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# Working Capital Management, Hedging and Macroeconomics Covariates of Default Risk: A Textile Sector Analysis in Pakistan

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**ABSTRACT**

Default is an increasingly important issue for the Fall, as market stress builds in a weak economic and financial environment rally. The study seeks to investigate if financial tools such as hedging and working capital management can be used for a precaution against default risk in the textile sector of Pakistan. Furthermore, it provides us an analysis on how macroeconomic variables are managed reduces the risk of default. Several elements can potentially impact the likelihood of a corporation experiencing a default on its debt. Nevertheless, this research has only analyzed Working Capital Management, Hedging, and macroeconomic covariables. Data of 102 textile firms was collected for the time of 2015-2020. The objective of this analysis is to assess the influence of these variables on the likelihood of default. The present study employs a logical approach to inquiry. The deductive approach would be the most suitable to evaluate the hypothesis of causation in the study. Our study provides evidence of a strong and statistically significant negative relationship between working capital management and default risk. The importance of the impact of CPI and R&D Investment is observed at a significant level. The statistical significance of the relationship between GDP growth and the probability of default is acceptable. The statistical significance of the impact of interest rates on default likelihood is insignificant. This study offers significant theoretical contributions by incorporating well-established financial theories, including Credit Rationing Theory, to develop a complete framework for understanding default risk. This article examines how these ideas shed light on the behavior of lenders, conflicts of interest inside agencies, and the impact of free cash flow on corporate decision-making. Furthermore, this study investigates the often-overlooked aspect of working capital management and the role of hedging in risk management. This study offers practical insights for finance experts, corporate administrators, legislators, and investors.



# INTRODUCTION

This research focuses on analyzing default risk and its contributing factors. The Expected Default Frequency of any firm is used to calculate default risk in this context. Because default risk is so important to organizations, it has been the focus of several research prior to this one (Durango-Gutiérrez et al., 2023; Vasquez & Xiao, 2024). Historically, default risk has been calculated in a variety of methods and has been associated with a wide range of variables in academic literature

(Nguyen & Nguyen, 2022; Soenen & Vander Vennet, 2022). The impact of financial strategies and risk-reduction tactics on the anticipated frequency of default in Pakistani textile industry enterprises is the main topic of this study. The term default represents the point at which a company can no longer fulfill its fiscal responsibilities, which may include the repayment of loans, payment of loan interest, or the fulfillment of contractual obligations (Correa et al., 2014). The implications of default are both extensive and far-reaching in terms of their collective impact on economies and financial markets, as well as on key stakeholders (Naveed et al., 2024). Default risk is of such enormous importance that no exploration of its many deeply interlocking and complex dimensions can be exhaustive. As Puspitasari et al. (2021) point out, successful management of default risk as is the management of risk in the financial sector is "reliant upon good financial management," sound micro-economic principles and risk management strategies, and a robust understanding of macroeconomic processes. This research fulfills a genuine need in literature by utilizing an array of theories and relevant empirical evidence.

The purpose of this paper was to extend the well-known financial and Credit Rationing Theory (Jin et al., 2023) by offering a comprehensive theoretical framework to investigate the pricing of default risk. This theory was established by (Baltensperger & Devinney, 1985) and has made considerable contributions to the understanding, of the behavior of creditors, the intricacies of agency conflicts between shareholders and management and the impact of free cash flow on the corporate behavior. The purpose of the present study is to extend the widely recognized financial and Credit Rationing Theory, by providing a comprehensive theoretical setting for the investigation of default risk. The theory was discussed by (Baltensperger & Devinney, 1985) and it made noteworthy contributions to the understanding, of the behavior of lenders, the complexities of agency conflicts between shareholders and management and the consequences of free cash flow on corporate behavior. The hedging is a risk management policy that safeguards a business from the potential detrimental financial happenings (Upreti et al., 2022). In practice, the implantation of a well-crafted hedging policy can not only inform the overall value of a corporation, but also increase the stability of its aggregate cash flows, reduce the adverse repercussions of financial distress and thus decrease the likelihood of bankruptcy (Shakatreh et al., 2023).

Our research is in harmony with that of Alfaro, (Carvalho et al., 2022), who investigate the link between countries' macroeconomic performance and corporate default rates and study the relationship between macroeconomic variables and firms' default rates across emerging and developed countries. Our study aims to take stock of those papers by exploring comprehensively interlinkages and causality between the variables to understand how GDP growth rate, CPI rate and firms' default are interconnected. Our study touches numerous aspects of wider economic relations of default risk. The theoretical and empirical analysis have great importance in the present study. The main objective of this paper is to offer an understanding of the causes of default risk variance, which can be achieved through a blend of empirical and theoretical research.

Prior to commencing our empirical inquiry in earnest, we subjected our instrumental variables to a battery of tests to ascertain their suitability for research purposes. In addition to the standard Sargan test to assess exogeneity, as seen in (Jeanblanc & Rutkowski, 2000), the nature of our objective also demanded a thorough evaluation of the reliability of the data used: due to the nature of the instrument, the veracity of our research hinged critically on this particular dataset. The results were unexpected. Although the first Sargan test provides some evidence in favor of the null hypothesis of exogeneity, the aggregate test yielded an economy of statistics sufficiently large to conclude that the null hypothesis was in fact false. So, we reject the null hypothesis, and find evidence in favor of the alternative, showing that endogeneity is omitted from some instrumental variables. In the light of our results, the dataset for instrumental analysis may have not delivered the anticipated efficacy. As such, more reliable methods of instrument identification and data collection should be applied for future research applications.

This highlighted remark illustrates the complexities involved in empirical investigations, as well as the critical necessity of continually improving one's research methodologies to safeguard the accuracy and reliability of our findings. Our hope is that the findings of this research as well as the groundbreaking new techniques we introduce will ultimately provide financial practitioners, investors and policymakers with the vital knowledge and tools they will need to successfully handle the complex realm of default risk in the fast-paced financial landscape.

# LITERATURE REVIEW

### Credit Rationing Theory

The Credit Rationing Theory initially proposed by (Jaffee & Stiglitz, 1990) creates a useful conceptual platform for understanding lender behavior across the myriads of conditions that attend varying magnitudes of loan supply and demand in financial markets. In cases of high marginal loan demand, the lenders ration credit under the hypothesis that they restrict the quantity of credit or the proportion of their "funds" that they are willing to allocate to each borrower (Stiglitz & Weiss, 1981). This reduces market risk and hence the expected costs of default. It is also essential that we understand that the theoretical framework is important not only for the analysis of credit rationing, but also for the exposure of redlining. Redlining, a discriminatory practice, runs counter to the basic tenet that credit and services should be universally available, regardless of such inherent characteristics as ethnicity or income (Tsvetkov, 2014). The relevance of the credit rationing theory endures, for it is inclusive of markets that are not characterized with equal distribution of information. One type of market failure as such occurs in the presence of information asymmetry, where one party holds an advantageous informational edge over the other (Panda, 2023). The Credit Rationing Theory establishes a vital starting point for examining the complexities of loan allocation and risk management, involving factors such as credit rationing, bias, and disparities in knowledge (Hasan et al., 2023). From addressing discrimination challenges to exposing uncertainties surrounding knowledge asymmetry in a market, the theory offers a coherent framework for analyzing how such a complex market operates, spotlighting the equitable as well as the flawed.

## Hypothesis Development

By now, an interdependence of fiscal needs across a gamut of entities not only underscores their commonalities but also raises questions about the blueprints for greater resilience (Ray et al., 2023). Whether it is the straits of equity holders laden with liabilities or states stewing in vast obligations, a remarkable number look inadequately provisioned for the financial reckonings they face. They include repaying capital to creditors, meeting the tab on their rollover borrowings, and funding investment activity that is needed to compensate for exhaustion of the materials capacity and tech impact upon labor in shrinking their gross output (Makoff, 2024). This ménage of claims across heterogenous forums of naturally invites inquiry on the frontiers of business cycle of what, exactly, is a "default" in a world spanning private debtors (Aguiar & Amador, 2023). Prior research highlights how the concept applies broadly, illustrating institutions unable to discharge multifarious monetary obligations (Mukherjee, 2015). It is imperative to acknowledge that this concept transcends business organizations. The concept of default is often closely associated with economic vulnerability and political turbulence, underscoring its significance within the wider framework of fiscal governance (Shapiro & Hanouna, 2019).

According to Enqvist et al. (2014), the implementation of sound financial management techniques exerts a substantial influence on the overall performance of a firm and its capacity to navigate through moments of volatility. While it is understandable that long-term financial decisions are given due attention, it is imperative to acknowledge the importance of short-term investment decisions as well (Chaudary et al., 2024). The mismanagement of short-term financial investments, encompassing current assets and current obligations such as working capital, can lead to significant consequences and potentially even insolvency (Baker et al., 2023). The basic aim of working capital management is to achieve equilibrium between short-term assets and liabilities, hence improving an organization's financial position (Padachi, 2006). The proficient administration of working capital techniques, including inventory management, accounts receivable, accounts payable, and cash conversion cycles, among other factors, is inherently interconnected with the evaluation of a company's financial well-being and its possible influence on profitability (Annan, 2023).

The current body of scholarly research has not adequately addressed the correlation between working capital management and the risk of default, despite the possible ramifications of misallocation.

The importance of liquidity theory within the realm of working capital management underscores the necessity of achieving a harmonious equilibrium between investments and liquidity to prevent the occurrence of either excessive or inadequate short-term investments (Eckhardt & Bardhi, 2020). Like any decision related to a firm, the choice of working capital management approaches could significantly depend on a firm's risk tolerance and financial objectives. The ultimate purpose would be to minimize the likelihood of defaulting (Alrabadi et al., 2021). The main rationale for carrying out this study is to have complete knowledge on the effect of many financial and macroeconomic factors including working capital management on default risk of the Pakistani economy. Previous studies have found a strong relationship between efficient management of working capital and financial

performance and profitability in a Pakistani context (Muhammad et al., 2016), suggesting that it is likely that there could be an indirect relationship between working capital management and default risk. Therefore, this study will investigate the relationship between working capital management and default risk.

Turning our attention to another critical financial approach, the utilization of hedging can have a significant impact on the likelihood of a firm's failure (Varotto, 2011). Firms ordinarily use hedging as a risk management tool to protect themselves from adverse movements in a future contract that could raise outlays (Nocco & Stulz, 2006). Prior studies have clearly demonstrated that utilizing strategic risk management techniques can positively impact a company's bottom line by lowering tax obligations, curbing agency issues, and reducing the likelihood of fiscal hardship (Fok et al., 1997; Gregory et al., 2014). As Graham and Rogers (2002) explained in their seminal work, appropriately mitigating risks through hedging means protecting shareholders from unexpected losses. Consequently, by using a risk facing approach, managers can strategically allocate capital to where it may deliver the most value (Welch & Yoon, 2023). Over time, a few industries have increasingly adopted proactive risk mitigation strategies (Ganesh & Kalpana, 2022).

The objective of these strategies is to provide resiliency for the business, enabling it to maintain operations and competitive positioning in the marketplace, despite volatility or the emergence of unforeseen events. With time, hedging has moved from the specificity to many other areas. Businesses in industry after industry now recognize its ability to strengthen financial position and reduce exposure to external uncertainties (Frestad & Beisland, 2015). In the broader perspective, this means that hedging, at some level, becomes a concern regardless of portrayal on the balance sheet. The improvements that result from the execution of hedging strategies have a variety of firm-level strategic outcomes. These include such benefits as increased firm value, reduced cash flow volatility, reduced costs of external borrowing, and an improved ability for the firm to pursue investment opportunities (Callahan & Soileau, 2017).

This avenue also softens cash flow volatility, alleviates the costs associated with borrowing externally, and strengthens the firm's capacity to engage in investment prospects (Callahan & Soileau, 2017). It is a modus operandi in which firms manage and reduce risk through lessening the exposure to price volatility on commodities and liquidity, in offshore operating environments. This is particularly so in low-income countries, where price volatility on commodities is a prevalent feature. It allows firms, as well, to manage liquidity problems effectively by turning to trade credit, such as commercial papers and bank support instruments, like letters of credit (Fabozzi et al., 2020). Liquidity is a continuing problem in various financial institutions, where they continue to be distinctive sights, by which we see themselves having been compelled to undertake different hedging mechanisms which would protect them and enable them to maximize its returns from loan portfolios (Matz, 2011). A varied range of market perils are reduced by employing a varied range of hedging products, which we see to include forward contracts, futures contracts, options, and interest rate swaps (Islam & Chakraborti, 2015).

Specifically, interest rate swaps represent one of the most versatile hedging instruments, which can be effectively used to mitigate a wide range of risks (Li et al., 2023). Given the importance of these risk mitigation tools, to both corporations and the economy in general, they can reduce the costs of anticipated losses and buffer against unanticipated adverse events. Accordingly, many businesses are working hard to hedge, using a combination of products, to prudently conserve cash and reduce its vulnerability during an uncertain economic environment (Chatjuthamard et al., 2024). Hedging's role in shielding against default risk is more significant given the current state of economic affairs. In simple terms, hedging's implementation is very significant to protect the loss of potential losses from default risk faced by firms (Rehman et al., 2019). Evidently, it is interesting to examine the question that are the firms in the prevalent textile industry in Pakistan using hedging as a tool to manage the default risk and what are the financial outcome of the said action. The nuanced insights about equilibrium between possible defaults and risk mitigants in the textile industry can provide useful input for the strategy makers in developing risk-management strategies more so, when so many economic troubles continue to beleaguer the Pakistani economy (Segal, 2011).

Furthermore, effectively managing short-term resources in a way that also maintains liquidity is vital for financial stability, as is using hedging strategies to lower broad risks and avoid ill effects in the market (Bervas, 2006). In short, through both working capital management and hedging, businesses can forestall defaults during cyclical changes in the economy (Hendricks et al., 2007). This is illuminated further when one ponders how increased GDP might help businesses stave off default: The problem could be mitigated with enhanced operational efficiency from greater industrial output. The anticipated accrual effect of the GDP growth will elevate sales and free cash flows as well as reduce reliance on foreign borrowing, thus creating a bulwark against potentially adverse market forces which could squeeze liquidity (Anjum et al., 2022). Over time, a lower risk profile from diminished uncertainty with respect to future cash flows lessens the high-beta nature of default premiums, thereby introducing a more stable financial climate (Tang & Yan, 2010). Together with hedging, the triple benefits become even more handy in affording protection for businesses so that they can stand apart when market gyrations are in force.

The likelihood that a company will experience insolvency can be affected by its current economic situation. Yoon et al. (2019) found that companies are often forced into bankruptcy in very competitive market conditions and that these conditions are consistently linked with higher rates of default. However, significant investment in research and development can help to steer businesses through such conditions. This allows them to create new sources of wealth and fortify their position in relation to their competitors, as (Johnson et al., 2022) found. Superior firms nurture marketplace supremacy through sustained commitment to technological and organizational progress, buttressing the corporation with armor against downturns which may undo lesser competitors. Subsequently, the allocation of R&D resources may attain even greater saliency insofar as it can be utilized to reduce the probability of default on financial instruments (Moon & Park, 2022). A corporation managers' decision regarding R&D investments may, however, potentially intensify the likelihood of defaults in markets characterized by intense rivalry (Boubaker et al., 2022).

According to the extant literature, information asymmetry is the principal contributor to the present issue. As an instance, a U-shaped relationship is born by Research and Development (R&D) expenditures with the risk of default. This an initial increase in Research and Developments (R&D) spending lessens the likelihoods of default as (Safiullah et al., 2022) point out, which unavoidably enhances the competitive position and the profitability of the firm. It is interesting in this context to consider that an overinvestment in Research and Development (R&D) can be expected to jeopardize a firm's liquidity and therefore represent risks to investors, as well as companies (Shaikh et al., 2018). This – so we suggest – is yet another example of the rationale of caution that financial markets display in Research and Development (R&D) investments as they recognize the likelihood of an incipient increase in default risk (Islam et al., 2020).

As Keshishbanoosy et al. (2022) shows, relationship between the Consumer Price Index (CPI), which is a widely accepted measure of inflation, and likelihood a company will default its bonds is complex and varies depending on circumstances. A positive relationship seems to exist between enhancements in the Consumer Price Index (CPI) and the possibility of bankruptcy. High levels of inflation can encourage companies to take excessive risks - for example, more debt financing than is prudent and at other times default where they cannot finance this borrowing (Ahmad et al., 2013). This relationship suggests the possibility of a link between inflation and the probability of default.

While some investigations propose that there exists a substantial inverse relationship between Consumer Price Index values and the chance of default, as shown by others suggest matters may not be so simple. For example, during periods of inflationary rises, companies possessing goods whose costs shift infrequently or that have limited alternatives could elevate prices and thus increase profits and decrease the likelihood of insolvency. However, for those enterprises whose obligations outstrip their means, default risk may grow alongside inflation (Milne, 2009). The association, then, proves intricate and vulnerable to aspects such as financial planning and an ability to judiciously navigate inflation's risks. Powerless to always foresee economic variations or prudently react, some businesses inevitably fall prey to adverse trends beyond their control (Pixley, 2004). Yet default need not be inevitable; with acumen and caution, inflation's perils can transform into opportunities. The connection linking consumer prices and unfulfilled responsibilities, in conclusion, resists simplistic portrayals and depends on numerous interrelated internal and external influences.

After a detailed review of earlier studies, the following hypothesis is extracted:

***H1:*** *Working Capital Management, Hedging and Macroeconomic Variables have an impact over default risk.*

***H1a:*** *Working Capital Management would have an impact over default risk.*

***H1b:*** *Increased Hedging practices would have an impact on default risk.*

***H1c:*** *Increased Interest Rate would have an impact on default risk.*

***H1d:*** *GDP Growth would have an impact over default risk.*

***H1e:*** *Increased R&D investment would have an impact on default risk.*

***H1f:*** *An increase in CPI would have an impact on default risk.*

**Theoretical Framework**

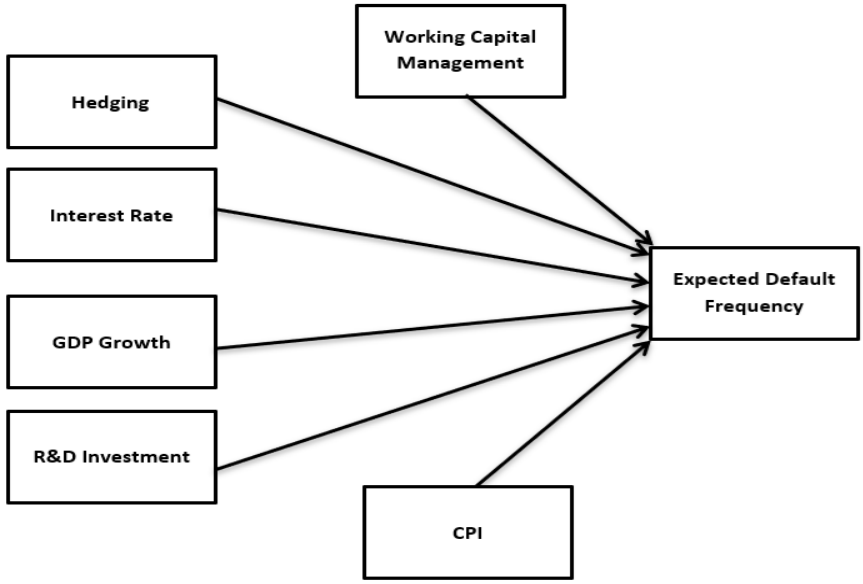


**Figure 1. Theoretical FrameworkFigure 1**

# RESEARCH METHODOLOGY

The present study employs secondary data obtained from current sources. The sampling technique employed in this study was cluster sampling, wherein a subgroup possessing the same characteristics as the full population was selected (Etikan & Bala, 2017). The population under consideration encompassed all financial institutions that were officially registered with the Pakistan Stock Exchange. To examine the phenomenon of "Working Capital Management, Hedging, and Macroeconomic Covariates of Default Risk," the entire population was deemed eligible and aligned with the research objectives. To streamline the research process, the study exclusively focused on registered enterprises in Pakistan's textile industry. The textile industry holds a significant position in Pakistan's economic landscape, being one of the most advanced and prominent sectors. Therefore, utilizing it as a representative case study is deemed suitable. Between the years 2017 and 2022, data was collected from a total of 102 textile enterprises. This study exclusively focuses on variables of a quantitative nature. As a result, supplementary sources were employed to gather data, albeit with varying collecting methodologies for each variable. Table 1 below presents a comprehensive overview of the sources utilized for collecting data on all variables incorporated in this study.

**Table 1: Variable Description**

| Variable | Description | Measurement Source |
|---|---|---|

| | | |
|---|---|---|
| **Dependent Variable** | | |
| Expected Default Frequency | Expected default frequency is the indicator used to measure the chances of default in any corporation. | Financial Statements |
| **Independent Variables** | | |
| Working Capital Management | Working Capital Management indicates a company's measures to maintain its working capital for a better financial position. | Financial statements |
| Hedging | Hedging indicates the practices done by any corporation to mitigate related financial assets. | Financial Statements |
| Interest Rate Increase | An interest rate increase indicates an increase in the lending rate in the economy. | World Development Indicators (WDI) |
| GDP growth | GDP growth indicates the increase in the capacity of any country to produce goods and services. | WDI |
| R&D Investment | R&D Investment indicates the amount invested in the Research and development sector. | WDI |
| Consumer Price Index | CPI is a measure which helps measure the inflation rate in any economy. | WDI |

*Source: Author's designed*

# RESULT AND DISCUSSION

The statistical analysis was done over the model of choice using STATA.

## Descriptive Statistics

The subsequent information outlines the descriptive attributes of the complete observed sample. The table presents the average values and standard deviations for each observation. In addition, the table also incorporates the maximum and minimum values for each variable. The identification of variables with the highest and lowest mean and standard deviation values can be achieved by interpreting the provided table. The mean value of Working Capital Management is the largest, amounting to 1,480,000,000, whereas Research and Development exhibits the lowest mean value of 0.0011388. The standard deviation exhibits a consistent trend, whereas WCM demonstrates the largest value (3100000000), while R&D Investment displays the lowest value (0.0011479). This observation indicates that the variables mentioned above exhibit higher volatility. At the data, it is evident that no one (mean) value falls below zero. Consumers Price Index (CPI) has the largest minimum value among the minimum and maximum values, and others are very close to zero. In any case, if we compare minimum and maximum values of other variables, there is no such big difference between others. Table 2 demonstrates the descriptive statistics in detail.

**Table 2: Descriptive Statistics**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| PTD | 612 | 0.197 | 0.281 | 0 | 0.999 |
| WCM | 612 | 1.0664 | .07316 | 1.15 | 1.15 |
| HEDGE | 612 | 0.424 | 0.494 | 0 | 1 |
| GDPG | 612 | 0.036 | 0.494 | -0.013 | 0.061 |
| CPI | 612 | 166.704 | 19.034 | 145.282 | 200.079 |
| IRS | 612 | 0.035 | 0.003 | 0.031 | 0.041 |
| RD | 612 | 0.001 | 0.001 | 0 | 0.002 |
| lnWCM | 411 | 20.381 | 1.820 | 12.013 | 23.729 |

*Source: Author's calculated by using STATA*

## Correlation Matrix

The Correlation matrix (Forrester & Zhang, 2020) provides valuable insights into the relationships between the dependent variable, Probability to Default (PTD), and the independent variables examined in our study. These relationships are found to demonstrate the direction and magnitude of these relationships, thus affording insights into their consistency with the hypotheses of our study and prior research. Notably, PTD evinces negative relationships with all independent variables, except for the Consumer Price Index (CPI), this validating our initial hypotheses. In this research, at the empirical level, the association between Interest Rate (IRS) and PTD has been noted as negative, which is contrary to common expectations of a positive relationship. This empirical evidence adds to the literature as a notable deviation. The strength of these associations has been found to have differed with the PTD demonstrating the most strength of association with Working Capital Management having the weakest. The presence of strong relationships among the control variables such as GDP growth, Interest Rate, and CPI, suggest the possibility of multicollinearity. Further diagnostic tests on our dataset need to be run to confirm the reliability of the dataset and to address this issue in future analyses. Table 3 briefly explains correlation analysis.

**Table 3: Pearson Correlation**

| | PTD | HEDG | GDPG | CPI | IRS | RD | lnWCM |
|---|---|---|---|---|---|---|---|
| **PTD** | 1.000 | | | | | | |
| **HEDG** | -0.196 | 1.000 | | | | | |
| **GDPG** | -0.104 | -0.075 | 1.000 | | | | |
| **CPI** | 0.135 | 0.100 | -0.872 | 1.000 | | | |
| **IRS** | -0.134 | -0.096 | 0.472 | -0.832 | 1.000 | | |
| **RD** | -0.022 | -0.036 | 0.115 | -0.338 | 0.315 | 1.000 | |
| **lnWCM** | -0.356 | 0.333 | -0.105 | 0.138 | -0.139 | -0.019 | 1.000 |

*Source: Author's calculated by using STATA*

## Test for Multicollinearity

Multicollinearity is one of the important issues that need to be addressed when we are examining dataset that have all our independent variables correlated with each other. Multicollinearity significantly reduces the reliability of the statistical results. It can cause the coefficients to be flipped and the results which lead to incorrect conclusions. Collinearity was examined using the variable inflation factor (VIF) values. As mentioned earlier, if the VIF score is less than 5 then collinearity will

not be a problem. The common rule of thumb is that greater than 10 would be distressful. Based on this, it can be said that the variables do not hinder from multicollinearity of the data set. In addition to the above points, we found that there is no considerable correlation exists among our independent variables in our data set through VIF test which was conducted for multicollinearity. Considering this information, we can say that the variables in the data set are not problematic, and it does not violate the assumptions of multiple regression analyses, because the variables that we used are not high multicollinear. Based on our analysis, we conclude that there is no detectable association among the independent variables discussed above and this appears to support the overall aim of this study. If there is no multicollinearity, assessments of our variables in the multiple regression model will be reliable and accurate because we have no underlying relationship among independent variables. In the absence of multicollinearity, the variables fail to meet this assumption, and the threat of having biased and non-robust results decreases drastically based on these findings.

**Table 4: Variance Inflation Factor**

| **Variance Inflation Factor** | |
|---|---|
| **Mean VIF** | 1.22 |

*Source: Author's calculated by using STATA*

## Test for Heteroskedasticity

The concept of heteroskedasticity, which refers to a markedly non-uniform variability of the residuals across the independent variables within the dataset, has been elaborately examined. The presence of heteroskedasticity in the data has profound effects on the Ordinary Least Squares (OLS) estimators, otherwise known as the estimators of the Best, Linear, Unbiased Estimators (BLUE). The estimators are said to be biased and inconsistent, thereby robbing the regression model of its robustness. This in turn results in the reduction of the p-values and consequently, the loss of overall significance of the regression model. Using the widely known and very valuable Breusch-Pagan Test, we checked for the presence of heteroskedasticity. For this study, we propose the null hypothesis, that the data is homoscedastic, meaning it has a uniform variance. The experiment is conducted to test the hypothesis. With a p-value of 0.0000, the evidence becomes strong enough to reject the null hypothesis. The rejection of this hypothesis tells us that there is significant homoskedasticity present in our dataset. A breach in the assumption of constant variance has important implications telling us that both our random and fixed effect regression models are ill-suited for analyzing our data. Since constant variance is assumed, this is something we must consider during our modeling process if we are to ensure the conclusions and predictions, we come to via our regression analysis are both accurate and fair.

**Table 5: Breusch–Pagan/Cook–Weisberg Test for Heteroscedasticity**

| **Null Hypothesis: Constant Variance** | |
|---|---|
| Chi-Sq (1) | 114.98 |
| Prob > Chi-sq | 0.000 |

*Source: Author's calculated by using STATA*

## Test for Endogeneity

Carrying out a rigorous examination of the dataset is key to obtaining reliable results. To comprehensively analyze the issue at hand, we needed to not only address the question of heteroskedasticity, but also thoroughly scrutinize the dataset for potential endogeneity. Endogeneity refers to a situation when an independent variable, assumed to be a regressor in the model, correlates with the error term. The existence of endogeneity violates crucial assumptions that the Ordinary Least Squares (OLS) estimators are based on, which could result in biased and statistically insignificant results. We framed our null hypothesis to test for the existence of endogeneity, stating that all the regressors are exogenous i.e., they each have no endogenous relationships. The model specification analysis revealed a significant Hausman test, suggesting that the alternative hypothesis is supported. The null hypothesis of the external character of regressors is therefore rejected, and the findings indicate that endogeneity exists within the model applied. The identification of endogeneity is particularly important within the scope of panel data analysis as it allows us to identify a more appropriate model for the dataset at hand, be it a random effect model, or a fixed effect model. The acceptance of the alternative hypothesis in the presence of endogeneity suggests that classical econometric methods, such as ordinary least squares (OLS), may not be appropriate for the analysis of this dataset. Consequently, this statement may also be an expression of a need for the application of more sophisticated econometric methodologies which can address and alleviate this endogeneity problem, thus refining the accuracy and dependability of our analytical findings.

**Table 6: Test of Endogeneity**

| **Null Hypothesis: Regressor is Exogenous** | | | |
|---|---|---|---|
| **Wu-Hausman F test** | 4.271 | F(1,404) | P-value = 0.039 |
| **Durbin-Wu-Hausman chi-sq test** | 4.300 | Chi-sq(1) | P-value = 0.038 |

*Source: Author's calculated by using STATA*

## Generalized Methods of Moments Model (GMM)

Preliminary diagnostics reveal that the dataset exhibits certain features that would render the ordinary least squares (OLS) estimators ineffective. Consequently, we leverage the Generalized Method of Moments (GMM) framework to produce estimates that are more reliable and statistically significant. Endogeneity and heteroskedasticity are pervasive in panel data analysis.

Generalized Method of Moments (GMM) is one such method that has been, but not limited to use, in empirical finance and macro-econometric fields to estimate complex parameter models. Since it employs instruments to manage endogenous explanatory variables, the estimation results are consistent. These properties make GMM apply to a wide range of economic and financial problems such as panel data analysis without concern regarding the model misspecifications. In general, GMM is a strong fix for complex relationships and endogeneity in econometrics. The GMM model was utilized in our research to analyze the dataset, leading to the subsequent discoveries:

The findings, as presented in Tables 5 and 6, indicate a significant and inverse relationship between the primary variables of Working Capital Management and Default Risk. The obtained outcome aligns with our initial conjecture, indicating that the effective management of working capital diminishes the probability of default. The control variables of GDP growth, CPI, and R&D Investment have statistically significant associations with Default Risk. It is worth mentioning that the p-value associated with the link between Interest Rate and Default Risk did not attain statistical significance, hence refuting our first hypothesis regarding the association between interest rates and default risk. Contrary to our initial expectations, the findings unveiled unforeseen patterns of correlation between GDP growth and R&D spending. The findings suggest that a growth in gross domestic product (GDP) or research and development (R&D) expenditure can create circumstances that could elevate the likelihood of default.

The outcomes of the Generalized Method of Moments (GMM) exhibited a substantial degree of conformity with our initial hypotheses. Nonetheless, given our main variables and the improvement of the GMM model, it appears to be more than a viable option. Its complexity makes it perfectly suited to addressing the complexities and nuances within our dataset: The model acts as a very thorough approach for analyzing the relationships between the different variables studied, and thus offers some major insights.

**Table 7: Results of GMM**

| PTD | Coefficient | Std. Err. | z | P>\|z\| | [95% conf. interval] | |
|---|---|---|---|---|---|---|
| **lnWCM** | -0.074 | 0.005 | -13.01 | 0.000 | -0.086 | -0.063 |
| **GDPG** | 4.720 | 2.801 | 1.68 | 0.092 | -0.770 | 10.210 |
| **CPI** | 0.011 | 0.005 | 1.93 | 0.054 | -0.002 | 0.023 |
| **IRS** | 17.648 | 14.864 | 1.19 | 0.235 | -11.486 | 46.782 |
| **RD** | 22.998 | 11.149 | 2.06 | 0.039 | 1.145 | 44.850 |
| **_cons** | -1.096 | 1.637 | -0.67 | 0.503 | -4.305 | 2.112 |

*Source: Author's calculated by using STATA*

## Arellano-Bonds Test

Arellano-Bonds' test was used to establish the suitability of the dynamic panel data in conjunction with Generalised Method of Moments (GMM) approach. The purpose was to ascertain if the modeling technique selected for this study satisfied the statistical criteria for an optimal model. The test results were interpreted in a nuanced way. Taken Arellano-Bonds test results, statistical significance of both Order 1 and Order 2 is concluded. Order 1's results showed that the null hypothesis is rejected, which means some of the instrumental variables do indeed have autocorrelation. Order 2's significant findings also showed that the null hypothesis is rejected, demonstrating the presence of autocorrelation. It's not definitive then that the instrumental variables we chose to use in our model are completely valid. There's a great deal of ambiguity, and their discard, tweaking or adoption all need further examination. Modification could be necessary to enhance the reliability and durability of the modelling approach we've gone with.

**Table 8: Arellano-Bonds**

| Arellano-Bond Test | | |
|---|---|---|
| **Order** | **Z** | **Pr > z** |
| **AR(1)** | -5.32 | 0.000 |
| **AR(2)** | -2.01 | 0.045 |

*Source: Author's calculated by using STATA*

## Sargan Test

The incorporation of the Sargan test, an important diagnostic tool within the framework of our model, further strengthens the results of our analysis. The test yields a statistically significant result, leading to the rejection of the null hypothesis and providing evidence in favor of the charge that our model is mis-specified with respect to autocorrelation. This finding provides some comfort, suggesting that the inclusion of instruments in the model we have relied on does not seriously undermine our inferences, although they cannot be completely immune from all possible sources of concern. In addition, Table 9 Sargan test for difference was exploited to consider the potential endogeneity of instrumental subsets. This inclusive test adds to the comprehensive examination of the soundness and resilience of the employed instrumental variables in our research. These examinations conducted to completeness have emboldened our confidence in the reliability and validity of our modeling methodology, and thereby strengthen the bedrock upon which our research outcomes are based.

**Table 9: Sargan Test**

| Sargan Test | |
|---|---|
| **Chi-sq (38)** | **Prob > chi2** |
| **195.78** | 0.000 |

*Source: Author's calculated by using STATA*

## Difference in Sargan Test

A critical analysis was conducted on the effectiveness of our instrumental variables within the boundaries of our study. This study sought to test the efficacy of the dataset used in the study bearing great consequences for the reliability of our research. A Sargan test for exogeneity was employed which rendered some unanticipated results. The initial showing of this test disproportionately backed the null hypothesis, which points towards homogeneity suggesting that the overidentifying restriction does not account for this homogeneity however, when the whole data was used the overall data was statistically significant which led to rejection of the null and subsequently acceptance of the alternative confirming endogeneity within the instrumental variables used by the researcher. The findings of the current study indicate that the instrumental dataset in question may not have produced the results anticipated; further illustrating the need for more reliable data acquisition techniques and instruments in future research efforts. This assertion highlights the complexities associated with empirical studies and emphasizes the imperative of perpetually refining our methods of inquiry to ensure the accuracy and validity of our findings.

**Table 10: Difference-in-Sargan Test**

| **chi-sq (28) = 56.55** | **Prob > chi2 = 0.001** |
|---|---|
| Difference: **chi-sq (10) = 139.23** | Prob > chi2 = 0.000 |
| Instrument (cpi irs rd) | |
| Sargan: **chi-sq (35) = 113.84** | Prob > chi2 = 0.000 |
| Difference: **chi-sq (3) = 81.94** | Prob > chi2 = 0.000 |

*Source: Author's calculated by using STATA*

## Discussion

This study had the motive to assess the impact of financial as well as macroeconomic factors on the default risk of any company, the sector chosen as representation is textile sector of Pakistan. For analysis, data was collected. Panel data for the years 2015-2020 was collected and World development indicators are used for economic data, the financial data was collected from the financial statements of specific companies, or summaries of financial statements of State bank of Pakistan.

Once dataset was collected, it was analyzed first statistically; to see the presence of any underlying patterns or relationships. STATA was used for this purpose. The utilization of ordinary least squares (OLS) regression is prevalent in the study of panel data. Nevertheless, ordinary least squares (OLS) estimators are prone to issues such as heteroskedasticity and endogeneity. Consequently, the dataset was subjected to other methodologies, specifically the Generalized Method of Moments model, and the ensuing outcomes are shown herewith.

The results of the study indicate a robust and statistically significant inverse relationship between working capital management and default risk, providing support for our research hypothesis (H1a) positing a connection between Enhanced Working Capital Management and Default Risk. Furthermore, when considering a significance level of 5%, the acceptance of hypotheses H1e and H1f indicates that both CPI and R&D Investment exert a substantial influence on default risk. The statistical analysis conducted at a significance level of 10% indicates a substantial association between GDP growth and the chance of default. This finding supports our hypothesis (H1d) that GDP growth has an impact on default risk. Contrary to our initial hypothesis (H1c) proposing a positive relationship between increasing interest rates and the probability of default, the statistical analysis reveals that the impact of interest rates on default likelihood is not statistically significant.

Moreover, the findings of the analysis suggest that there exists a negative relationship between Working Capital Management and Default Risk. Furthermore:

1. The utilization of hedging strategies exhibits a somewhat adverse impact on default risk; nevertheless, this impact lacks statistical significance.
2. An upward adjustment in interest rates has a somewhat favorable impact on the likelihood of default.
3. The relationship between economic growth and default risk is significant and favorable.

4. The probability of default is significantly influenced by an increase in expenditure in research and development (R&D).
5. An increase in the Consumer Price Index (CPI) exerts a substantial and favorable impact on the likelihood of default.

Although the model yielded encouraging outcomes that are consistent with our empirical findings, the conducted robustness tests to assess the effectiveness of the model were not entirely satisfying. To enhance the validity of these findings, it is recommended to incorporate further instrumental variables into the model or utilize modern analytical approaches to enhance its precision and predictive capacity.

# CONCLUSION AND POLICY IMPLICATION

### Theoretical Contributions

This study presents noteworthy theoretical advancements in the domains of finance and risk management. The current research seeks to investigate the Credit Rationing framework, aimed at explaining the way in which creditors react to variations in the amount of loan supply and demand, and the rationale for the management of risk in financial markets. This is a broader approach to default than an enigma that originates only in corporate organizations, treating this as a comprehensive phenomenon that has multiple outcomes, and stressing the considerable capacity of economic and political conditions to influence the odds of default. Hence this research paper suggests the possibility of a connection between the management of working capital and default proneness, emphasizing the significance of short-term financial decisions in this respect. Further to the above, this research also explores the importance of derivatives in decreasing the likelihood of default through efficient management of financial distress and insurance against adverse market movements, and the ancillary significance of exchange risk in determining when an entity is at the point of a liquidity crisis.

This research also takes up the way a macroeconomic variable, namely, increasing level of the Gross Domestic Product (GDP), operates as a statistical instrument to either differentiate or confound the likelihood of default issues and contributes to our insights into the operation of economic indicators, including the Consumer Price Index (CPI) in the likelihood of default. This discussion offers new insights into broadening systemic risk and risk management approaches. The research outcomes suggest a U-shaped relation between investment in research and development (R&D) and the likelihood of default and accentuates the capacity of managerial decisions to affect competitiveness and liquidity. These are several contributions we make to our understanding of risk management and financial decision-making in several contexts, including the economy of Pakistan, and the sector of textiles.

### Practical Implications

The practical implications are quite noteworthy. The initial findings in working capital management, for example, embody the paramount importance of managing short-term capital and liquidity more effectively to improve the odds of financial practitioners and managers evading default. A sound

strategy for regulating working capital, as it happens, is a necessary part of establishing firm financial ground and warding off default risks. Meanwhile, hedging in the context of a broader risk-management strategy to rein in some of the perils associated with a trade wind home, underscores the managerial call to use these practices to manage the additional financial peril that comes with market volatility. On balance, then, it is likely a prudent step for companies, particularly those subject to such conditions, to implement a suite of comprehensive hedging practices to minimize additional exposure to default risk. Understanding how GDP growth interacts with the Consumer Price Index (CPI) and default risk is valuable for investors, policymakers, and economists. The interaction between inflation dynamics and default risk can depend on a corporation's financial decisions. In the final analysis, the practical implications presented here reinforce the importance of informed financial management, risk-mitigating techniques, and a sophisticated grasp of the workings of economic indicators for reducing the likelihood of default in various industries and sectors.

## Conclusion

This multifaceted examination strove to pinpoint approaches for mitigating default hazards within the industrial sector by concentrating on macroeconomic determinants, especially working capital management, hedging practices, and pivotal macroeconomic variables. Using panel statistics from 2015 through 2020, the Generalized Method of Moments (GMM) model was applied to tackle statistical issues such as heteroskedasticity and endogeneity. The conclusions exposed that successful working capital management dramatically reduces default risk, corroborating its role as a core instrument for financial stability. On the other hand, augmentations in the Consumer Price Index, research and development outlays, and GDP growth were found to heighten default risks. Moreover, prudent hedging practices and diminished short-term debt loads were shown to effectively lessen hazards over the period. However, the effect of interest rates was insignificant. In evaluating economic conditions that impact industry stability, these findings provide valuable insights for firms looking to reduce financial risks and for external stakeholders, including investors and policymakers.

The results are consistent with the purpose of the study, which was identifying factors that could be used to mitigate default risk; however, limitations associated with data availability and exclusion of some relevant theories minimize the extent of this analysis. As complete financial data was often unavailable (as in the case of Pakistan) and as there is only one The consistency of response to revenue and other stress-tests across country source resulted in the ability to test fewer hypotheses than we have for LIC sample, and that all such tests are from a single study with limited time and resources. Future investigations should validate the model in developed economies having more reliable data, and behavioral finance theory should be considered to investigate how management and investor behavior play a role in the default risk. Furthermore, replacement measures for other variables (such as interest rates) could be considered to see if alternative approaches consistently implausibly good results. Lastly, the study fulfills its dual academic and practical purpose by providing important new insights that could help firms improve their working capital management so that they can react better to macro-economic any ultimately lead to lower default risk for these firms.

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