# Does Working Capital Management Affect Profitability of Belgian Firms?

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## 1. INTRODUCTION

Most firms have a large amount of cash invested in working capital, as well as substantial amounts of short-term payables as a source of financing. For instance, according to the National Bank of Belgium, in 1997 accounts receivable and inventories were respectively 17% and 10% of total assets of all Belgian non-financial firms. Accounts payable were 13% of total assets of these firms. It can be expected that the way in which working capital is managed will have a significant impact on the profitability of firms. Accordingly, for many firms working capital management (WCM) is a very important component of their financial management.

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). Because suppliers may have

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significant cost advantages over financial institutions in providing credit to their customers, it can also be an inexpensive source of credit for customers (Petersen and Rajan, 1997). The flip side of granting trade credit and keeping inventories is that money is locked up in working capital.

Another component of working capital is accounts payable. 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 payment of invoices can be very costly if the firm is offered a discount for early payment. In a 1996 survey of trade credit policies in Europe, Svensson (1997) found that 75% of Belgian firms offered a discount for prompt payment (within 10 days), and the average discount offered was 3%. The average *contractual* credit period was 41 days, but the average *actual* payment period was 61 days: 49% of all trade credit was paid too late. In a 2001 survey by the Institute for Credit Management of the Vlerick Leuven Ghent School for Management of trade credit policies of Belgian firms, it was found that the median Belgian firm offers a 2/10n30 discount for quick payment.

Compared with payment periods in the USA, payment periods of Belgian firms appear quite long. In Belgium, as in many other continental European countries, capital markets are underdeveloped in the sense that information and agency problems are particularly pronounced. La Porta et al. (1997 and 1998), who find that countries with poorer investor protection have smaller and narrower external capital markets, show that Belgium has weak legal protections of corporate shareholders and creditors, making bank financing and trade credit more attractive. Fisman and Love (2001) argue that trade creditors mitigate weak creditor protection and imperfect information better than formal lenders, and find that firms in countries with less developed financial markets use informal credit provided by their suppliers to finance growth.

A popular measure of WCM is the cash conversion cycle, i.e. the time lag between the expenditure for the purchases of raw materials and the collection of sales of finished goods. The longer this time lag, the larger the investment in working capital. A longer cash conversion cycle might increase profitability because it leads to higher sales. However, corporate profitability might

also decrease with the cash conversion cycle, if the costs of higher investment in working capital rise faster than the benefits of holding more inventory and/or granting more trade credit to customers. Shin and Soenen (1998) investigate the relation between a measure of the cash conversion cycle and corporate profitability. For a large sample of listed American firms for the 1975–1994 period, they find a strong negative relation. This result indicates that managers can create value for their shareholders by reducing the cash conversion cycle to a reasonable minimum.

In this paper, I investigate the relation between WCM and corporate profitability for a sample of 1,009 large Belgian non-financial firms for the 1992–1996 period. Number of days accounts receivable, inventories and accounts payable are used as measures of trade credit and inventory policies. The cash conversion cycle is used as a comprehensive measure of WCM. The results suggest that managers can increase corporate profitability by reducing the number of days accounts receivable and inventories. Less profitable firms wait longer to pay their bills.

The paper proceeds as follows. In the next section the sample and the variables used in the empirical analysis are presented. The results of the empirical analysis are presented in Section 3. Section 4 discusses the causality in the relation between WCM and corporate profitability. Section 5 concludes.

## 2. SAMPLE AND VARIABLES

The sample is based on a database provided by the National Bank of Belgium that consists of financial statements of the 2,000 most important Belgian firms. The sample was constructed as follows. I started with the 1,637 firms for which a financial statement was available for each year of the 1991–1996 period. Because of the specific nature of their activities, firms in NACE-industries 1 ('energy and water'), 8 ('banking and finance, insurance, business services, renting') and 9 ('other services') were excluded from the sample.[1] Some firms with missing data were also removed. Finally, the firms with the 1% outlying values for number of days accounts

receivable, number of days inventories, number of days accounts payable, net operating income and gross operating income were left out. Thus a balanced panel set of 5,045 firm-year observations was obtained, with observations of 1,009 firms over the 1992–1996 period.[2]

Profitability is measured by gross operating income, which is defined as sales minus cash costs of goods sold, and is divided by total assets minus financial assets.[3] For a number of firms in the sample, financial assets, which are mainly shares in other firms, are a significant part of total assets. That is also the reason why return on assets is not considered as a measure of profitability: when a firm has mainly financial assets on its balance sheet, its operating activities will contribute little to the overall return on assets. Profitability measures based on stock market valuation are not considered because only a limited number of Belgian firms is listed on a stock exchange.

Number of days accounts receivable is calculated as [accounts receivable × 365]/sales. Number of days inventories is [inventories × 365]/cost of sales. Number of days accounts payable is [accounts payable × 365]/purchases. A more detailed description of the definitions of these variables, which involve a number of Belgian financial statement items, can be found in Theunisse and Jegers (1994).

The cash conversion cycle is used as a comprehensive measure of WCM. The cash conversion cycle is simply [number of days accounts receivable + number of days inventory − number of days accounts payable]. Gentry, Vaidyanathan and Lee (1990) developed a *weighted* cash conversion cycle, which scales the timing by the amount of funds in each step of the cycle. However, this measure cannot be used because not all information necessary for calculation is available.[4]

In addition, size (the natural logarithm of sales), sales growth ([this year's sales − previous year's sales]/previous year's sales), the financial debt ratio (financial debt/total assets), and the ratio of fixed financial assets to total assets are included as control variables in the regressions. Fixed financial assets are shares in other (mainly affiliated) firms, intended to contribute to the activities of the firm that holds them, by establishing a lasting and specific relation, and loans that were granted with the same purpose. For some firms such assets are a significant part of total assets.

**Table 1**

Descriptive Statistics

1,009 Belgian Non-financial Firms, 1992–1996: 5,045 Firm-year Observations

| | Mean | St. Dev. | Minimum | Median | Maximum |
|---|---|---|---|---|---|
| Gross operating income | 0.122 | 0.109 | −0.271 | 0.106 | 0.721 |
| Net operating income | 0.055 | 0.090 | −0.377 | 0.046 | 0.603 |
| No. of days accounts receivable | 54.64 | 33.00 | 0 | 51.44 | 272.57 |
| No. of days inventories | 46.62 | 52.92 | 0 | 33.81 | 517.79 |
| No. of days accounts payable | 56.77 | 33.52 | 0 | 51.96 | 221.29 |
| Cash conversion cycle | 44.48 | 59.56 | −155.74 | 34.59 | 515.25 |
| Sales ($\times$ 1,000 BEF) | $5.256 \cdot 10^6$ | $10.942 \cdot 10^6$ | $6.714 \cdot 10^4$ | $2.298 \cdot 10^6$ | $1.688 \cdot 10^8$ |
| Sales growth | 0.028 | 0.212 | −0.856 | 0.016 | 1.881 |
| Financial debt | 0.254 | 0.223 | 0 | 0.224 | 1.653 |
| Fixed financial assets | 0.120 | 0.184 | 0 | 0.024 | 0.930 |
| Variability | 0.049 | 0.036 | 0.000 | 0.039 | 0.250 |

*Notes:*

Net operating income is (sales − cost of sales − financial assets). Gross operating income is (sales − cost of sales + deprecation & amortisation)/(total assets − financial assets). No. of days accounts receivable is (accounts receivable × 365)/sales. No. of days inventories is (inventories × 365)/cost of sales. No. of days accounts payable is (accounts payable × 365)/purchases. The cash conversion cycle is (No. of days accounts receivable + No. of days inventories − No. of days accounts payable). Sales is expressed in thousands of Belgian Francs. Sales growth is (this year's sales − previous year's sales)/previous year's sales. Financial debt is financial debt/total assets. Fixed financial assets is fixed financial assets/total assets. Variability is the standard deviation of net operating income over the 1991–1996 period.

I also consider variability of net operating income (divided by total assets minus financial assets) as a control variable. Variability is the standard deviation of net operating income of each firm over the 1991–1996 period.

Table 1 presents descriptive statistics. Gross operating income is on average 12.2% of [total assets − financial assets], while the median is 10.6%. The average cash conversion cycle is 44.5 days (median is 59.6 days). Firms receive payment on sales after an average of 54.6 days (the median is 51.4 days). It takes on average 46.6 days to sell inventory (median is 33.8 days) and firms wait on average 56.8 days to pay their purchases (median is 52 days).

Mean sales growth is only 2.8%, while median sales growth is even less at 1.6%. On average about a quarter of all assets are financed with financial debt (median is 22.4%). It is also noteworthy that while for the median firm in the sample, fixed financial assets are only 2.4% of total assets, the mean fixed financial assets ratio is much higher at 12%. For a number of firms, a large proportion of total assets are fixed financial assets.

## 3.  EMPIRICAL ANALYSIS

### (i)  Correlation Analysis

Table 2 presents Pearson correlation coefficients for all variables considered. There is a negative relation between gross operating income on the one hand and the measures of WCM (number of days accounts receivable, inventories and accounts payable and cash conversion cycle) on the other hand. This is consistent with the view that the time lag between the expenditure for the purchases of raw materials and the collection of sales of finished goods can be too long, and that decreasing this time lag increases profitability.

A shortcoming of Pearson correlations is that they do not allow to identify causes from consequences. A negative relation between number of days accounts payable and profitability is consistent with the view that less profitable firms wait longer to pay their bills. In that case, profitability affects accounts payable

**Table 2**

Pearson Correlation Coefficients

1,009 Belgian Non-financial Firms, 1992–1996: 5,045 Firm-year Observations

| | No. of Days Accounts Receivable | No. of Days Inventories | No. of Days Accounts Payable | Cash Conversion Cycle | Ln(sales) | Sales Growth | Financial Debt | Fixed Financial Assets | Variability |
|---|---|---|---|---|---|---|---|---|---|
| Gross operating income | −0.173 | −0.142 | −0.061 | −0.189 | 0.157 | 0.105 | −0.022 | 0.306 | 0.151 |
| No. of days accounts receivable | | 0.191 | 0.533 | 0.424 | −0.148 | −0.041 | 0.077 | −0.088 | −0.147 |
| No. of days inventories | | | 0.269 | 0.843 | −0.109 | −0.029 | 0.016 | −0.041 | −0.046 |
| No. of days accounts payable | | | | −0.028 | −0.079 | −0.020 | −0.084 | 0.001 | −0.057 |
| Cash conversion cycle | | | | | −0.135 | −0.037 | 0.104 | −0.086 | −0.091 |
| Ln(sales) | | | | | | 0.167 | 0.071 | 0.222 | −0.038 |
| Sales growth | | | | | | | −0.000 | −0.032 | −0.033 |
| Financial debt | | | | | | | | 0.130 | −0.002 |
| Fixed financial assets | | | | | | | | | 0.137 |

*Notes:*
Gross operating income is (sales − cost of sales + deprecation & amortisation)/(total assets − financial assets. No. of days accounts receivable is (accounts receivable × 365)/sales. No. of days inventories is (inventories × 365)/cost of sales. No. of days accounts payable is (accounts payable × 365)/purchases. The cash conversion cycle is (No. of days accounts receivable + No. of days inventories − No. of days accounts payable). Sales is expressed in thousands of Belgian Francs. Sales growth is (this year's sales − previous year's sales)/previous year's sales. Financial debt is financial debt/total assets. Fixed financial assets is fixed financial assets/total assets. Variability is the standard deviation of net operating income over the 1991–1996 period.

policy, and not *vice versa*. An alternative explanation for a negative relation between the number of days accounts payable and profitability could be that firms wait too long to pay their accounts payable. Speeding up payments to suppliers might increase profitability because Belgian firms often receive a substantial discount for prompt payment. However, in Belgian financial statements, discounts received for prompt payment should be booked as financial income, and should not affect operating income.

## (ii) Regression Analysis

Next, I use regression analysis to investigate the impact of WCM on corporate profitability. The determinants of corporate profitability are estimated with a fixed effects model. Fixed effects estimation assumes firm specific intercepts, which capture the effects of those variables that are particular to each firm and that are constant over time.[5] A disadvantage of fixed effects estimation is that it eliminates anything that is time-invariant from the model. Variability of income, which is measured by the standard deviation of net operating income over the 1991–1996 period, can therefore not be included in a fixed effects model. I also estimate plain OLS-models, which not only include all variables of the fixed effects model, but also variability of income, 4 year dummies and 37 industry dummies, which are based on 2-digit NACE-code. In all regressions, standard errors are calculated using White's correction for heteroscedasticity.

The determinants of gross operating income are investigated for all 5,045 firm-year observations. The results can be found in Table 3. Regression (1) is estimated with fixed effects and includes number of days accounts receivable as a measure of accounts receivable policy. The coefficient of the accounts receivable variable is negative and highly significant, and implies that an increase in the number of days accounts receivable by 1 day is associated with a decline in gross operating income (divided by total assets minus financial assets) by 0.048%. The coefficients of the other variables included in the model are also highly significant. Gross

operating income increases with firm size (measured by the natural logarithm of sales), sales growth and fixed financial assets, and decreases with financial debt. In regression (2), a significant negative relation is found between gross operating income and number of days inventories ($p$-value = 0.015). Regression (3) shows a very significant negative relation between gross operating income and number of days accounts payable. This negative relation confirms the negative correlation between operating income and number of days accounts payable in Table 2.

The cash conversion cycle is included in regression (4). The coefficient of the cash conversion cycle variable is negative, but it is not significantly different from zero ($p$-value = 0.668). That is not a surprise: gross operating income declines with the number of days accounts receivable and inventories, but also with the number of days accounts payable, which is subtracted to calculate the cash conversion cycle.

The results of regressions (1) to (4) suggest that managers can increase corporate profitability by reducing the number of days accounts receivable and inventories. An explanation for the negative relation between accounts payable and gross operating income is that less profitable firms wait longer to pay their bills.

In regressions (5) to (8), the determinants of gross operating income are estimated using plain OLS instead of fixed effects estimation, and include variability of income, 4 year dummies and 37 industry dummies as independent variables. OLS estimation does not take into account firm specific differences in profitability. The results are generally consistent with the results of regressions (1) to (4). Gross operating income decreases with number of days accounts receivable, inventories and accounts payable. One difference between fixed effects estimation and OLS estimation is that in regression (8) gross operating income decreases with the cash conversion cycle: the coefficient is highly significant ($p$-value = 0.000). In regression (4), it was not significant. It is interesting to note that the adjusted $R^2$s of the OLS regressions are much lower than the adjusted 'within' $R^2$s of the fixed effects regressions. The regression models explain a much higher portion of the variations in profitability *within* firms than *between* firms.[6]

**Table 3**

The Determinants of Corporate Profitability
1,009 Belgian Non-financial Firms, 1992–1996: 5,045 Firm-year Observations

| Dependent Variable: | Gross Operating Income | | | | | | | |
| Regression Model: | Fixed Effects | | | | OLS with Industry and Year Dummies | | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Ln(sales) | 0.045 | 0.048 | 0.044 | 0.051 | 0.006 | 0.007 | 0.007 | 0.006 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) | (0.000) |
| Sales growth | 0.016 | 0.015 | 0.017 | 0.015 | 0.052 | 0.053 | 0.053 | 0.052 |
|  | (0.005) | (0.008) | (0.004) | (0.007) | (0.000) | (0.000) | (0.000) | (0.000) |
| Financial debt | −0.151 | −0.153 | −0.175 | −0.154 | −0.030 | −0.034 | −0.041 | −0.026 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Fixed financial assets | 0.147 | 0.158 | 0.158 | 0.161 | 0.141 | 0.142 | 0.146 | 0.138 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Variability | − | − | − | − | 0.277 | 0.322 | 0.321 | 0.305 |
|  |  |  |  |  | (0.000) | (0.000) | (0.000) | (0.000) |
| No. of days accounts receivable | −0.48 $10^{-3}$ | − | − | − | −0.44 $10^{-3}$ | − | − | − |
|  | (0.000) |  |  |  | (0.000) |  |  |  |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No. of days inventories | — | $-0.12$ $10^{-3}$ (0.015) | — | — | — | $-0.25$ $10^{-3}$ (0.000) | — | — |
| No. of days accounts payable | — | — | $-0.54$ $10^{-3}$ (0.000) | — | — | — | $-0.22$ $10^{-3}$ (0.000) | — |
| Cash conversion cycle | — | — | — | $-0.17$ $10^{-4}$ (0.668) | — | — | — | $-0.27$ $10^{-3}$ (0.000) |
| Adjusted $R^2$ | 0.73 | 0.72 | 0.73 | 0.72 | 0.22 | 0.22 | 0.21 | 0.22 |

*Notes:*
*p*-values (robust for heteroscedasticity) in parentheses. OLS-regressions include 37 industry dummies and 4 year dummies (results not reported). Gross operating income is (sales − cost of sales + deprecation & amortisation)/(total assets − financial assets). No. of days accounts receivable is (accounts receivable × 365)/sales. No. of days inventories is (inventories × 365)/cost of sales. No. of days accounts payable is (accounts payable × 365)/purchases. The cash conversion cycle is (No. of days accounts receivable + No. of days inventories − No. of days accounts payable). Sales is expressed in thousands of Belgian Francs. Sales growth is (this year's sales − previous year's sales)/previous year's sales. Financial debt is financial debt/total assets. Fixed financial assets is fixed financial assets/total assets. Variability is the standard deviation of net operating income over the 1991–1996 period.

## 3. DOES PROFITABILITY AFFECT WCM, OR *VICE VERSA*?

It cannot be ruled out that the negative relation between WCM and profitability is to some extent a consequence of profitability affecting WCM, and not *vice versa*. Indeed, the most plausible explanation for the negative relation between *accounts payable* and profitability is that less profitable firms wait longer to pay their bills. A negative relation between *inventory* and profitability can be caused by declining sales, leading to lower profits and more inventory.

An alternative explanation for the negative relation between *accounts receivable* and profitability could be that customers want more time to assess the quality of products they buy from firms with declining profitability. However, finance based models explaining trade credit (e.g. Schwartz, 1974) argue that firms able to obtain funds at a low cost will offer trade credit to firms facing higher financing costs. Emery (1984) sees trade credit as a more profitable short term investment than marketable securities. These models imply that higher profits should lead to *more* accounts receivable, because firms with higher profits have more cash to lend to customers. This is confirmed by Deloof and Jegers (1996), who find that Belgian firms with a shortage of cash *reduce* investment in accounts receivable.

Figure 1 shows the median number of days accounts receivable, accounts payable and inventories, all partitioned by gross operating income deciles. Consistent with the hypothesis that less profitable firms wait longer to pay their bills, the number of days accounts payable is much higher for the lowest income deciles than for the other income deciles. The median number of days accounts payable is 62.5 days for the first income decile (gross operating income = 0.009) and 65.8 days for the second income decile (gross operating income = 0.039). For the other income deciles, the median number of days accounts payable ranges from 47.1 days (fourth income decile) to 54.3 days (sixth income decile). Figure 1 does not show a clear trend in the median number of days inventories and accounts receivable across income deciles.

**Figure 1**

Median No. of Days Accounts Receivable, Accounts Payable and
Inventories, Partitioned by Gross Operating Income Deciles (1,009
Belgian Non-financial Firms, 1992–1996: 5,045 Firm-year
Observations)
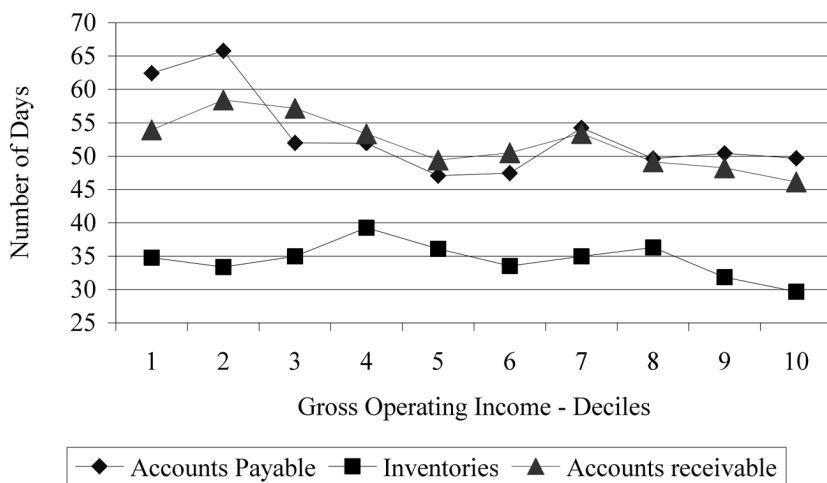


## 4. CONCLUSION

Most firms have a large amount of cash invested in working
capital. It can therefore be expected that the way in which
working capital is managed will have a significant impact on the
profitability of firms. Shin and Soenen (1998) find a strong
negative relation between the cash conversion cycle and
corporate profitability for a large sample of listed American
firms for the 1975–1994 period. In this paper, I find a
significant negative relation between gross operating income
and the number of days accounts receivable, inventories and
accounts payable of Belgian firms.

These results suggest that managers can create value for their
shareholders by reducing the number of days accounts
receivable and inventories to a reasonable minimum. The
negative relation between accounts payable and profitability is
consistent with the view that less profitable firms wait longer to
pay their bills.

NOTES

1  The NACE industrial classification serves the same purpose as the well
   known SIC classification, and has been established for industry taxonomy
   within the European Union. For details, see Eurostat (1985).
2  The 1991 data were needed to calculate some of the variables.
3  All regressions in the paper were also estimated with net operating income
   (sales minus cash *and non cash* cost of goods sold) instead of gross operating
   profit as the dependent variable, with similar results.
4  Shin and Soenen (1998) use the *net trade cycle* as a comprehensive measure
   of WCM. The net trade cycle is simply [accounts receivable + inventory −
   accounts payable] × 365/sales. All regressions in this paper that include the
   cash conversion cycle were also estimated with the net trade cycle instead of
   the cash conversion cycle. The results (not reported) confirm the estimation
   results of the regressions with the cash conversion cycle.
5  An important feature of the fixed effects model is that it concentrates on
   differences 'within' firms. The fixed effects model is estimated by (1)
   computing the means for each variable *by firm*, (2) subtracting the firm
   means from each variable and (3) running a regression on the transformed
   data. Fixed effects estimation explains why the variables differ from their
   means, but not why the firm means differ from each other.
6  For a number of firms in the sample, a large proportion of total assets are
   fixed financial assets, which might influence the results. I re-estimated all
   panel regressions for the firms for which the average fixed financial assets
   ratio over the 1992–1996 period is below the median value (0.034). All OLS
   regressions were re-estimated for the observations for which the fixed
   financial assets ratio is below the median value (0.024). The results of all
   these regressions (not reported) are very similar to the ones reported in the
   paper.

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