# Working Capital Management Impact on Capital Structure and Corporate Performance:Empirical Evidence from Spain

### Sahar Loukil*

*Faculty of Economic Science and Management, Management department, University of Sfax, Sfax, Tunisia*

## Abstract

Statistical mediation analysis can help to identify and explain the mechanisms behind the linkage between capital structure and corporate performance through the mediating effect of working capital management. We use a sample of 1149 Spanish firms in 2019. A path analysis shows that overinvesting in working capital management reduce the positive impact of internal funds on corporate performance. We show that efficient working capital management is value enhancing when a firm converges to a financial optimal level. As a robustness test, we check for the potential effect of working capital on firm's solvency through cash and we find that holding cash has got a positive mediation effect. Thus, we prove the nonlinear relationship between working capital and firm performance and that efficient management technique through cash holding could improve the positive impact on firm's solvency and consequently corporate performance.

## Keywords

Working capital management • Capital structure • Corporate performance • Solvency • Mediation effect • SEM

## Introduction

The literature on the impact of capital structure on corporate performance evolved through many theoretical and empirical contributions since the seminal work by Modigliani and Miller, Fazzari, et al. According to Jensen and Meckling working capital's elements are part of the objective of maximizing shareholder value by the management techniques [1-3]. Several studies examine the impact of working capital on corporate performance Sartoris, et al. as well as the effect of capital structure of capital structure on corporate performance [4,5], Modigliani and Miller but few studies consider the moderating effect of working capital on the relationship between capital structure and working capital [1].

Working capital management studying falls into two competing views. Under one view, higher working capital levels allow firms to increase their performance and hence their value. On the other hand, higher working capital levels necessitate more financial resources. Consequently, firms face additional operating cost increasing the likelihood of bankruptcy. Given that working capital might play an important role in this relation, we also study whether firms' working capital management affects the above relation. To our knowledge, our paper is the first to analyze the functional form of this relation as well as the possible mediating effect of working capital on it.

Our study adds to the existing body of literature where research on the relationship between working capital practices, corporate performance and capital structure. There are different areas of investigation of working

***Address for Correspondence:*** *Sahar Loukil, Faculty of Economic Science and Management, Management department, University of Sfax, Sfax; Email: saharloukil@windowslive.com*

capital management techniques that need to be examined further. This allows us to raise the following questions. Do internal funds improve corporate performance through investing in working capital? Do firms indeed over-invest in working capital as claimed by practitioners? When does excessive investing in working capital reduce firm solvency? Which management techniques should be followed to reach best impact of working capital on the corporate solvency and performance? The aim of this paper is to provide answers to these questions.

This study examines these issues based on a sample of 1149 non-financial Spanish firms in 2018 through the impact of capital structure on the improvement process of performance by the mediating effect working capital investment. The hypothesis in this paper is that working capital management has a mediating effect on the relationship between the firm's capital structure and corporate performance through management techniques.

When internal financial measures such as performance, capital structure and working capital techniques experience significant shifts in magnitude or direction, then we need to investigate if those changes could impact directly and indirectly the firm's performance through the mediating effect of working capital management techniques. We conducted the SEM to test for the mediating effect of working capital. This method is a multivariate statistical analysis technique that is used to analyze structural relationships and to analyze the structural relationship between measured variables and latent constructs. We find that internal funds allow alleviating corporate performance but it is likely that over working capital investing does significantly and negatively moderate the positive impact of internal funds. The positive impact of internal funds on corporate performance is previously proved by Greenwald et, al. Given that financing conditions might play an important role in corporate performance, we also study whether firms' working capital could moderate this relationship. Our results support the existence of a negative moderating impact of working capital [6]. Our evidence counters past researches like Kim and Chung. On the other hand [7], our findings are confirmed by Wang who argued that highly valued firms hold a significantly lower working capital [8].

In order to reconcile these findings, Baños-Caballero, et al. suggest an inverted U-shaped relation between working capital and firm performance. This suggests that we should consider differences in management techniques that will be extended in the following section as a robustness test to check for the complex financial decision in terms of working capital extensions and cash holding [9].

We demonstrate that the negative moderating impact of working capital

is explained through the complex relationship between working capital and solvency. In fact, over investing in working capital has a negative direct effect on firm's global solvency that could be positively moderated by holding cash. This result could be explained by the treasury strategy of the firm. This finding could explain the reducing effect of working capital on the positive relationship between internal funds and corporate performance.

In several ways, this study contributes to the working capital management literature. First, we offer new evidence on the impact of capital structure on corporate performance, by taking into account the mediating effect of working capital management and the possible non-linearity of this relation. Second, we estimate the models by using cross section data methodology and a Structural Equation Model (SEM) in order to deal with the possible endogeneity problems. Third, as a robustness test, we check for the reducing effect of investing in working capital through the study of its impact on firm's solvency.

Our results have significant implications for practitioners and researchers alike the importance of internal funds alleviating corporate performance. Moreover, it is important to consider that over investing in working capital could reduce the advantage of these internal financial resources. This non linear relation could be explained through the negative impact of marginal investing in working capital on solvency that could be abridged by having more cash in firms. This result is logic since the more a firm has cash and cash equivalent the more it becomes solvent in the short term. This depends on the financial manager's decision when distributing working capital among different working capital need elements. So, improving working capital techniques is able to boost corporate performance. Our empirical results confirm this high degree of correlation between working capital and corporate performance on one hand and firm's solvency on the other hand and support the theory advanced by Jensen, et al. and their version of the firm's objective function [3].

The remainder of the paper is organized as follows: Section 2 provides a brief background. Section 3 discusses the sample selection and methodology. Section 4 examines the empirical findings of the study, while in section 5 we detail our conclusions and suggestions for future researchers.

# Materials and Methods

## Corporate performance and working capital management

The interrelations between the individual components of working capital significantly influence corporate performance. For some firms, working capital can be a competitive advantage specifically through management techniques such as extending payable days while minimizing inventory and maximizing speed of accounts receivable. The working capital is essential to provide cash flows for timing differences. According to the theory of the firm resources should receive their highest uses and earn the highest returns for the stakeholders. The use of working capital is necessary to provide for the timing differences in the cash flow streams.

Jensen and Meckling support that working capital elements are part of the objective of maximizing shareholder value by the management of the firm [3]. They also mention that working capital elements are correlated with the firm's operating cycle measure. More recently, Reason, suggests that important cash flow can cause aggressive working force management. In this sense, Sonia et, al. argue that managers should avoid negative effects on firm performance because of lost sales or additional financing expenses. Working capital management is important because it enables firms to free up cash and improve liquidity.

We conclude that improving working capital management techniques can help increase performance. A potential explanation is that efficient working capital management can be associated with lower financial constraints in firms. They also demonstrate that for firms with efficient working capital management, the negative connection between financial constraints and future share price is significantly weakened. On the other hand Wang, supports that firms characterized with high values hold a

significantly lower investment in working capital than firms with lower values for Japanese firms [7]. Faulkender and Wang, confirm the inverse relationship between investment in working capital and stock's excess return as proxy for firm value [10]. To reconcile these divergent results, Baños-Caballero, et al. prove the existence of an inverted U-shaped relation between working capital and firm performance [9]. They conclude that there is an optimal level of investment in working capital. At this point, a firm's value is maximized since costs and benefits are balanced.

## Capital structure and working capital investment

Market imperfections could increase the cost of outside capital relative to inside ones. It may result in to the moral hazard problem through credit rationing Greenwald, et al. [6]. So, external capital does not provide a perfect substitute for internal funds. Especially, investments in working capital are more sensitive to financing constraints than investments in fixed capital. So, investing decisions depend on financial factors such as the availability of internal finance, access to capital markets or cost of financing. In line with these findings, Fazzari and Petersen confirm that analyzing investment in working capital does more depend on financing constraints and particularly internal funds [11]. They emphasized the reversibility of working capital since working capital investment can temporarily be negative (when raw materials consumption is faster than its replacement) and can be improved upon by tightening credit policies on new sales and intensifying collections efforts. Particularly, firms with capital market access and greater internal financing capacity have a higher working capital level [12].

Baños-Caballero, et al. analyze whether the optimal working capital level is sensitive to financial constraints. They find that this optimum is lower for financially constrained firms [9].

For most firms, trade credit is an important source of funds while the investment in receivable accounts and inventories represents the important proportion of a firm's assets.

Data from CEPYME (Spanish Confederation of Small and Medium Enterprises) demonstrate that he average payment term–calculated from the invoice issue date to the payment receipt date–is around 99 days in Spain compared to 46 days in Europe overall. This difference also appears in the average payment terms of public administrations, which take the longest to pay (154 days in Spain vs. 58 days in Europe), companies (83 days vs. 47 in Europe) and consumers (61 vs. 34).

There is substantial literature on capital structure and working capital management, but few attempts to integrate both of them, even though Schiff and Lieber do show the importance of taking into account the interactions between the various working capital elements (i.e. receivable accounts, inventories and payable accounts) [5] .

To test the effect of financial constraints on the optimal level of working capital, we approximate capital structure through internal funds [13].

This would allow us to conclude about the relevance of external and internal financing resources in terms of investing in working capital.

## Corporate performance and capital structure

Several theorems explain the effect of capital structure on firm performance such as Modigliani–Miller (MM) theory, agency theory, asymmetric information theory and signal theory. According to Modigliani and Miller, the firm value is independent of its capital structure in a perfect market, without tax effects, industry effects, bankruptcy effects, agency effects, among other. But in reality the market is imperfect, the modified theory of Modigliani and Miller, assumed that the firm's capital structure considerably affects the firm's value[1]. Consequently, the value of the firm should increase with higher debt ratios. Agency theory is seen as the theoretical explanation of governance phenomena. It depends on the cost of conflicts existing among managers, shareholders and debt holders. For Jensen and Meckling, there is an optimal debt ratio for which total agency costs are minimized. This is the compromise theory[3]. Investigated by Rajan and Zingales, firms providing high tangible assets[14], can reduce

agency costs of the debt leading to more productivity in the firm value.

On the other hand, in Bombay stock exchange, Bandyopadhyay and Barua found that there is a negative relationship between price to book ratio and firm's debt [15]. So, firms with higher future growth options have less long term debt in order to reduce agency cost which is consistent with previous studies. Asymmetry information theory is advanced to explain the capital structure. In fact, firm's age, firm size, and business's risk affect firm's capital structure. In this context, Bevan and Danbolt prove the existence of a negative relationship between firm size and leverage ratio for large firms since large firms have low information asymmetry [16]. Moreover, using a balanced panel data of 1594 Indian companies during 1998 to 2011, Bandyopadhyay and Barua found a negative relationship between older firms and debt ratio[15]. On the other hand, the study of Ramli, et al. showed a insignificant relationship between business risk which is defined as the absolute difference between the annual percentage difference in earnings before interest and tax and debt level in Malaysia and Indonesia over 1990- 2010 [17]. This finding is inconsistent first with the study of Kraus and Litzenberger for which [18], the cost of debt is caused by the increase in financial risk, and second with the results of Tian and Zeitun. They pointed that company with more risk level has a problem to formulate a strategy and this negatively reduces firm performance[19]. Therefore, companies holding high liquidity ratios benefit of more debt maturity choices. A growing amount of studies provide empirical supports for the positive relationship between liquidity assets and long term debt, Stephan, et al. [20].This finding is consistent with a potential explanation is that firms with a high liquidity level can finance their new projects, pay dividends or mitigate financial distress problems, whereas this relationship is not consistent with Bandyopadhyay and Barua findings [15]. They used the current ratio as a proxy to measure liquidity and they showed the negative effect on firm performance. Ramli, et al. defined liquidity as the ratio of current assets to current liabilities and support the existence of a negative relationship between liquidity and firm financial performance [17].

## Model and data

**Specification of the model and methodology:** This section explains the sample and data sources. We then describe the measures of the key variables used in this study and the methodological approach. Our sample is extracted from the Sabi data base of Spain in the bibliotheca of the polytechnic university of Cataluña. Specifically, this database provides data on financial indicators for Spanish and Portuguese firms. We gather data for 1150 Spanish firms for 2018.

We employ the SEM to test the mediation effect between capital structure and firm performance through working capital management. Mediation is a hypothesized causal chain in which one variable affects a second variable that, in turn, affects a third variable. Based on the arguments that have been previously presented in this study on the relationship between working capital, corporate performance and capital structure, we propose to test the following hypothesis:

H1: The relationship between internal funds and corporate performance is mediated by working capital investment

H2: The relationship between working capital and firm's solvency is mediated by cash holding

Rajan and Zingales examined how applied researchers in corporate finance can address endogeneity concerns. They discuss in detail a number of econometric techniques aimed at addressing endogeneity problems, including instrumental variables, difference-in-differences estimators, regression discontinuity design, matching methods, panel data methods, and higher order moments estimators. In our present work, we choose the difference-in-differences estimators technique [14].

Tian and Zeitun proposed a four step approach in which several regression analyses are conducted and significance of the coefficients is examined at each step [19]. Take a look at the diagram below to follow the description (note that h is also a direct effect).

In some cases, one problem can take place when a concealed relationship

in Steps 1-3 exists. In this case, there is an alternative approach. We can calculate the indirect effect and test it for significance. The literature proposes two ways to achieve test the indirect effect. Sobel suggests calculating the indirect effect by multiplying two regression coefficients obtained from two regression models [21]. Another approach is proposed Tian and Zeitun by through computing the difference between two regression coefficients. To do this, two regressions are required.

In the present paper, we apply the second approach calculate the indirect effect though the difference between the global and direct effect and we find that this coefficient is significant in our two models (basic and robustness test).

To measure corporate performance, we use proxies that have been used extensively in research. We measure capital structure by shareholders funds and approximate corporate performance by the Earnings Before Interest and Taxes (EBIT) .We also measure the firm's solvency by the solvency ratio. To measure the treasury of a firm, we use the amount of cash and cash equivalent as Liu, et el. Finally, we consider the working capital amount for the firm as Schiff and Lieber. Table 1 presents variables definitions and measurements while Table 2 summarizes the descriptive statistics of the variables [5,22].

**Table 1**. Variables definitions.

| Variable | Indication | Measurement | Authors |
| --- | --- | --- | --- |
| Working capital | WC | The value of working capital per year | Schiff and Lieber, Sartoris and Hill, and Kim and Chung, Fazzari and Petersen, Kieschnick et al., |
| Corporate performance | EBIT | Earnings before interest and taxation | Brounn and Laverick |
| | | | Yongming et yini |
| | | | Younis et al., Wetzel and Hofmann, Bai et al. |
| Corporate solvency | SOLV | The firm's solvency ratio | Cook et al., Vuillemey, Peleckienė et al.Yeo, Nguyen et al. |
| Capital structure | SH.FUNDS | Shareholder's funds | Ozetekin and Flannery, Cappa et al. |
| | | | Borochin et al., Rao et al. |
| Cash | CASH | Cash and cash equivalent | Liu et el. |
| | | | Torkelson |

**Table 2**. Summary statistics.

| Variable | Mean | Std. Dev. | Min | Max |
| --- | --- | --- | --- | --- |
| CASH | 7866.687 | 127429.9 | 0.43277 | 4159000 |
| SH.FUNDS | 70278.7 | 561492.4 | -41.4188 | 1.22E+07 |
| EBIT | 14583.65 | 318016.3 | -302183 | 1.05E+07 |
| SOLV | 95.71445 | 14.35202 | 2.315 | 99.999 |
| WC | 315.8415 | 2276.298 | -99.982 | 38023.23 |

## Summary statistics

All of the variables are winsorized at the extreme 1% and 99% to mitigate the possible effect of outliers. The average magnitude of cash and cash equivalent is 7866.687 for the period 2018. In our sample, the average

shareholders amount is approximately 70278.7. We notice that on average, EBIT is about the double of cash and cash equivalent and is about 14583.65. For the solvency proxy, the average ratio is about 95.71% showing that on average Spanish firms are globally solvent with an average working capital about 315.8415. We note that except for solvency ratio, all proxies present a high standard deviation showing a wide range of distributed values. This reflects the high heterogeneity of working capital management techniques and financial decisions impacting corporate performance. Further econometrics tests would allow us to more understand these complex relationships (Tables 3 and 4).

## Reliability and validity of measures

Prior to the final data analysis, three tests were performed to strengthen the reliability and validity of subsequent calculations. First, data distributions were checked for heteroskedasticity through observation of the values of Breusch-Pagan and Cook-Weisberg test for heteroskedasticity. Heteroscedasticity qualifies data that does not have a constant variance. Heteroscedasticity does not bias the estimation of the coefficients, but the usual inference is no longer valid since the standard deviations found are not the good. In our case, we found no prove for the presence of a problem of heteroskedasticity. Second, we test for the existence of correlation between each two variables. According to the matrix below, the Pearson coefficients are all always less than 0.8, much lower than that plotted by Kennedy. This observation leads us to conclude that there is no serious problem of bi-varied multi-collinearity[23]. Third, considering the possibility of multicollinearity in the regression analysis, the variance inflation factor (VIF-test) and the tolerance values were calculated (Tables 5 and 6).

The variance inflation factors were all lower than the critical value of 10, whichindicates that the regression performed in this study do not present a multicollinearity problem. More details will be presented below.

Table 3 provides the Pearson correlations of the variables for our two econometric models. In the first model, we test for the moderating effect of working capital on the relationship between internal funds and corporate performance while in the second one we test for the moderating effect of cash on the relationship between working capital and firm's solvency. We intend to explain the moderating effect of working capital through its relationship with firm's solvency. As expected, the proxy shareholders funds show positive and significant correlation with corporate performance. Thus, these results present preliminary evidence of a positive association between capital structure and firm performance. In addition, most of the correlation coefficients are generally within a normal range, suggesting that our variables are free of multicollinearity problems. Furthermore, we check the Variance Inflation Factors (VIFs) of our regression (Tables 7 and 8).

Several indicators are offered to detect the presence of multi-varied multi-collinearity such as the tolerance of a variable which is the expression of $1-R_j^2$ of the regression of each variable on the (P-1) other independent variables. The closer it is to zero, the probable there is a problem of multi-collinearity. It can have a lower limit of 0.1, 0.2 or 0.25 depending on the chosen limit of the VIF. The inflation factor of the VIF variance: "Variance Inflation Factor", corresponds to the expression $1/(1-R_j^2)$. If this factor reaches 4 or 5, a risk of multi-collinearity presents itself. However, this limit is up to 10. In our case, we used the tolerance index as well as the variance inflation factors. According to Table 4, all the variance inflation factors are less than 2 and therefore all the tolerances largely exceed 0.5. In addition, our test indicates that the mean VIFs are less than 2, indicating that multicollinearity does not appear to be a concern (Tables 9 and 10).

**Table 3.** Pearson correlation (model 1).

|  | **SH.FUNDS** | **WC** | **EBIT** |
|---|---|---|---|
| SH.FUNDS | 1 |  |  |
| SC | -0.0129 | 1 |  |
|  | 0.6628 |  |  |
| EBIT | 0.7646 | -0.0058 | 1 |
|  | 0 | 0.8453 |  |

**Table 4.** Pearson correlation (model 2).

|  | **CASH** | **WC** | **SOLV** |
|---|---|---|---|
| CASH | 1 |  |  |
| WC | -0.006 | 1 |  |
|  | 0.8396 |  |  |
| SOLV | -0.1341 | -0.0401 | 1 |
|  | 0 | 0.1746 |  |

**Table 5.** Variance inflation factor (model 1).

| Variable | VIF | 1/VIF |
|---|---|---|
| SH.FUNDS | 1 | 0.999834 |
| WC | 1 | 0.999834 |
| Mean VIF | 1 |  |

**Table 6.** Variance inflation factor (model 2).

| Variable | VIF | 1/VIF |
|---|---|---|
| CASH | 1.02 | 0.982006 |
| SOLV | 1.02 | 0.982006 |
| Mean VIF | 1.02 |  |

**Table 7.** Direct effects analysis.

| SEM | Coef. | Std. Err. | z | (95% Conf. Interval) | |
|---|---|---|---|---|---|
| WC <- | | | | | |
| SH.FUNDS | 4.83E-05 | 0.000408 | 0.12 | -.0007517 | .0008482 |
| EBIT <- | | | | | |
| WC | -0.05324 | 0.779088 | -0.07 | -1.58022 | 1.473749 |
| SH.FUNDS | 0.433049 | 0.010774 | 40.19 | .411932 | .4541653 |

**Table 8.** Indirect effects analysis.

| SEM | Coef. | Std. Err. | z | (95% Conf. Interval) | |
|---|---|---|---|---|---|
| WC | | | | | |
| SH.FUNDS | 0 | (no path) | | | |
| EBIT <- | | | | | |
| WC | 0 | (no path) | | | |
| SH.FUNDS | -2.57E-06 | 4.34E-05 | -0.06 | -.0000877 | .0000826 |

**Table 9.** Total effect.

| | Coef. | Std. Err. | z | p>|z| | (95% Conf. Interval) | |
|---|---|---|---|---|---|---|
| WC | | | | | | |
| SH.FUNDS | 4.83E-05 | 0.000408 | 0.12 | 0.906 | -.0007517 .0008482 | 4.34E-05 |
| EBIT | | | | | | |
| WC | -0.05324 | 0.779088 | -0.07 | 0.946 | -1.58022 | 1.473749 |
| SH.FUNDS | 0.433046 | 0.010774 | 40.19 | 0 | .4119295 | .4541626 |

**Table 10.** Equation-level goodness of fit.

| Dependant variables | fitted | Variance predicted | residual | R-squared | mc | mc² |
|---|---|---|---|---|---|---|
| Observed | | | | | | |
| WC | 6.03E+07 | 735.017 | 6.03E+07 | 1.22E-05 | 0.003492 | 1.22E-05 |
| EBIT | 1.01E+11 | 5.91E+10 | 4.20E+10 | 0.584593 | 0.764587 | 0.584593 |
| Overall | | | | 0.584597 | | |

**Note:** mc=correlation between dependant variables and its prediction. $mc^2=mc^2$ is the Bentler-Raykov squared multiple correlation coefficient

# Empirical Results

H1 predicted that working capital mediates the effect of internal funds on corporate performance and H2 stated that cash holding mediate the effect of working capital on firm's solvency. In order to test these hypotheses. According to these authors, a variable's mediation must meet three conditions:

• The independent variable is a significant predictor of both the dependent and mediator variables

• The mediator variable is a significant predictor of the dependent variable

• The effects of the independent variable on the dependent variable are reduced when the mediator variable is added to the regression model.

Additionally, further evidence of mediation was obtained by the Sobel test, which was also used in the works of Baron and Tang. The Sobel test statistics for mediation in each dimension of entrepreneurial alertness (Working capital=-1.117481, Shareholders funds=864.5231, and EBIT=.0000193) the last two variables are statistically significant (p<0.01), providing more evidence for mediation[24].

The Average Causal Mediation Effect (ACME), defined as $\delta(t) \equiv E(Y_i(t, M_i(1))-Y_i(t, M_i(0)))$, is negative while the total direct effect is positive. According to results, the total effect mediated is negative. In fact, mediation estimates the role of particular causal mechanisms that mediate a relationship between treatment (working capital) and outcome variables (EBIT) and calculates causal mediation effects and direct effects for models with continuous or binary dependent variable presented.

The moderating effect of working capital on the relationship between capital structure and corporate performance.

The purpose of this study was to analyze the influence of internal funds directly on corporate performance and incorporating working capital as a mediator variable[25]. We use structural equation model to test for the mediating effect of working capital management. We further present a robustness test for this mediation effect by analyzing the relationship

between working capital and firm solvency.

First, we present the results according the paths analysis. Empirical results show that shareholders funds do significantly, positively and directly affect corporate performance according to the path analysis. Our finding is theoretically supported by Greenwald, et al. whose empirical results indicate that performance in Romanian companies is higher when they avoid debt and operate based on equity. Thi Phuong Vy Le and Thi Bich Nguyet Phan support that all debts ratios have significant and negative impact on firm performance. This result is in favor of internal funds when considering acquisition of new funds to improve firm performance.

According to Structural Equation Model (SEM), we notice that the indirect effect of shareholders funds is negative through the mediating effect of working capital. This negative impact is confirmed by the works of Wang , Faulkender and Wang. But, this effect is globally positive when we consider direct and indirect effects [7,21]. In fact, we find that the direct effect is lowered by the mediating effect of working capital management since overinvesting in working capital reduces corporate performance. This suggests that the firm's financial management in terms of working capital is able to reduce the positive impact of internal funds on corporate performance. This result can be explained by the existence of an optimal level of working capital, Baños-Caballero, et al. In fact, firms that converge to this optimal level improve their stock value and operating performance through efficient working capital management techniques. Ek and Guerin , Ernst and Young support the existence of a certain latitude for improving the efficiency of working capital management [26]. Doing so, we validate the findings of A. Bandyopadhyay and N.M. Baruaarguing supporting that the performance of any company hinges around its ability to operate on a capital structure [15].

To judge the goodness of fit of our model, we find that the R-squared of the model is about 58.45% which is quiet acceptable. This suggest that overall, the direct and indirect effects between working capital and capital structure explain 58.45% of the firm performance variation.

### Robustness test

In order to better understand the complex relationship between corporate performance and working capital management and capital owned by shareholders, we intend to examine the relation between the working capital management and the firm's solvency through its treasury management in terms of cash holding. In fact, Schiff and Lieber confirm the importance to integrate various working capital elements. Intuition suggests that firms with higher cash holdings are safer and should have higher solvency ratio [5]. The following Figures 1 and 2 recapitulates the results of the SEM.

## Results and Discussion

The path analysis shows that working capital does negatively impact the firm's solvency. But, it has globally a positive impact through the moderating effect of cash and cash equivalent. Our result could be apprehended by the fact that overinvesting in working capital level cause additional capital resources in the form of new funds which involves financing and opportunity costs. Similar to Faulkender and Wang find that the incremental dollar invested in need for working capital is worth less than the incremental dollar held in cash [10]. To combine these findings, N. Aktas, et al. explain this negative relationship by the abnormal high level of working capital need [27]. In fact, when a firm holds a higher working capital level it also results in facing more interest expenses and consequently more credit risk. So, investing in working capital expose the firm to experience financial distress and consequently face the threat of bankruptcy, Kieschnick, et al. In addition, high working capital levels lock up money and this might reduce the chance to take up other value-enhancing projects [28].

We interestingly find that unless the firm keeps cash and cash equivalent it could positively moderate the negative impact of investing in working capital on firm's solvency through a positive indirect effect of cash. N. Aktas, et al. confirm that working capital is a potential source of cash to fund growth and consequently a firm's solvency [29]. This implies that the impact of working capital on firm solvency depend on the management techniques in terms of working capital distribution. We confirm the results of Baños-Caballero , et al. and N. Aktas, et al. and present empirical support for the fact that an optimal working capital level does exist through the balance between costs and benefits and thus improve firm's solvency and consequently its value [9,27]. Specifically[28,30], we expect corporate performance to rise as working capital is well distributed among different working capital element (Table 5). Conversely[31-55], we expect that, beyond this optimum, the relation between internal funds and performance through the moderating effect of working capital will become negative due high interest expenses and bankruptcy risk (Tables 11-14) [56-75].
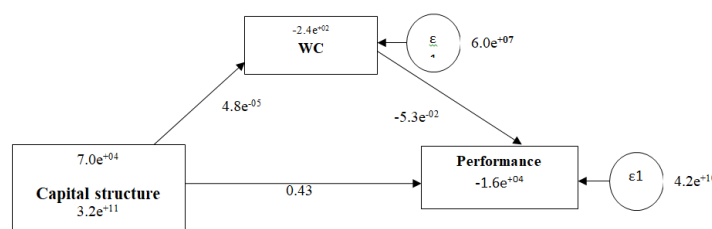


**Figure 1.** The moderating effect of working capital investing on the relationship between capital structure and firm performance.
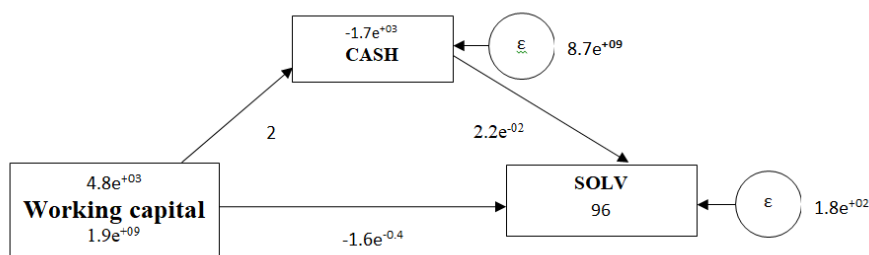


**Figure 2.** The moderating effect of cash on the relationship between working capital and firm solvency.

**Table 11.** Direct effects analysis.

| SEM | Coef. | Std. Err. | z | p>|z| | (95% Conf. Interval) | |
|---|---|---|---|---|---|---|
| CASH <- | | | | | | |
| WC | 2.020595 | 0.063816 | 31.66 | 0 | 1.895517 | 2.145672 |
| SOLV <- | | | | | | |
| CASH | 2.24E-05 | 4.21E-06 | 5.31 | 0 | .0000141 | .0000306 |
| WC | -0.00016 | 1.24E-05 | -13.04 | 0 | -0.00032 | |

**Table 12.** Indirect effects analysis.

| | Coef. | Std. Err. | z | p>|z| | (95% Conf. Interval) | |
|---|---|---|---|---|---|---|
| CASH <- | | | | | | |
| WC | 0 | (no path) | | | | |
| SOLV <- | | | | | | |
| CASH | 0 | (no path) | | | | |
| WC | 4.52E-05 | 8.62E-06 | 5.24 | 0 | .0000283 | .0000621 |

**Table 13.** Total effect analysis.

| | Coef. | Std. Err. | z | p>|z| | (95% Conf. Interval) | |
|---|---|---|---|---|---|---|
| CASH <- | | | | | | |
| WC | 2.020595 | 0.063816 | 31.66 | 0 | 1.895517 | 2.145672 |
| SOLV <- | | | | | | |
| CASH | 2.24E-05 | 4.21E-06 | 5.31 | 0 | .0000141 | .0000306 |
| WC | -0.00012 | 9.20E-06 | -12.73 | 0 | -0.00023 | |

**Table 14.** Equation-level goodness of fit.

| Dependant variables | Fitted | Variance predicted | Residual | R-squared | mc | mc$^2$ |
|---|---|---|---|---|---|---|
| Observed | | | | | | |
| CASH | 1.62E+10 | 7.57E+09 | 8.67E+09 | 0.466177 | 0.682772 | 0.466177 |
| SOLV | 205.8009 | 29.78801 | 176.0129 | 0.144742 | 0.38045 | 0.144742 |
| Overall | 0.535078 | | | | | |

# Conclusion

The literature concerning the impact of capital structure on corporate performance evolved through many theoretical and empirical contributions but there were few studies that assess the moderating effect of investment in working capital. In fact, even though it does not appear on an income statement, working capital can amount to significant revenue for a company unless it is associated with efficient management techniques. This study should be of interest to those who only consider direct effects since we consider the indirect global effect of working capital. In fact, several arguments are presented in the literature. Working capital allows firms to minimize loss of sales, provide hedge against input price fluctuations and reduce supply cost, and also serves as a warranty for quality, allows for price discrimination and long-term relationship with customers, shows that efficient management of the cash conversion cycle can improve corporate profitability significantly. But, adverse effects and value destruction for shareholders could be generated by overinvesting in working capital.

This study has highlighted how overinvesting in working capital could harm the positive relationship between internal funds and corporate performance and thus validate the existence of an inverted U-shaped relationship. In fact, we find proof for the reducing effect of working capital on the positive relationship between internal funds and corporate performance. In line with previous studies, we confirm the results of Faulkender and Wang proving the existence of an optimal level of working capital and an inverted U-shaped relation between working capital and firm performance. Consequently, efficient working capital management is value enhancing when a firm converges to an optimal level as suggested by Deloof.

To better understand which working capital management techniques should be adopted by managers, we checked for the working capital impact on firm solvency moderated by cash holding. We prove that over investing in working capital does negatively affect firm's solvency unless we hold cash and cash equivalent in the firm. This is in favor for improving the effect of working capital on firm's global solvency. Thus, we present empirical support for the existence of an optimal working capital level through the balance between costs and benefits and consequently improve firm's solvency and performance. We conclude that the working capital management can be a competitive advantage specifically through efficient management techniques and distribution among working capital needs elements.

# References

1. Modigliani, F, Miller M. "Corporate Income Taxes and the Cost of Capital: A Correction:"*American Economic Review* (1963)53: pp.433–443.

2. Fazzari, Steven M and Bruce C Petersen. "Working Capital and Fixed Investment: New Evidence on Financing Constraints." *RAND J Econom* 24 (1993): 328-342.

3. Jensen, Michael C and William H Meckling. Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. Oxfordshire: Taylor and Francis, UK, (2019).

4. Sartoris, W and Hill N. "Cash and Working Capital Management." *Jou of Fin,* (1983)38: 349–360.

5. Schiff, M and Liebern Z. "A Model for the Integration of Credit and Inventory Management:" *Jou of Fin* (1974) 29: 133–140.

6. Greenwald, Bruce C, Joseph E Stiglitz and Andrew Weiss. "Informational Imperfections in the Capital Market and Macro-Economic Fluctuations." *National Bureau Econom Res* 7 (1984): 1-15.

7. Kim,YH and Chung KH. "An Integrated Evaluation of Investment in Inventory and Credit: A Cash Flow Approach." *Jour of Bus Fin & Account* (1990)17: 381–390.

8. Wang YJ. "Liquidity Management, Operating Performance, and Corporate Value: Evidence from Japan and Taiwan."*Journal of Multi Financ Manag* (2002)12: 159–169. .

9. Barclay, Michael J and Clifford W Smith Jr. "The Maturity Structure of Corporate Debt." *J Finan* 50 (1995): 609-631.

10. Faulkender, Michael and Rong Wang. "Corporate Financial Policy and the Value of Cash." *J Finan* 61 (2006): 1957-1990.

11. Fazzari, Steven, R Glenn Hubbard and Bruce C. Petersen. "Financing Constraints and Corporate Investment." *Econom Act* 1 (1987): 141-195.

12. Hill, Matthew D, G Wayne Kelly and Michael J. Highfield. "Net Operating Working Capital Behavior: A First Look." *Finan Manag* 39 (2010): 783-805.

13. Carpenter, Robert E, Steven M. Fazzari, Bruce C. Petersen and Anil K. Kashyap, et al. "Inventory Investment, Internal-Finance Fluctuations, and the Business Cycle." *Brook Pap Econom Act* 1994 (1994): 75-138.

14. Rajan, RG and Zingales L. "What do we know about Capital Structure? Some Evidence from International Data:" *The Jou of Fin* (1995)50: 1421–1460.

15. Bandyopadhyay, Arindam and Nandita Malini Barua. "Factors Determining Capital Structure and Corporate Performance in India: Studying the Business Cycle Effects." *Econom Finan* 61 (2016): 160-172.

16. Bevan, Alan A and Jo Danbolt. "Capital Structure and its Determinants in the UK-A Decompositional Analysis." *Appl Finan Econom* 12 (2002): 159-170.

17. Ramli, NA, Latan H, Nartea GV. "Why should PLS-SEM be used Rather than Regression? Evidence from the Capital Structure Perspective: In Partial Least Squares Structural Equation Modeling ."*Springer, Cham* (2018): 171-209.

18. Kraus ,A and Litzenberger RH. "A State Preference Model of Optimal Financial Leverage:" *J. Finance*(1973) 9: 911–922.

19. Zeitun,R, Tian GG. "Capital Structure and Corporate Performance: Evidence from Jordan."*Australasian Account Busin & Financ Jour, Forthcoming* (2014).

20. Stephan,A, Talavera O, Tsapin A. "Corporate Debt Maturity Choice in Emerging Financial Markets." QRev Econ Finance (2011)51: 141-151.

21. Sobel, ME. "Asymptotic Confidence Intervals for Indirect Effects in Structural Equation Models." *Sociological Methodology* (1982)13: 290-312.

22. Liu ,E, Liu J, Qiu H, Wang J. "Treasury Bill Auctions: Do Bidders' Cost of Funds and Winning Probability Matter?." *Economics Letters* (2019)182: 101-104.

23. Kennedy, Peter. A Guide to Econometrics. Cambridge: MIT Press, UK, (1999).

24. Baron, Robert A and Jintong Tang. "The Role of Entrepreneurs in Firm-Level Innovation: Joint Effects of Positive Affect, Creativity, and Environmental Dynamism." *J Business Vent* 26 (2011): 49-60.

25. Imai, Kosuke, Luke Keele and Dustin Tingley. "A General Approach to Causal Mediation Analysis." *Psychological Methods* 15 (2010): 309.

26. Ek, Ron and Stephen Guerin. "Is there a Right Level of Working Capital?" *J Corporate Treasury Manag* 4 (2011): 137-149.

27. Aktas, Nihat, Ettore Croci and Dimitris Petmezas. "Is Working Capital Management Value-Enhancing? Evidence from Firm Performance and Investments." *J Corp Finan* 30 (2015): 98-113.

28. Kieschnick,R, LaPlante M and Moussawi R. "Working Capital Management and Shareholderwealth."Avaible at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1431165 (2013).

29. Deloof, Marc. "Does Working Capital Management Affect Profitability of Belgian Firms?" *J Business Finan Account* 30 (2003): 573-588.

30. Adam, Tim and Vidhan K. Goyal. "The Investment Opportunity Set and its Proxy Variables." *J Finan Res* 31 (2008): 41-63.

31. Aiken, Leona S, Stephen G West and Raymond R. Reno. Multiple Regression: Testing and Interpreting Interactions. California: Sage Publications, USA, (1991).

32. Bai, Lijuan, Xiangbin Yan and Guang Yu. "Impact of CEO Media Appearance on Corporate Performance in Social Media." *Nor Amer J Econom Finan* 50 (2019): 100996.

33. Baños-Caballero, Sonia, Pedro J. García-Teruel and Pedro Martínez-Solano. "Working Capital Management, Corporate Performance, and Financial Constraints." *J Business Res* 67 (2014): 332-338.

34. Bao, Helen XH and Cynthia Miao Gong. "Reference-Dependent Analysis of Capital Structure and REIT Performance." *J Behav Expl Econom* 69 (2017): 38-49.

35. Blinder, Alan S. and Louis J. Maccini. "The Resurgence of Inventory Research: What have we Learned?" *J Econom Surv* 5 (1991): 291-328.

36. Bloom, Matt and George T. Milkovich. "Relationships among Risk, Incentive Pay, and Organizational Performance." *Acad Manag J* 41 (1998): 283-297.

37. Borochin, Paul, Yaacov Kopeliovich and Kevin Shea. "A General Method for Valuing Complex Capital Structures." *Finan Res Lett* 35 (2020): 101304.

38. Brennan, Michael J., Vojislav Maksimovics and Josef Zechner. "Vendor Financing." *J Finan* 43 (1988): 1127-1141.

39. Brown, D. Michael and Stuart Laverick. "Measuring Corporate Performance." *Long Range Plan* 27 (1994): 89-98.

40. Campos, Héctor Montiel. "Impact of Entrepreneurial Passion on Entrepreneurial Orientation with the Mediating Role of Entrepreneurial Alertness for Technology-Based Firms in Mexico." *J Small Business Enterp Develop* 24 (2017): 353-374.

41. Cappa, Francesco, Giorgio Cetrini and Raffaele Oriani. "The Impact of Corporate Strategy on Capital Structure: Evidence from Italian Listed Firms." *Econom Finan* 76 (2020): 379-385

42. Cardon, Melissa S and Colleen P Kirk. "Entrepreneurial Passion as Mediator of the Self–Efficacy to Persistence Relationship." *Entrepren Theory Prac* 39 (2015): 1027-1050.

43. Judd, Charles M. and David A Kenny. "Process Analysis: Estimating Mediation in Treatment Evaluations." *Evaluation Rev* 5 (1981): 602-619.

44. Cook, Douglas O, Xudong Fu and Tian Tang. "The Effect of Liquidity and Solvency Risk on the Inclusion of Bond Covenants." *J Banking Finan* 48 (2014): 120-136.

45. Corsten, Daniel and Thomas W Gruen. "Stock-Outs cause Walkouts." *Harvard Business Rev* 82 (2004): 26-28.

46. Dhole, Sandip, Sagarika Mishra and Ananda Mohan Pal. "Efficient Working Capital Management, Financial Constraints and Firm Value: A Text-based Analysis." *Pacific-Basin Finan J* 58 (2019): 101212.

47. Frank, Murray Z and Vidhan K Goyal. "Capital Structure Decisions: Which Factors are Reliably Important?" *Finan Manag* 38 (2009): 1-37.

48. Hubbard, R Glenn. "Capital-Market Imperfections and Investment." *J Econom Lit* 36 (1997): 193-225.

49. Kieschnick, Robert, Mark Laplante and Rabih Moussawi. "Working Capital Management and Shareholders' Wealth." *Review Finan* 17 (2013): 1827-1852.

50. Kim, EH. "A Mean-Variance Theory of Optimal Capital Structure and Corporate Debt Capacity:" *J. Finance* 33 (1978):45–63.

51. Le ,T PV, Phan TBN. "Capital Structure and Firm Performance: Empirical Evidence from a Small Transition Country." *Res in int bus and fin* (2017)42: 710-726.

52. Long,MS, Malitz IB, Ravid SA. Trade Credit, Quality Guarantees and Product Marketability: Financ. Manag (1993)22: 117–127.

53. Toni, MRR and Whited M. "Chapter 7 - Endogeneity in Empirical Corporate Finance", *Handbook of the Economics of Finance Volume 2, Part A*. 2013:493-572.

54. Modigliani, F, Miller M. "Corporate Income Taxes and the Cost of Capital: A Correction:" *American Economic Review* (1963)53: pp.433–443.

55. Modigliani, F and Miller MH. "The Cost of Capital, Corporation Finance and The Theory of Investment:" *American Economic Review* (1958)48: 261–297.

56. Myers, S, and Majluf N. "Corporate Financing and Investment Decisions when Firms have Information that Investors do not Have:" *Jour of Fin Eco* (1984) 13:187–221.

57. Myers, SC. "Determinants of Corporate Borrowing:" *Jouof Fin Eco* (1977)5: 147–175.

58. Nguyen, DK and Vo DT. "Enterprise Risk Management and Solvency: The Case of the Listed EU Insurers. "*Jou of Bus Res* (2019)113: 360-369.

59. Nur ,AR, Hengky L ,Grace TS. "Determinants of Capital Structure and Firm Financial Performance—A PLS-SEM Approach:" *Evidence from Malaysia and Indonesia* (2019)71: 148-160.

60. Oztekin, O and Flannery MJ. "Institutional Determinants of Capital Structure Adjustment Speeds." *Jou of fin eco* (2012)103: 88-112.

61. Peleckienėa, V and Peleckisa K. "Omnibus II Effective Measures in Adjusting the Current Solvency II Framework" *Procedia-Social and Behavioral Sciences* (2014)110: 156-163.

62. Preacher, KJ and Hayes AF. "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models:" *Behavior Research Methods* 40(2008): 879-891.

63. Rao, CU and Litzenberger RH. "Leverage and the Cost of Capital in a Less Developed Capital Market: Comment." *The Jour of Fin* (1971)26: 777-782.

64. Reason, T. "The 2002 Working Capital Survey:" *CFO Magazine* (2002)2–15.

65. Russe , PB , Thomas ECJ, Michael BM. "Working Capital Management: Financial and Valuation Impacts:"*Jour of Bus Res* (2020) 108: 1–8.

66. Shin,H and Soenen L. "Efficiency of Working Capital Management and Corporate Profitability." *Financ. Pract. Educ* (1998)8: 37–45.

67. Smith, K. "Profitability Versus Liquidity Tradeoffs in Working Capital Management: Readings on the Management of Working Capital."(1980)42: 549–562.

68. Sonmez ,R . "Parametric Range Estimating of Building Costs Using Regression Models and Bootstrap." *Jour of const Engineer and Man* (2008)134.12: 1011-1016.

69. Stiglitz,J.E and Weiss, A. "Credit Rationing in Markets with Imperfect Information." *Amer Econ Rev* (1981)71: pp. 393–410.

70. Stohs, MH and Mauer DC. "The Determinants of Corporate Debt Maturity Structure." The Journ of Busi (1996)69: 279-312. Summers ,B and Wilson N."An Empirical Investigation of Trade Credit Demand." *International Jour of the Eco of Busi* (2002)9: 257-270.

71. Summers,B, Wilson N. "Trade Credit Terms Offered by Small Firms: Survey Evidence and Empirical Analysis."*J Bus Financ Account* (2002)29: 317–335.

72. Torkelson, E. "Collateral Damages: Cash Transfer and Debt Transfer in South Africa."World Development (2020)126: 104711Bank,VP. "Vietnam Banking Industry." *Retrieved Feb 2014, from* https://www.vpbs.com.vn/ViewReports.aspx. (2014)

73. Wetzel P, Hofmann E. "Supply Chain Finance, Financial Constraints and Corporate Performance: An Explorative Network Analysis and Future Research Agenda."*Intern Jour of Product Econo* (2019)216: 364-383.

74. Yeo H. "Solvency and Liquidity in Shipping Companies." The Asian Jour of Shipping and Log (2016)32: 235-241. Yongming Z, Yini S. "The Impact of Coupling Interaction of Internal Control and Csr on Corporate Performance—Based on the Perspective of Stakeholder."*Procedia engineering* (2017)174: 449-455.

75. Younis, H, Sundarakani B, O'Mahony B.. "Green Supply Chain Management and Corporate Performance: Developing a Roadmap for Future Research Using a Mixed Method Approach." *IIMB Management Review* (2019).