The effect of Working Capital and the Cash Conversion Cycle at the profits of French PLCs, during the period 2020-2024

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Abstract

Working capital has been the subject of study for many economists for decades. Many scientific articles have been written in order to highlight the importance of the role of working capital in the survival of businesses as it is one of the key pillars in maintaining financial balance. Working capital management, essentially means managing companies' stocks, cash, accounts payable and accounts receivable.

Working capital management has become increasingly vital in the wake of global disruptions, most notably the COVID-19 pandemic. This study, explores the relationship between working capital components, particularly the Cash Conversion Cycle (CCC) and the profitability of French Public Limited Companies (PLCs) during the period 2020–2024.

Data were obtained from 80 French PLCs and analyzed through regression modeling and descriptive statistics. The results show a strong negative correlation between CCC and both Sales and Operating Income. Specifically, firms that successfully reduced their CCC experienced

increased profitability and financial stability. This highlights the strategic importance of liquidity management and operational efficiency in enhancing corporate resilience and recovery.

The findings of this research, reinforce the value of proactive working capital strategies and provide key insights for decision-makers, especially during periods of economic volatility.

Key words: Working Capital, Cash conversion cycle, Liquidity, Profitability.

JEL classifications: M40, M41, M48

1. Introduction

The financial disruptions caused by the COVID-19 pandemic between 2020 and 2021 had a profound impact on global businesses, especially on liquidity management and operational efficiency. During this period, companies around the world—including French PLCs—faced unprecedented challenges such as supply chain disruptions, cash flow constraints, as well as volatility in demand. These challenges heightened the importance of working capital management as a critical financial strategy for survival and resilience.

Working capital represents the operational liquidity available to a business and is vital for maintaining daily operations. Proper working capital management ensures that companies have enough resources to cover short – term obligations while investing in growth opportunities. In this context, the Cash Conversion Cycle (CCC) — the time it takes for a company to convert resource inputs into cash flows — has emerged as a key metric for evaluating the efficiency of working capital practices.

This study revisits and extends prior research by analyzing the relationship between working capital components and profitability in French PLCs over the period 2020–2024. The study focuses particularly on how businesses adapted their CCC during and after the COVID-19 crisis. By applying updated financial data and regression analysis, this research aims to offer fresh insights into the strategic role of liquidity in corporate recovery and performance.

1.1 Conceptual content

Working capital is considered for businesses, as the blood in the human body (Peel & Wilson, 1996) (Sagner, 2010). Cash is used to purchase fixed assets, to purchase raw materials and to pay creditors. The raw materials are processed, wages and overheads are paid, which then produce goods for sale. The sale of goods can be done either in cash or by credit. In the first case, the cash is collected directly, while in the second, cash is collected by the debtors. The funds are also produced by the operation and sale of fixed assets. Part of the profit is used to pay interest, taxes and dividends, while the rest remains with the business. This cycle continues throughout the life of the business (Peel & Wilson, 1996) (Sagner, 2010).

The quantitative concept of working capital is known as gross working capital, while the qualitative concept is known as net working capital. The important classifications are a) the conceptual classification and b) the classification based on the financial reports. Moreover, in

the international bibliography, according to Afza & Nazir, (2008), classification based on variability is found, a type of classification is very important for the compensation of decisions.

1.2 Factors determining working capital

The optimal level of current assets according to Palombini & Nakamura (2012) and Sagner (2010), depends on the nature of the business as especially commercial and industrial companies, require more working capital resources. In contrast, public utility companies need smaller working capital. The reasons supporting the need for working capital according to Palombini & Nakamura (2012), Sagner (2010), Mansoori & Muhammad (2012) and Gill (2011), are various including and not limiting to the terms of supply, the production policy business, the seasonal sales, the availability of credits, the business credit policy, the need for growth and expansion, the sales volume, the liquidity and profitability and the external environment.

1.3 The Role of Working Capital Management

According to Ukaegbu (2014), Yeshmin, & Hossan (2011), the effectiveness of proper management of working capital, can contribute to the profitable utilization of fixed assets in order to ensure long – term business success and achieve the goal of maximizing the shareholders' funds. Furthermore, a business should maintain sufficient working capital for its smooth operation. Both excessive working capital and insufficient working capital, will reduce profitability and create fertile ground for malfunctions in its operating processes. Finally, according to Belt (1979) and Nazir & Afza (2009), the risks that a company faces when it maintains high levels of working capital may be over investment in fixed assets, reckless stock market, sporadic trends, liberal credit, while the risks posed by low levels of working capital are the difficulty in implementing business plans, the payment of dividends due to lack of funds, the reduction of bargaining power in credit markets, the loss of business reputation due to inability to cover even the everyday operating deficiencies that may arise when the company is unable to deliver on its financial promises, stagnation in growth, the possibility of borrowing funds for short-term liabilities at excessively high interest rates and finally the possibility of the company being forced to sell products to very low prices in order to obtain capital which is in urgent need.

2. Management of Working Capital

According to Rafuse (1996), in order to effectively manage a company's working capital, a company must focus on four different short term assets: a) accounts receivable, b) inventories, c) cash, and d) short-term debt.

2.1 Accounts Receivable

A company can manage the accounts receivable according to the credit terms. A company can also rely on factoring, with a view to shorten its cash flow. Factoring means that the company sells its receivables to a third party, which usually holds a commission of the amount payable as fees and interest (Mian, & Smith Jr, 1992).

2.2 Stocks

Inventories are an additional component of current assets. Depending on the industry in which the company operates, stocks can be different types of items such as raw materials, semi – final products or final products. An idea often used to manage stocks is, the just-in-time approach (JIT). Just-in-time means that stocks are kept as low as possible in order to optimize supply chain processes and never run out (Michalski, 2009).

2.3 Management of cash and short-term securities

It is a common policy for companies to maintain high levels of cash availability for liquidity purposes or to avoid unexpected large-scale capital withdrawals in the short term. The problem that usually arises from maintaining a large percentage of cash, is the cost of capital that this entails. Many companies use sweeping as a method of profit in their cash balances. Cash redemption means that the company's cash balances are transferred to one – day deposit accounts in the money market, which pay a one – day interest rate. Other short – term securities that companies can invest in cash, are commercial documents, bonds, mutual funds, corporate banknotes and mortgages (Chen, et al, 2010).

2.4 Operating Cycle

According to Chakraborty (1973) and Hill et al (2010), the time required to complete the conversion of cash into a) raw materials, b) from raw materials into products in progress, c)

from products in progress into finished products, d) from final products into debts and accounts receivable through sales and e) from debts and accounts receivable into cash, is called the operating cycle.

2.5 Movement Capital Management Techniques

The management of working capital can depend on many different factors. It has been found that inventory management models became more common in the mid-1980s, most likely as a result of the rise of just-in-time management (Bontis, 2001).

2.6 Working Capital Management Difference - Fixed Assets

Working capital management is similar to managing fixed assets in the sense that in both cases a business analyzes its impact on profitability and risk. However, the management of fixed assets and the management of working capital differ in three important respects. Firstly, time management of fixed assets is very important. Secondly, large investments in working capital, especially cash, strengthen a company's liquidity position and thirdly, the level of fixed and current assets, depends on expected sales, but only current assets which can be adjusted to sales fluctuations in the short term (Sagner, 2010).

2.7 Working Capital Management Policies

A financing policy shows the ratio of current liabilities to current assets with a high index indicating aggression. A financing policy is a decision on which current assets will be used by long – term sources of funding and how much investment will be made from short – term resources. Oloo & Mwangi (2014), measured the aggressive financing policy based on total current liabilities of all the assets of a company and concluded that AFP has a positive effect on the profitability of Kenya's companies that are policy adjustments.

Kaviani et al (2014), Sahail et al (2016), concluded that working capital management is similar to managing fixed assets in the sense that in both cases a business, analyzes its impact on profitability and risk. However, the management of fixed assets and the management of working capital differ in three important respects:

1   Time management of fixed assets which is very important.

2 Large investments in working capital, especially cash, that strengthen a company's liquidity position.

3 The level of fixed and current assets that depends on expected sales but only current assets that can be adjusted to sales fluctuations in the short term (Sagner, 2010).

2.8 Calculation of Working Capital

According to Stone et al, (2013), the main ways of measuring working capital and its effective management, are sales turnover rate (DSO), accounts payable turnover rate (DPO), inventory turnover rate (DIO) and Cash Conversion Cycle (CCC). Outstanding sales, express the number of days of sales value (or revenue) still pending in balances (receivables).

Traffic sales speed / sales turnover rate (DSO) can be improved by optimizing the process of collecting receivables (accounts receivable) in a business. Also, the credit policy pursued by a company, plays a vital role since, which also affects the payment schedule of future sales (Stone et al, 2013). The ration can be seen below:

$$\text{DSO} = \frac{\text{Average accounts receivable}}{\text{Sales}} * 365$$

Due days (accounts payable) express the number of payment value days still pending at the end of the period. This number shows how many days, does the company use on average to pay its obligations. By extending this period, the company can to some extent, improve its net operating capital. (Stone et al, 2013). The ration of accounts payable turnover, can be seen below:

$$\text{DPO} = \frac{Average\ acounts\ payable}{\text{Cost of sales}} * 365$$

Outstanding inventories are an economic and business term that calculates inventory value. The value is estimated from the days of clearing the stock, based on the cost of goods sold. The result can be seen as the time required to convert the stock into revenue (Stone et al, 2013). The inventory ration can be seen below:

$$\text{DIO} = \frac{Average\ stock}{\text{Cost pf sales}} * 365$$

The cash conversion cycle (CCC) is a combination of the previous measurements. Cash conversion cycle is an additional way of measuring working capital, which measures the number of days that funds are linked to inventories and receivables, minus the number of payment days deferred to suppliers (CCC = DIO + DSO - DPO). This cycle expresses, in other

words, how many days it takes from the purchase of raw materials to the collection of receivables from the sale of the final product (Nobanee, 2009).

2.9 Working Capital and Profitability

In order to observe how management of working capital can affect the profitability of the company, emphasis must be placed on the cash flows of the company. More specifically, a larger cash conversion cycle may indicate that a company's sales are increasing and that the company can compete with loose credit policies or high stocks. Conversely, a higher cash conversion cycle can actually hurt a company's profitability by increasing the time that cash is tied to the non – interest bearing accounts of those accounts receivable. This indicates what a company must "sacrifice" in order to have either the corresponding flexibility in sales or the observance of specific economic policies (Nobanee, 2009).

2.10 Working Capital Calculation

Most companies, depending on the industry in which they belong, have invested a significant percentage of their capital in activities that may be subject to working capital. The required amount invested can be calculated using the net working capital method. However, it should be emphasized that cash, marketable securities, overdrafts and debts to banks, can't be considered as part of these operations, because they are considered as purely financial concepts. The required working capital can be calculated from the following formula:

$$\text{Working } Capital = \text{NWC} - \text{N}BC \text{ (Rafuse, 1996)}$$

Where WC is working capital, NWC is the net working capital and ΚΚΚ είναι το καθαρό κεφάλαιο κίνησης και NBC is the net cash balance.

NBC can be calculated with cash, commercial titles, withdraws and payable bonds.

Rafuse (1996), identified that the concept of requirement is mainly determined by four key variables. These variables are a) the accounts receivable, b) the reserves, c) the accounts payable and d) the net inflows. Finally, the functions of the company that affect them is the technology of the company, the managerial (operational) efficiency and the level of sales.

3. Net Working Capital

The investment required for receivables, reserves and cash is generally called working capital or gross working capital. Ideally, on the part of lenders, current liabilities should cover most of the financing for current assets and the rest of the shareholders (Padachi, 2006). Working capital, i.e. the part that can be optimized and influenced by the company's activities, is the accounts receivable, inventories and accounts payable. Other accounts such as cash, marketable securities, prepayments and all other current liabilities, are an economic decision of the company and have little to do with the company's own activities (Mathuva, 2015).

The more a business connects its assets to its working capital, the better for its liquidity. An optimal level of working capital could be considered as a level where a balance between risk and efficiency is achieved (Gul, et al., 2013). In the event that net working capital is negative (ie liabilities exceed assets), net working capital is financed with short-term capital, which can significantly increase borrowing costs (Kieschnick et al. 2006).

3.1 Net Working Capital and Liquidity

By using the cash conversion cycle, the management of working capital will ensure that sufficient funds are available for the company's liquidity and that these funds will be properly disposed of (Wang, 2002).

For liquidity management, the cash conversion cycle is suggested as the most dynamic tool. The larger the cash conversion cycle, the higher the required liquidity growth rate and vice versa, the smaller the cash conversion cycle, the lower the required liquidity level. The company must carefully reconsider whether to extend the credit period to launch a new product or, conversely, try to keep the comparative credit periods. In addition, the company must use a financial value – added approach to these decisions, in an effort to maximize shareholder value (Anjum & Malik, 2013).

In addition, working capital can be used to normalize liquidity when companies are trying to maintain a certain level of fixed (capital) investment. This means that companies can make short – term liquidity possible, by adjusting working capital without having to limit fixed investment (Wang, 2002).

Anjum & Malik, (2013), consider that conventional liquidity ratios do not substantially record the company's liquidity situation, as capital is linked to working capital. In essence, companies,

especially the smaller ones, should try to focus on the cash flow cycle to maximize their short-term operating liquidity. Focusing on statistics at the end of the period may worsen the company's financial situation.

4. Cash conversion cycle

According to Attari & Raza, (2012), the cash conversion cycle (CCC) is a measurement of the time period (measured in days) that a company needs to convert its investments into reserves and other resources into cash flows (cash) from sales.

The method of calculating the cash conversion cycle (CCC) is as follows: $CCC = DSI + DSO – DPO.$

4.1 Cash conversion cycle and profitability

The first attempt to quantify working capital management, was made by Gitman in 1974, who introduced the concept of cash conversion cycle by indicating how many days the company had to accept cash collection from the purchase of raw materials (Farris et al. 2002). The problem with this measurement is that it is often impossible to find enough data to conduct a study, as detailed account balances are required for different types of stocks, such as raw materials, semi-finished and finished products. Therefore, the clean trading cycle was created, which adjusts the various elements of the cash conversion cycle depending on the company's sales (Zeidan & Anshapir, 2017). Deloof (2003), Awunyo-Vitor & Angmor (2013) and Anser & Malik (2013), measured the profitability of European companies based on gross operating income, which is defined as sales minus the cost of cash sold and this is divided by the total assets minus the financial assets. Deloof uses the cash conversion cycle as a comprehensive measure of working capital management. He has defined the cash conversion cycle (CCC) as follows:

$$Cash\ conversion\ cycle$$
$$= no.\ of\ accounts\ receivable\ days +\ stock\ count\ days$$
$$-\ no\ of\ accounts\ payable$$

With regards to control variables, it uses the sales growth rate (sales growth), the financial debt ratio, the fixed financial assets ratio to the total financial assets (fixed financial assets) and the volatility of the net operating income (variability defines the standard deviation of net operating income for the period 1991-96) (Deloof, 2003) (II, & Hutchison, 2003). They concluded that

most companies have a high level of cash invested in working capital, so it is expected that companies will be able to manage working capital in order to significantly affect their profitability. He also noted a significant negative relationship between gross operating income and the number of days accounts receivable, stocks and accounts paid to Belgian companies. In addition, it is pointed out that reducing the number of days accounts receivable and inventories to a minimum possible point, can create value to shareholders. The view that less profitable businesses are waiting longer to pay their dues is confirmed by the study (Deloof, 2003). Panigrahi (2013), in a similar study introduced other variables such as sales growth, fixed financial asset index and financial debt ratio and finally, he found out that there is a negative relationship between cash flow and profitability.

4.2 The effect of net commercial cycle in profitability

Erasmus (2010), Afza & Nazir (2007) have shown that shorter net trading cycles are usually associated with higher profitability and vice versa (Erasmus, 2010) (Afza, & Nazir, 2007).

The most important variables for managing working capital are the cash conversion cycle, the weighted cash conversion cycle and the net trading cycle. The net trading cycle is basically a calculation of the percentage of the simple cash conversion cycle. This means that each element of the simple cycle is converted to a percentage, dividing it by the total sales. In this way, the various elements are additional and at the same result have concluded the researchers Erasmus (2010), Baños-Caballero, García-Teruel & Martínez-Solano (2014).

Various surveys have used a correlation analysis between net turnover, profitability (sales performance and asset performance) and stock market adjustment returns (adjusted for risk based on the Alpha and Treynor index). In addition, it has been found that companies with a larger net turnover also have more leverage, which means that they need to finance their activities (especially working capital) by borrowing (Erasmus 2010), (Kaldor 1940), (Afza, & Nazir 2007).

5. Literature review

The relationship between business capital management and business profitability is examined by Professor Marc Deloof in a sample of 1,009 major Belgian non-financial companies during the period 1992-1996. Trade credit policy and inventory policy are measured by the number of

account receivables, accounts payable and inventories. The cash conversion cycle is used as a complete working capital management measure. The results show that running a business can increase profitability by reducing the number of days of accounts receivable and stocks. In addition, less profitable companies wait longer to pay their bills (Deloof, 2003).

The aim of the research of Juan García-Teruel and Martinez-Solano presented in their paper is to provide empirical evidence on the effects of working capital management on the profitability of a sample of small and medium size Spanish companies. The authors gathered data on a group of 8,872 small and medium size enterprises for the period 1996-2002. They examined the effects of working capital management on the profitability of these companies using the methodology of the table data. The results have shown that management can create value by reducing stocks and the number of days for which their accounts are excellent. The aim is to ensure that the relationships resulting from the analysis are due to the effects of the cash flow conversion cycle on business profitability and not the other way around (Juan García-Teruel & Martinez-Solano, 2007).

The purpose of the study by Samiloglu and Demirgunes (2008) is to analyze the effect of working capital management on business profitability. According to this goal, in order to take into account the statistically significant relationship between profitability and the components of the cash conversion cycle, a regression model is used, a sample consisting of companies listed on the Istanbul Stock Exchange (ISE) for the period 1998-2007. The empirical conclusions of the study show that the period of receipt of receivables, the period of inventory and leverage negatively affect the profitability of companies while growth (in sales) positively affects their profitability.

Uyar (2009) collected data from the financial statements of listed companies on the Istanbul Stock Exchange for the year 2007 and presents benchmarks for companies in order to assess the performance of the CCC.

The study of Nobanee et al. (2011) explores the relationship between the cash conversion cycle and profitability for Japanese companies, where the organizational structure is completely different from that of American companies. Most of the Japanese companies were found to be affiliated through corporate groups.

It becomes clear that the cash conversion cycle (CCC) is considered a useful measure for the effective management of a company's working capital and especially for the management of its cash and cash equivalents. The following study was conducted to examine the relationship

between the cash conversion cycle and the size and profitability of companies in the four specific construction sectors listed on the Karachi Stock Exchange, namely in the automotive and parts sector, cement, chemicals and food producers. The data were collected from the annual reports of 31 companies included in the sample, from the total companies of the relevant sectors, i.e. 143, for the period 2006-2010. Data analysis was performed by using ANOVA and Pearson One-Way correlation techniques. The lowest average value of the cash conversion cycle length is in the cement industry, averaging -52.38 days and the highest average is in the automotive industry, averaging 73.72 days. A similar study by Attari & Raza (2012), in the four specific construction sectors listed on the Karachi Stock Exchange, found a significant negative correlation between the cash conversion cycle and the size of the business, in terms of total assets, but also negative correlation between cash conversion cycle and profitability, in terms of return on total assets.

In a sample of 30 companies listed on the Nairobi Stock Exchange (NSE) for the periods 1993-2008, by Mathuva (2015), a positive relationship is found between the time it takes the company to pay its creditors (average payment period) and profitability. This means that the longer the company takes to pay its creditors, the more profitable it is.

6. Data collection and methodology

The purpose of this paper, as mentioned above, is to study the influence of working capital on the profitability of a sample of French PLCs. The data concerns 80 French companies and their financial data refer to the period from 2020 to 2024 and the data were obtained from STATA as well as the Paris Stock Exchange.

The present work will follow a combined methodology regarding the previous bibliographic review. The least squares method for regression and the ANOVA analysis method will be used. Specifically, elements of the Balance Sheet and Income Statement will be used to calculate inventory turnover (DSI), accounts receivable (DSO) and accounts receivable (DPO), which in turn will lead to the calculation of the cash conversion cycle (CCC), which will be the independent variable of both models.

In order to investigate the effect of working capital on profitability, the following two models will be created.

$$Sales = s * CCC + constant + \varepsilon \ (1)$$

$$\text{Operating Income} = t * \text{CCC} + \text{constant} + \varepsilon \, (2)$$

s, t: regression coefficients

The first model, as shown in equation (1), has as its dependent variable Sales and as an independent variable the cash conversion cycle (CCC). The coefficient "s" is the regression coefficient, the term constant is the model constant and e represents the residuals of the regression. In equation (2), the dependent variable is the operating income (Operating Income) and the independent variable is the cash conversion cycle (CCC). The coefficient "t" is, in this model as well, the regression coefficient, the term constant is the constant of the model and "ε" indicates the residuals of the regression.

In addition, the basic tests of a regression model will be performed. More specifically, the tests of autocorrelation, heteroscedasticity as well as the control of statistical significance will be carried out. Finally, the analysis will be performed with the GRETL program.

Pearson factor	
Sales - CCC	-0,01
Pearson rate	
Operating income - CCC	-0,01

7. Analysis

7.1 Descriptive statistics

The table below shows the descriptive data of the variables that have been selected in order to examine the influence of working capital on the profitability of 80 French companies PLCs during the 2020–2024 period. These variables, in turn, are the inventory turnover rate (DSI), the accounts receivable turnover rate (DSO), the accounts receivable turnover rate (DPO), the cash conversion cycle (CCC), the sales (Sales) and operating income (Operating Income). The descriptive elements, which have been calculated in order, are the mean value (median), the median, the standard deviation, the minimum (min) and the maximum value (max). The average value of accounts receivable is quite high and therefore leads to high levels of the cash conversion cycle. This means that companies are slow to recover their original outflows, thus creating potential liquidity problems.

Table 1 – Descriptive statistics of variables

```
                      Mean       Median       S.D.         Min          Max
DSI                  668.3        78.29       10498     0.1053 2.298e+005
DSO                   3115        71.30       56410    0.06609 1.236e+006
DPO        .         716.8        92.93        6860      5.022 1.404e+005
CCC                   3067        101.6       56574 -4.613e+004 1.235e+006
Sales          1.451e+009 1.869e+007 7.506e+009       6380 6.658e+010
OperatingIncome 9.245e+007 -5.915e+004 4.700e+008 -7.310e+008 4.062e+009
```

7.2 Sales and Cash Conversion Cycle

The below table presents the results that resulted from the regression of the cash conversion cycle with sales. The resulting equation is as follows:

$$\text{Sales} = -1.369{,}42 * \text{CCC}$$

Table 2 – Regression analysis

```
Model 1: Pooled OLS, using 480 observations
Included 6 cross-sectional units
Time-series length = 80
Dependent variable: Sales

                  coefficient        std. error      t-ratio    p-value
     ---------------------------------------------------------------------
     const           1.45534e+09       3.43459e+08     4.237     2.72e-05
     CCC         -1369.42              6068.41         -0.2257    0.8216

Mean dependent var    1.45e+09    S.D. dependent var     7.51e+09
Sum squared resid     2.70e+22    S.E. of regression     7.51e+09
R-squared             0.000107    Adjusted R-squared    -0.001985
F(1, 478)             0.050924    P-value(F)             0.821560
Log-likelihood      -11595.29     Akaike criterion      23194.58
Schwarz criterion    23202.93     Hannan-Quinn          23197.86
rho                   0.908362     Durbin-Watson          0.183179
```

From the sign of the exogenous variable it seems that the cash conversion cycle has a negative effect on sales. In other words, these two variables are inversely related. However, according to the Spearman correlation coefficient (rho) the two variables have a strong positive correlation with each other as the coefficient is quite close to the unit (rho = 0.908362). That is, their relationship from this factor emerges as proportional.

Due to this fact, the statistical significance check of the coefficient resulting from the regression with the calculated P-value will be performed. 95% with $\alpha = 5\%$ is selected as the confidence level. The zero and alternative hypothesis of the control are listed below.

H$_0$: The rate is not statistically significant

H$_1$: The rate is statistically significant

The p-value of CCC is 0,82.

$$P - value = 0,82 > a = 0,05$$

Since the p value is much greater than α the null hypothesis must be accepted. Therefore, the negative coefficient (-1.369,42) resulting from the regression is not statistically significant and there is no strong indication of the type of correlation between the two variables. However, the only substantive result is that there is a lack of linear relationship between the two variables.
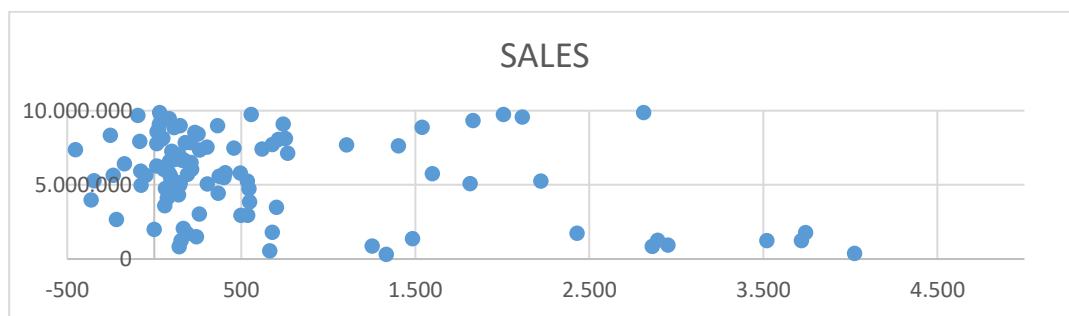

Figure 1 - Diagram Sales dispersion – Cash conversion cycle CCC

Even from the scatter plot between the two variables it seems that there is no linear correlation

For this reason even the Pearson correlation coefficient, which is suggested through the literature review, is close to zero.

Table 3 – Correlation rate Pearson

Pearson factor	
Sales - CCC	-0,01

In the below table the P-Value has been calculated to perform the heteroskedasticity test. The existence of heteroskedasticity is a key prerequisite in the application of regression analysis, including analysis of variance, as it can invalidate important statistical tests that assume that the model errors are indivisible and uniform and therefore their variations do not vary according to

the model. For example, while the standard least squares estimator is still unbiased in the presence of heteroskedasticity, it is ineffective because actual variance and covariance are underestimated. Similarly, in tests for differences between subpopulations using a position test, some standard tests assume that the variations within the groups are equal. 95% with $\alpha = 5\%$ is selected as the confidence level.

Table 4 - Heteroskedasticity test

```
White's test for heteroskedasticity -
  Null hypothesis: heteroskedasticity not present
  Test statistic: LM = 0.065481
  with p-value = P(Chi-square(2) > 0.065481) = 0.96779
```

Therefore, the null and the alternative hypothesis for control are formulated as follows:

H_0: There is homoskedasticity

H_1: There is heteroskedasticity

The p-value of heteroscedasticity White is 0,96.

$$P-value = 0,96 > \alpha = 0,05$$

Since the value of p is greater than α the null hypothesis must be accepted. Consequently, there is homoscedasticity in the observations of the variables and the possibility of canceling some controls due to the existence of heteroscedasticity is reduced.

The check for the existence of autocorrelation of the residues will be done with the statistical data of Durbin - Watson and the resulting P-Value. 95% with $\alpha = 5\%$ is selected as the confidence level. The assumptions for the audit are as follows:

H_0: There is no autocorrelation

H_1: There is autocorrelation

The resulting p-value of the resulting Durbin-Watson autocorrelation test is infinitesimal and close to zero.

Because the p-value is much less than a, the null hypothesis must be rejected and the alternative accepted. In addition, there is autocorrelation in the regression residues and this is an indication that the residues are not just white noise but may be missing data and important information.

Table 5 – Autocorrelation test

```
Durbin-Watson statistic = 0.183179
p-value is "very small" (the Imhof integral could not
be evaluated so a definite value is not available)
```

Analysis of variance (ANOVA) provides a statistical test of whether two or more mean values of a population are equal and therefore generalizes the t-test beyond two mean values. 95% with $\alpha = 5\%$ is selected as the confidence level. The assumptions for the audit are as follows:

H_0: There is no significant statistical influence

H_1: There is significant statistical influence

The resulting p-value of t test for variance analysis (ANOVA) is 0.82.

$$P - value = 0{,}82 > a = 0{,}05$$

Table 6 – ANOVA

```
Analysis of Variance:

                  Sum of squares       df      Mean square

  Regression        2.87498e+018        1      2.87498e+018
  Residual          2.69862e+022       478     5.64565e+019
  Total             2.69891e+022       479     5.63446e+019

  R^2 = 2.87498e+018 / 2.69891e+022 = 0.000107
  F(1, 478) = 2.87498e+018 / 5.64565e+019 = 0.0509239 [p-value 0.8216]
```

Since the p value is greater than α the null hypothesis must be accepted. Therefore, there is no statistically significant influence between the two variables.

7.3 Operating Income and Cash Conversion Cycle

The table below presents the results obtained from performing the regression of the cash conversion cycle with operating income. The resulting equation is as follows:

$$\text{Operating Income} = -88{,}90 * \text{CCC}$$

Table 7 – Regression analysis

```
Model 3: Pooled OLS, using 480 observations
Included 6 cross-sectional units
Time-series length = 80
Dependent variable: OperatingIncome

               coefficient    std. error    t-ratio    p-value
      --------------------------------------------------------------
      const        9.27268e+07   2.15033e+07    4.312    1.96e-05
      CCC         -88.9001       379.932       -0.2340   0.8151

      Mean dependent var    92454177    S.D. dependent var    4.70e+08
      Sum squared resid     1.06e+20    S.E. of regression    4.70e+08
      R-squared             0.000115    Adjusted R-squared   -0.001977
      F(1, 478)             0.054751    P-value(F)            0.815093
      Log-likelihood      -10265.28     Akaike criterion      20534.55
      Schwarz criterion    20542.90     Hannan-Quinn          20537.83
      rho                   0.807091    Durbin-Watson         0.385634
```

Due to this, the statistical significance check of the coefficient resulting from the regression with the calculated P-value will be performed. 95% with $\alpha = 5\%$ is selected as the confidence level. The zero and alternative hypothesis of the control are listed below.H_0:

H_1: The rate is statistical important

The p-value of CCC is 0,81.

$$P - value = 0,81 > a = 0,05$$

Since the value of p is much greater than α the null hypothesis must be accepted. Therefore, the negative coefficient (-93.83) resulting from the regression is not statistically significant and there is no strong indication of the type of correlation between the two variables. However, the only substantive result is that there is a lack of linear relationship between the two variables.
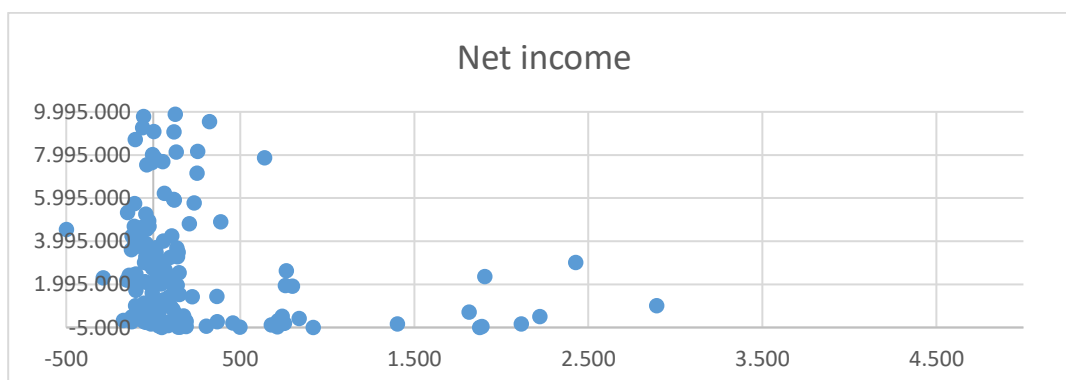

Figure 2 – Dispersion of operating income – CCC

Even from the scatter plot between the two variables it seems that there is no linear correlation.

For this reason even the Pearson correlation coefficient, which is suggested through the literature review, is close to zero.

Table 8 – Correlation rate Pearson

Pearson rate	
Operating income - CCC	-0,01

In the table below, the P-Value has been calculated to perform the heteroscedasticity test 95% with $\alpha = 5\%$ is selected as the confidence level.

Table 9 – Heteroscedasticity test

```
White's test for heteroskedasticity -
  Null hypothesis: heteroskedasticity not present
  Test statistic: LM = 0.103375
  with p-value = P(Chi-square(2) > 0.103375) = 0.949625
```

The zero and alternative hypothesis for control are as follows:

H_0: There is homoscedasticity

H_1: There is heteroscedasticity

The p-value of heteroscedasticity White test is 0,949.

$$P\text{-value} = 0,949 > a = 0,05$$

Since the value of p is greater than α the null hypothesis must be accepted. Consequently, there is homoscedasticity in the observations of the variables and the possibility of canceling some controls due to the possibility of heteroscedasticity is reduced.

The check for the existence of autocorrelation of the residues will be done with the statistical data of Durbin - Watson and the resulting P-Value. 95% with $\alpha = 5\%$ is selected as the confidence level. The assumptions for the audit are as follows:

H_0: there is no autocorrelation

H_1: there is autocorrelation

The resulting p-value of the resulting Durbin-Watson autocorrelation test is close to zero.

Table 10 – Autocorrelation check

```
Durbin-Watson statistic = 0.385634
p-value is "very small" (the Imhof integral could not
be evaluated so a definite value is not available)
```

Since the p-value is greater than a, the null hypothesis must be accepted. Therefore, there is no autocorrelation in the regression residues and this is an indication that the residues are just white noise.

The assumptions for the audit are as follows:

H_0: There is no statistical significant influence

H_1: There is statistical significant influence

The p-value from the ANOVA analysis, is 0,81.

$$\text{P-value} = 0,81 > a = 0,05$$

Table 11 – ANOVA

```
Analysis of Variance:

                    Sum of squares        df       Mean square

  Regression          1.21163e+016         1       1.21163e+016
  Residual             1.0578e+020        478       2.21297e+017
  Total               1.05792e+020        479        2.2086e+017

  R^2 = 1.21163e+016 / 1.05792e+020 = 0.000115
  F(1, 478) = 1.21163e+016 / 2.21297e+017 = 0.0547512 [p-value 0.8151]
```

95% with $\alpha = 5\%$ is selected as the confidence level.

Since the value of p is greater than α the null hypothesis must be accepted. Therefore, there is no statistically significant influence between the two variables.

8. Conclusion

This study examined the relationship between working capital management and profitability using data from 80 French PLCs during the period 2020–2024. The post-COVID period introduced unique liquidity pressures and operational challenges across industries. The data

collected concerned 80 French companies and presented data on inventory accounts, accounts receivable, accounts payable, sales, net sales and cost of goods sold

After the presentation of the descriptive statistics of the variables, a regression analysis was performed on the relationship between the cash conversion cycle and first stage sales and then the cash conversion cycle with the operating income of the companies. The results, in general, do not seem to converge.

The results regarding the pair sales - cash conversion cycle show that there is an almost weak correlation between the variables. This conclusion came mainly from the Pearson correlation coefficient. The negative correlation resulting from the regression was statistically insignificant and in combination with the scatter plot the two variables had no linear relationship at all.

On the other hand, the results of the pair of variables operating income - cash conversion cycle, seem to show a negative correlation between them. While the Pearson correlation coefficient is almost zero and the exogenous variable coefficient is statistically insignificant, there appears to be a negative correlation between the two variables.

Taking into account all the above, and based on the selected sample, it appears that the profitability of French companies has from negligible to negative relationship with the cash conversion cycle and consequently with working capital.

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