THE IMPACT OF WORKING CAPITAL MANAGEMENT ON FIRM PROFITABILITY IN DIFFERENT BUSINESS CYCLES: EVIDENCE FROM FINLAND

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Abstract

The recent economic downturn of 2007-2008 has brought renewed focus on working capital policies. In this paper we examine the role of business cycles on the working capital-profitability relationship using a sample of Finnish listed companies over an 18 year period. We find the impact of business cycle on the working capital-profitability relationship is more pronounced in economic downturns relative to economic booms. We further show that the significance of efficient inventory management and accounts receivables conversion periods increase during periods of economic downturns. Our results demonstrate that active working capital management matters and, thus, should be included in firms' financial planning.

JEL classification: G30, G31, G32

Keywords: Working capital; Business cycles; Profitability

1. Introduction

This paper investigates the effect of the business cycle on the link between working capital, the difference between current assets and current liabilities, and corporate performance. Efficient working capital management is recognized as an important aspect of financial management practices in all organizational forms. In acknowledgement of this importance, the *CFO Magazine* publishes an annual study of corporate working capital management performance in many countries. The extensive literature indicates that it impacts directly on corporate liquidity (Kim, Mauer and Sherman 1998; and Opler, Pinkowitz, Stulz, and Williamson 1999), profitability (e.g., Shin and Soenen 1998; Deloof 2003; Lazaridis and Tryfonidis 2006), and solvency (e.g., Berryman 1983; Peel and Wilson, 1994).

It is reasonable to assume that economy-wide fluctuations exogenous to the operations of the firm play an important role in the demand for firms' products and any financing decision. Korajczyk and Levy (2003), for instance, suggest that firms time debt issuance based on economic conditions. Also, given that retained earnings are a significant component of working capital, business cycles can be said to affect all enterprises financing source through its effect on economic growth and sales. For example, when company sales weaken it engenders earning declines, thereby, affecting an important source of working capital. The recent global economic downturn with crimping consumer demand is an excellent

example of this. The crisis, characterized by plummeting sales, put a squeeze on corporate revenues and profit margins, and subsequently, working capital requirements. This has brought renewed focus on working capital management at companies all over the world.

The literature on working capital, however, only includes a handful of studies examining the impact of the business cycle on working capital. An early study by Merville and Tavis (1973) examined the relationship between firm working capital policies and business cycle. More recent studies have investigated the degree to which firms' reliance on bank borrowing to finance working capital is cyclical (Einarsson and Marquis 2001), the significance of firms' external dependence for financing needs on the link between industry growth and business the cycle in the short term (Braun and Larrian 2005), and the influence of business indicators on the determinants of working capital management (Chiou, Cheng, and Wu 2006). These studies have independently linked working capital to corporate profitability and the business cycle. No study, to the best of our knowledge, has examined the simultaneous working capital-profitability and business cycle effects. There is therefore a substantial gap in the literature which this paper seeks to fill. Firms may have an optimal level of working capital that maximizes their value. However, optimal levels may change to reflect business conditions. Consequently, we contribute to the literature by re-examining the relationship between working capital

management and corporate profitability by investigating the role business cycle plays in this relationship.

We investigate this important relationship using a sample of firms listed on the Helsinki Stock Exchange and an extended study period of 18 years, between 1990 and 2008. Finnish firms tend to react strongly to changes in the business cycle, a characteristic that can be observed from the volatility of the Nasdaq OMX Helsinki stock index. The index usually declines quickly in poor economic states, but also makes fast recoveries. Finland, therefore, presents an excellent representative example of how the working capital-profitability relationship may change in different economic states. The choice of Finland is also significant as it also offers a representative Nordic perspective of this important working capital-profitability relationship. Hitherto no academic study has examined the working capital-profitability relationship in the Nordic region, to the best of our knowledge. Surveys on working capital management in the Nordic region carried out by Danske Bank and Ernst & Young in 2009 show, however, that many companies rated their working capital management performance as average, with a growing focus on optimizing working capital in the future. The surveys are, however, silent on how this average performance affected profitability. This gives further impetus for our study.

Our results point to a number of interesting findings. First, we find that firms can enhance their profitability by increasing working capital efficiency. This is a significant result because many Nordic firms find it hard to turn good policy intentions on working capital management into reality (Ernst & Young 2009). Firms may gain by paying increasing attention to efficient working capital practices. Our empirical finding, therefore, should motivate firms to implement new work processes as a matter of necessity. We also find that working capital management is relatively more important in low economic states than in the economic boom state, implying working capital management should be included in firms' financial planning. This finding corroborates evidence from the survey results in the Nordic region. Specifically, the survey results by Ernst & Young 2009 indicate that the largest potential for improvement in working capital could be found within the optimization of internal processes. This suggests that this area is not prioritized in times of business growth which is typical of the general economic expansion periods and is exposed in economic downturns.

Our empirical findings have practical usage especially in the event of the recent financial crisis of 2007-2008 and the associated distressed state of the global economy. The liquidity of many companies comes under intense pressure and cash becomes a scarce resource due to the tight credit market conditions and decreased demand around such periods. Evidently, this

condition accentuates the importance of efficient working capital practices. Interestingly, a Europe-wide survey on working capital indicates that very little has been done to significantly increase working capital efficiency between 2004 and 2008, which includes the onset of the current financial crisis (PwC 2009). The implications of our results for corporate liquidity position and improving profitability highlights the importance of working capital to companies, not only in times of distress, but as a daily routine.

The remainder of this paper is organized as follows: Section 2 presents a brief review of the literature presents the hypotheses for empirical testing. Sections 3 and 4 discuss data and models to be estimated. The empirical results are presented in section 5 and section 6 concludes.

2. Related literature and hypotheses

2.1 Literature review

Many firms have invested significant amounts in working capital and a number of studies have examined the determinants of this investment. For example Kim, Mauer and Sherman (1998) and Opler, Pinkowitz, Stulz, Williamson (1999), Chiou et al. (2006) and D'Mello, Krishnaswami and Larkin (2008) find that the availability of external financing is a determinant of liquidity. Thus restricted access to capital markets requires firms to hold larger cash reserves. Other studies show that firms with

weaker corporate governance structures hold smaller cash reserves (Harford, Mansi, and Maxwell 2008). Furthermore firms with excess cash holding as well as weak shareholder rights undertake more acquisitions. However there is a higher likelihood of value-decreasing acquisitions (Harford 1999). Kieschnick and LaPlante (2012) provide evidence linking working capital management to shareholder wealth. They find that the incremental dollar invested in net operating capital is less valuable than the incremental dollar held in cash for the average firm. The findings reported in the paper further suggest that the valuation of the incremental dollar invested in net operating working is significantly influenced by a firm's future sales expectations, its debt load, its financial constraints, and its bankruptcy risk. Further the value of the incremental dollar extended in credit to one's customers has a greater effect on shareholder wealth than the incremental dollar invested in inventories for the average firm. Taken together the results indicate the significance of working capital management to the firm's residual claimants, and how financing impacts these effects.

A thin thread of the literature links business cycles to working capital. In a theoretical model, Merville and Tavis (1973) posit that investment and financing decisions relating to working capital should be made in chorus as components of each impact on the optimal policies of the others. The optimal working capital policy of the firm is, therefore, made within a systems context, components of which are related spatially over time in a chance-constrained format. Uncertainty in the wider business environment

directly affects the system. For example, short run demand fluctuations disrupt anticipated incoming cash flows, and the collection of receivables faces increased uncertainty. The model provides a structure enabling corporate managers to solve complex inventory and credit policies for short term financial planning.

In an empirical study, Einarsson and Marquis (2001) find that the degree to which companies rely on bank financing to cover their working capital requirements in the U.S. is countercyclical; it increases as the state of the economy weakens. Furthermore, Braun and Larrain (2005) find that high working capital requirements are a key determinant of a business' dependence on external financing. They show that firms that are highly dependent on external financing are more affected by recessions, and should take more precautions in preparing for declines in the economic environment, including ensuring a secure level of working capital reserves during times of crisis. Additionally, Chiou et al. (2006) recognize the importance of the state of the economy and includes business indicators in their study of working capital determinants. They find a positive relationship between business indicator and working capital requirements.

The relationship between profitability and working capital management in various markets has also attracted intense interest. In a comprehensive study, Shin and Soenen (1998) document a strong inverse relationship

between working capital efficiency and profitability across U.S. industries. This inverse relationship is supported by Deloof (2003), Lazaridis and Tryfonidis (2006), and Garcia-Teruel and Martinez-Solano (2007) for Belgian non-financial firms, Greek listed firms, and Spanish small and medium size enterprises (SME), respectively. There are, however, significant divergences in the results relating to the effect of the various components of working capital on profitability. For example, whereas Deloof (2003) find a negative and statistically significant relationship between account payable and profitability, Garcia-Teruel and Martinez-Solano (2007) find no such measurable influences in a sample of Spanish SMEs.

2.2 Hypotheses development

The cash conversion cycle (CCC), a useful and comprehensive measure of working capital management, has been widely used in the literature (see for example Deloof 2003; and Gill, Biger and Mathur 2010). The CCC, measured in days, is the length of time between a company's expenditure for the procurement of raw materials and the collection of sales of finished goods. We adopt this as our measure of working capital management in this study. Previous studies have established a link between profitability and the CCC in different countries and market segments.

Efficient working capital management practices aims to shorten the CCC to optimize to levels that best suites the requirements of the specific company (Hager 1976). A short CCC indicates quick collection of receivables and delays in payments to suppliers. This is associated with profitability given that it improves corporate efficiency in its use of working capital. Deloof (2003), however, posits that low inventory levels, tight trade credit policies and utilizing obtained trade credit as a means of financing can increase risks of inventory stock-outs, decrease sales stimulants and increase accounts payable costs by forgoing given cash discounts. Managers must, therefore, always consider the tradeoff between liquidity and profitability when managing working capital. A faster rise in the cost of higher investment in working capital relative to the benefits of holding more inventories and/ or granting trade credit to customers may lead to decrease in corporate profitability. Deloof (2003), Wang (2002), Lazaridis and Tryfonidis (2006), and Gill et al. (2010) all propose a negative relationship between the cash conversion cycle and corporate profitability. Following this, we propose a general hypothesis stating the expected negative relationship between the cash conversion cycle and corporate profitability:

Hypothesis 1a: There is a negative relationship between the cash conversion cycle and profitability.

The CCC has three components; account payable deferral period, accounts receivable conversion period, and inventories conversion period. A firm can minimize its CCC by independently optimizing each of the three components. For example, accounts payable can be an inexpensive and flexible source of financing for firms. A delay in payments to the firm's suppliers increases the accounts payable cycle, which effectively decreases the length of the CCC and make working capital more efficient. Prior studies suggest that this increased working capital efficiency translates in increased profitability. On the other hand, excess inventories and longer accounts receivable cycles increase the CCC, implying decreased efficiency and profitability. The efficiency of working capital is, therefore, based on the principle of speeding up cash collections and slowing down cash disbursements. As a result, companies that operate with lean inventories and collect their receivables quickly have shorter CCCs can be seen to be more efficient, which impacts positively on profitability (Deloof 2003). As indicated above, companies must, however, also take into consideration the tradeoff between liquidity and profitability when deciding on their optimal cash gap. Consequently, we also propose the following three hypotheses relating the three components of CCC to profitability:

Hypothesis 2a: There is a positive relationship between the payables deferral period and profitability.

Hypothesis 3a: There is a negative relationship between the receivables conversion period and profitability.

Hypothesis 4a: There is a negative relationship between the inventory conversion period and profitability.

The extant literature linking business cycles to working capital management does not show how the different economic states' impact on the profitability-working capital relationship. Working capital assessments by firms are mainly motivated by liquidity considerations. Changes in the macroeconomy affect firm investments and how these are financed. Recessions and economic crises put a premium on liquidity and pressure on working capital positions. Korajczyk and Levy (2003), for instance, note that financially constrained firms react differently to macroeconomic uncertainty than financially unconstrained firms. This may be reflected in poor economic or business states, where companies' growth stutter and cash flow constraints become apparent. Such period may reflect higher likelihood of longer time periods for collecting accounts receivable and increased inventories due to crimping sales. As a result, there is the need for companies to maintain higher levels of working capital requirements to function. This is recognized in the theoretical models of Einarsson and Marquis (2001) and Braun and Larrain (2005). Furthermore Fernandez-Corugedo, McMahon, Millard, and Lukasz (2011) develop a dynamic

stochastic general equilibrium (DSGE) model that shows how economic shock leads to adjustment of working capital positions by firms.

Due to the increased challenges in poor states of the economy, we hypothesize that working capital management should be of greater significance with respect to profitability in economic downturns. Furthermore as demand and fixed capital investments improve during a booming economy, we hypothesize that the relationship between working capital and profitability would be less significant in improved economic climates. Accordingly, we adjust hypotheses 1a-4a to reflect this pattern in the following way:

Hypothesis 1b: The significance of the relationship between the cash conversion cycle and profitability increases during economic downturns.

Hypothesis 1c: The significance of the relationship between the cash conversion cycle and profitability decreases during economic booms.

Hypothesis 2b: The significance of the relationship between the account payables deferral period and profitability increases during economic downturns.

Hypothesis 2c: The significance of the relationship between the account payables deferral period and profitability decreases during economic booms.

Hypothesis 3b: The significance of the relationship between the account receivables conversion period and profitability increases during economic downturns.

Hypothesis 3c: The significance of the relationship between the account receivables conversion period and profitability decreases during economic booms.

Hypothesis 4b: The significance of the relationship between the inventory conversion period and profitability increases during economic downturns.

Hypothesis 4c: The significance of the relationship between the inventory conversion period and profitability decreases during economic booms.

3. Data environment and variables description

The firm level data used in this paper consists of the income statement and balance sheet information of all listed companies on the Nasdaq OMX Helsinki stock exchange between the years 1990 and 2008. The data is

obtained from Research Institute of the Finnish Economy (ETLA), a leading private sector research organization in Finland. The sample consists of 1,136 firm year observations. Following Shin and Soenen (1998), Deloof (2003), and Lazardis and Tryfonidis (2006) we exclude financial firms from our dataset. Figure 1 presents the distribution of the sample observations by year. The vertical and horizontal axes represent the actual numbers and years, respectively. We observe the distribution to be relatively even across all years with no systematic declines in any year(s).

[Insert Figure 1 about here]

As indicated above, our view of efficient working capital management is based on the concept of cash conversion cycle (CCC) defined as:

CCC = (No. of Days Account Receivable + Number of Days Inventory) – (No. of Days Account Payable) (1)

The three components of CCC are estimated as follows:

No. of Days Account Receivable = (Accounts Receivables/Sales) x 365; (2)

No. of Days Account Payable = (Accounts Payables/Cost of Goods Sold) x 365; (3)

No. of Days Inventory = (Inventory/Cost of Goods Sold) x 365 (4)

Using CCC is advantageous as it recognizes the life expectancies of working capital components as well as the fact that production, distribution and collection are not instantaneous and synchronized processes but come with a time lag (Richards and Laughlin 1980). Also the CCC serves as a better predictor of future cash flows than static liquidity ratios (Kamath 1989). Consequently many other recent studies have adopted the CCC (see e.g., Wang 2002; Deloof 2003; Lazardis and Tryfonidis 2006; Garcia-Teruel & Martinez-Solano 2007 and Gill et al. 2010).

Following Lancaster, and Stevens (1996), Wang (2002), Jose, and Garcia-Teruel and Martinez-Solano (2007), we use the return on assets (ROA), measured as the ratio of net income to total assets, as a proxy for company profitability. The ROA concentrates on measuring the company's overall profitability and, as pointed out by Barber and Lyon (1996), is not obscured by special items or affected by the capital structure of the firm. We also utilize an alternative measure of profitability, gross operating income (GOI), calculated as the ratio of sales (adjusted for cost of goods sold) to the difference between total assets and financial assets. Whiles *ROA* can be considered an overall indicator of profitability, *GOI* measures operational performance. Hence we are also able to directly associate with the success

or failure of operational activities of the firm with CCC, which is also an operating variable (Lazaridis and Tryfonidis 2006).

We include several control variables known to affect firm profitability in the models to be estimated. We control for company size (natural logarithm of sales), current ratio (current assets/current liabilities), and debt ratio (short-term loans + long-term loans)/total assets), (see e.g., Deloof 2003; Lazaridis and Tryfonidis 2006; and Azadegan and Pai 2008),

The reference to business cycles relate to the irregular fluctuations in economic activity, measured by real GDP, in the long term development of the economy. We infer the different economic states in the following way: First we estimate the annual GDP changes over the 19 year period (1990-2008) utilized in this study. Then we segment the data into 5 year periods to specify the different stages of the economy. Poor economic states are defined by the five years during the 19 year study period which showed the worst performance (i.e., change in Finnish real GDP), whiles prosperous states of the economy are reflected by the five years showing higher GDP growth. We include dummy variables which take binary values to indicate these business conditions. These dummy variables are used reflect the importance of working capital components in the two different states of the economy which are then compared to results from the entire study period. GDP data for Finland is publicly available and retrieved from the Statistics

Finland-website. Figure 2 shows the annual changes in the Finnish GDP between the years 1990 to 2008. The percentage changes are shown on the vertical axis and the respective years are shown on the horizontal axis.

[Insert Figure 2 about here]

To check the robustness of our economic states specification, we use an alternative methodology to define economic states. Following McQueen and Roley (1993), a trend is estimated in the log of GDP by regressing the actual log of GDP on a constant and a time trend from 1990 to 2008. Then, we add and subtract a constant from the trend to create the upper and lower bounds of economic activity. As in McQueen and Roley (1993), we choose a constant so that approximately 25 percent of the actual log on industrial production is above the upper bound, represented as "HIGH" economic activity, and below the lower bounds, represented as "LOW" economic activity. The remaining 50 percent of the actual log on industrial production between the upper and lower bounds represent "MEDIUM" economic activity. This alternative definition leads to a nearly identical specification as the previous categorization and the results using this approach are very similar to those discussed in the empirical results section below.

Table 1 presents the descriptive statistics for the variables used in the empirical analyses. We show the average cash conversion cycle for Finnish

firms to be 108.8 days, which is considerably higher that of Spanish SMEs (76.3 days) and large Belgian companies (44.5 days), but lower than the average CCC of listed companies on the Athens Stock Exchange (189 days) (see Deloof 2003; Lazaridis and Tryfonidis 2006; and Garcia-Teruel and Martinez-Solano 2007). There is, however, considerable variation in the CCC for Finnish firms with a range of 408.8 days. The average accounts payables deferral, average inventory, and accounts receivables conversion periods are 56.4 days, 117.6 days, and 47.6 days respectively. The mean inventory for Finnish companies is distinctly higher relative to U.S. (78) and Belgian (46.62) firms (see Gill et al. 2010; Deloof 2003) but lower than Greek firms (see Lazaridis and Tryfonidis 2006). We also detect a mean ROA value of 8.4% for Finnish firms. This exceeds the average value of 7.9% reported for Spanish SMEs (Garcia-Teruel and Martinez-Solano 2007). Furthermore, gross operating income is on average 101% of [total assets and financial assets] which in excess of the 12.2% documented for Belgian firms (Deloof 2003).

In an average Finnish listed company, 55.3% of the company's assets are financed with debt. Finnish companies also record an average sales figure of 5.8 million and the average current ratio is 1.59.

[Insert Table 1 about here]

Figure 3 depicts the development of the working capital and net working capital ratios of Finnish listed companies between 1990 and 2008. Total assets and years are represented on the vertical and horizontal axes, respectively. The average values of the working capital-total assets and net working capital and total assets ratios are depicted by the broken horizontal lines. The Figure shows that average working capital levels represented a fifth of total assets, while net working capital represented almost 18 percent of total assets.

[Insert Figure 3 about here]

In Table 2, we present the pairwise correlations between all pairs of firm variables used in this study. We have segmented in the correlation into three in accordance with our categorization of the economic states: correlations in normal, boom, and downturn period. The CCC, in normal and boom periods (downturn), is shown to correlate positively (negatively) with profitability. The correlations between the components of CCC and profitability and show both *ROA* and *GOI* to have a negative correlation with accounts payable in all economic states, implying less profitable firms wait longer to pay their bills. This also indicates that the longer firms wait to clear their accounts payable the more detrimental the effect on corporate profitability. Inventory generally shows positive (negative) correlations with the two profitability measures in the normal and boom (downturn)

periods. Account receivable generally correlates positively with profitability.

The control variables, debt and sales (current ratio), are negatively (positively) correlated with the two measures of profitability in the three economic states. Simple correlation analysis could, however, be misleading due to the temporal instability of such correlation coefficients.

[Insert Table 2 about here]

4. Models

Following the structures of the models previously applied by Deloof (2003) and Lazaridis and Tryfonidis (2006), we estimate the following regression model to examine the effects of the CCC on corporate profitability:

$$Profitability = \beta_0 + \beta_1 CCC + \beta_2 CR + \beta_3 DEBT + \beta_4 SALES + \beta_5 D1 + \beta_6 D2 + \beta_7 (D1 * CCC) + \beta_8 (D2 * CCC) + u \quad (5)$$

where *Profitability* is measured by return on assets (*ROA*) and gross operating income (*GOI*); *CCC* is the cash conversion cycle; *CR is c*urrent ratio; *DEBT* is debt Ratio; *SALES* is the natural logarithm of sales; *D1* is the

recession dummy variable; *D2* is the boom dummy variable; and *u* is an error term. We include industry dummies in estimating equation (5).

We re-estimate equation (5) to examine the effect of the three components of CCC on the two profitability measures. That is, we substitute CCC with the accounts payable deferral period, the accounts receivable conversion period, and inventory conversion period and re-estimate equation (5) in subsequent models. With respect to possible multicollinearity, the analysis of variance inflation factors (VIF) indicates that the multicollinearity problem is not present in the regression equations (see e.g., Judge, Hill, Griffiths, Lütkepohl and Lee 1988, 868-871). We use White (1980) heteroscedasticity-consistent covariance matrix in all the estimated models.

5. Results

Tables 3 and 4 report results of the regression models investigating the relationship between working capital management and corporate profitability. The cash conversion cycle and its three individual components are independently regressed against the two measures of profitability. The effect of the business cycle is taken into consideration in each regression model by including dummy variables for the respective economic states. The relevant measure of profitability is ROA in Table 3, whereas profitability is measured by GOI in Table 4. In both Tables, results of

estimating four (4) regression models are presented. We discuss the results contained in both tables together.

Model (1) in Tables 3 and 4 analyzes the relationship between profitability and the *CCC*. We find a negative a statistically significant relationship between *CCC* and *ROA and CCC* and *GOI*, thereby, providing support for hypothesis 1a. This result is in line with previous studies (Deloof 2003; Garcia-Teruel & Matrinez-Solano 2007; Lazaridis and Tryfonidis 2006; and Gill et al. 2010) and implies that companies can boost their profitability by increasing working capital efficiency, i.e., minimizing CCC.

The empirical results also lend some support for the assertion that the business cycle affects the profitability-working capital management relationship. The interactive dummy variable *(D1*CCC)* which depicts the performance of the *CCC* in poor states of the economy is negatively related to profitability and statistically significant at the 1% level, thereby providing support for hypothesis 1b. This implies that the overall significance of the *CCC* on profitability is greater in poor economic states. However there is no statistically significant evidence to suggest that the *CCC*-profitability relationship departs from the norm during more prosperous economic states.

Model 2 in Tables 3 and 4 examines the influence of account payable deferral period on profitability. Consistent with the correlation analysis, the results show a negative and significant relationship between account payable deferral period and the GOI, implying less profitable firms wait longer to pay their bills. This negative result suggests that shorter *AP* cycles enhance profitability in firms and rejects hypothesis 2a which predicts a positive relationship between account payable deferral period and profitability. It can be inferred from the results that more profitable Finnish companies utilize cash discounts on payables and do not use accounts payable trade credit as a source of financing. These results differ from that reported for Greek and U.S. listed companies. Lazaridis and Tryfonidis (2006) find that where more profitable firms had longer *AP* cycles and Gill et al. (2010) show no relationship between AP and profitability. This also indicates that there are country specific aspects to working capital efficiency even among listed companies.

The economic states do not appear to exert any measurable influence on the profitability-account payable relationship. The absence of significant results suggests that the importance of accounts payable in relation to profitability does not vary according to the stage of the business cycle.

We next examine the relationship between the accounts receivable conversion period and profitability. The results reported (Model 3 in Tables

3 and 4) show a negative but statistically insignificant relationship between *AR* and profitability, thereby rejecting hypothesis 3a. The results, however, show that in poor economic states the aggregate relationship between *AR* and *ROA* is significantly negative, implying that during economic downturns less profitable firms extend their accounts receivable conversion periods. We infer that Finnish firms increase incentives for sales by extending more trade credit to buyers, which increases the firm's accounts receivable conversion period. The evidence presented support hypothesis 3b which states that the significance of *AR* increases during economic downturns. There is no evidence to support the assertion of a change in *AR* significance during a boom economic state.

The empirical evidence on the relationship between profitability and the inventories conversion period *(INV)* is provided by model 4 in Tables 3 and 4. The results support prior evidence of a negative and statistically significant relationship between inventories and corporate profitability. The coefficients of both profitability measure, ROA and GOI, are statistically significant implying that by increasing the efficiency of inventories and minimizing inventory conversion periods, Finnish companies can achieve higher profitability levels. This provides empirical support for hypothesis 4a. The negative and statistically significantly coefficient of the interactive dummy variable *(D1*INV)* in Table 4 provides evidence in support of hypothesis 4b. That is, in poor economic states, the significance of the

negative relationship between *INV* and *GOI* increases. However economic boom periods do not affect the significance of the relationship between inventories and profitability. The result of the interactive boom dummies for inventories imply that the role of managing inventories in prosperous economic times is not as important as during economic downturns.

For the most part the relationships regarding *ROA* and the control variables are similar to the relationships between the control variables and operating profit, *GOI*. The relationship between the current ratio (*CR*) and profitability is found to be positive and statistically significant for all of the first four regressions, which indicates that firm's can increase profitability by improving their margin of liquidity. The amount of leverage a company uses in its operations (*DEBT)* is generally negative but only statistically significant when profitability is measured by ROA. Firm size is also negatively related to profitability.

The dummy variables *D1* and *D2* reflect changes in profitability in different stages of the business cycle. The recession dummy *(D1)* is generally significant and negative models estimated. This underlines the fact that corporate profitability is significantly lower during economic downturns. We also find some evidence to suggest that companies show higher return on assets rates during more prosperous economic times. The dummy for

prosperous economic periods *(D2)* is positive and statistically significant in Table 3.

6. Conclusions

Working capital, the difference between current assets and current liabilities, is used to fund a business' daily operations due to the time lag between buying raw materials for production and receiving funds from the sale of the final product. With vast amounts invested in working capital, it can be expected that the management of these assets would significantly affect the profitability of a company. Consequently, companies strive to achieve optimize levels of working capital by paying bills as late as possible, turning over inventories quickly, and collecting on account receivables quickly. The optimal level, though, may vary to reflect business conditions. This study examines the role business cycle plays in the working capital-corporate profitability relationship using a sample of Finnish listed companies from years 1990 to 2008.

We utilize the cash conversion cycle (*CCC*), defined as the length of time between a company's expenditure for the procurement of raw materials and the collection of sales of finished goods, as our measure of working capital. We further make use of 2 measures of profitability, return on assets and gross operating income. We document a negative relationship between cash

conversion cycle and corporate profitability. Our results also show that companies can achieve higher profitability levels by managing inventories efficiently and lowering accounts receivable collection times. Furthermore shorter account payable cycles enhance corporate profitability. These results, which largely mirror findings from other countries, indicate effective management of firm's total working capital as well as its individual components has a significant effect on corporate profitability levels.

Our results also show that economic conditions exhibit measurable influences on the working capital-profitability relationship. The low economic state is generally found to have negative effects on corporate profitability. In particular, we find that the impact of efficient working capital (*CCC*) on operational profitability increases in economic downturns. We also find that the impact of efficient inventory management and accounts receivables conversion periods, subsets of CCC, on profitability increase in economic downturns.

Overall the results indicate that investing in working capital processes and incorporating working capital efficiency into everyday routines is essential for corporate profitability. As a result, firms should include working capital management in their financial planning processes.

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Table 1. Descriptive statistics

Variable	Mean	Median	Std Dev	Min	Max
A. Working Capital Management					
Cash Conversion Cycle	108.810	100.623	88.794	-85.569	494.408
Account Payable	56.366	53.400	25.530	0.000	159.000
Account Receivable	47.573	47.000	20.543	0.000	109.000
Inventory	117.603	101.712	79.858	0.647	492.608
B. Profitability Measures					
Return on Assets	0.084	0.079	0.071	-0.167	0.334
Gross Operating Income to non-financial assets	1.012	0.852	0.573	0.087	3.166
C. Control Variables					
Current Ratio	1.589	1.500	0.623	0.300	3.900
Sales	5.872	5.644	1.619	2.312	9.619
Debt	0.553	0.557	0.149	0.152	0.974

Notes: Descriptive statistics for firm level variable for Finnish firms from the years 1990 to 2008, for a total number of 1136 observations.

Table 2. Correlations of key variables during the normal, boom and downturn periods

	ROA	*GOI*	*CCC*	*AP*	*AR*	*INV*	*CR*	*DEBT*	*SALES*
ROA									
GOI	0.250								
	(0.000)								
CCC	0.032	0.098							
	(0.456)	(0.021)							
AP	-0.068	-0.084	-0.182						
	(0.109)	(0.049)	(0.000)						
AR	-0.022	0.061	0.386	0.303					
	(0.604)	(0.153)	(0.000)	(0.000)					
INV	0.019	0.067	0.953	0.036	0.267				
	(0.650)	(0.116)	(0.000)	(0.397)	(0.000)				
CR	0.298	0.221	0.300	-0.131	0.194	0.241			
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)			
DEBT	-0.320	-0.052	0.012	0.112	0.060	0.033	-0.411		
	(0.000)	(0.217)	(0.784)	(0.008)	(0.161)	(0.438)	(0.000)		
SALES	-0.150	-0.289	-0.159	0.052	0.059	-0.175	-0.294	0.066	
	(0.000)	(0.000)	(0.000)	(0.224)	(0.164)	(0.000)	(0.000)	(0.118)	
ROA		0.436	0.118	-0.070	0.041	0.097	0.285	-0.340	-0.178
		(0.000)	(0.047)	(0.237)	(0.496)	(0.102)	(0.000)	(0.000)	(0.003)
GOI	0.478		0.048	-0.017	0.088	0.024	0.175	-0.080	-0.255
	(0.000)		(0.417)	(0.773)	(0.140)	(0.683)	(0.003)	(0.180)	(0.000)
CCC	-0.042	-0.157		-0.139	0.468	0.944	0.281	0.072	-0.129
	(0.465)	(0.007)		(0.020)	(0.000)	(0.000)	(0.000)	(0.226)	(0.031)
AP	-0.048	0.035	-0.128		0.255	0.109	-0.215	-0.030	-0.062
	(0.409)	(0.545)	(0.027)		(0.000)	(0.067)	(0.000)	(0.613)	(0.300)
AR	0.035	0.043	0.548	0.144		0.336	0.090	0.106	0.053
	(0.552)	(0.461)	(0.000)	(0.013)		(0.000)	(0.131)	(0.075)	(0.372)
INV	-0.071	-0.175	0.946	0.133	0.413		0.218	0.042	-0.179
	(0.221)	(0.002)	(0.000)	(0.022)	(0.000)		(0.000)	(0.483)	(0.003)
CR	0.107	0.165	0.102	-0.127	-0.064	0.090		-0.477	-0.288
	(0.066)	(0.004)	(0.079)	(0.029)	(0.270)	(0.120)		(0.000)	(0.000)
DEBT	-0.187	-0.184	0.035	0.174	0.166	0.052	-0.495		0.116

	(0.001)	(0.002)	(0.551)	(0.003)	(0.004)	(0.367)	(0.000)		(0.051)
SALES	0.006	-0.222	-0.124	-0.110	0.001	-0.173	-0.299	0.187	
	(0.918)	(0.000)	(0.033)	(0.058)	(0.987)	(0.003)	(0.000)	(0.001)	

Notes: Pearson correlation coefficients for the key variables, for a total number of 1136 observations. *ROA* is return on assets; *GOI* is gross operating income; *CCC* is cash conversion cycle; *AP* is accounts payable deferral period; *AR* is accounts receivable conversion period; *INV* is inventory conversion period; *CR* is current ratio; *DEBT* is debt ratio; *SALES* is natural logarithm of sales; *OI* is natural logarithm of operating income; and *GROWTH* is growth rate measured by annual sales growth. *, **, *** denote the 10%, 5% and 1 % significance levels, respectively. **Normal, lower – recession, higher boom**

Table 3. The relation of ROA with the working capital management and business cycle

Coefficient Estimate	Expected sign	(1)	(2)	(3)	(4)
Intercept		14.256***	14.179***	14.034***	14.605***
D1	-	-1.903***	-1.872***	-1.931***	-1.861***
D2	+	1.848***	1.913***	1.905***	1.858***
CCC	-	-0.009***			
(D1*CCC)	-	-0.004			
(D2*CCC)	+	0.009			
AP	+		-0.013		
(D1*AP)	+		0.008		
(D2*AP)	-		-0.009		
AR	-			-0.016	
(D1*AR)	-			-0.001	
(D2*AR)	+			-0.018	
INV	-				-0.010***
(D1*INV)	-				-0.006***
(D2*INV)	+				0.008
CR		1.936***	1.668***	1.772***	1.866***
DEBT		-9.272***	-9.642***	-9.489***	-9.203***
SALES		-0.142	-0.13	-0.114	-0.168
Adj. R^2		0.23	0.22	0.22	0.23
F-value		11.66	11.21	11.23	11.72
p-value		0.0000	0.0000	0.0000	0.0000

The table reports results from estimating the following regression model from the years 1990 to 2008, for a total number of 1136 observations:

$$Profitabil\,ity = \beta_0 + \beta_1 CCC + \beta_2 CR + \beta_3 DEBT + \beta_4 SALES + \beta_5 D1 + \beta_6 D2 + \beta_7 (D1 * CCC) + \beta_8 (D2 * CCC) + u$$

where profitability is measured by return on assets (*ROA*). *CCC* is cash conversion cycle; *AP* is accounts payable deferral period; *AR* is accounts receivable conversion period; *INV* is inventory conversion period; *CR* is current ratio; *DEBT* is debt Ratio; *SALES* is the natural logarithm of sales; and *D1* and *D2* are economic downturn and economic boom dummy variables, respectively. The models are estimated with industry dummies. The White (1980) heteroscedasticity-consistent covariance matrix is used.

*, **, *** denote the 10%, 5% and 1 % significance levels, respectively.

Table 4. The relation of GOI with the working capital management and business cycle

Coefficient Estimate	Expected sign	(1)	(2)	(3)	(4)
Intercept		137.179***	146.530***	130.149***	143.206***
D1	-	-27.895***	-26.160***	-28.089***	-27.441***
D2	+	-4.658	-4.117	-4.487	-4.707
CCC	-	- 0.037***			
(CCC*D1)	-	-0.126***			
(CCC*D2)	+	-0.010			
AP	+		-0.264***		
(AP*D1)	+		0.094		
(AP*D2)	-		0.085		
AR	-			-0.032	
(AR*D1)	-			-0.157**	
(AR*D2)	+			-0.149	
INV	-				-0.066**
(INV*D1)	-				-0.149***
(INV*D2)	+				-0.021
CR		11.405***	9.193***	9.988***	11.307***
DEBT		-3.735	-3.803	-5.097	-2.529
SALES		-3.23***	-3.140***	-3.194***	-3.598***
Adj. R^2		0.38	0.37	0.37	0.39
F-value		22.78	22.19	21.67	23.57
p-value		0.0000	0.0000	0.0000	0.0000

The table reports results from estimating the following regression model from the years 1990 to 2008, for a total number of 1136 observations:

$$Profitabil\,ity = \beta_0 + \beta_1 CCC + \beta_2 CR + \beta_3 DEBT + \beta_4 SALES + \beta_5 D1 + \beta_6 D2 + \beta_7 (D1 * CCC) + \beta_8 (D2 * CCC) + u$$

where profitability is measured by gross operating income (GOI). *CCC* is cash conversion cycle; *AP* is accounts payable deferral period; *AR* is accounts receivable conversion period; *INV* is inventory conversion period; *CR* is current ratio; *DEBT* is debt Ratio; *SALES* is the natural logarithm of sales; and *D1* and *D2* are economic downturn and economic boom dummy variables, respectively. The models are estimated with industry dummies. The White (1980) heteroscedasticity-consistent covariance matrix is used.

*, **, *** denote the 10%, 5% and 1 % significance levels, respectively

Figure 1 Distribution of sample observations per year

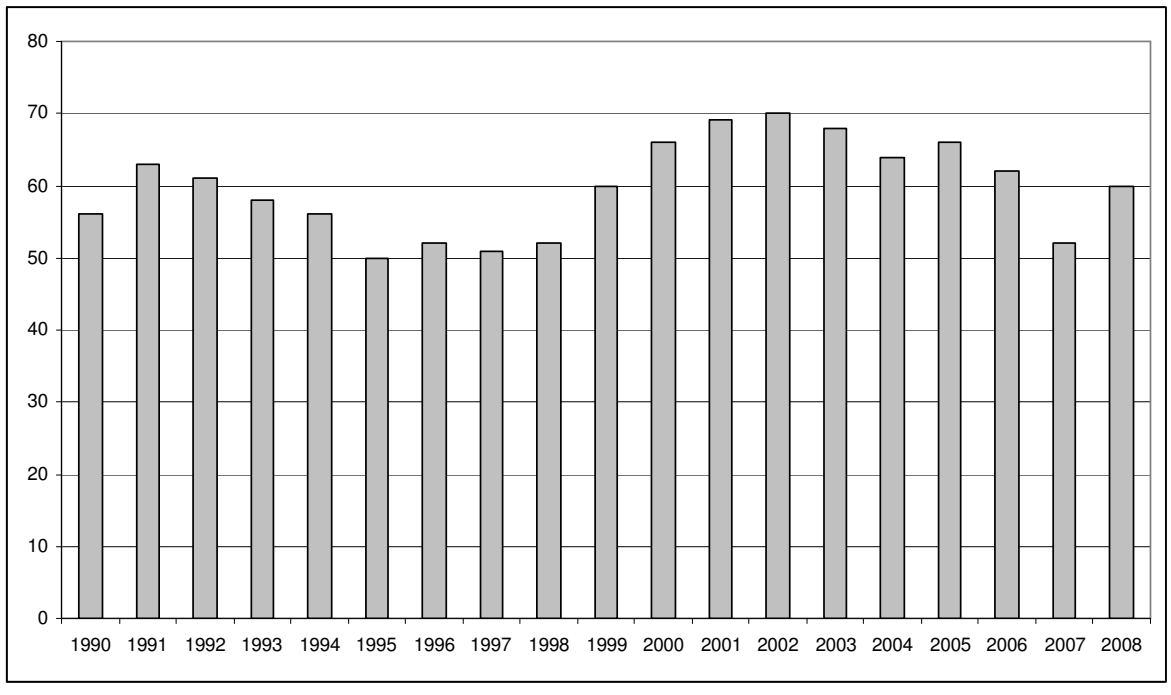

Figure 2 Changes in Finnish Annual GDP

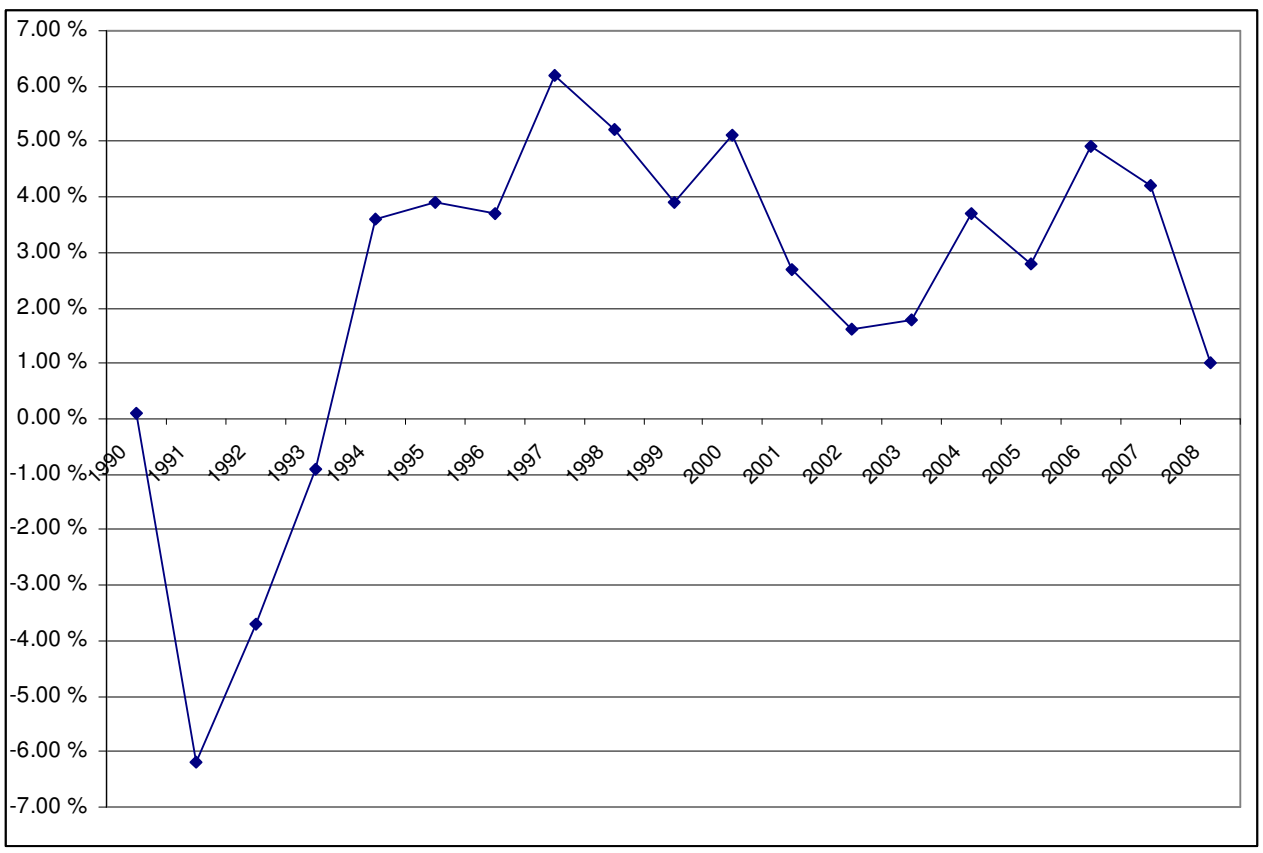

Figure 3 The development of Finnish listed companies' working capital (WC) to total assets (TA) and net working capital (NWC) to total assets (TA) ratios