net trade cycle and its respective components.

The extension and comparison between working capital management in different countries would be also an interest topic to explore, admitting the hypothesis that the management culture of each country has impact on the profitability of the firms.

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