IMPACT OF FIRM AGE ON INVESTMENT AND FIRM PERFORMANCE: AN ANALYSIS OF LISTED NON-FINANCIAL FIRMS IN PAKISTAN.

by

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CERTIFICATE

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Author's Declaration

I, **Wajeeha Zainab,** hereby state that my MPhil thesis titled **" Impact of Firm Age on Investment and Firm Performance: An Analysis of Listed Non-Financial Firms In Pakistan"** is my own work and has not been submitted previously by me for taking any degree from the Pakistan Institute of Development Economics or anywhere else in the country/world.

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Date: 24-10-2024

Wajeeha Zainab

Dedication

This Effort is Dedicated to My Parents

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In the name of Allah, the Most Gracious, the Most Merciful. All praise is due to Allah, who provided me with the strength, patience, and guidance to complete this thesis. I am profoundly grateful for the wisdom and perseverance that He bestowed upon me during this journey. Without His blessings and guidance, this achievement would not have been possible. I offer my countless salutations upon my beloved Holy Prophet MUHAMMAD (P.B.U.H) the entire source of guidance for humanity as a whole forever.

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ABSTRACT

Pakistan has grappled with a significant investment issue over the past few decades. This study endeavors to elucidate the impact of firm age on both investment and performance utilizing data from all non-financial firms listed on the Pakistan Stock Exchange (PSE) ranging from 2010 to 2022. For the analysis, the study employed both fixed effects and random effects models followed by the application of the Hausman test. The results show that there is a positive relationship between firm age and investment (working capital) which represents the short-term investment of a firm, in overall panel as well as at sectoral level. The study also revealed that there is also a positive relationship between firm age and investment (non-current assets) which indicates the long-term investment of the firm in overall panel as well as at sectoral level. Conversely, the study also investigate the impact of firm age on firm performance and find that in overall panel there is a negative relationship between firm age and performance. Sector-specific analysis further clarifies this relationship. In the textile, paper, food, information, communication, and transport services, as well as minerals manufacturing, petroleum, and motor vehicles, trailers, and auto parts sectors, firm age negatively impacts performance. However, in the sugar, cement, chemical products, pharmaceuticals, and electrical machinery and apparatus sectors, there is a modest improvement in firm performance over time.This study holds significant importance as it highlights the intricate issues related to investment and performance as a firm's age. The findings suggest the necessity for policies that can aid Pakistani firms in enhancing their performance with increasing age. It will also provide financial incentives, grants, and access to capital for young firms to boost their investment capabilities and drive their growth and innovation it will also helps to promote the hiring and development of young talent in older firms. This can bring fresh perspectives and skills, potentially boosting performance and mitigating the adverse effects of aging.

Key Words: *Investment, Firm Age, Working Capital, Non-current Assets, Firm Performance*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

INV	Investment
FA	Firm Age
FP	Firm Performance
D/E	Debt Equity Ratio
INT	Interest Rate
WC	Working Capital
NCA	Non-Current Assets
ROA	Return on Assets
NP	Net Profit

CHAPTER 1

INTRODUCTION

1.1 Background

Firm age and its relationship with firm performance and investment is an important area of research. Both theoretical and empirical research show that as a firm's age increases, its behavior and performance change due to various factors. Scholars from a variety of disciplines, including economics, organizational behavior, and finance hold different perspectives on the topic of financial performance variations between younger and older firms. Despite this diversity of views, there has been progress in understanding the connection between the age of the firm and its performance (Do, 2013a). For example (Coad et al., 2018) observed that the performance of a firm declines over time due to a shift in focus. Many studies suggest that new firms tend to achieve their targets more quickly compared to older ones. As firms mature, they need to adapt and learn how to operate efficiently over time. However, this does not always happen due to several reasons, for example, due to the deterioration of corporate governance quality (Loderer and Waelchli, 2010). Similarly, (Evans, 1987) found that, for most firms, firm growth decreases with both age and size.

Declining profitability in aging firms is indeed a prominent issue. Firm aging may result from the rigidity of firms over time, leading to increased costs, slower growth, the loss of the value of assets, and decreased investment. The profitability of a firm is reduced as it becomes mature, which can be attributed to both structural problems and internal governance issues within the firm (Loderer and Waelchli, 2010).

Some studies show that there is a positive relationship between firm age and performance. Similarly, in Ethiopia, a study investigates the effects of firm age and financial leverage on the performance of 146 medium enterprises (MEs). It finds that while foreign ownership does not directly influence performance, firm age significantly impact it. Specifically, foreign ownership mediates the relationship between firm age and performance, suggesting that older firms, which are more attractive to foreign investors, perform better than younger ones(Mallinguh et al., 2020).

Over the past three decades, organizations have actively researched the causes behind this phenomenon. Age has an impact on profitability due to the firm's accumulated experience and the

development of purchasing and bargaining power. Additionally, based on the experience curve, the business gains from experienced performance and economies of scale during its existence. Handling the licensing procedure results in a great deal of knowledge in anticipating market capacity, which can then generate higher profitability due to market capture. Therefore, older firms are expected to be more profitable (Ghafoorifard et al., 2014).

There are many examples from around the world which show that as firms mature, they increase in size and their performance improves. Some of the prominent examples from around the world include Nike, Amazon, Google, Reliance Industries, Unilever, and Toyota to name a few. However, in Pakistan, except for a very few firms (such as Engro) firms do not grow as much as firms from other parts of the world grow. A comparison between, for example, Pakistani and Indian business houses shows that one of India's largest conglomerates was worth USD 311 billion in 2020, while Pakistan's largest conglomerate was worth only USD 6 billion in the same year (PIDE, 2023). Although these figures are for conglomerates, they are suggestive of relative firm sizes in Pakistan and elsewhere. Thus, it is important to analyze how Pakistani firms progress with age in terms of size, investment, type of investment, performance, and other related indicators.

In Pakistan, however, there is limited research on the relationship between firm age, investment and performance. Existing studies have primarily focused on checking the connection between firm age and firm performance in the case of Pakistan (S. Ali et al., 2021; Hussain & Waseer, 2018; Tuba et al., 2023). Another study shows that as firms grow older, their profitability seems to decline. First, corporate aging could reflect a cementation of organizational rigidities over time. Consistent with that, costs rise, growth slows, assets become obsolete, and investment and R&D activities decline. Second, older age could advance the diffusion of rent-seeking behavior inside the firm (Coad et al., 2018). However, no study has examined the impact of firms' age on firms' investment and performance. Thus, there is a need for an in-depth analysis so we can observe that how firm age and outcomes in Pakistan. Understanding these relationships can give various insights. One insights from the policy perspective could be the role of regulatory and market supporting policies in the growth of Pakistani firms. It can help business leaders develop targeted strategies to enhance firm growth, improve performance, and optimize investment decisions.

1.2 Motivation of the Study

In the intricate global economic landscape, large firms and corporations play a pivotal role by driving innovation, introducing diverse investments, and contributing significantly to value addition. However, in Pakistan, the concentration of economic activities lies in the hands of a limited number of business conglomerates. Unlike their global counterparts, Pakistani conglomerates tend to focus on activities that yield maximum returns without emphasizing innovation, product diversification, and research and development. Moreover, Pakistani firms stagnate after reaching a certain size, whereas firms in other countries continue to grow. Prominent examples include Apple, Amazon, and Microsoft, among others.

Moreover, in Pakistan, the combined value of the top 42 conglomerates, owning 421 companies, stood at approximately USD 48.23 billion in 2020. To provide context, India's Tata Group, the second-largest conglomerate globally, with 30 companies, boasts a net worth of USD 311 billion. The largest Pakistani conglomerate, in contrast, holds a total worth of USD 6 billion.

This study can be a valuable contribution to the literature on firm age and its relationship with performance, investment, and size since there is a dearth of such studies in Pakistan. Since it is an empirical study, the results will show if the relationship between firm age, investment, performance, and size holds in the case of Pakistan for all firms included in analysis as well at the sectoral level. It can help businesses make informed decisions about future investment plans, and improving performance and size. For example, if there is a positive relationship between firm age and investment in one sector and negative in the other, one can analyze the behavior of the firms in the sector in which there is a positive relationship to see what factors lead to such a result. Moreover, the results can help businesses modify their capital composition and manage their investment or assets more efficiently. From the policy perspective, it can give insights into regulatory framework and market supporting policies that work better in one sector than the other.

1.3 Research Problem

Since a firm is where investment, innovation, and value addition happen, it is crucial for the health and dynamism of the overall economy that firms grow and show strong performance. If private sector firms are growing, it augurs well for the overall health of the economy. If firm-level investment is increasing and their performance is on an upward trajectory, investment at the macro

level will also increase and vice versa. Compared to firms from around the world, in Pakistan, however, firms tend to stagnate, and their investment taper off as they age. In Pakistan, investment as a percentage of GDP is very low as compared to other comparator countries. Low investment-GDP ratio is indicative of the overall economic environment and policy framework in the country. In Pakistan, investment rate is low because of various reasons which include cumbersome regulatory environment, macroeconomic uncertainty, and incentivizing some sectors or firms at the expense of the others(*Why Do We Have Less Investment Than China and India?*, n.d.)

Our study investigated the correlations between innovation performance, technical investment and firm age among enterprises in the Ankara technopolis, Turkey. The findings demonstrate a substantial correlation between investments in technology and the performance of innovation. Moreover, the results indicate a robust association between investment in technology and the level of innovation achieved. Nevertheless, our analysis uncovered no noteworthy correlations between innovation performance and either the size or age of the organization (Yildiz et al., 2013).

In the case of Pakistan, there is a lack of research that examines the influence of company age on firm behavior, specifically in terms of investment and firm performance. The objective of this study is to examine the correlation between the age of a company, investment and performance. The study will specifically examine all non-financial companies that are publicly traded on the Pakistan Stock Exchange (PSX). The companies will be categorized based on their respective industries**.**

1.4 Research Questions

1. What is the relationship between firm age and investment in Pakistan?
2. What is the relationship between firm age and firm performance?

1.5 Testable Hypothesis

The study includes these testable hypotheses.

Table 1. 1: Hypothesis Testing

Hypothesis Nature	Description
Null Hypothesis H_0	There is a positive relationship between firm age and investment in Pakistan
Alternative Hypothesis H_1	There is a negative relationship between firm age and investment in Pakistan.
Null Hypothesis H_0	There is a positive relationship between firm age and firm performance.
Alternative Hypothesis H_1	There is a negative relationship between firm age and firm performance.

1.6 Research Objectives

A firm is one of the fundamental units in an economy that generates economic activity. Thus, a firm is a crucial ingredient in a country's overall economic growth. In Pakistan, however, there is a dearth of firm-level analyses that look into firm age, investment, performance, and size. It is primarily investment at the firm level that drives private investment. In Pakistan, investment as a percentage of GDP, has been very low. There are very few studies that investigate investment at the firm level even though it is important to analyze a firm's investment trends. Firm performance shows how well a firm is doing, which, in turn, shows overall economic sentiment in an economy. Thus, the objective of this study is to investigate the relationship between firm age, investment behavior, and firm performance.

The main objectives of this study are to:

- To investigate relationship between firm age and investment behavior in non-financial firms listed on the Pakistan Stock Exchange (PSX).
- To analyze the impact of firm age on performance in non-financial firms listed on the Pakistan Stock Exchange (PSX).

1.7 Significance of the Study

This study is important from different aspects. Firstly, very few studies investigate firm-level data to see the relationship between firm age, investment, and performance. These variables are crucial because they show in which direction an economy is going. Thus, it will pave the way for further research on the different factors that affect investment and performance. Secondly, analyzing investment behavior in relation to age and other firm-level variables is very important because investment in Pakistan has been low historically. The research sheds light on how these variables are related and what factors influence firm investment. Thirdly, since the study analyzes investment behavior not only at the firm level but also at the sectoral level, it will help to devise strategies to stimulate investment both by firms and policymakers. A sectoral level analysis is insightful because if the relationship between the variables included in the analysis is different in different sectors, it can help understand why one sector is different from the other. From a business's perspective, it could help it devise an informed decision regarding investment, improving firm performance, and take decisions regarding the firm's size.

The study of firm age and its relationship with the economic and financial indicators is important from a policy perspective. For example, since private firms respond to incentives, such as sector-specific policies and regulatory framework, among other things, an analysis of firm age with respect to firm performance will shed light on important areas of policy formulation like financial incentives, grants, and access to capital for young firms to boost their investment capabilities and drive their growth and innovation.

1.8 Units of Data Collection

Secondary data of non-financial firms from their annual reports is used in this study. Panel data of firms listed on the Pakistan Stock Exchange is studied.

1.9 Organization of the study

This study consist on 6 chapters with several sub-sections within each chapter. Chapter 1 provides an overview of the study. Chapter 2 contains a literature review which discusses all the research objectives. Chapter 3 elaborates on the method used (Methodology) in the study and gives an account of the variables. The Chapter 4 which contains the findings and results of the study. The

qualitative research, which includes interviews with key informants, is presented in Chapter 5. In last, Chapter 6 summarizes the key findings and presents the policy implications.

CHAPTER 2

LITERATURE REVIEW

The literature on the relationship between firm age and investment, performance, and size is limited. Although many studies look into the relationship between firm age and specific variables, there are very few studies, if any, that analyze this relationship in a combined setup. Moreover, research studies on the topic at hand are mostly done in developed countries, while very few studies are available for developing countries. As far as Pakistan is concerned, the literature is very thin. Therefore, this literature review mostly relies on studies done in other countries. It will help us draw implications for Pakistan.

2.1 Firm Age

The firm's age is defined by (Ilaboya & Ohiokha, 2016) as *"the number of years of incorporation of the company".* While some researchers argued that listing as a criterion for defining firm age is more prudent, asserting that a company's life commences at the point of listing (Shumway, 2001). Opposing this perspective, some have countered the argument by asserting that a company comes into existence through the process of incorporation as a legal entity (Gotzmann, 2008). Wang (2011) characterized firm age as the duration of years that an enterprise has elapsed from its inception to the time of examination. In cases where the enterprise ceases to exist at the point of investigation, it is also referred to as the lifespan of the enterprise.

2.2 Firm Age and Investment

Grazzi et al., (2015) This research also establishes a link between investment fluctuations and firm size in France and Italy. The analysis of determinants of investment vintages confirms that French and Italian firms are similar in terms of growth, profitability, and productivity, as the findings reveal positive correlations with productivity, sales, and employment once firm characteristics are accounted for. Thus, the study enriches the literature relating to investment, firm characteristics and performance with an acknowledgement of the complexities of each country context and its industrial structure.

Suteja et al., (2023) investigates the impact of Corporate Social Responsibility (CSR) and profitability on firm value in emerging markets, using panel data analysis on 215 non-financial sector companies listed on the Indonesian Stock Exchange. The results indicate a negative effect

of investment decisions on firm value, moderated by CSR and profitability. The findings highlight that investment decisions are critical financial choices that can be managed effectively through sound fund and risk management practices. Specifically, the study reveals that investment decisions negatively influence firm value, with firm value increasing when investment decisions decrease. This decline is partly attributed to the COVID-19 pandemic, which led to a 16.89% reduction in investment activity in 2020. Additionally, strong managerial qualities often limit investment in non-financial sector companies.

(Akbar et al., 2020) examines the efficacy of working capital management (WCM) and surplus money in non-financial companies in Pakistan, encompassing 12 industries. The data indicate that there are inefficiencies, as seen by an average Net Working Capital (NWC) to sales ratio of 30%. Excessive net working capital (NWC) negatively impacts investments in fixed assets, and companies with longer net trade cycles tend to have lower levels of fixed asset investments. This article seeks to evaluate the impact of working capital management on a firm's investment, specifically on fixed asset investment, with the goal of reducing unneeded working capital. The results suggest that there is a negative correlation between the amount of extra net working capital (NWC) and the sales ratio. The study reveals that companies with substantial working capital make investments to release surplus cash, ultimately improving their operational performance. The addition of working capital has a positive impact on the performance of organizations that have low levels of capital. By using effective working capital management strategies, company managers can prevent the accumulation of excessive cash and instead allocate the surplus towards productive assets.

Azhar et al. (2019) explores impact of corporate governance on investment practices of 50 non-financial companies listed on the Pakistan Stock Exchange (PSE) from 2010 to 2015. They find that as ownership concentration rises, investment efficiency tends to decrease. Managerial ownership, where managers have a stake in the company, positively influences investment efficiency.

Fan and Wang (2021) examine the relationship between the age of a corporation and its spending on research and development (R&D) among Chinese manufacturing companies that are publicly listed on the stock exchange from 2007 to 2014. It is determined that research and development (R&D) expenses vary based on the age of the company. Typically, there exists a curvilinear link

between the age of a company and its investments in research and development (R&D), taking the shape of an inverted U. Hence, the non-linear relationship between the age of a corporation and its investment in research and development (R&D) in China provides significant empirical data regarding the distinct dynamics that China exhibits in comparison to other developing and established countries.

2.3 Firm Age and Firm Performance

Past research has predominantly focused on examining the relationship between firm size and performance, seeking to answer the question of whether larger firms surpass their smaller counterparts or vice versa (Penrose, 2009). In recent studies, the approach to the topic takes a different perspective, aiming to determine whether older firms surpass their younger counterparts or vice versa. Some studies assert a positive correlation between firm age and performance (Papadogonas, 2006),

According to (Coad et al., 2013) Firm performance in relation to age remains underexplored, likely due to the limited availability of data on firm age. In his study, we examine a panel of Spanish manufacturing firms from 1998 to 2006 to investigate this relationship. The results suggest that as firms age, their performance improves. Older firms exhibit consistent growth in productivity, increased profits, larger sizes, reduced debt ratios, and higher equity ratios. Additionally, he demonstrate a stronger ability to translate sales growth into subsequent gains in profits and productivity. The literature still lacks consensus on the association between firm age and performance, making it an area where further exploration is needed to enhance our understanding of this phenomenon.

Ghafoorifard et al. (2014) selected 96 firms from Tehran Stock Exchange and found that the performance of the firms increase with the increase in age of the firm it was established that age and size of the firm are important and relevant variables that can be considered as the predictor variables. To this end, the current study aims at exploring the relationship between the financial performance of a listed company and firm age on the Tehran Stock Exchange. He discovers that the age of the firm and its financial output are related. As a business grows, its network increases thus offering several learning opportunities. As a result of experience, the mature business is able to make better decisions than a young business, thus increasing the chances of success.

Nawaiseh (2020) analyzed financial data from 22 Jordanian insurance businesses listed on the Amman Security Exchange (ASE) from 2008 to 2017 to investigate how a company's age, size, and growth affect its profitability. He observes that the profitability of the insurance company is not influenced by its size, growth, or age. Prior to making any determinations about the expansion of a company, the replacement of assets, the production of high-quality items, or the hiring of new personnel, financial managers are recommended to analyze the correlation between a firm's age, size, growth, and profitability. Instead than pursuing a strategy to achieve quick growth in the short term during an economic downturn, managers should reduce the scale of the firm's operations.

Do (2013b) analyzed the impact of a company's longevity on its profitability by studying Turkish companies registered on the Istanbul Stock Exchange. The study utilized a dataset consisting of an average of 302 non-financial enterprises annually between 2005 and 2014. He discovers that there is a negative and convex relationship between the age of a corporation and its profitability, as measured by the return on equity, return on assets, or gross profit margin. This suggests that newly established enterprises may initially face a decline in profitability but may later see a significant increase in profitability. This dissertation seeks to improve current research by undertaking an empirical inquiry into the relationship between the age of a company and its profitability in Turkey.

Mallinguh et al. (2020) explores the relationship betwee firm age and firm performance, with the influence of financial leverage and the percentage of foreign ownership in domestic firms acting as mediating factors. They find that foreign investor’s decisions about local enterprises are significantly influenced by the firm’s age. Firm age has a significant indirect impact on its performance, indicating a mediating role for foreign ownership levels.

Nafees et al. (2023) find the entrepreneurial performance within the manufacturing sector, focusing on the influence exerted by firm age and size. They use the data of manufacturing firms listed in the Lahore Chamber of Commerce between 2019 and 2020. They find that there is a positive correlation between firm size and entrepreneurial performance, signifying that an increase in size also increases its profitability. Furthermore, the research underscores the advantageous impact of a company’s longevity on financial success, attributing it to experience, brand reputation, and the ability to command a more substantial profit margin. Ultimately, it contributes to the broader comprehension that small firms, particularly those operated by sole proprietors or family enterprises, serving as platforms for showcasing superior decision-making powes.

Dioha et al. (2018) investigates the 22 listed Nigerian companies characteristics which affect the consumer profitability of the companies from 2011 to 2016. They used the Return on sales (ROS) is used as a proxy for business characteristics, whereas firm size, age, sales growth, liquidity, and leverage are used as independent variables. They find that firm features have no discernible impact on listed consumer profitability.

Akben-Selcuk (2016) investigates the impact of company age on the financial success of Turkish firms that are publicly traded on Borsa Istanbul. A panel data model with fixed effects and resilient standard errors was constructed using a dataset comprising an annual average of 302 non-financial firms from 2005 to 2014. The relationship between the age of a corporation and its profitability, as measured by return on equity and return on assets, is discovered to be negative and characterized by a convex curve. This suggests that newly established enterprises may initially face a decrease in profitability but could subsequently enjoy a rebound in profitability as they mature.

Haykir & Çelik (2018) presents an empirical study of the effect of age on the performance of family businesses in Turkey, a developing country. They employ ordinary least squares estimation and examine 38 listed, non-financial family-owned businesses over the period of 2008–2016. The measure of company performance used is profitability which is calculated as earnings before interest and taxes to total assets. The research outcomes indicate that there is a positive but non-linear association between the profitability of family-owned businesses and their age. This implies that younger firms make more sales until they attain a given age after which older firms perform better than young firms.

Coad et al. (2016) examine the relationship between innovation and business growth in different generations of businesses. They applied Panel quantile regressions to the data set collected from the Spanish Community Innovation Survey for the period 2004–2012. The results suggest that the effects of R&D investments on performance are more pronounced for new firms in the upper tails of the growth rate distribution than in the lower tails. Therefore, R&D investment by young companies seems to be much riskier than that of established companies, which may have implications for policy. This means that while older organization's innovation efforts are more certain and easier to anticipate, those of the younger organizations are uncertain and have unpredictable outcomes. From a policy perspective, it can be noted that new firms are confronted with different innovation problems and engage in more risky R&D despite the fact that the

outcomes of such investments are becoming less uncertain. Furthermore, job creation is likely to be associated with innovation by newer firms.

Majumdar (1997) analyzes the correlation between the size and age of enterprises and their productivity and profitability by using recent data from a substantial sample of 1,020 Indian firms. Studies conducted in India indicate that older enterprises demonstrate high levels of productivity but lack profitability, whereas larger firms exhibit profitability but lower levels of productivity. The variations in performance can be ascribed to the market-restricting industrial policies that have been implemented during the past three decades. The study seeks to determine the correlation between the size and age of an organization and its levels of productivity and profitability. The findings indicate that larger firms tend to be more profitable but less productive, and older firms tend to be more productive but less profitable. The Indian case demonstrates that understanding the relationship between business size, age, and performance requires considering the institutional context in which enterprises operate.

2.4 Firm Size and Firm Performance

(K. Azhar & Ahmad, 2019) examines the correlation between the size of companies and their profitability within the textile industry in Pakistan. The analysis utilizes data from the leading 10 textile companies listed on the Pakistan Stock Exchange over the period of 2012 to 2016. It assesses profitability by examining the net profit ratio and return on assets, while company size is evaluated based on total sales and total assets. An empirical investigation, utilizing correlation and regression methodologies, demonstrates that there is no conclusive association between the size of textile enterprises and their profitability. The analysis reveals a significant inverse correlation between corporate profitability and total assets, which contradicts previous findings in different industries.

Across the past century, extensive research has delved into the intricate link between firm size and performance, yielding varied outcomes. While some studies uncovered a positive association Whittington, (1980) introduced the “stuck in the middle theory,” suggesting that small and large firms outperform medium-sized ones due to their efficiency in capturing niche markets, leaving medium-sized firms at a disadvantage. Amato & Amato, (2004) affirmed this notion, identifying a nonlinear relationship between firm size and profitability and advocating for further exploration

of economies of scale. Moreover, Lee's extensive study involving over 7,000 US public firms highlighted a nonlinear positive relationship between size and performance. Additionally, industry-specific research by Becker-Blease et al (2010) demonstrated varying associations, with performance increasing at a decreasing rate across most industries, synthesized contrasting perspectives, noting the advantages of large firms in achieving economies of scale through mass production and access to top-tier talent, while also acknowledging potential drawbacks such as bureaucratic management structures.

Luo et al., (2024) examines the effects of performance and size on the environmental information disclosure (EID) of A-share listed companies in Shanghai and Shenzhen between 2008 and 2017. Size is determined based on the total assets while performance is measured based on the return on net assets. The Environmental Information Disclosure Index (EIDI) is used to measure the EID quality. To control for unobserved heterogeneity, the study uses non-balanced panel data models and controls for year and industry effects. The research findings indicate that size and performance positively affect EID quality. Enhancing managerial practices and defining specific environmental performance targets may enhance the firm's performance and the quality of its EID. Further studies should examine how specific attributes, including ownership type, ownership concentration, and executives' experience, affect the quality of EID.

(Kiruga et al., 2024) Analyze the correlation between the size of enterprises and their financial success within the context of the Nairobi Stock Exchange in Kenya. This study employed a correlation research approach and focused on firms that maintained a stable listing status from 2016 to 2020. Firms that were delisted, suspended, or newly listed after 2016 were excluded from the study. As a result, 55 firms were chosen, resulting in a total of 275 data points. The study sample was chosen using purposive sampling technique to guarantee that the samples fulfilled the study criteria. The data collected was of a secondary nature and was acquired from annual audited financial statements using data collecting sheets. Calculations were performed to determine the mean, maximum, minimum, and standard deviations. The data was then analyzed using correlation and regression analysis within the panel data framework. The results indicated a growth in company size between 2016 and 2020. The study demonstrated a favorable correlation between business size and financial success when using Return on Assets (ROA) as a variable. Nevertheless, the use of Return on Equity (ROE) yielded a good outcome, but lacking in

significance. The study's findings indicate that the size of a corporation is a determining factor in its financial performance as measured by return on assets (ROA), but not return on equity (ROE). It is recommended that companies listed on the NSE should take into account their size, since larger enterprises have the ability to leverage their market dominance and economies of scale to enhance performance and achieve higher returns on assets.

The objective of this study is to analyze the relationship between Return on Assets (ROA) and business value, with the dividend payout ratio acting as the mediator and institutional investors as the moderator. The data was collected from secondary sources, specifically five pharmaceutical companies, over a period of ten years, resulting in a total of 192 data points. The analyses were conducted using Hayes's PROCESS macros. The findings suggest that (i) there is a positive relationship between ROA and both firm value and the dividend payout ratio, (ii) the dividend payout ratio is negatively correlated with firm value, and (iii) firm size moderates the relationship between ROA, the dividend payout ratio, and institutional holdings. The size of the firm specifically impacts the correlation between return on assets (ROA) and institutional investors, as well as the correlation between the dividend payment ratio and firm value. This novel moderated-mediation model represents a valuable addition to the existing body of finance literature and offers valuable insights for future scholars in the field of finance.(Chakkravarthy et al., 2024)

2.5 Literature gap

The preceding discourse demonstrates that this investigation varies in multiple aspects. There is a significant lack of research on the correlation between the age of a company, its investment activities, its performance, and its size. A recent study conducted by (R. Ali et al., 2022) on firm's performance and investment considering few nonfinancial firms listed at the Pakistan Stock Exchange. The finding of the study reveals the theoretical implications of upper echelons theory in an emerging economy context. Onother side study shows positive relation of firm's performance with fixed asset investment (FAI) and negative with return on assest (ROA), return on equity (ROE) and firm age (control varible). These results are on aggregate level (all sector) of few nonfinancial firm's selected using purposive sampling technique.

Our study, however, will specifically concentrate on all the sectors that are listed on Pakistan Stock Exchange (PSX). The literature has not provided a comprehensive description of the correlation between the age of a firm and its investment patterns except one (R. Ali et al., 2022). Furthermore,

our study explored firm's at individual sectoral-level for validation and sectoral comparisons. This information would be valuable for policy makers to determine the specific areas in which they should allocate their investments. There remains a lack of comprehension of the specific field of interest for investors and the pattern of investment over time. The primary objective of our research will be to specifically target and resolve these particular aspects.

2.6 Literature Summary

We are examining the influence of firm age on investment, firm performance, and firm size within the context of Pakistan. The extant literature on this specific relationship is sparse, as the variable of firm age has not been extensively explored in prior research. Nonetheless, we have identified literature that elucidates various other factors contributing to the fluctuation in investment levels and performance metrics of firms in Pakistan. In our study, we will check the impact of firm age on investment, firm performance and firm size we will incorporate this existing literature to provide a comprehensive backdrop for our analysis, while specifically elucidating the unique impact of firm age on these dimensions.

Table 2. 1: Literature Review Summary

Study	Impact	Country	Sectors	Reasons
(Hatem, 2016)	Positive	Moldova, Romania, Russia, and Serbia	170 firms from each country	sectors does not lead managers to invest more.
Grazzi et al., (2015)	Positive	France and Italy	Manufacturing firms	Due to fast-growing, profitable, and productive firms between investment and firm performance
(Suteja et al., 2023)	Negative	Indonesia	215 non financial firms	Increasing firm value
(Akbar et al., 2020)	Negative	Pakistan	Non financial firms	Firms use idle to boost their investment activities
(A. B. Azhar et al., 2019)	Negative	Pakistan	Non financial firms	Managerial ownership, CEO duality
(Fan & Wang, 2021)	Positive	China	Manufacturing firms	Unique size and role in the global economy
(Papadogonas, 2006)	Positive	Greece	3035 firms	Financial performances
(Ghafoorifard et al., 2014)	Positive	Tehran	96 companies	Investment decisions
(Mallinguh et al., 2020)	Positive	Kenya	146 MEs	Foreign ownership levels.
(Nafees et al., 2023)	Positive	Pakistan	Manufacturing sector	Increase in size also increases its profitability.
Do (2013b)	Positive	Turkey	302 non-financial enterprises	Younger firms typically experience a decline in profitability initially, but they may become profitable again as they mature.
Nawaiseh (2020)	Insignificant	Jordan	22 insurance companies	Renewing assets and appointing new employers.
(Dioha et al., 2018)	No significant effect	Nigeria	Consumer goods companies	Nigeria should conduct careful evaluation, they should not only focus on growing sales
(Akben-Selcuk, 2016)	Negative	Turkey	302 non financial firms	Firm behavior
(Haykir & Çelik, 2018)	Negative	Turkey	38 non financial companies	Due to experience
(Coad et al., 2016)	Negative	Spain	Large firms	Over time the returns to R&D become more predictable.
(Majumdar, 1997)	Positive	India	1020 firms	Market-restricting industrial policies

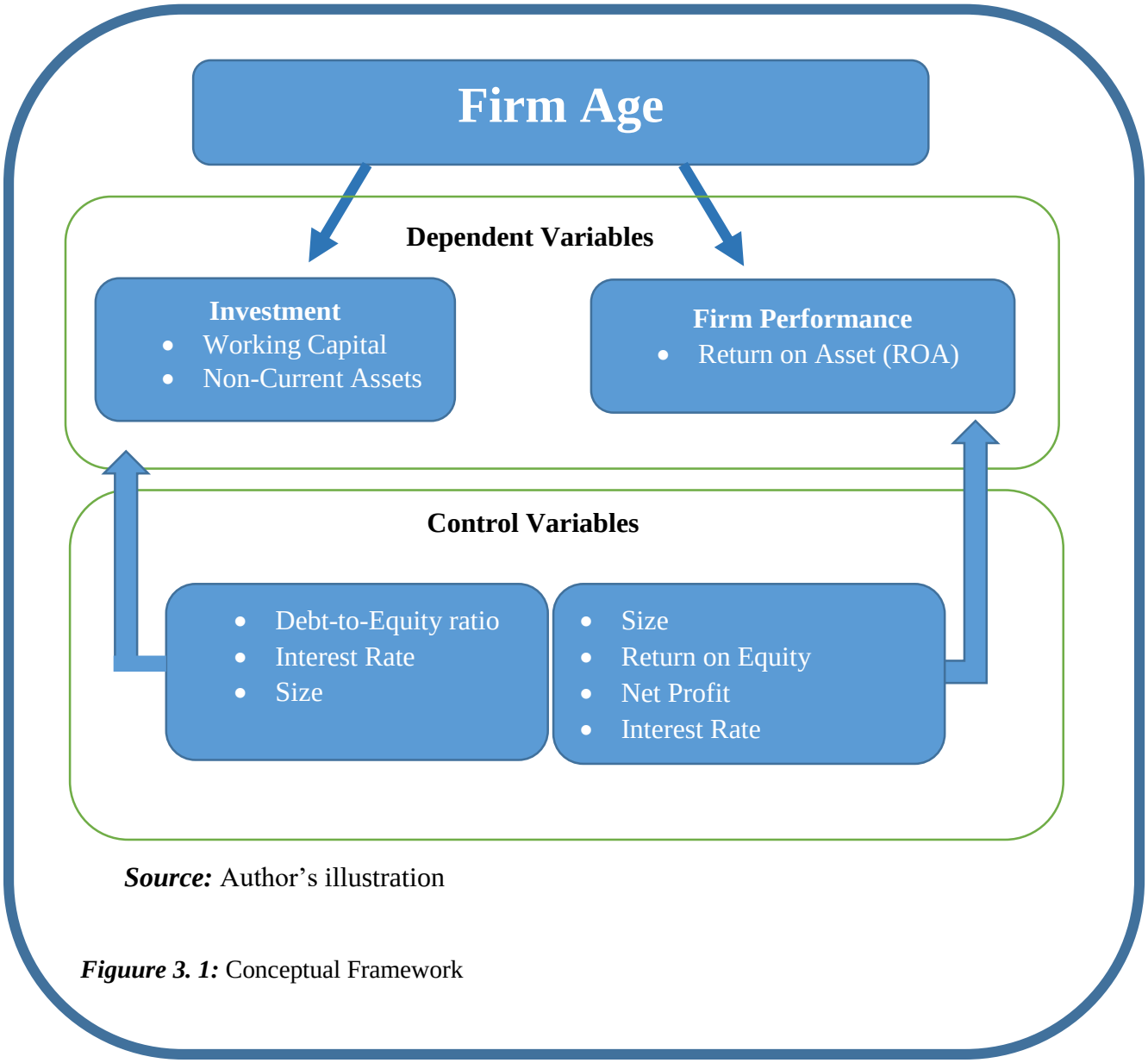
(Raja & Kumar, 2005)	Negative	India	Manufacturing and service sector	They act differently among different sectors
(Whittington, 1980)	Positive	UK	Manufacturing companies	high rate of return will be associated with low measure of size.
(Becker-Blease et al., 2010)	Negative	US	Manufacturing industries	large firms earn more returns than small firms
(Do, 2013b)	Positive	Tehran	96 listed companies	Financial Performance
(Meilita et al., 2024)	Negative	Indonesia	424 non-financial companies	capital structure management.
(Kiruga et al., 2024)	Positive	Kenya	55 firms	As larger firms can leverage market power and economies of scale for better performance

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Conceptual Framework

Diagram 3.1 illustrates the relationship between firm age and its impact on both investment and firm performance, highlighting the interconnected nature of various financial variables. Firm age is the main independent variable influencing two primary dependent variables firm investment, measured through working capital and non-current assets, and firm performance, assessed via return on assets as (Akben-Selcuk, 2016) use it in his analysis. The model further details how firm investment is mediated by factors such as the debt-to-equity ratio, interest rate, and firm size, while firm performance is influenced by size, return on equity, net profit, and interest rate (Muhammad & Shah, 2014) also uses a model with debt to equity, return on equity and sales as a mediating variables. This comprehensive view underscores the multifaceted ways in which firm age can shape investment decisions and overall performance outcomes.



Source: Author's illustration

Figuure 3. 1: Conceptual Framework

3.2 Theoretical Framework

This chapter has briefly discussed the theoretical framework for supporting evidence concerning the different theories If you look at the existing literature there are some theories that provide the basis for this relationship the first theory is organizational inertia theory which says firms experience negative performance often resist change due to deeply embedded routines, structures, and behaviors, making it difficult to adapt to external challenges or reverse declining profitability. Second theory is The theory of optimal firm size which says that performance decreases due to rising inefficiencies. Third theory is A life cycle theory of the firm which posits that businesses evolve through stages of growth, maturity, and eventual decline, each marked by distinct changes in the performance of firm. These are some theories related to the impact of firm age on firm performance which is the main objective of our thesis.

3.2.1 Organizational inertia theory

Witteloostuijn (1998) finds that a firm begins a period of downturn after sometime, characterized by a prolonged decline in profitability. Some potential outcomes can result from this process. Immediate exit, where the firm exits the market as soon as profitability turns negative. Turnaround success, where the firm recovers from losses and returns to profitability. Flight from losses, where the firm eventually leaves the market after a period of losses and Chronic failure, where the firm continues to operate despite ongoing negative profits. These outcomes reflect broader patterns of organizational decline, which can differ in real-world scenarios. Various decline patterns may lead to a flight from losses. The organizational inertia theory says that decline can be understood through four elements causes, conditions, courses, and consequences. The causes can be internal or external, the conditions indicate failure risks, and the courses refer to strategies that firms adopt to manage decline, focusing on either the size or direction of their operations.

3.2.2 A lifecycle theory of the firm

According to (Coad et al., 2018) profitability declines right from the start, as though firms' drive and determination to succeed diminish rapidly. Initially, this appears to contradict the concept of a firm life cycle. Firms in the early stages seem to improve over time, but eventually, their profitability declines. (Andersen & Rozsypal, 2021) provided evidence supporting the firm life cycle, demonstrating that firm size and activity decline after reaching maturity. The decrease in

firm entry can indirectly reflect the weakening of incumbent firms. According to the theory, firms experience an S-shaped growth trajectory, with slow growth in the initial phase, rapid growth during maturity, and an eventual slowdown as they lose their competitive edge.

3.2.3 The theory of optimal firm size

In response to the limitations of the managerial limit theory, the optimal firm size hypotheses suggest that firm size is heavily influenced by several factors, including the market structure in which the firm operates whether it is in a perfectly competitive market or an imperfectly competitive one, such as a monopoly, oligopoly, or monopolistic competition. A key conclusion of the optimal firm size theory is that smaller companies tend to grow more quickly than larger ones until they reach the minimum efficient scale (MES) of production. In cases where firms possess market power (i.e., they operate in imperfectly competitive markets), their optimal size may diverge from this cost-efficient point, and such deviations can be more pronounced if economies of scope are present. In these scenarios, a firm's growth potential is closely tied to its ability to innovate. Thus, the primary constraint on a firm's growth is often driven by the demand for its unique product, rather than by cost-related factors. (Olawale et al., 2017)

3.3 Research Strategy

This study employs the mixed-methodology approach, integrating both quantitative and qualitative methods. By incorporating both approaches, a comprehensive understanding is sought to achieve the study's objectives. While the primary reliance is on secondary data, interviews with relevant experts from the Ministry of Finance and the Board of Investment are conducted and it will also be conducted after estimations. These interviews will serve to discuss the study's procedure and findings, providing a means to assess the research's reliability. Hence, the study adopts a mixed-method approach.

3.4 Research design

The objective of this study is to evaluate the correlation between the firm's age, investment choices and performance. The study explicitly intends to ascertain the impact of various levels of independent variables, such as company age, on the levels of dependent variables, including businesses' investments and performance. This study aims to investigate the influence of firm age on the relationship between a firm's investment and performance in case of Pakistan.

3.5 Sample selection

The data on all non-financial firms listed on the PSX from 2010 to 2022 was collected. The sample was refined by excluding:

1- Firms listed for fewer than 10 years.
2- Firms with missing data for any variable.
3- All financial firms.

The reason for excluding firms that were listed less than 13 years ago is that these firms would have not presented a long-term picture of their behaviour and would have resulted in unbalanced panel data. Similarly, those firms that had missing observations for some of the variables were excluded because if there had been a systematic omission of variables, it would have created estimation problems. Finally, the dynamics of financial firms in terms of investment, performance, and size are entirely different from non-financial firms, so, for this reason, financial firms were excluded from the analysis.

The Pakistan Stock Exchange (PSX) comprises approximately 453 non-financial listed firms. Following the resolution of all data availability concerns, this study will curate a sample from the PSX firms. The sample will be drawn from 12 primary sectors as defined by the PSX. The reason for choosing the time from 2010 to 2022, spanning 13 years, is to get a long-term view of the firms in all the sectors represented on the PSX in terms of investment, performance, and size mediated by firm age. This timeframe requires reviewing each yearly report of 320 entities over 12 years, resulting in a total of 3,840 reports. Moreover, it is crucial to note that analyzing a comprehensive series of accounting data, covering a decade-long timeframe, may potentially alleviate concerns about the reliability of accounting data.

The following table lists the number of firms in different sectors that are present on Pakistan's stock exchange. As the table shows, a total of 298 firms constituted the final sample after excluding firms according to the criteria listed above.

Table 3. 1: Names And Number Of Firms included

Sr. No.	Sectors	No. of firms
1.	Textile sector	111
2.	Sugar sector	26
3.	Food sector	13
4.	Manufacturing sector	28
5.	Mineral sector	8
6.	Cement sector	15
7.	Petroleum sector & Fuel and Energy sector	24
8.	Electrical machinery & apparatus sector	6
9.	Chemical products and pharma sector	33
10.	Paperboard and products sector	6
11.	Motor vehicles, trailers and auto parts sector	17
12.	Information, communication and transport services sector	11
	Total firms	**298**

Table 3. 2: Names And Number Of Firms excluded

Sr. No.	Sectors	No. of firms
1.	Textile sector	41
2.	Sugar sector	5
3.	Food sector	5
4.	Manufacturing sector	3
5.	Mineral sector	0
6.	Cement sector	5
7.	Petroleum sector & Fuel and Energy sector	4
8.	Electrical machinery & apparatus sector	2
9.	Chemical products and pharma sector	10
10.	Paperboard and products sector	3
11.	Motor vehicles, trailers and auto parts sector	5
12.	Information, communication and transport services sector	2
	Total firms	**85**

The selection of the timeframe from 2010 to 2022 is motivated by the fact that the Financial Crisis of 2007-08 affected the behavior and performance of firms around the world. Therefore, period

before 2010 was excluded from the analysis. Another rationale for this timeframe is the predominant availability of data starting from 2011. Given that many firms release their annual reports in June, the research extends data collection until 2022. Information for all variables is gathered from the Pakistan Stock Exchange (PSX) website and the financial statements of the respective firms.

3.6 Econometric Specifications

The following econometric specifications will be used in this study.

Specification 1:

$$Investment_{i,t} = f(Firm\ Age_{i,t}) \qquad (3.1)$$

Where investment is the dependent variable, and the firm age is the independent variable. We will measure the investment by non-current assets and working capital.

$$INV_{i,t} = \alpha + \beta_1 FA_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 D/E_{\ i,t} + \beta_4 INT_{i,t} + \varepsilon_{i,t} \qquad (3.2)$$

Where $INV_{i,t}$ represents the investment which is the dependent variable, $FA_{i,t}$, $SIZE_{i,t}$, $D/E_{\ i,t}$, $and\ INT_{i,t}$represents the Firm's Age, Size, Debt-to-Equity ratio, and interest rate respectively. $\varepsilon_{i,t}$ represents the stochastic error term.

As we mentioned above we are using two proxies for the investment to check the investment behavior of the firm, which are the working capital and non-current assets. So, the investment equation will be:

$$WC_{i,t} = \alpha + \beta_1 FA_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 D/E_{\ i,t} + \beta_4 INT_{i,t} + \varepsilon_{i,t} \qquad (3.3)$$

Where, $WC_{i,t}$ represents the working capital which is the dependent variable, $FA_{i,t}$, $SIZE_{i,t}$, $D/E_{\ i,t}$, $and\ INT_{i,t}$ represents the Firm's Age, Size, Debt-to-Equity ratio, and interest rate respectively. $\varepsilon_{i,t}$ Represents the stochastic error term.

For Non-Current Assets (NCA):

$$NCA_{i,t} = \alpha + \beta_1 FA_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 D/E_{\ i,t} + \beta_4 INT_{i,t} + \varepsilon_{i,t} \qquad (3.4)$$

Where, $WC_{i,t}$ and $NCA_{i,t}$ represents the working capital and Non-current assets respectively, which are the dependent variables. $\varepsilon_{i,t}$ represents the stochastic error term.

Specification 2:

$$ROA_{i,t} = f(FA_{i,t}) \qquad (3.5)$$

Where, $ROA_{i,t}$ is the dependent variable, which represents the Return on Asset. $FA_{i,t}$ is the firm age and it is an independent variable.

$$ROA_{i,t} = \alpha + \beta_1 FA_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 NP_{i,t} + \beta_4 ROE_{i,t} + \beta_5 INT_{i,t} + \varepsilon_{i,t} \qquad (4.6)$$

Where, $ROA_{i,t}$ is the return on asset as a dependent variable. $FA_{i,t}$ is the firm age as an independent variable. $SIZE_{i,t},\ NP_{i,t},\ and\ ROE_{i,t}$represents the size of the firm, net profit and return on equity respectively, as control variables. $\varepsilon_{i,t}$ represents the stochastic error term.

3.7 Variable Description

The detail of all the dependent, independent, and control variables, which will be used in the study is given below:

3.7.1 Dependent Variables

The dependent variables in our study are the investment and firm performance.

Investment (INV): Investment refers to the allocation of capital towards acquiring assets, such as machinery, equipment, or expanding facilities, with the anticipation of generating future returns and enhancing the firm's overall performance and value. The study uses the three proxies of the investment behavior of the firm, which are, given below:

I. **Working Capital (WC):** Working capital represents the financial metric that measures a company's operational liquidity by subtracting its current liabilities from its current assets. It reflects the funds available for day-to-day business activities and is crucial for maintaining smooth operational efficiency. Following (Bintara, 2020; Fazzari & Petersen, 1993) we use the working capital as a proxy of investment.

$$Working\ Capital\ (WC) = Current\ Assets - Current\ Liabilities \qquad (3.7)$$

II. **Non-Current Assets (NCA):** Non-current assets are long-term resources held by a company for ongoing use in its operations, encompassing items like property, equipment, and intangible assets. These assets contribute to the company's operational continuity and are not intended for immediate sale. Following (Egwu, 2023; Enekwe et al., 2023; Ullah & Ahmad, 2019) we use the non-current assets as a proxy of the investment.

Firm Performance (FP): Return on Assets (ROA) is a financial metric that evaluates a company's profitability in relation to its total assets. This ratio is calculated by dividing the company's net income by its average total assets. This offers valuable insights into the company's capacity to effectively leverage its resources for profit generation. Following (Islam & Iqbal, 2022; Mohd & Siddiqui, 2020) in the case of Pakistan we use the ROA as a proxy of the firm performance.

$$ROA = \frac{Net\ Income}{Average\ Total\ Assets} \qquad (3.8)$$

3.7.2 Independent Variable

The independent variable of our study is firm Age.

Firm Age (FA): Firm age refers to the duration or length of time that a company has been in existence or operational since its establishment. It is a measure of how long a business entity has been conducting its activities, providing insights into its level of experience, stability, and resilience in the marketplace. Firm age is often used as a variable in research and analysis to understand its potential impact on various aspects of a company's performance, behavior, and strategies. We take the Firm Age as the total years of its establishment. Following the (Ilaboya & Ohiokha, 2016) we use the firm age as an independent variable.

3.7.3 Control Variables

This research will include a series of control variables, drawing upon previous studies, outlined as follows:

- **Debt-Equity Ratio**

The debt-to-equity ratio is determined by dividing the total debt by the shareholders' equity, providing valuable information about the balance between debt and equity financing. According to (Muhammad & Shah, 2014) a higher ratio may indicate greater financial risk. Therefore, we will include the debt-to-equity ratio as a control variable. This ratio is an important indicator of a firm's

financial leverage and stability, which in turn affects its investment decisions. This ratio also indicates the balance between debt financing and shareholders' equity, which can impact the firm's capacity to obtain additional capital for investments.

- **Size (Sales)**

Sales of a firm, also known as revenue, represent the total amount of money generated from its business activities. Using sales as a proxy for firm size is based on the assumption that larger firms typically generate higher revenues due to their larger scale of operations. Therefore, the magnitude of a firm's sales is often considered indicative of its size within the market, making it a convenient measure for assessing the scale and economic impact of the business. Following (Shalit & Sankar, 1977), we will use sales as a proxy of firm size, because according to Shalit & Sankar (1977), the size of a firm is measured by total dollar annual sales. We use sales in investment and firm performance because in investment sales reflects the revenue-generating capability of a firm, which directly impacts its ability to invest in working capital and non-current assets. And in pfirm performance sales serve as a key indicator of a company's market success and financial health.

- **Return on Equity**

Return on equity (ROE) is a financial metric calculated by dividing net income by shareholders' equity, indicating the profitability generated with shareholder investment. In the context of studying firm performance, ROE serves as a control variable to assess how efficiently a firm utilizes its equity to generate profits. Including ROE in the analysis allows researchers to account for the impact of shareholder returns on overall firm performance, providing insights into the firm's financial effectiveness and sustainable growth.(Muhammad & Shah, 2014) says that return on Equity (ROE) serves as an accounting metric indicating value generation, gauging the profitability derived from equity invested in the enterprise. We use it because it provides a clear measure of a company's profitability relative to shareholders' equity. ROE indicates how effectively a firm is using the invested capital from its shareholders to generate earnings growth.

- **Net Profit**

The net profit of a company is the remaining amount after subtracting all expenses from total revenue, indicating the overall profitability. Considering net profit as a control variable in a study on firm performance enables researchers to factor in fluctuations in financial outcomes that could

impact the dependent variable. By taking into account net profit in conjunction with other factors, one can gain a more comprehensive analysis of the firm's overall performance. This allows for a more nuanced understanding of its financial health and stability. Based on the research conducted by (Masyhuri, 2024), the net profit will be utilized as a control variable for the firm performance. This is because it serves as a crucial indicator of a company's profitability and overall financial well-being.

Macroeconomic Variables

Various macroeconomic factors possess distinct theoretical frameworks and significance. Therefore, the process of choosing the appropriate macroeconomic parameters is crucial (Humpe & Macmillan, 2009). To determine the most appropriate macroeconomic elements for the research design, an analysis was conducted on the prior empirical findings and the relevant literature. interest rates is commonly employed as macroeconomic factor. This variable exert a direct or indirect influence on firms' investment decisions, eventually affecting their performance**.**

- **Interest Rate**

An interest rate is a numerical representation, expressed as a percentage, of the amount of money borrowed or invested. It serves as a kind of remuneration for lenders or investors in exchange for providing funds. This rate signifies the expense associated with borrowing funds or the gain derived from investing capital. We use it as a variable of firm performance because Interest rates significantly impact a firm's performance by affecting its cost of borrowing. When interest rates are high, the cost of obtaining loans increases, leading to higher interest expenses and we can aslo use it as a variable of investment because high-interest rates increase the cost of capital, making it more expensive for firms to finance investments in working capital and non-current assets. This can lead to reduced investment activities as firms may find fewer projects meeting the required rate of return

3.8 Unit of Data Collection

Data collection for this study will involve multiple sources. Macro-level data will be sourced from the State Bank. Information regarding firm characteristics will be extracted from annual financial reports of firms and non-financial firm analyses conducted by the State Bank. Detailed formulas for variable calculations are provided in Table 3.3.

Table 3. 3: Unit of Data Collection

Variables	Measurement/Description	Source	Year
Dependent Variables			
ROA	$Net\ Income/Average\ total\ assets$	Annual reports of firms & PSX	2010-2022
Working Capital	Subtracting the current liabilities from current assets	Annual reports of firms & PSX	2010-2022
Non-Current Assets	These are long-term resources held by a company for ongoing use in its operations, encompassing items like property, equipment, and intangible assets.	Annual reports of firms & PSX	2010-2022
Independent Variables			
Firm Age	Total years of Establishment	Annual reports of firms & PSX	2010-2022
Control Variables			
Net Profit	Total revenue – total expense	Annual reports of firms & PSX	2010-2022
Firm Size	Total sales of a firm	Annual reports of firms & PSX	2010-2022
Debt-to-Equity ratio	$\frac{Total\ debt}{Total\ shareholders\ equity}$	Annual reports of firms & PSX	2010-2022
Return on Equity	$Net\ income / shareholders\ equity$	Annual reports of firms & PSX	2010-2022
Interest Rate	Return on a principal amount in a certain period.	SBP	2010-2022

3.9 Econometric Techniques

The methodology proposed for the analysis is employing the econometric techniques of panel data (fixed effect and random effect models) to uncover how firm age impacts the investment decisions, and the firm performance. We use the fixed and random effect models because fixed and random effects models are utilized in panel analysis to address issues related to unobserved heterogeneity and to examine the effects of time-invariant and time-varying factors on the outcome variable. The empirical findings will provide insights into how firms will change their investment decisions with age, corporate governance (where they are financing), performance metrics despite potential challenges in adapting to rapidly changing market dynamics, and lastly their implications for policy recommendations.

3.9.1 Fixed Effect Model

The fixed effects model is a statistical technique commonly used in econometrics. It is commonly referred to as the individual-specific effects model or the inside estimator. This study utilizes the Fixed-effects panel model to eliminate the potential influence of closely associated errors. It is ensured that during the analysis, the effects specific to each participant are both fixed and constant. Dummy variables specific to each individual are incorporated into the regression equation to address variations among individuals. The incorporation of dummy variables allows for the inclusion of time-invariant features that are specific to each individual, thereby reducing the impact of individual-specific effects. The fixed effects model is a method used to calculate the average effect and also enables the estimation of variance among different groups.

$$Y_{i,t} = \alpha + \beta X_{i,t} + \gamma D_i + \mu_{i,t} \qquad (3.9)$$

Where, D_i is the individual-specific dummy variable for individual i.

3.9.2 Random Effect Model

This statistical method, commonly referred to as the random effects model, is widely used in a variety of research settings. It is believed that the individual effects are random and unrelated to the independent factors. This study's methodology considers the effects that vary for each individual as random variables and utilizes the method of moments to estimate them. Using the random effects model allows for the estimation of the overall variance among individuals, akin to estimating the average impact across individuals.

$$Y_{i,t} = \alpha + \beta X_{i,t} + C_i + \mu_{i,t} \qquad (3.10)$$

Where, C_i is the individual-specific random effect. It is assumed that the random effect C_i is not associated with the independent variable $X_{i,t}$.

3.9.3 Diagnostic tests

Our study involves conducting a range of tests to ensure the strength and reliability of our linear regression model. First, we assess the VIF for multicollinearity to determine if there is any correlation among the independent variables in our equation. The results suggest that our model is free from any problems related to multicollinearity. Next, we conduct the modified Wald test to examine for heteroscedasticity in our model. Based on the test results, it is evident that our model exhibits heteroscedasticity. In order to address this issue, we employ robust standard errors in our

estimation process. In order to determine the nature of our model, we conduct tests to assess for serial autocorrelation. The results indicate that our model is static, as it does not exhibit serial autocorrelation. Ultimately, we analyze both fixed and random effects models and subsequently perform the Hausman test to ascertain the most suitable model. The results of the Hausman test suggest that the fixed effects model is a better fit for our analysis.

We assume that there is no endogeneity in our model because the relationship between firm age and investment (and similarly, firm age and performance) is assumed to be exogenous, meaning that firm age affects investment/performance directly and is not influenced by omitted variables or reciprocal causality within the model. We assume that firm age is predetermined and unaffected by firm-specific factors that might also influence investment or performance. This simplifies the model and focuses purely on observing correlation patterns, without addressing potential bidirectional influences or unobserved confounders.

3.9.4 Limitations of fixed and random effect models

The fixed effects model controls for time-invariant characteristics, making it useful for examining variables that change over time within entities, but it cannot estimate the impact of time-invariant variables and may suffer from omitted variable bias if important time-variant factors are left out. In contrast, the random effects model can estimate time-invariant effects and is more efficient with data that exhibit little heterogeneity, but it assumes no correlation between individual-specific effects and independent variables, which, if violated, can lead to biased results. The choice between these models often hinges on the specific data structure and the validity of underlying assumptions, as determined by tests like the Hausman test.

3.9.5 Qualitative analysis

In our qualitative analysis, we conduct detailed interviews with experts from the Board of Investment and the Ministry of Finance. Data is collected through a questionnaire. Various questions are asked to the experts to determine whether the variables in our model are appropriate and to assess the significant impact of firm age on investment and firm performance. After collecting the qualitative data and discussing it with the experts, we run our models and perform our estimations. Our qualitative analysis helps strengthen our results.

CHAPTER 4

RESULTS AND DISCUSSION
SECTION-I

4.1 Overall Panel Results

This section presents the results of the overall panel estimation, which are provided below.

4.1.1 Descriptive Statistics

It is important to check the descriptive statistics of the data because they summarize and describe the main features of a dataset in a clear and concise manner.

The below table 4.1 presents descriptive statistics for the dataset. The table provides the mean, median, maximum, minimum values, and standard deviation as well as the total number of observations of these variables.

Table 4. 1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital (PKR)	1,471,279	74,870	639,000,000	-283,000,000	26,154,974	3,874
Non-Current Assets (PKR)	11,808,136	2,033,425	509,000,000	10	34,733,307	3,874
Return On Asset (%)	4.04	3.18	337.92	-164.31	17.51	3,874
Firm Age	40.47	35	162	3	20.01	3,874
Return On Equity (%)	10.44	9.65	2,134.99	-1,411.77	100.71	3,874
Sales (PKR)	21,787,057	4,061,800	2,450,000,000	0	81,832,560	3,874
Debt Equity Ratio (%)	1.65	1.32	135.89	-98.24	8.14	3,874
Net Profit (PKR)	1,899,834	116,915	233,000,000	-67,571,397	10,423,040	3,874
Real Interest Rate (%)	2.52	3.28	7.76	-4.45	3.22	3,874

Note: The values of Working Capital, Non-Current Assets, Sales, and Net Profit are in "000". While Return on Assets, Return on Equity, Debt to Equity Ratio, and Real Interest Rate are in "%". Firm Age values represent the total number of years since the firm was established.

The table 4.1 presents the descriptive statistics for several key firm variables in the dataset. The Working capital has a mean value of 1,471,279 with a maximum value of 639,000,000 and a minimum value of -283,000,000, and a standard deviation of 26,154,974 which means data is more

spread out from the mean. The Non-current asset has a mean of 11,808,136 indicates that, on average, every firms have long-term investments in assets such as property, plant, and equipment. The Non-current asset varies widely, ranging from 10 to 509,000,000, with a standard deviation of 34,733,307.

The average firm age is 40.47, indicating that most firms have been in existence for over four decades. The median age of 35 further supports this, as it represents the middle value of the data. On the other hand, the relatively young median age implies the presence of numerous youthful companies, with half of them being 35 years old or younger. The average Return on Assets is 4.04%, suggesting that the firms in the sample generally generate a 4.04% return on their assets. Nevertheless, the ROA exhibits significant fluctuation, ranging from a high of 337.91 to a low of -119.77, with a standard deviation of 14.34. The Return on Equity has an average of 10.44%, suggesting that the firms in the sample typically generate a return of 10.44% on their equity. Nevertheless, the ROE exhibits significant fluctuations, ranging from a high of 2134.99 to a low of -1411.77, with a standard deviation of 100.71.

The variable Sales, which indicates the size of the firms, has an average of 21,787,057. The values range from a minimum of 0 to a maximum of 2,450,000,000, with a standard deviation of 81,832,560. The mean of the debt-equity ratio is 1.65. The values span a wide range, from -98.24 to 135.89, and exhibit a standard deviation of 8.14. The net profit data shows a mean of 1,899,834, with a maximum value of 233,000,000 and a minimum value of 10,423,040. The standard deviation is also 10,423,040.

4.1.2 Correlation

Here is a correlation table 4.2 that gives an overview of the relationships between different financial variables. The correlation between FA and NCA is 0.20, indicating a positive and statistically significant relationship at a 10% level of significance. As companies mature, their non-current assets typically experience growth. Additionally, it is worth noting that there is a statistically significant positive correlation of 0.01 between WC and firm age. This suggests that as firms mature, they have a tendency to increase their working capital and effectively manage it. The correlation between firm age and ROA is 0.04, indicating a positive and statistically significant relationship at a 10% level of significance. As companies mature, their performance typically improves. There is a significant positive correlation of 0.39 between sales and net profit.

There is a weak positive correlation between working capital and non-current assets with the debt equity ratio, which is 0.01.

Table 4. 2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.17*	1							
ROA	0.10*	0.02*	1						
FA	0.01*	0.20*	0.04*	1					
ROE	0.01	0.03*	0.17*	-0.01*	1				
SALES	0.21*	0.45*	0.05*	0.11*	0.05*	1			
D/E	0.01	0.01*	0.00	0.01*	-0.11*	0.04*	1		
NP	0.82*	0.47*	0.17*	0.05*	0.05*	0.39*	0.02*	1	
RIR	-0.04*	-0.05*	-0.04*	-0.07*	-0.02*	-0.05*	0.02*	-0.05*	1

Note: ***, **and * indicate statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, Positive numbers imply a positive relationship, whereas negative values suggest a negative relationship. The table includes the following variables: WC (working capital), NCA (non-current assets), ROA (return on assets), FA (firm size), ROE (return on equity), D/E (debt to equity ratio), NP (net profit), and RIR (real interest rate).

Hausman Test

The Hausman test is a statistical procedure that helps in choosing the most suitable model from a range of options. There are two models that are commonly used for panel data analysis: the random effect model and the fixed effect model. Before estimating the initial model in this study, the Hausman test is used to choose between two models based on the statistical significance of the computed coefficients. Addressing endogeneity and selecting the appropriate model definition is crucial for the analysis. The results of the Hausman test can be found in table 4.3 below.

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Table 4. 3: Hausman Test

Chi^2	179.75
$Prob < Chi^2$	0.000

Note: P< 0.05 indicates 1% level of significance , P< 0.01 indicates 5% level of significance, and P< 0.1 indicates 1% level of significance.

The Hausman test yielded a chi-square statistic with a probability of 0.000, indicating statistical significance at a 5% level. So, we reject the null hypothesis of random effect model, and use the fixed panel model.

4.1.3 Impact of Firm Age on Working Capital

The table 4.4 below displays the results of a regression analysis that investigates the relationship between firm age and working capital. Working capital refers to the short-term investment of a firm. The working capital experiences a significant increase of around 10.31% for every additional year of firm age. This is supported by a coefficient of 0.103, with a standard error of 0.012, indicating statistical significance at the 5% level. It can be observed that as firms mature, their working capital tends to increase, as indicated by the positive coefficient. This implies that more experienced companies are likely to have well-established operations and may effectively handle their short-term assets and liabilities, resulting in higher levels of working capital. The sales coefficient is 0.394, with a standard error of 0.0884. It is statistically significant at the 1% level. The presence of a positive coefficient indicates a correlation between higher sales and an increase in working capital. In terms of the numbers, a 1% increase in sales results in a 0.394% increase in working capital. This suggests that as companies generate more sales, they are able to sustain or enhance their working capital, which in turn supports their operational and investment requirements.

The debt-to-equity ratio is highly significant at a level of 1% ($p<0.01$), displaying a coefficient of -0.362 and a standard error of 0.065. It is worth noting that there is a correlation between a 1% increase in the debt-to-equity ratio and a decrease in working capital of around 0.362%. It can be inferred that a lower working capital is linked to a higher debt-to-equity ratio, as indicated by the negative sign. This relationship suggests that companies with higher levels of debt may experience reduced flexibility and liquidity. Consequently, they may need to allocate a larger portion of their resources towards servicing their debt, leading to a decrease in working capital. The coefficient for the real interest rate is 0.103, and it has a standard error of 0.0365. This result is statistically significant at the 10% level ($p<0.01$). It is evident that with each incremental rise in the real interest rate, there is a corresponding increase of 0.103% in working capital. This indicates that there is a direct relationship between an increase in working capital and higher real interest rates. Despite its seemingly counterintuitive nature, this could suggest that companies are aiming to acquire additional liquid assets as a safeguard against rising borrowing costs. The model demonstrates

strong statistical significance, with an impressive F-statistic of 41.70 and a p-value of 0.00. It effectively explains around 50.8% of the variance in working capital, as indicated by the R-squared value of 0.508. (Akbar et al., 2020) explores a negative relationship between investment and working capital.

Table 4. 4: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.103***
	(0.0124)
Debt-to-Equity Ratio	-0.362***
	(0.0652)
Sales	0.394***
	(0.0884)
Real Interest Rate	0.103***
	(0.0365)
Constant	2.978**
	(1.260)
Observations	3,874
Number of Firm Code	298
F-Statistics	41.70
Prob. (F-Stat)	0.00
R-Squared	0.508

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

Hausman Test

The Hausman test produced a chi-square statistic with a probability of 0.000, which suggests strong statistical significance at a 5% level. Therefore, we conclude that the random effect model is not applicable and opt for the fixed panel model.

Table 4. 5: Hausman Test

Chi^2	387.80
$Prob < Chi^2$	0.000

Note: P< 0.05 indicates 1% level of significance , P< 0.01 indicates 5% level of significance, and P< 0.1 indicates 1% level of significance.

4.1.5 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.6 reveals a positive relationship between firm age and non-current assets, indicated by a coefficient of 0.0738, significant at the 1% level ($p<0.01$). This means that for each additional year of a firm's age, non-current assets increase by 7.38%. This relationship suggests that older firms tend to invest more in long-term assets, potentially due to accumulated experience, enhanced stability, and better resource management.

This finding is consistent with the literature that suggests mature firms have more established networks, better access to financing, and enhanced risk management capabilities, which allows them to allocate more resources to long-term investments in the context of Pakistan. Many studies conducted in emergent markets, such as Pakistan, have demonstrated that older firms are able to make more significant investments in non-current assets due to their established reputations, economies of scale, and stronger relationships with financial institutions. For instance, Ahmed and Malik (2015) conducted a study on Pakistani firms that discovered that the age of the firm has a positive impact on its investment in long-term assets. This finding lends credence to the notion that experienced firms are more adept at making substantial capital expenditures. Therefore, the positive correlation between firm age and non-current assets emphasizes the significance of firm maturity in the development of long-term investment strategies. This suggests that policies that prioritize firm longevity could increase overall economic growth by encouraging substantial capital investments.

Table 4. 6: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0738***
	(0.00725)
Debt-to-Equity Ratio	0.0171
	(0.0298)
Sales	0.314***
	(0.0878)
Real Interest Rate	-0.0252
	(0.0245)
Constant	6.922***
	(1.151)
Observations	3,874
Number of Firm Code	298
F-Statistics	91.23
Prob (F-Stat)	0.00
R-Squared	0.477

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

The debt-to-equity ratio is also statistically insignificant, with a coefficient of 0.017, suggests that there is no meaningful association between the firm's leverage and its long-term investments. This could mean that firms do not rely heavily on debt to finance their non-current assets, or that other factors are more influential in determining their long-term investment strategies. The coefficient for sales is 0.314 with a standard error of 0.0878, statistically significant at the 0.01% level. This positive coefficient suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 0.314% increase in working capital. This indicates that as firms generate more sales, they can maintain or increase their working capital, supporting their operational and investment needs.

The real interest rate has a negative coefficient of -0.0252, which is statistically insignificant . This means that real interest is not impacting the long-term investment of the firms as (Girardi, 2021) says that firms with sufficient internal funds or access to liquidity might not be responsive to changes in real interest rates. The model is statistically significant (F-statistics = 91.23, Prob (F-Stat) = 0.00) and explains 47.7% of the variance in non-current assets (R-squared = 0.477). (Egwu, 2023; Enekwe et al., 2023; Ullah & Ahmad, 2019) in his study use non-current assets as a variable

of investment and check the impact of it on firm performance. The study says that there is a positive relationship between non-current assets and firm performance.

Hausman Test

The Hausman test produced a chi-square statistic with a probability of 0.000, which suggests strong statistical significance at a 5% level. Therefore, we conclude that the random effect model is not applicable and opt for the fixed panel model.

Table 4. 7: Hausman Test

Chi^2	45.27
$\text{Prob} < \text{Chi}^2$	0.000

Note: P< 0.05 indicates 1% level of significance , P< 0.01 indicates 5% level of significance, and P< 0.1 indicates 1% level of significance.

4.1.5 Impact of Firm Age on Firm Performance

The relationship between firm age and Return on Assets (ROA) in Table 4.8 demonstrates a significant negative coefficient of -0.0358, suggesting that the ROA of firms decreases by approximately 3.58% as they age. This implies that the profitability of established firms in Pakistan decreases over time as studied by (Do, 2013c). Several factors, such as potential complacency, bureaucratic inefficiencies, and increased operational rigidity, can contribute to this adverse relationship, which may impact senior firms.

This discovery is consistent with the extant literature in Pakistan, which indicates that older firms may encounter difficulty in adapting to the rapidly evolving market dynamics and technological advancements. The efficiency and profitability of elder firms may be diminished as a result of the established routines and processes that may impede innovation and flexibility. For example, mature organizations may encounter difficulties in adapting to changing consumer preferences or incorporating new technologies at the same pace as their younger counterparts (Afraz et al., 2014). Additionally, the competition from newer, more agile firms that are better suited to capitalize on emerging market opportunities may increase for older firms in Pakistan. These challenges for older enterprises may be further exacerbated by the economic environment in Pakistan, which is defined by changing market conditions and regulatory changes. Consequently, in order to mitigate the potential adverse effects of aging on their profitability, it is imperative that senior organizations

prioritize strategic renewal, innovation, and continuous improvement in order to preserve or improve their performance.

Table 4. 8: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0358***
	(0.0100)
Sales	-0.136***
	(0.0423)
Net Profit	0.388***
	(0.0624)
Return on Equity	0.653***
	(0.0613)
Real Interest Rate	0.0359**
	(0.0144)
Constant	-1.418***
	(0.429)
Observations	3,874
Number of Firm Code	298
F-Statistics	1143.33
Prob (F-Stat)	0.00
R-squared	0.892

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

The sales coefficient is -0.136, which is statistically significant at the 1% level. This means that a 1% increase in sales leads to a 13.6% decline in return on assets (ROA). This suggests the presence of potential inefficiencies or decreasing returns as sales volumes increase. The coefficient for net profit is 0.388, which is statistically significant at the 1% level. This means that a 1% increase in net profit leads to a 0.338% rise in return on assets (ROA). This emphasizes the significance of profitability in determining the performance of a company. The coefficient of 0.653 indicates a strong positive association between return on equity and ROA. This link is significant at the 1% level, meaning that a 1% rise in return on equity leads to a 0.653% increase in ROA. The coefficient of the real interest rate is 0.036, which is statistically significant at the 5% level. This indicates that a minor increase in real interest rates leads to a 0.036% increase in the return on assets (ROA).

The inverse correlation between the age of a firm and its return on assets (ROA) could be attributed to the difficulties experienced by older enterprises, such heightened operational inflexibility,

contentment with the status quo, or the use of obsolete business strategies that impede profitability. In the fast developing market dynamics and competitive landscape of Pakistan, older enterprises may face challenges in adapting and innovating, resulting in diminished returns. This study aligns with existing research that indicates a possible decrease in the ability of established companies to quickly adapt and operate efficiently. This highlights the need for ongoing efforts to enhance and update operations in order to remain competitive.

The table emphasizes the significance of a firm age in influencing its performance, while simultaneously underlining the critical roles played by sales, profitability, equity returns, and interest rates. The findings indicate that in order to increase return on assets (ROA), companies should priorities the enhancement of profit margins and equity returns. Additionally, they should also be proactive in adjusting their strategies to accommodate evolving market dynamics, hence minimizing the adverse effects of an aging population.

SECTORAL ESTIMATION

4.2 Textile Sector Estimation

The below section presents the results of the overall panel estimation of a Textile Sector, which are provided below.

4.2.1 Descriptive Statistics

The table A1 in the appendix provides the descriptive statistics of the Textile sector for various important variables in the dataset. The working capital has an average of 263,758.5, with a highest value of 17,144,871 and a lowest value of -1,235,940. The standard deviation is 2,304,539. The non-current asset with a mean of 4,227,543 suggests that the companies have substantial long-term investments in assets like property, plant, and equipment. This significant investment in non-current assets indicates a robust asset base to support long-term growth and stability. The non-current asset exhibits a significant range, spanning from a minimum of 10 to a maximum of 88,532,128, with a standard deviation of 34,733,307. The average Return on Assets is 1.59. Nevertheless, the ROA exhibits a mean value of 1.59. This indicates that, on average, firms in the textile sector have a return on assets of 1.59%. The maximum value reaches an impressive 319.53, while the minimum value plunges to -164.31. The standard deviation stands at 18.07. The average age of the firm is 38.35, with a maximum age of 104 and a minimum age of 6.

4.2.2 Correlation

The correlation table A2 in the appendix provides a comprehensive overview of the relationships between different financial variables in the Textile sector. The correlation between FA and NCA is 0.20, indicating a positive and statistically significant relationship at a 10% level of significance. As companies mature, their non-current assets typically experience an upward trend. Additionally, it is worth noting that there is a statistically significant positive correlation of 0.09 between WC and firm age. This suggests that as firms mature, they tend to experience an increase in their working capital, indicating their ability to effectively manage their financial resources. The correlation between firm age and ROA is 0.02, indicating a positive and statistically significant relationship at a 10% level of significance. As companies mature, their performance typically improves.

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4.2.3 Impact of Firm Age on Working Capital

The table 4.11 below presents the results of a regression analysis examining the impact of firm age on working capital in Textile sector, which represents the short-term investment of a firm. The working capital increases by approximately 12.5% for each additional year of firm age, as indicated by the coefficient of 0.125 with a standard error of 0.028. The positive coefficient implies that the working capital of firms tends to increase as they age. This suggests that elder firms are more likely to have more established operations and may manage their short-term assets and liabilities more efficiently.

The coefficient for sales is 0.289 with a standard error of 0.227. This positive coefficient suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 28.9% increase in working capital. This indicates that as firms generate more sales, they can maintain or increase their working capital, supporting their operational and investment needs.

The debt-to-equity ratio is highly significant, with a coefficient of -0.232 and a standard error of 0.111. It is worth noting that there is a strong correlation between a 1% increase in the debt-to-equity ratio and a significant decrease in working capital, amounting to approximately 23.2%. It can be inferred from the negative sign that a lower working capital is linked to a higher debt-to-equity ratio. This relationship suggests that companies with higher levels of debt may experience reduced flexibility and liquidity. Consequently, they may need to allocate a larger portion of their resources towards servicing their debt, leading to a decrease in working capital. The coefficient for the real interest rate is 0.0610, and it has a standard error of 0.0775. This correlation suggests that there is a connection between an increase in working capital and higher real interest rates.

Table 4. 9: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.125***
	(0.0280)
Debt-to-Equity Ratio	-0.232**
	(0.111)
Sales	0.289
	(0.227)
Real Interest Rate	0.0610
	(0.0775)
Constant	3.634
	(3.049)
Observations	1,443
Number of Firm Code	111
F-Statistics	14.66
Prob. (F-Stat)	0.00
R-Squared	0.236

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.2.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.12 reveals a positive relationship between firm age and non-current assets in Textile sector indicated by a coefficient of 0.0816. This means that for each additional year of a firm's age, non-current assets increase by 8.16%. This relationship suggests that older firms tend to invest more in long-term assets, potentially due to accumulated experience, enhanced stability, and better resource management.

The debt-to-equity ratio has a coefficient of 0.0152. It is evident that having a higher leverage allows for more financial resources, enabling long-term investments. This is demonstrated by the fact that a 1% increase in the debt-to-equity ratio leads to a 1.52% increase in non-current assets. The sales coefficient is 0.217, with a standard error of 0.0565. The presence of a positive coefficient indicates a correlation between higher sales and an increase in working capital. More precisely, a 1% uptick in sales results in a 2.17% boost in working capital. The real interest rate has a coefficient of 0.0338, indicating a positive relationship. These findings indicate that a slight rise in the real interest rate corresponds to a significant increase in non-current assets. This implies that higher borrowing costs may have a slight dampening effect on long-term investments.

These results underscore the significance of leverage, sales, and firm age in the development of long-term investment strategies, while also taking into account the impact of interest rates on these strategies.

Table 4. 10: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0816***
	(0.00674)
Debt-to-Equity Ratio	0.0152
	(0.0282)
Sales	0.217***
	(0.0565)
Real Interest Rate	0.0338**
	(0.0164)
Constant	8.177***
	(0.885)
Observations	1,443
Number of Firm Code	111
F-Statistics	42.66
Prob (F-Stat)	0.00
R-Squared	0.480

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.2.5 Impact of Firm Age on Firm Performance

Table 4.13 presents a significant negative coefficient of -0.0548 between firm age and Return on Assets (ROA) in the Textile sector, indicating that ROA decreases by approximately 5.48% as firm's age. This negative relationship can be attributed to several factors, such as potential complacency, bureaucratic inefficiencies, and increased operational rigidity, which may affect older firms. The sales coefficient of -0.0887 implies that a 1% increase in sales leads to an 8.87% decline in ROA, indicating potential inefficiencies or decreasing returns as sales volumes rise. Conversely, the net profit coefficient of 0.459 suggests that a 1% increase in net profit results in a 45.9% rise in ROA, highlighting the importance of profitability in determining a company's performance. Additionally, a coefficient of 0.589 indicates a strong positive association between return on equity and ROA, where a 1% increase in return on equity leads to a 58.9% increase in ROA. The real interest rate coefficient of 0.0892 shows that a slight increase in real interest rates results in an 8.92% increase in ROA.

Table 4. 11: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0548***
	(0.0187)
Sales	-0.0887*
	(0.0515)
Net Profit	0.459***
	(0.110)
Return on Equity	0.589***
	(0.0980)
Real Interest Rate	0.0892***
	(0.0255)
Constant	-2.250***
	(0.549)
Observations	1,443
Number of Firm Code	111
F-Statistics	319.46
Prob (F-Stat)	0.00
R-squared	0.915

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.3 Sugar Sector

This section presents the results of the overall panel estimation of a Sugar Sector, which are provided below.

4.3.1 Descriptive Statistics

The table B1 in the appendix provides the descriptive statistics of the Sugar sector for various key variables in the dataset of the sugar sector. The working capital has an average of -541,876.The data exhibits significant variation, ranging from a maximum value of 4,108,907 to a minimum value of -9,594,166, with a standard deviation of 1,704,281. The non-current asset has an average value of 4142719, suggesting that the companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, with a minimum value of 301,039 and a maximum value of 28,565,376. The standard deviation is calculated to be 4,916,837. The average Return on Assets is 1.75. Nevertheless, the ROA exhibits significant fluctuations, ranging from a high of 40.05 to a low of -30.54, with a standard deviation

of 9.14. The firm's age has an average of 40.30, with a highest value of 78 and a lowest value of 18.

4.3.2 Correlation

The correlation table B2 provides an overview of the relationships between various financial metrics of Sugar sector for a dataset with 338 observations. The correlation between FA and NCA is -0.16. This relationship is weak and negative. The impact of FA on ROA is very weak and positive which is 0.03. There is also a weak and positive correlation of 0.25 between WC and firm age we can see a strong and positive correlation of 0.74 between sales and net profit.

4.3.3 Impact of Firm Age on Working Capital

Table 4.16 below presents the results of a regression analysis examining the impact of firm age on working capital in the sugar sector, representing the short-term investment of a firm. The analysis shows that working capital increases by approximately 8.98% for each additional year of firm age, as indicated by a coefficient of 0.0898 with a standard error of 0.0405. This positive coefficient implies that older firms tend to have more working capital, suggesting that they have more established operations and may manage their short-term assets and liabilities more efficiently.

The coefficient for sales is -0.267, with a standard error of 0.621. This negative coefficient suggests that lower sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 26.7% decrease in working capital. This indicates that firms generating more sales may see a decrease in working capital. The debt-to-equity ratio has a coefficient of -0.619 with a standard error of 0.301. This suggests that there is a strong negative correlation between the debt-to-equity ratio and working capital. Specifically, a 1% increase in the debt-to-equity ratio is associated with a significant decrease in working capital of approximately 61.9%. The presence of a negative sign implies a correlation between higher leverage and a decrease in working capital. This indicates that companies with higher levels of debt have limited flexibility and liquidity, as a significant portion of their resources are dedicated to servicing their debts. The coefficient for the real interest rate is 0.187, with a standard error of 0.218. This suggests a positive correlation between working capital and real interest rates. It appears that there is a correlation between higher real interest rates and an uptick in working capital.

Table 4. 12: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0898**
	(0.0405)
Debt-to-Equity Ratio	-0.619*
	(0.301)
Sales	-0.267
	(0.621)
Real Interest Rate	0.187
	(0.218)
Constant	12.48
	(8.495)
Observations	338
Number of Firm Code	13
F-Statistics	3.10
Prob. (F-Stat)	0.044
R-Squared	0.127

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.3.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.17 reveals a positive relationship between firm age and non-current assets in the Sugar sector, indicated by a coefficient of 0.106. This means that with each additional year of a firm's age, non-current assets increase by 10.6%. This relationship suggests that older firms tend to invest more in long-term assets, potentially due to accumulated experience, enhanced stability, and better resource management.

Additionally, the debt-to-equity ratio has a coefficient of 0.00146, indicating that higher leverage provides additional financial resources, supporting long-term investments. Specifically, a 1% increase in the debt-to-equity ratio results in a 0.146% increase in non-current assets. Conversely, the coefficient for sales is -0.00806 with a standard error of 0.0440, suggesting that lower sales are associated with increased working capital. A 1% increase in sales leads to a 0.806% decrease in working capital. The real interest rate has a positive coefficient of 0.0164, indicating that a 1% increase in the real interest rate leads to a 1.64% increase in non-current assets, suggesting that higher borrowing costs can marginally boost long-term investments.

Table 4. 13: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.106***
	(0.0125)
Debt-to-Equity Ratio	0.00146
	(0.0533)
Sales	-0.00806
	(0.0440)
Real Interest Rate	0.0164
	(0.0327)
Constant	10.62***
	(0.826)
Observations	338
Number of Firm Code	13
F-Statistics	42.66
Prob (F-Stat)	0.00
R-Squared	0.667

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.3.5 Impact of Firm Age on Firm Performance

The relationship of Sugar sector between firm age and Return on Assets (ROA) in Table 4.18 demonstrates a significant positive coefficient of 0.000454, suggesting that the ROA of firms increases by approximately 0.0454% as they age. Several factors, financial stability, human capital development and accumulated experience and expertise can contribute to this adverse relationship. The sales coefficient is -0.219 It is important to note that even a small increase in sales can have a significant impact on the return on assets (ROA). There may be potential inefficiencies or diminishing returns as sales volumes increase. The net profit coefficient is 0.157. This indicates that a 1% growth in net profit results in a significant 15.7% increase in return on assets (ROA). The importance of profitability in assessing a company's performance cannot be overstated. The coefficient of 0.901 suggests a significant positive correlation between return on equity and ROA, implying that a 1% increase in return on equity results in a substantial 90.1% boost in ROA. The coefficient of the real interest rate is -0.00229, suggesting that even a slight increase in real interest rates can result in a decrease of 0.229% in the return on assets (ROA).

The table highlights the importance of a company's age in impacting its performance. It also showcases the crucial roles played by sales, profitability, equity returns, and interest rates. The

findings suggest that companies can improve their return on assets (ROA) by focusing on increasing profit margins and equity returns. In addition, it is important for individuals to be proactive in adapting their strategies to keep up with changing market dynamics. This will help minimize the negative impact of an aging population.

Table 4. 14: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	0.000454
	(0.0122)
Sales	-0.219*
	(0.113)
Net Profit	0.157***
	(0.0503)
Return on Equity	0.901***
	(0.0566)
Real Interest Rate	-0.00229
	(0.0258)
Constant	0.657
	(1.549)
Observations	338
Number of Firm Code	13
F-Statistics	700.21
Prob (F-Stat)	0.00
R-squared	0.947

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.4 Paperboard and Products Sector Estimation

This section presents the results of the overall panel estimation of a Paper Sector, which are provided below.

4.4.1 Descriptive Statistics

The table C1 in the appendix provides the descriptive statistics of the Paper sector for various important variables in the dataset. The working capital exhibits a mean of 1,751,175 and demonstrates significant variation, with a maximum value of 11,939,923 and a minimum value of -692,319. Additionally, it has a standard deviation of 2,215,132. The non-current asset has an average value of 12811832, suggesting that companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, ranging from a minimum of 224,906 to a maximum of 90,562,241, with a standard deviation of

22,691,049. The average Return on Assets is 6.07. Nevertheless, the ROA exhibits significant fluctuations, ranging from a high of 21.29 to a low of -14.83, with a standard deviation of 6.65. The firm's age has an average of 44.66, with a highest value of 71 and a lowest value of 18.

4.4.2 Correlation

The correlation table C2 in appendix provides an overview of the relationships between various financial variables of Paper sector for a dataset with 78 observations. The correlation between FA and NCA is 0.03. This relationship is weak and positive. The impact of FA on ROA is even weaker 0.30. There is also a weak and negative correlation of 0.14 between WC and firm age. The correlation between firm age and ROA is also very week and positive which is 0.30 we can see a strong and positive correlation of 0.76 between sales and net profit.

4.4.3 Impact of Firm Age on Working Capital

The table 4.21 below presents the results of a regression analysis examining the impact of firm age on working capital in Paperboard and Products Sector, the working capital of a firm which represents its short-term investments, increases by approximately 8.11% with each additional year of firm age. This is evidenced by a coefficient of 0.0811 with a standard error of 0.0393. The positive coefficient suggests that as firms age, their working capital tends to grow, indicating that older firms often have more established operations and manage their short-term assets and liabilities more efficiently.

The coefficient for sales is 0.232 with a standard error of 0.745, indicating that higher sales are associated with increased working capital. Specifically, a 1% increase in sales corresponds to a 23.2% increase in working capital. This suggests that as firms generate more sales, they can maintain or enhance their working capital, supporting their operational and investment needs. For the debt-to-equity ratio, the coefficient is -0.348 with a standard error of 0.156. This implies that a 1% increase in the debt-to-equity ratio is linked to a 34.8% decrease in working capital. The negative coefficient indicates that firms with higher leverage may have less flexibility and liquidity, leading to a decrease in working capital as they allocate more resources to servicing debt. The coefficient for the real interest rate is 0.0473 with a standard error of 0.222. This positive correlation suggests that higher real interest rates are associated with increased working capital.

Table 4. 15: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0811*
	(0.0393)
Debt-to-Equity Ratio	-0.348*
	(0.156)
Sales	0.232
	(0.745)
Real Interest Rate	0.0473
	(0.222)
Constant	6.339
	(10.52)
Observations	78
Number of Firm Code	6
F-Statistics	4.47
Prob. (F-Stat)	0.0660
R-Squared	0.321

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.4.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.22 reveals a positive relationship between firm age and non-current assets in Paperboard and Products Sector indicated by a coefficient of 0.102. This means that for each additional year of a firm's age, non-current assets increase by 10.2%. It suggests that older firms mostly invest in long-term assets, due to accumulated experience, enhanced stability, and better resource management.

The debt-to-equity ratio has a coefficient of 0.128. It is evident that having a higher leverage allows for more financial resources, enabling long-term investments. This is demonstrated by the fact that a mere 1% increase in the debt-to-equity ratio leads to a significant 12.8% increase in non-current assets. The sales coefficient is 0.176, and its standard error is 0.463. The presence of a positive coefficient indicates a correlation between higher sales and an increase in working capital. In particular, a 1% uptick in sales results in a significant 17.6% boost in working capital. The real interest rate is characterized by a negative coefficient of 0.00760. These findings indicate that a slight rise in the real interest rate results in a modest increase of 0.760% in non-current assets. This implies that higher borrowing costs may have a slight dampening effect on long-term investments.

These results tell the significance of leverage, sales, and firm age in the development of long-term investment strategies, while also taking into account the impact of interest rates on these strategies.

Table 4. 16: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.102
	(0.0670)
Debt-to-Equity Ratio	0.128
	(0.0783)
Sales	0.176
	(0.463)
Real Interest Rate	0.00760
	(0.0664)
Constant	7.856
	(5.100)
Observations	78
Number of Firm Code	6
F-Statistics	7.80
Prob (F-Stat)	0.0224
R-Squared	0.584

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.4.5 Impact of Firm Age on Firm Performance

Table 4.23 reveals a significant negative coefficient of -0.0155 between firm age and Return on Assets (ROA) in the Paperboard and Products sector, indicating that ROA decreases by approximately 1.55% as firm's age. This negative relationship can be attributed to factors such as potential complacency, bureaucratic inefficiencies, and increased operational rigidity, which may affect older firms. The sales coefficient of -0.0342 implies that a 1% increase in sales leads to a 3.42% decline in ROA, indicating potential inefficiencies or decreasing returns as sales volumes rise. Conversely, the net profit coefficient of 0.171 suggests that a 1% increase in net profit results in a 17.1% rise in ROA, highlighting the importance of profitability in determining a company's performance. Additionally, a coefficient of 0.917 indicates a strong positive association between return on equity and ROA, where a 1% increase in return on equity leads to a 91.7% increase in ROA. The real interest rate coefficient of 0.0166 shows that a slight increase in real interest rates results in a 1.66% increase in ROA.

Table 4. 17: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0155
	(0.00786)
Sales	-0.0342
	(0.0794)
Net Profit	0.171*
	(0.0730)
Return on Equity	0.917***
	(0.0623)
Real Interest Rate	0.0166
	(0.0247)
Constant	-1.381
	(1.126)
Observations	78
Number of Firm Code	6
F-Statistics	28980.04
Prob (F-Stat)	0.000
R-squared	0.985

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.5 Information, Communication and Transport Services Sector

This section presents the results of the overall panel estimation of Information, communication and transport services sector, which are provided below.

4.5.1 Descriptive Statistics

The table D1 in the appendix provides the descriptive statistics of the Information, Communication, and Transport Services sector for various key variables in the dataset. The working capital exhibits significant variation, ranging from a minimum value of -283000000 to a maximum value of 26710684. The mean value is -18384644, with a standard deviation of 60785123. The non-current asset has an average value of 42878466, suggesting that the firms have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, with a minimum value of 226127 and a maximum value of 3.03E+08. The standard deviation is 77457666, indicating a wide range of values. The average Return on Assets is 2.47. Nevertheless, the ROA exhibits significant fluctuations, ranging from a

high of 70.25 to a low of -61.8, with a standard deviation of 22.63. The firm's age has an average of 29.63, with the highest value being 76 and the lowest value being 5.

4.5.2 Correlation

The correlation table D2 in appendix provides an overview of the relationships between various financial variables of Information, communication and transport services sector for a dataset with 143 observations. The correlation between FA and NCA is 0.90. This relationship is strong and positive. The impact of FA on ROA is even weaker -0.19. There is also a strong negative correlation of -0.60 between WC and firm age. The correlation between firm age and ROA is also very week and negative which is -0.19 we can see a week negative correlation of -0.41 between sales and net profit.

4.5.3 Impact of Firm Age on Working Capital

The table 4.26 below presents the results of a regression analysis examining the impact of firm age on working capital in Information, Communication and Transport Services Sector, which represents the short-term investment of a firm. The working capital increases by approximately 4.52% for each additional year of firm age, as indicated by the coefficient of 0.0452 with a standard error of 0.0282. The positive coefficient implies that the working capital of firms tends to increase as they age. This suggests that elder firms are more likely to have more established operations and may manage their short-term assets and liabilities more efficiently. The coefficient for sales is 0.589 with a standard error of 0.209. This positive coefficient suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 58.9% increase in working capital. This indicates that as firms generate more sales, they can maintain or increase their working capital, supporting their operational and investment needs.

The debt-to-equity ratio has a coefficient of -0.347 and a standard error of 0.203. This implies that a 1% increase in the debt-to-equity ratio is correlated with a decrease in working capital of approximately 34.7%. The negative sign suggests that a reduced working capital is associated with a higher debt-to-equity ratio. This relationship implies that firms with greater leverage may have less flexibility and liquidity, which can result in a decrease in working capital as they allocate more resources to debt servicing. The real interest rate coefficient is -0.109 with a standard error of 0.139. This negative correlation implies that increased working capital is linked to lower real interest rates.

Table 4. 18: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0452
	(0.0282)
Debt-to-Equity Ratio	-0.347
	(0.203)
Sales	0.589**
	(0.209)
Real Interest Rate	-0.109
	(0.139)
Constant	4.093
	(2.999)
Observations	143
Number of Firm Code	11
F-Statistics	4.12
Prob. (F-Stat)	0.0420
R-Squared	0.301

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.5.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.27 reveals a negative relationship between firm age and non-current assets in Information, Communication and Transport Services Sector indicated by a coefficient of -0.0407. This means that for each additional year of a firm's age, non-current assets decrease by 4.07%. This relationship suggests that older firms tend to invest less in long-term assets due to various reasons.

The debt-to-equity ratio is calculated to be 0.220. It is evident that having a higher leverage allows for more financial resources, enabling long-term investments. This is demonstrated by the fact that a mere 1% increase in the debt-to-equity ratio leads to a significant 22% increase in non-current assets. The sales coefficient is 0.413, with a standard error of 0.204. Higher sales are positively correlated with increased working capital. In particular, a 1% uptick in sales results in a significant boost of 41.3% in working capital. The real interest rate has a coefficient of 0.000571. These findings indicate that a slight rise in the real interest rate can result in a small uptick in non-current assets. This implies that higher borrowing expenses may have a slight dampening effect on long-term investments.

These results highlight the importance of considering leverage, sales, and firm age when developing long-term investment strategies. Additionally, it is crucial to take into account the influence of interest rates on these strategies.

Table 4. 19: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	-0.0407
	(0.0277)
Debt-to-Equity Ratio	0.220
	(0.170)
Sales	0.413*
	(0.204)
Real Interest Rate	0.000571
	(0.0594)
Constant	10.14**
	(3.317)
Observations	143
Number of Firm Code	11
F-Statistics	1.93
Prob (F-Stat)	0.1887
R-Squared	0.216

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.5.5 Impact of Firm Age on Firm Performance

Table 4.28 reveals a significant negative coefficient of -0.00927 between firm age and Return on Assets (ROA) in the Information, Communication, and Transport Services sector, indicating that ROA decreases by approximately 0.927% as firm's age. This adverse relationship can be attributed to factors such as potential complacency, bureaucratic inefficiencies, and increased operational rigidity, which may impact older firms. The sales coefficient of -0.0982 implies that a 1% increase in sales leads to a 9.82% decline in ROA, indicating potential inefficiencies or decreasing returns as sales volumes rise. Conversely, the net profit coefficient of 0.244 suggests that a 1% increase in net profit results in a 24.4% rise in ROA, highlighting the importance of profitability in determining a company's performance. Additionally, a coefficient of 0.852 indicates a strong positive association between return on equity and ROA, where a 1% increase in return on equity leads to an 85.2% increase in ROA. The real interest rate coefficient of 0.0316 shows that a slight increase in real interest rates results in a 3.16% increase in ROA.

Table 4. 20: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.00927
	(0.0241)
Sales	-0.0982*
	(0.0487)
Net Profit	0.244
	(0.171)
Return on Equity	0.852***
	(0.109)
Real Interest Rate	0.0316
	(0.0323)
Constant	-1.802
	(1.374)
Observations	143
Number of Firm Code	11
F-Statistics	16402.6
Prob (F-Stat)	0.000
R-squared	0.987

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.6 Food Sector Estimation

This section presents the results of the overall panel estimation of a Food Sector, which are provided below.

4.6.1 Descriptive Statistics

The table D1 in the appendix provides the descriptive statistics of the Food sector for various key variables in the dataset. The working capital exhibits significant variation, with a highest value of 10437119 and a lowest value of -22103466. Its mean is 107313, and it has a standard deviation of 3935377. The non-current asset has an average value of 5279416, suggesting that the companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, ranging from a minimum of 10 to a maximum of 34,363,432, with a standard deviation of 8,787,143. The average Return on Assets is 10.28. Nevertheless, the ROA exhibits significant variation, ranging from a high of 67.59 to a low of -95.04, with a standard deviation of 19.67. The firm's age has a mean of 53, with a maximum value of 162 and a minimum value of 20.

4.6.2 Correlation

The correlation table E2 in appendix provides an overview of the relationships between various financial variables of Food sector for a dataset with 169 observations. The correlation between FA and NCA is -0.11. This relationship is weak and negative. The impact of FA on ROA is even weaker 0.13. There is also a weak and negative correlation of 0.32 between WC and firm age. The correlation between firm age and ROA is also very week and positive which is 0.13 we can see a strong and positive correlation of 0.93 between sales and net profit.

4.6.3 Impact of Firm Age on Working Capital

The table 4.31 below presents the results of a regression analysis examining the impact of firm age on working capital in Food Sector, which represents the short-term investments of a firm are represented by its working capital. The data indicates that working capital increases by approximately 8.95% for each additional year of firm age, as shown by a coefficient of 0.0895 with a standard error of 0.0381. This positive coefficient suggests that as firms age, their working capital tends to grow, likely due to more established operations and more efficient management of short-term assets and liabilities. Sales also positively impact working capital, with a coefficient of 0.0937 and a standard error of 0.0748. This indicates that a 1% increase in sales leads to a 9.37% increase in working capital. As firms generate higher sales, they can maintain or boost their working capital, which supports their operational and investment needs.

The debt-to-equity ratio has a coefficient of 0.0838 and a standard error of 0.120. This suggests that a 1% increase in the debt-to-equity ratio is associated with an approximate 8.38% increase in working capital. The positive sign implies that higher leverage corresponds with reduced working capital, as firms with greater debt may allocate more resources to servicing this debt, thus increasing their working capital. The coefficient for the real interest rate is 0.0824 with a standard error of 0.142, indicating a negative correlation. This suggests that higher real interest rates are associated with increased working capital.

Table 4. 21: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0895**
	(0.0381)
Debt-to-Equity Ratio	0.0838
	(0.120)
Sales	0.0937
	(0.0748)
Real Interest Rate	0.0824
	(0.142)
Constant	6.944**
	(2.431)
Observations	169
Number of Firm Code	13
F-Statistics	3.79
Prob. (F-Stat)	0.036
R-Squared	0.158

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.6.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.32 reveals a positive relationship between firm age and non-current assets in Food Sector which has a coefficient of 0.0153. This means that for each additional year of a firm's age, non-current assets increase by 1.53%. This relationship tells that older firms tend to invest more in long-term assets, due to accumulated experience, enhanced stability, and better resource management.

This ratio has a coefficient of -0.233, meaning that a 1% increase in the ratio leads to a 2.33% decrease in non-current assets. The sales coefficient is 1.344, and its standard error is 0.0924. The presence of a positive coefficient indicates a correlation between higher sales and an increase in working capital. More precisely, a 1% uptick in sales results in a significant 13.4% boost in working capital. The real interest rate is characterized by a negative coefficient of -0.0332. These findings indicate that a slight rise in the real interest rate results in a significant reduction in non-current assets. This implies that elevated borrowing expenses can potentially deter long-term investments to some extent.

These results underscore the significance of leverage, sales, and firm age in the development of long-term investment strategies, while also taking into account the impact of interest rates on these strategies.

Table 4. 22: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0153
	(0.0341)
Debt-to-Equity Ratio	-0.233
	(0.136)
Sales	1.344***
	(0.0924)
Real Interest Rate	-0.0332
	(0.174)
Constant	-7.284***
	(1.420)
Observations	169
Number of Firm Code	13
F-Statistics	252.02
Prob (F-Stat)	0.000
R-Squared	0.732

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.6.5 Impact of Firm Age on Firm Performance

Table 4.33 illustrates a significant negative coefficient of -0.0831 between firm age and Return on Assets (ROA) in the Food sector, suggesting that ROA declines by approximately 8.31% as firm's age. Several factors contribute to this adverse relationship, including potential complacency, bureaucratic inefficiencies, and increased operational rigidity, which can impact older firms. The sales coefficient of -0.00882 indicates that a 1% increase in sales leads to a 0.882% decline in ROA, suggesting potential inefficiencies or diminishing returns as sales volumes rise. In contrast, the net profit coefficient of 0.463 highlights that a 1% increase in net profit results in a substantial 46.3% rise in ROA, underscoring profitability's critical role in firm performance. Additionally, a coefficient of 0.523 reveals a strong positive correlation between return on equity and ROA, where a 1% increase in return on equity correlates with a 52.3% increase in ROA. The real interest rate coefficient of 0.0168 indicates that a minor increase in real interest rates leads to a 1.68% increase in ROA.

Table 4. 23: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0831**
	(0.0364)
Sales	-0.00882
	(0.0179)
Net Profit	0.463***
	(0.147)
Return on Equity	0.523***
	(0.135)
Real Interest Rate	0.0168
	(0.0585)
Constant	-0.892
	(0.666)
Observations	169
Number of Firm Code	13
F-Statistics	2626.17
Prob (F-Stat)	0.000
R-squared	0.945

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.7 Cement Sector

This section presents the results of the overall panel estimation of a Cement Sector, which are provided below.

4.7.1 Descriptive Statistics

The table E1 in the appendix provides the descriptive statistics of the Cement sector for various important variables in the dataset. The working capital has an average of 1495465, indicating significant variation. It reaches a highest value of 39132725 and a lowest value of -9811324, with a standard deviation of 6998162. The non-current asset has an average value of 28154287, suggesting that companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, with values ranging from a minimum of 851985 to a maximum of 3.28E+08. The standard deviation is 39977281. The average Return on Assets is 6.54. Nevertheless, the ROA exhibits significant variation, ranging from a high of 37.68 to a low of -18.22, with a standard deviation of 9.79. The average age of the firm is 36.26, with the highest age being 70 and the lowest age being 17.

4.7.2 Correlation

The correlation table F2 in appendix provides an overview of the relationships between various financial variables of Cement sector for a dataset with 195 observations. The correlation between FA and NCA is -0.18. This relationship is week and negative. The impact of FA on ROA is even weaker -0.11. There is also a week negative correlation of -0.15 between WC and firm age. We can see a strong and positive correlation of 0.88 between sales and net profit.

4.7.3 Impact of Firm Age on Working Capital

The table 4.36 below presents the results of a regression analysis examining the impact of firm age on working capital in Cement sector, which represents the short-term investment of a firm. The working capital increases by approximately 5.61% for each additional year of firm age, as indicated by the coefficient of 0.0561 with a standard error of 0.0969. The positive coefficient implies that the working capital of firms tends to increase as they age. This suggests that elder firms are more likely to have more established operations and may manage their short-term assets and liabilities more efficiently.

The coefficient for sales is 2.105 with a standard error of 0.727. This positive coefficient suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 21.05% increase in working capital. This indicates that as firms generate more sales, they can maintain or increase their working capital, supporting their operational and investment needs. The debt-to-equity has a coefficient of -1.120 and a standard error of 0.220. This implies that a 1% increase in the debt-to-equity ratio is correlated with a decrease in working capital. The negative sign suggests that a reduced working capital is associated with a higher debt-to-equity ratio. This relationship implies that firms with greater leverage may have less flexibility and liquidity, which can result in increase in working capital as they allocate more resources to debt servicing. The real interest rate coefficient is 0.128 with a standard error of 0.139. This positive correlation implies that increased working capital is linked to higher real interest rates.

Table 4. 24: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0561
	(0.0969)
Debt-to-Equity Ratio	-1.120***
	(0.220)
Sales	2.105**
	(0.727)
Real Interest Rate	0.128
	(0.139)
Constant	-22.91**
	(9.312)
Observations	195
Number of Firm Code	15
F-Statistics	16.82
Prob. (F-Stat)	0.0001
R-Squared	0.462

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.7.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.37 reveals a positive relationship between firm age and non-current assets in Cement Sector indicated by a coefficient of 0.164. This means that for each additional year of a firm's age, non-current assets increase by 16.4%. This relationship suggests that older firms tend to invest more in long-term assets, potentially due to accumulated experience, enhanced stability, and better resource management.

The debt-to-equity ratio has a coefficient of 0.423. This suggests that higher leverage provides additional financial resources, which in turn supports long-term investments, as a 1% increase in the debt-to-equity ratio results in a 42.3% increase in non-current assets. The coefficient for sales is -0.182 with a standard error of 0.0564. This negative coefficient tells that lower sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 18.2% decrease in working capital. The real interest rate has a negative coefficient of 0.121. This suggests that a 1% increase in the real interest rate leads to a 12.1% increase in non-current assets, suggesting that higher borrowing costs can marginally discourage long-term investments

These results underscore the significance of leverage, sales, and firm age in the development of long-term investment strategies, while also taking into account the impact of interest rates on these strategies.

Table 4. 25: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.164***
	(0.0137)
Debt-to-Equity Ratio	0.423***
	(0.0517)
Sales	-0.182***
	(0.0564)
Real Interest Rate	0.121**
	(0.0430)
Constant	13.52***
	(0.847)
Observations	195
Number of Firm Code	15
F-Statistics	76.62
Prob (F-Stat)	0.000
R-Squared	0.813

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.7.5 Impact of Firm Age on Firm Performance

The relationship of Cement Sector between firm age and Return on Assets (ROA) in Table 4.38 demonstrates a significant positive coefficient of 0.00522, suggesting that the ROA of firms increases by approximately 0.522% as they age. The sales coefficient is -0.317 this means that a 1% increase in sales leads to a 31.7% decline in return on assets (ROA). This suggests the presence of potential inefficiencies or decreasing returns as sales volumes increase. The coefficient for net profit is 0.314 this means that a 1% increase in net profit leads to a 31.4% rise in return on assets (ROA). This emphasizes the significance of profitability in determining the performance of a company. The coefficient of 0.710 indicates a strong positive association between return on equity and ROA that a 1% rise in return on equity leads to a 71% increase in ROA. The coefficient of the real interest rate is 0.128, indicates that a minor increase in real interest rates leads to a 12.8% increase in the return on assets (ROA).

Table 4. 26: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	0.00522
	(0.0216)
Sales	-0.317*
	(0.151)
Net Profit	0.314***
	(0.0889)
Return on Equity	0.710***
	(0.0829)
Real Interest Rate	0.128**
	(0.0452)
Constant	0.451
	(1.884)
Observations	195
Number of Firm Code	15
F-Statistics	329.95
Prob (F-Stat)	0.000
R-squared	0.961

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.8 Motor Vehicles, Trailers and Auto Parts Sector

This section presents the results of the overall panel estimation of Automobiles Sector, which are provided below.

4.8.1 Descriptive Statistics

The table F1 in the appendix provides the descriptive statistics of the Motor Vehicles, Trailers, and Auto Parts Sector for various important variables in the dataset. The working capital exhibits a mean of 3355561, indicating significant variation. It reaches a highest value of 30458149 and a lowest value of -4670746, with a standard deviation of 6027341. The non-current asset has an average value of 3232871, suggesting that the companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits a wide range, spanning from a minimum of 43062 to a maximum of 24926516, accompanied by a standard deviation of 4306974. The average Return on Assets is 9.31. Nevertheless, the ROA exhibits significant variation, ranging from a high of 57.32 to a low of -28.88, with a standard deviation of 12.88. The firm's average age is 37.11, with the highest age being 69 and the lowest age being 12.

4.8.2 Correlation

The correlation table F2 in appendix provides an overview of the relationships between various financial variables of Motor Vehicles, Trailors and Auto Parts sector for a dataset with 221 observations. The correlation between FA and NCA is 0.32. This relationship is weak and positive. The impact of FA on ROA is even weaker -0.16. There is also a weak and negative correlation of 0.30 between WC and firm age. The correlation between firm age and ROA is also very week and negative which is -0.16 we can see a strong and positive correlation of 0.79 between sales and net profit.

4.8.3 Impact of Firm Age on Working Capital

The table 4.41 below presents the results of a regression analysis examining the impact of firm age on working capital in Motor Vehicles, Trailers and Auto Parts Sector, working capital represents the short-term investments of a firm, increases by approximately 7.35% for each additional year of firm age, as indicated by a coefficient of 0.0735 with a standard error of 0.033. This positive coefficient suggests that older firms tend to have higher working capital, likely due to more established operations and more efficient management of short-term assets and liabilities.

The coefficient for sales is 0.695 with a standard error of 0.249, indicating that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 69.5% increase in working capital. This suggests that as firms generate more sales, they can maintain or boost their working capital, supporting their operational and investment needs. The debt-to-equity ratio has a coefficient of -0.504 and a standard error of 0.163, implying that a 1% increase in the debt-to-equity ratio correlates with an approximate 50.4% decrease in working capital. The negative coefficient indicates that higher leverage is associated with reduced working capital, as firms with greater debt have less flexibility and liquidity, often allocating more resources to debt servicing. Additionally, the real interest rate coefficient is 0.256 with a standard error of 0.116, indicating a positive correlation. This suggests that higher real interest rates are associated with increased working capital.

Table 4. 27: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0735**
	(0.0330)
Debt-to-Equity Ratio	-0.504***
	(0.163)
Sales	0.695**
	(0.249)
Real Interest Rate	0.256**
	(0.116)
Constant	-0.0817
	(3.500)
Observations	221
Number of Firm Code	17
F-Statistics	10.81
Prob. (F-Stat)	0.0002
R-Squared	0.464

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.8.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.42 reveals a positive relationship between firm age and non-current assets in the Motor Vehicles, Trailers and Auto Parts Sector, indicated by a coefficient of 0.0801. This means that for each additional year of a firm's age, non-current assets increase by 8.01%. This suggests that older firms tend to invest more in long-term assets, potentially due to accumulated experience, enhanced stability, and better resource management.

Additionally, the debt-to-equity ratio has a coefficient of 0.0367, indicating that higher leverage provides additional financial resources, supporting long-term investments. Specifically, a 1% increase in the debt-to-equity ratio results in a 3.67% increase in non-current assets. The coefficient for sales is 0.197 with a standard error of 0.0972, suggesting that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 19.7% increase in working capital. Conversely, the real interest rate has a negative coefficient of -0.0998, indicating that a 1% increase in the real interest rate leads to a 9.98% decrease in non-current assets, suggesting that higher borrowing costs can marginally discourage long-term investments.

Table 4. 28: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0801***
	(0.0171)
Debt-to-Equity Ratio	0.0367
	(0.0403)
Sales	0.197*
	(0.0972)
Real Interest Rate	-0.0998**
	(0.0395)
Constant	8.114***
	(1.422)
Observations	221
Number of Firm Code	17
F-Statistics	0.80
Prob (F-Stat)	0.0110
R-Squared	0.614

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.8.5 Impact of Firm Age on Firm Performance

Table 4.43 illustrates a significant negative coefficient of -0.0414 between firm age and Return on Assets (ROA) in the Motor Vehicles, Trailers, and Auto Parts sector, suggesting that ROA decreases by approximately 4.14% as firm's age. Several factors contribute to this negative relationship, including potential complacency, bureaucratic inefficiencies, and increased operational rigidity, which can impact older firms. The sales coefficient of -0.407 indicates that a 1% increase in sales leads to a substantial 40.7% decline in ROA, suggesting potential inefficiencies or diminishing returns as sales volumes rise. Conversely, the net profit coefficient of 0.491 highlights that a 1% increase in net profit results in a significant 49.1% rise in ROA, underscoring the critical role of profitability in firm performance. Additionally, a coefficient of 0.604 reveals a strong positive correlation between return on equity and ROA, where a 1% increase in return on equity correlates with a 60.4% increase in ROA. The coefficient of the real interest rate, -0.0427, indicates that a minor decrease in real interest rates leads to a 4.27% decrease in ROA.

The table underscores the influence of firm age on performance while emphasizing the pivotal roles played by sales, profitability, equity returns, and interest rates. To enhance ROA, companies should prioritize improving profit margins and equity returns. Moreover, proactive adjustment of

strategies to accommodate evolving market dynamics is crucial to mitigate the adverse effects associated with an aging firm population.

Table 4. 29: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0414**
	(0.0144)
Sales	-0.407***
	(0.0784)
Net Profit	0.491***
	(0.104)
Return on Equity	0.604***
	(0.102)
Real Interest Rate	-0.0427
	(0.0328)
Constant	2.091***
	(0.689)
Observations	221
Number of Firm Code	17
F-Statistics	730.38
Prob (F-Stat)	0.000
R-squared	0.954

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.9 Chemical Products and Pharma Sector

This section presents the results of the overall panel estimation of Chemical and Pharma Sector, which are provided below.

4.9.1 Descriptive Statistics

The table G1 in the appendix provides the descriptive statistics of the Chemical Products and Pharma sector for various key variables in the dataset. The working capital has an average of 554,521 and exhibits significant variation, ranging from a maximum value of 75,406,819 to a minimum value of -44,662,318. Additionally, it has a standard deviation of 9,902,560. The non-current asset has an average value of 11185921, suggesting that the firms have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variability, with a minimum value of 2707 and a maximum value of 1.26E+08. The standard deviation is 22668828. The average Return on Assets is 6.08. Nevertheless, the ROA

exhibits significant fluctuation, ranging from a high of 53.13 to a low of -156.67, with a standard deviation of 15.57. The firm's age has an average of 39.67, with a maximum value of 89 and a minimum value of 3.

4.9.2 Correlation

The correlation table G2 in appendix provides an overview of the relationships between various financial variables of Chdmical Products and Pharma sector for a dataset with 429 observations. The correlation between FA and NCA is -0.13. This relationship is weak and negative. The impact of FA on ROA is very weak and positive which is 0.11. There is also a weak and positive correlation of 0.38 between WC and firm age we can see a strong and positive correlation of 0.86 between sales and net profit.

4.9.3 Impact of Firm Age on Working Capital

The table 4.46 below presents the results of a regression analysis examining the impact of firm age on working capital in Chemical Products and Pharma Sector, the analysis examines the short-term investments of firms, specifically working capital. The results indicate that working capital increases by approximately 7.28% for each additional year of firm age, as shown by a coefficient of 0.0728 with a standard error of 0.0455. This positive coefficient implies that older firms tend to have higher working capital, suggesting that they are likely to have more established operations and better management of their short-term assets and liabilities.

The coefficient for sales is 0.586, with a standard error of 0.206. This positive relationship suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 58.6% increase in working capital. This indicates that as firms generate more sales, they can maintain or increase their working capital, supporting their operational and investment needs. The debt-to-equity ratio has a coefficient of -0.0532 with a standard error of 0.191, indicating that a 1% increase in the debt-to-equity ratio is correlated with a decrease in working capital of approximately 5.32%. The negative sign suggests that higher leverage is associated with reduced working capital, implying that firms with more debt have less flexibility and liquidity as more resources are allocated to debt servicing. The real interest rate coefficient is -0.0999 with a standard error of 0.0899, indicating a negative correlation between working capital and real interest rates. This suggests that lower real interest rates are associated with increased working capital.

Table 4. 30: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0728
	(0.0455)
Debt-to-Equity Ratio	-0.0532
	(0.191)
Sales	0.586***
	(0.206)
Real Interest Rate	-0.0999
	(0.0899)
Constant	1.418
	(1.922)
Observations	429
Number of Firm Code	33
F-Statistics	19.12
Prob. (F-Stat)	0.00
R-Squared	0.249

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.9.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.47 reveals a positive relationship between firm age and non-current assets in the Chemical Products and Pharma Sector, indicated by a coefficient of 0.0574. This means that for each additional year of a firm's age, non-current assets increase by 5.74%. This relationship suggests that older firms tend to invest more in long-term assets, potentially due to accumulated experience, enhanced stability, and better resource management. However, the debt-to-equity ratio has a coefficient of -0.0144, indicating that a 1% increase in the debt-to-equity ratio results in a 1.44% decrease in non-current assets. The coefficient for sales is 0.309 with a standard error of 0.180, suggesting that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 3.09% increase in working capital. Conversely, the real interest rate has a negative coefficient of -0.00733, indicating that a 1% increase in the real interest rate leads to a 0.733% decrease in non-current assets, suggesting that higher borrowing costs can marginally discourage long-term investments.

These results highlight the significance of leverage, sales, and firm age in the development of long-term investment strategies, while also considering the impact of interest rates on these strategies.

Table 4. 31: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0574**
	(0.0264)
Debt-to-Equity Ratio	-0.0144
	(0.155)
Sales	0.309*
	(0.180)
Real Interest Rate	-0.00733
	(0.0342)
Constant	7.432***
	(1.987)
Observations	429
Number of Firm Code	33
F-Statistics	25.50
Prob (F-Stat)	0.000
R-Squared	0.334

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.9.5 Impact of Firm Age on Firm Performance

Table 4.48 reveals a significant positive coefficient of 0.0236 between firm age and Return on Assets (ROA) in the Chemical Products and Pharma sector, suggesting that ROA increases by approximately 2.36% as firm's age. This positive relationship is attributed to factors such as financial stability and strong networks established over time. The sales coefficient of -0.0296 indicates that a 1% increase in sales leads to a 2.96% decline in ROA, suggesting potential inefficiencies or diminishing returns as sales volumes grow. Conversely, the net profit coefficient of 0.175 highlights that a 1% increase in net profit results in a substantial 17.5% rise in ROA, underscoring the critical role of profitability in firm performance. Additionally, a coefficient of 0.887 reveals a strong positive correlation between return on equity and ROA, where a 1% increase in return on equity correlates with an 88.7% increase in ROA. The coefficient of the real interest rate, 0.0312, indicates that a slight increase in real interest rates leads to a 3.12% increase in ROA.

Table 4. 32: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	0.0236
	(0.0229)
Sales	-0.0296
	(0.0888)
Net Profit	0.175
	(0.107)
Return on Equity	0.887***
	(0.0925)
Real Interest Rate	0.0312
	(0.0288)
Constant	-4.096*
	(1.689)
Observations	429
Number of Firm Code	33
F-Statistics	289.15
Prob (F-Stat)	0.000
R-squared	0.987

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.10 Mineral Sector

This section presents the results of the overall panel estimation of a Mineral Sector, which are provided below.

4.10.1 Descriptive Statistics

The table H1 in the appendix provides the descriptive statistics of the Mineral sector for various key variables in the dataset. The working capital exhibits a significant range of values, with a maximum number of 5112908 and a lowest value of -1229440. The mean working capital is 257165, indicating notable variation. Additionally, the standard deviation is 1106254. The non-current asset has an average value of 2983863, suggesting that companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, with a minimum value of 177203 and a maximum value of 18077581. The standard deviation is calculated to be 3828169. The average Return on Assets is 3. Nevertheless, the ROA exhibits significant fluctuation, ranging from a high of 30.92 to a low of -25.61, with a standard deviation of 11.08. The firm's age ranges from 5 to 55, with an average of 33.

4.10.2 Correlation

The correlation table H2 in appendix provides an overview of the relationships between various financial variables of Mineral sector for a dataset with 104 observations. The correlation between FA and NCA is 0.01. This relationship is weak and positive. The impact of FA on ROA is even weaker 0.21. There is also a weak and negative correlation of -0.11 between WC and firm age. The correlation between firm age and ROA is also very week and positive which is 0.21 we can see a strong and positive correlation of 0.93 between sales and net profit.

4.10.3 Impact of Firm Age on Working Capital

The table 4.51 below presents the results of a regression analysis examining the impact of firm age on working capital in Mineral Sector, working capital represents the short-term investments of a firm, increases by approximately 29.3% for each additional year of firm age, as indicated by a coefficient of 0.293 with a standard error of 0.0693. This positive coefficient suggests that as firms age, their working capital tends to grow. This indicates that older firms likely have more established operations and manage their short-term assets and liabilities more efficiently. Conversely, the coefficient for sales is -0.650 with a standard error of 0.550. This negative coefficient suggests that higher sales are associated with decreased working capital. Specifically, a 1% increase in sales leads to a 65% decrease in working capital, indicating that firms generate less sales as working capital increases.

The debt-to-equity ratio has a coefficient of -0.606 and a standard error of 0.290. This implies that a 1% increase in the debt-to-equity ratio correlates with an approximate 60.6% decrease in working capital. The negative coefficient suggests that higher leverage corresponds with reduced working capital, as firms with greater debt have less flexibility and liquidity and thus allocate more resources to servicing debt. Additionally, the real interest rate coefficient is 0.561 with a standard error of 0.316, indicating a positive correlation. This suggests that higher real interest rates are associated with increased working capital.

Table 4. 33: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.293***
	(0.0693)
Debt-to-Equity Ratio	-0.606*
	(0.290)
Sales	-0.650
	(0.550)
Real Interest Rate	0.561
	(0.316)
Constant	10.94
	(6.675)
Observations	104
Number of Firm Code	8
F-Statistics	9.93
Prob. (F-Stat)	0.0081
R-Squared	0.288

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.10.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.52 reveals a positive relationship between firm age and non-current assets of Mineral Sector indicated by a coefficient of 0.0477. This means that for each additional year of a firm's age, non-current assets increase by 4.77%. It reveals that older firms tend to invest more in long-term assets, due to their experience, enhanced stability, and better resource management.

The debt-to-equity ratio has a coefficient of 0.131. This suggests that higher leverage provides additional financial resources, which supports the long-term investments, as a 1% increase in the debt-to-equity ratio results in a 13.1% increase in non-current assets. The coefficient for sales is 0.465 with a standard error of 0.161. This positive coefficient suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 46.5% increase in working capital. The real interest rate has a negative coefficient of -0.0353. This suggests that a 1% increase in the real interest rate leads to a 3.53% decrease in non-current assets, suggesting that higher borrowing costs can marginally discourage long-term investments

These results underscore the significance of leverage, sales, and firm age in the development of long-term investment strategies, while also taking into account the impact of interest rates on these strategies.

Table 4. 34: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0477*
	(0.0223)
Debt-to-Equity Ratio	0.131*
	(0.0581)
Sales	0.465**
	(0.161)
Real Interest Rate	-0.0353
	(0.0326)
Constant	5.824**
	(1.973)
Observations	104
Number of Firm Code	8
F-Statistics	0.80
Prob (F-Stat)	0.0110
R-Squared	0.687

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.10.5 Impact of Firm Age on Firm Performance

Table 4.53 shows a significant negative coefficient of -0.0125 between firm age and Return on Assets (ROA) in the Mineral sector, indicating that ROA decreases by approximately 1.25% as firm's age.

The sales coefficient of 0.270 indicates that a 1% increase in sales leads to a substantial 27% increase in ROA, suggesting potential for enhanced returns as sales volumes grow. Conversely, the net profit coefficient of 0.00517 highlights that a 1% increase in net profit results in a modest 0.517% rise in ROA, emphasizing the critical role of profitability in firm performance. Furthermore, a coefficient of 0.985 reveals a strong positive correlation between return on equity and ROA, where a 1% increase in return on equity correlates with a robust 98.5% increase in ROA. The coefficient for the real interest rate, 0.0385, indicates that a slight increase in real interest rates leads to a 3.85% increase in ROA.

Table 4. 35: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0125
	(0.0281)
Sales	0.270
	(0.234)
Net Profit	0.00517
	(0.111)
Return on Equity	0.985***
	(0.100)
Real Interest Rate	0.0385
	(0.0532)
Constant	-4.307
	(2.602)
Observations	104
Number of Firm Code	8
F-Statistics	730.38
Prob (F-Stat)	0.000
R-squared	0.954

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.11 Manufacturing Sector

This section presents the results of the overall panel estimation of a Manufacturing Sector, which are provided below.

4.11.1 Descriptive Statistics

The table H1 in the appendix provides the descriptive statistics of the Mineral sector for various key variables in the dataset. The working capital exhibits a significant range of values, with a maximum number of 5112908 and a lowest value of -1229440. The mean working capital is 257165, indicating notable variation. Additionally, the standard deviation is 1106254. The non-current asset has an average value of 2983863, suggesting that companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, with a minimum value of 177203 and a maximum value of 18077581. The standard deviation is calculated to be 3828169. The average Return on Assets is 3. Nevertheless, the ROA exhibits significant fluctuation, ranging from a high of 30.92 to a low of -25.61, with a standard deviation of 11.08. The firm's age ranges from 5 to 55, with an average of 33.

4.11.2 Correlation

The correlation table I2 in appendix provides an overview of the relationships between various financial variables of Manufacturing sector for a dataset with 364 observations. The correlation between FA and NCA is 0.19. This relationship is weak and positive. The impact of FA on ROA is 0. There is also a weak and positive correlation of 0.14 between WC and firm age we can see a strong and positive correlation of 0.81 between sales and net profit.

4.11.3 Impact of Firm Age on Working Capital

The table 4.56 below presents the results of a regression analysis examining the impact of firm age on working capital in Manufacturing Sector, which represents the short-term investment of a firm. The working capital increases by approximately 12.8% for each additional year of firm age, as indicated by the coefficient of 0.128 with a standard error of 0.0414. The positive coefficient implies that the working capital of firms tends to increase as they age. This suggests that elder firms are more likely to have more established operations and may manage their short-term assets and liabilities more efficiently.

The coefficient for sales is 0.445 with a standard error of 0.169. This positive coefficient suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 44.5% increase in working capital. This indicates that as firms generate more sales, they can maintain or increase their working capital, supporting their operational and investment needs.

The debt-to-equity has a coefficient of -0.757 and a standard error of 0.206. This implies that a 1% increase in the debt-to-equity ratio is correlated with a decrease in working capital of approximately 75.7%. The negative sign suggests that a reduced working capital is associated with a higher debt-to-equity ratio. This relationship implies that firms with greater leverage may have less flexibility and liquidity, which can result in increase in working capital as they allocate more resources to debt servicing. The real interest rate coefficient is 0.142 with a standard error of 0.100. This positive correlation implies that increased working capital is linked to higher real interest rates.

Table 4. 36: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.128***
	(0.0414)
Debt-to-Equity Ratio	-0.757***
	(0.206)
Sales	0.445**
	(0.169)
Real Interest Rate	0.142
	(0.100)
Constant	-0.0930
	(2.886)
Observations	364
Number of Firm Code	28
F-Statistics	5.67
Prob. (F-Stat)	0.002
R-Squared	0.458

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.11.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.57 reveals a positive relationship between firm age and non-current assets in the Manufacturing Sector, indicated by a coefficient of 0.0779. This means that with each additional year of a firm's age, non-current assets increase by 7.79%. This suggests that older firms tend to invest more in long-term assets, likely due to accumulated experience, enhanced stability, and better resource management. However, the debt-to-equity ratio has a coefficient of -0.120, indicating that a 1% increase in the debt-to-equity ratio results in a 1.20% decrease in non-current assets. The coefficient for sales is 0.391 with a standard error of 0.138, suggesting that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 3.91% increase in working capital. Conversely, the real interest rate has a negative coefficient of -0.141, indicating that a 1% increase in the real interest rate leads to a 1.41% decrease in non-current assets, suggesting that higher borrowing costs can marginally discourage long-term investments.

These results underscore the significance of leverage, sales, and firm age in developing long-term investment strategies while also considering the impact of interest rates on these strategies.

Table 4. 37: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0779***
	(0.0212)
Debt-to-Equity Ratio	-0.120
	(0.168)
Sales	0.391***
	(0.138)
Real Interest Rate	-0.141
	(0.103)
Constant	4.348*
	(2.223)
Observations	364
Number of Firm Code	28
F-Statistics	14.88
Prob (F-Stat)	0.00
R-Squared	0.303

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.11.5 Impact of Firm Age on Firm Performance

Table 4.58 illustrates a significant negative coefficient of -0.0168 between firm age and Return on Assets (ROA) in the Manufacturing sector, indicating that ROA decreases by approximately 1.68% as firm's age. This decline can be attributed to factors such as potential complacency, bureaucratic inefficiencies, and increased operational rigidity, which often affect older firms. The sales coefficient of -0.261 indicates that a 1% increase in sales leads to a 2.61% decline in ROA, suggesting potential inefficiencies or diminishing returns as sales volumes rise. Conversely, the net profit coefficient of 0.359 highlights that a 1% increase in net profit results in a substantial 35.9% rise in ROA, underscoring the critical role of profitability in firm performance. Additionally, a coefficient of 0.680 reveals a strong positive correlation between return on equity and ROA, where a 1% increase in return on equity correlates with a robust 68% increase in ROA. The coefficient for the real interest rate, -0.0575, indicates that a slight decrease in real interest rates leads to a 5.75% increase in ROA.

Table 4. 38: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0168
	(0.0237)
Sales	-0.261
	(0.169)
Net Profit	0.359*
	(0.189)
Return on Equity	0.680***
	(0.205)
Real Interest Rate	-0.0575
	(0.0573)
Constant	0.464
	(1.812)
Observations	364
Number of Firm Code	28
F-Statistics	146.60
Prob (F-Stat)	0.00
R-squared	0.869

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.12 Electrical Machinery & Apparatus Sector

This section presents the results of the overall panel estimation of Electrical Machinery & Apparatus Sector Sector, which are provided below.

4.12.1 Descriptive Statistics

The table J1 in the appendix provides the descriptive statistics of the Electrical Machinery & Apparatus sector for various important variables in the dataset. The working capital has an average of 2564764, indicating significant variability. It reaches a maximum value of 19137919 and a minimum value of -516135, with a standard deviation of 4437790. The non-current asset has an average value of 4901381, suggesting that the firms have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, with a minimum value of 14753 and a maximum value of 25608208. The standard deviation is calculated to be 7161722. The average Return on Assets is 0.86. Nevertheless, the ROA exhibits significant fluctuation, ranging from a high of 51.28 to a low of -26.92, with a standard deviation

of 10.23. The firm's age has an average of 69.16, with a maximum value of 145 and a minimum value of 26.

4.12.2 Correlation

The correlation table J2 in appendix provides an overview of the relationships between various financial variables of Electrical Machinery & Appratus sector for a dataset with 78 observations. The correlation between FA and NCA is 0.09. This relationship is weak and positive. The impact of FA on ROA is very weak and negative which is -0.01. There is also a weak and negative correlation of -0.01 between WC and firm age we can see a strong and positive correlation of 0.70 between sales and net profit.

4.12.3 Impact of Firm Age on Working Capital

The table 4.61 below presents the results of a regression analysis examining the impact of firm age on working capital in Electrical Machinery and Apparatus Sector, which represents the short-term investment of a firm. The working capital increases by approximately 7.62% for each additional year of firm age, as indicated by the coefficient of 0.0762 with a standard error of 0.0442. The positive coefficient implies that the working capital of firms tends to increase as they age. This suggests that elder firms are more likely to have more established operations and may manage their short-term assets and liabilities more efficiently.

The coefficient for sales is 1.150 with a standard error of 0.132. This positive coefficient suggests that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 11.5% increase in working capital. This indicates that as firms generate more sales, they can maintain or increase their working capital, supporting their operational and investment needs.

The debt-to-equity has a coefficient of -0.310 and a standard error of 0.203. This implies that a 1% increase in the debt-to-equity ratio is correlated with a decrease in working capital of approximately 31%. The negative sign suggests that a reduced working capital is associated with a higher debt-to-equity ratio. This relationship implies that firms with greater leverage may have less flexibility and liquidity, which can result in a decrease in working capital as they allocate more resources to debt servicing. The real interest rate coefficient is 0.209 with a standard error of 0.151. This positive correlation implies that increased working capital is linked to higher real interest rates.

Table 4. 39: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0762
	(0.0442)
Debt-to-Equity Ratio	-0.310
	(0.203)
Sales	1.150***
	(0.132)
Real Interest Rate	0.209
	(0.151)
Constant	-9.197
	(5.258)
Observations	78
Number of Firm Code	6
F-Statistics	4891.1
Prob. (F-Stat)	0.00
R-Squared	0.722

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.12.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.62 reveals a positive relationship between firm age and non-current assets in the Electrical Machinery and Apparatus Sector, indicated by a coefficient of 0.0557. This means that with each additional year of a firm's age, non-current assets increase by 5.57%. This relationship suggests that older firms tend to invest more in long-term assets, likely due to accumulated experience, enhanced stability, and better resource management.

However, the debt-to-equity ratio has a coefficient of -0.176, indicating that a 1% increase in the debt-to-equity ratio results in a 1.76% decrease in non-current assets. The coefficient for sales is 0.224 with a standard error of 0.0983, suggesting that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 2.24% increase in working capital. Conversely, the real interest rate has a negative coefficient of -0.236, indicating that a 1% increase in the real interest rate leads to a 2.36% decrease in non-current assets, suggesting that higher borrowing costs can marginally discourage long-term investments.

Table 4. 40: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0557
	(0.0536)
Debt-to-Equity Ratio	-0.176
	(0.201)
Sales	0.224*
	(0.0983)
Real Interest Rate	-0.236
	(0.139)
Constant	7.302
	(5.003)
Observations	78
Number of Firm Code	6
F-Statistics	44.83
Prob (F-Stat)	0.0004
R-Squared	0.276

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.12.5 Impact of Firm Age on Firm Performance

Table 4.63 illustrates a significant positive coefficient of 0.0236 between firm age and Return on Assets (ROA) in the Electrical Machinery and Apparatus sector, suggesting that ROA increases by approximately 2.36% as firm's age. The sales coefficient of -0.0296 indicates that a 1% increase in sales leads to a 2.96% decline in ROA, suggesting potential inefficiencies or diminishing returns as sales volumes grow. Conversely, the net profit coefficient of 0.175 highlights that a 1% increase in net profit results in a substantial 17.5% rise in ROA, underscoring the critical role of profitability in firm performance. Additionally, a coefficient of 0.887 reveals a strong positive correlation between return on equity and ROA, where a 1% increase in return on equity correlates with an 88.7% increase in ROA. The coefficient for the real interest rate, 0.0312, indicates that a minor increase in real interest rates leads to a 3.12% increase in ROA.

Table 4. 41: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	0.0236
	(0.0229)
Sales	-0.0296
	(0.0888)
Net Profit	0.175
	(0.107)
Return on Equity	0.887***
	(0.0925)
Real Interest Rate	0.0312
	(0.0288)
Constant	-4.096*
	(1.689)
Observations	78
Number of Firm Code	6
F-Statistics	46.32
Prob (F-Stat)	0.00
R-squared	0.987

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.13 Petroleum Sector

This section presents the results of the overall panel estimation of a Petroleum Sector, which are provided below.

4.13.1 Descriptive Statistics

The table K1 in the appendix provides the descriptive statistics of the Petroleum sector for various key variables in the dataset. The working capital has an average of 1.98E+07, indicating significant variation. It reaches a maximum value of 6.39E+08 and a minimum value of -9.79E+07, with a standard deviation of 7.78E+07. The average value of the non-current asset is 5.56E+07, suggesting that companies have substantial long-term investments in assets like property, plant, and equipment. The non-current asset exhibits significant variation, with a minimum value of 12842 and a maximum value of 5.09E+08. The standard deviation is 8.30E+07. The average Return on Assets is 5.48. Nevertheless, the ROA exhibits significant fluctuations, ranging from a high of 43.8 to a low of -122.28, with a standard deviation of 12.74. The average age of the firm is 42.54, with a maximum age of 109 and a minimum age of 3.

4.13.2 Correlation

The correlation table K2 in appendix provides an overview of the relationships between various financial variables of Petroleum sector for a dataset with 312 observations. The correlation between FA and NCA is 0.53. This relationship is strong and positive. The impact of FA on ROA is 0.02 which is very week and positive. There is also a weak and positive correlation of 0.07 between WC and firm age we can see a weak and positive correlation of 0.27 between sales and net profit.

4.13.3 Impact of Firm Age on Working Capital

The table 4.66 below presents the results of a regression analysis examining the impact of firm age on working capital in Petroleum Sector, which the analysis reveals that a firm's short-term investments are influenced by several factors. For each additional year of a firm's age, working capital increases by approximately 6.77%, as indicated by the coefficient of 0.0677 with a standard error of 0.0199. This positive coefficient suggests that as firms age, their working capital tends to grow, likely due to more established operations and more efficient management of short-term assets and liabilities.

The coefficient for sales is 0.451, with a standard error of 0.0355. This positive relationship indicates that higher sales are associated with increased working capital. Specifically, a 1% increase in sales leads to a 45.1% increase in working capital. This suggests that as firms generate more sales, they are better able to maintain or increase their working capital, supporting their operational and investment needs.

Conversely, the debt-to-equity ratio has a coefficient of -0.215 with a standard error of 0.0886. This indicates that a 1% increase in the debt-to-equity ratio is correlated with a decrease in working capital of approximately 21.5%. The negative coefficient suggests that higher leverage is associated with reduced working capital, implying that firms with greater debt have less flexibility and liquidity, as more resources are allocated to debt servicing.

The real interest rate has a coefficient of -0.184 with a standard error of 0.0854, indicating a negative correlation with working capital. This suggests that lower real interest rates are associated with increased working capital.

Table 4. 42: Working Capital and Firm Age

Variables	Working Capital
Firm Age	0.0677***
	(0.0199)
Debt-to-Equity Ratio	-0.215**
	(0.0886)
Sales	0.451***
	(0.0355)
Real Interest Rate	-0.184**
	(0.0854)
Constant	5.648***
	(0.728)
Observations	117
Number of Firm Code	9
F-Statistics	64.41
Prob. (F-Stat)	0.00
R-Squared	0.421

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.

4.13.4 Impact of Firm Age on Non-Current Assets

The analysis of Table 4.67 reveals a positive relationship between firm age and non-current assets in the Petroleum Sector, indicated by a coefficient of 0.0677. This means that with each additional year of a firm's age, non-current assets increase by 6.77%. This relationship suggests that older firms tend to invest more in long-term assets, potentially due to accumulated experience, enhanced stability, and better resource management. Additionally, the debt-to-equity ratio has a coefficient of 0.0696, indicating that higher leverage provides additional financial resources, supporting long-term investments. Specifically, a 1% increase in the debt-to-equity ratio results in a 6.96% increase in non-current assets. The coefficient for sales is 0.151 with a standard error of 0.0771, suggesting that higher sales are associated with increased working capital. A 1% increase in sales leads to a 1.51% increase in working capital. The real interest rate has a positive coefficient of 0.0710, indicating that a 1% increase in the real interest rate leads to a 7.10% increase in non-current assets, suggesting that higher borrowing costs can marginally discourage long-term investments.

Table 4. 43: Non-Current Assets and Firm Age

Variables	Non-Current Assets
Firm Age	0.0677***
	(0.0226)
Debt-to-Equity Ratio	0.0696
	(0.0898)
Sales	0.151*
	(0.0771)
Real Interest Rate	0.0710
	(0.0442)
Constant	10.90***
	(1.414)
Observations	117
Number of Firm Code	9
F-Statistics	42.66
Prob (F-Stat)	0.00
R-Squared	0.246

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.13.5 Impact of Firm Age on Firm Performance

Table 4.68 reveals a significant negative coefficient of -0.0311 between firm age and Return on Assets (ROA) in the Petroleum sector, suggesting that ROA decreases by approximately 3.11% as firm's age. This decline may stem from factors such as potential complacency, bureaucratic inefficiencies, and increased operational rigidity, which can adversely affect senior firms.

The sales coefficient of -0.308 indicates that a 1% increase in sales leads to a significant 30.8% decline in ROA, suggesting potential inefficiencies or diminishing returns as sales volumes rise. In contrast, the net profit coefficient of 0.747 underscores that a 1% increase in net profit results in a substantial 74.7% rise in ROA, highlighting the crucial role of profitability in firm performance. Additionally, a coefficient of 0.279 reveals a strong positive correlation between return on equity and ROA, where a 1% increase in return on equity correlates with a 27.9% increase in ROA. The coefficient for the real interest rate, 0.0920, indicates that a minor increase in real interest rates leads to a 9.2% increase in ROA.

Table 4. 44: Return on Assets and Firm Age

Variables	Return on Asset
Firm Age	-0.0311
	(0.0243)
Sales	-0.308***
	(0.0920)
Net Profit	0.747***
	(0.231)
Return on Equity	0.279
	(0.258)
Real Interest Rate	0.0920
	(0.0662)
Constant	-3.696
	(2.809)
Observations	117
Number of Firm Code	9
F-Statistics	194.09
Prob (F-Stat)	0.00
R-squared	0.654

Note: The astarik *** indicates p<0.01, ** indicates p<0.05, * indicates p<0.1

4.14 Hausman test

In our study Hausman test is run for all the sectors seperately which tells us that in between fixed and random affect model, fixed affect model is more appropriate. The hausman test of overall analysis is mentioned.

4.15 Results Summary

The tables below are showing the results summary of the sectoral results.

Table 4.45: Sectoral Results Summary of Firm Age and Working Capital

Variables	Textile	Sugar	Paper	Transport	Food	Cement	Motor	Chemical	Mineral	Manufacturing	Electrical	petroleum
Firm Age	0.125***	0.0898**	0.0811*	0.0452	0.0895**	0.0561	0.0735**	0.0728	0.293***	0.128***	0.0762	0.0677***
	(0.0280)	(0.0405)	(0.0393)	(0.0282)	(0.0381)	(0.0969)	(0.0330)	(0.0455)	(0.0693)	(0.0414)	(0.0442)	(0.0199)
Debt-to-Equity Ratio	-0.232**	-0.619*	-0.348*	-0.347	0.0838	-1.120***	-0.504***	-0.0532	-0.606*	-0.757***	-0.310	-0.215**
	(0.111)	(0.301)	(0.156)	(0.203)	(0.120)	(0.220)	(0.163)	(0.191)	(0.290)	(0.206)	(0.203)	(0.0886)
Sales	0.289	-0.267	0.232	0.589**	0.0937	2.105**	0.695**	0.586***	-0.650	0.445**	1.150***	0.451***
	(0.227)	(0.621)	(0.745)	(0.209)	(0.0748)	(0.727)	(0.249)	(0.206)	(0.550)	(0.169)	(0.132)	(0.0355)
Real Interest Rate	0.0610	0.187	0.0473	-0.109	0.0824	0.128	0.256**	-0.0999	0.561	0.142	0.209	-0.184**
	(0.0775)	(0.218)	(0.222)	(0.139)	(0.142)	(0.139)	(0.116)	(0.0899)	(0.316)	(0.100)	(0.151)	(0.0854)
Constant	3.634	12.48	6.339	4.093	6.944**	-22.91**	-0.0817	1.418	10.94	-0.0930	-9.197	5.648***
	(3.049)	(8.495)	(10.52)	(2.999)	(2.431)	(9.312)	(3.500)	(1.922)	(6.675)	(2.886)	(5.258)	(0.728)
Observations	1,443	338	78	143	169	195	221	429	104	364	78	117
Number of Firms	111	13	6	11	13	15	17	33	8	28	6	9
F-Statistics	14.66	3.10	4.47	4.12	3.79	16.82	10.81	19.12	9.93	5.67	4891.1	64.41
Prob. (F-Stat)	0.00	0.044	0.0660	0.0420	0.036	0.0001	0.0002	0.00	0.0081	0.002	0.00	0.00
R-Squared	0.236	0.127	0.321	0.301	0.158	0.462	0.464	0.249	0.288	0.458	0.722	0.421

Table 4.46: Sectoral Results Summary of Firm Age and Non-current Assests

Variables	Textile	Sugar	Paper	Transport	Food	Cement	Motor	Chemical	Mineral	Manufacturing	Electrical	Petroleum
Firm Age	0.125***	0.0898**	0.0811*	0.0452	0.0895**	0.0561	0.0735**	0.0728	0.293***	0.128***	0.0762	0.0677***
	(0.0280)	(0.0405)	(0.0393)	(0.0282)	(0.0381)	(0.0969)	(0.0330)	(0.0455)	(0.0693)	(0.0414)	(0.0442)	(0.0199)
Debt-to-Equity Ratio	-0.232**	-0.619*	-0.348*	-0.347	0.0838	-1.120***	-0.504***	-0.0532	-0.606*	-0.757***	-0.310	-0.215**
	(0.111)	(0.301)	(0.156)	(0.203)	(0.120)	(0.220)	(0.163)	(0.191)	(0.290)	(0.206)	(0.203)	(0.0886)
Sales	0.289	-0.267	0.232	0.589**	0.0937	2.105**	0.695**	0.586***	-0.650	0.445**	1.150***	0.451***
	(0.227)	(0.621)	(0.745)	(0.209)	(0.0748)	(0.727)	(0.249)	(0.206)	(0.550)	(0.169)	(0.132)	(0.0355)
Real Interest Rate	0.0610	0.187	0.0473	-0.109	0.0824	0.128	0.256**	-0.0999	0.561	0.142	0.209	-0.184**
	(0.0775)	(0.218)	(0.222)	(0.139)	(0.142)	(0.139)	(0.116)	(0.0899)	(0.316)	(0.100)	(0.151)	(0.0854)
Constant	3.634	12.48	6.339	4.093	6.944**	-22.91**	-0.0817	1.418	10.94	-0.0930	-9.197	5.648***
	(3.049)	(8.495)	(10.52)	(2.999)	(2.431)	(9.312)	(3.500)	(1.922)	(6.675)	(2.886)	(5.258)	(0.728)
Observations	1,443	338	78	143	169	195	221	429	104	364	78	117
Number of Firms	111	13	6	11	13	15	17	33	8	28	6	9
F-Statistics	14.66	3.10	4.47	4.12	3.79	16.82	10.81	19.12	9.93	5.67	4891.1	64.41
Prob. (F-Stat)	0.00	0.044	0.0660	0.0420	0.036	0.0001	0.0002	0.00	0.0081	0.002	0.00	0.00
R-Squared	0.236	0.127	0.321	0.301	0.158	0.462	0.464	0.249	0.288	0.458	0.722	0.421

Table 4.45: Sectoral Results Summary of Firm Age and Firm Performance

Variables	Textile	Sugar	Paper	Transport	Food	Cement	Motor	Chemical	Mineral	Manufacturing	Electrical	petroleum
Firm Age	-0.0548***	0.000454	-0.0155	-0.00927	-0.0831**	0.00522	-0.0414**	0.0236	-0.0125	-0.0168	0.0236	-0.0311
	(0.0187)	(0.0122)	(0.00786)	(0.0241)	(0.0364)	(0.0216)	(0.0144)	(0.0229)	(0.0281)	(0.0237)	(0.0229)	(0.0243)
Sales	-0.0887*	-0.219*	-0.0342	-0.0982*	-0.00882	-0.317*	-0.407***	-0.0296	0.270	-0.261	-0.0296	-0.308***
	(0.0515)	(0.113)	(0.0794)	(0.0487)	(0.0179)	(0.151)	(0.0784)	(0.0888)	(0.234)	(0.169)	(0.0888)	(0.0920)
Net Profit	0.459***	0.157***	0.171*	0.244	0.463***	0.314***	0.491***	0.175	0.00517	0.359*	0.175	0.747***
	(0.110)	(0.0503)	(0.0730)	(0.171)	(0.147)	(0.0889)	(0.104)	(0.107)	(0.111)	(0.189)	(0.107)	(0.231)
Return on Equity	0.589***	0.901***	0.917***	0.852***	0.523***	0.710***	0.604***	0.887***	0.985***	0.680***	0.887***	0.279
	(0.0980)	(0.0566)	(0.0623)	(0.109)	(0.135)	(0.0829)	(0.102)	(0.0925)	(0.100)	(0.205)	(0.0925)	(0.258)
Real Interest Rate	0.0892***	-0.00229	0.0166	0.0316	0.0168	0.128**	-0.0427	0.0312	0.0385	-0.0575	0.0312	0.0920
	(0.0255)	(0.0258)	(0.0247)	(0.0323)	(0.0585)	(0.0452)	(0.0328)	(0.0288)	(0.0532)	(0.0573)	(0.0288)	(0.0662)
Constant	-2.250***	0.657	-1.381	-1.802	-0.892	0.451	2.091***	-4.096*	-4.307	0.464	-4.096*	-3.696
	(0.549)	(1.549)	(1.126)	(1.374)	(0.666)	(1.884)	(0.689)	(1.689)	(2.602)	(1.812)	(1.689)	(2.809)
Observations	1,443	338	78	143	169	195	221	429	104	364	78	117
Number of Firm	111	13	6	11	13	15	17	33	8	28	6	9
F-Statistics	319.46	700.21	28980.04	16402.6	2626.17	329.95	730.38	289.15	730.38	146.60	46.32	194.09
Prob (F-Stat)	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00
R-squared	0.915	0.947	0.985	0.987	0.945	0.961	0.954	0.987	0.954	0.869	0.987	0.654

CHAPTER 5

QUALITATIVE ANALYSIS

This chapter utilizes a combination of questionnaire surveys and in-depth interviews to examine the correlation between the age of a company, its investment choices, and its overall success. The study focuses on non-financial enterprises that are listed on the Pakistan Stock Exchange (PSE). Our primary goal was to examine the factors identified by experts that contribute to the underperformance of enterprises in Pakistan, as well as the policies that may be implemented to address this issue. A meticulously crafted questionnaire was developed, specifically targeting inquiries pertaining to the utilization of working capital as a variable for investment. During the interviews, participants were queried about their viewpoints regarding the significance of working capital in investment strategies.

A consultant at the Board of Investment, expressed the view that working capital can indeed be considered a valid variable for investment. According to him, firms allocate increased investment in working capital to facilitate business expansion and enhance operational capabilities. Director General at the Board of Investment also expressed his views as he said that working capital is a variable of investment and he said that the relationship between firm age and investment can be observed after the analysis. On the contrary, Deputy Economist at the Ministry of Finance, offered a divergent opinion. She also agreed that in the context of Pakistan, working capital can be a suitable variable for investment. Carrying out two interesting interviews has enriched the understanding and offered a more detailed view of the connection between the firm age, investment activities, and the Pakistani economy. The interviews are structured to initially address the topic in a broad manner, followed by a discussion on the study's findings. This allows for an examination of the recommendations derived from the research.

5.1 Working capital as Investment

To conduct the interviews, a meticulously crafted questionnaire was devised to elicit opinions on the impact of firm age on investment and firm performance. The primary and foremost question centered around our variable of interest: working capital. Universally, respondents concurred that working capital constitutes a significant variable of investment. One respondent from the Board of Investment articulated that firms allocate augmented investment towards working capital to facilitate business expansion and bolster operational capabilities, thereby affirming its

appropriateness as a variable. Director General at the Board of Investment, also endorsed this notion, asserting that working capital is a pertinent variable for investment. Deputy Economist at the Ministry of Finance, similarly concurred, noting that in the context of Pakistan, working capital stands as a suitable variable for investment.

5.2 The Relationship Between Firm Age And Investment in Pakistan

The second inquiry posed to the respondents concerned the nexus between firm age and investment. Our respondents indicated that extant literature scarcely delves into this particular relationship. They acknowledged the existence of a correlation, albeit with a caveat that definitive conclusions would emerge post-analysis. Subsequent to our analysis, it was discerned that, on an aggregate level, a positive relationship prevails. However, when scrutinized on a sectoral basis, the relationship manifests as positive in certain sectors and negative in others.

5.3 Firm age and Firm Performance in Non-Financial Firms in Pakistan

Our third inquiry pertained to firm performance. Respondents indicated that in certain sectors, firm age exerts a positive impact on firm performance, while in other sectors, the impact is negative. However, our comprehensive analysis reveals an overarching negative impact of firm age on firm performance.

5.4 Which firms invest more (old firms or new firms)?

The fourth question addressed the variation in investment between nascent and established firms. Respondents indicated that this variation is contingent upon the sector. In certain sectors, investment is more pronounced during the initial stages, whereas in others, investment intensifies as firms mature. This latter trend is attributed to the burgeoning confidence of stakeholders and the commendable performance exhibited by older firms.

5.5 Conclusion

The conclusion drawn from the interviews with all respondents indicates that investment and firm performance are critical issues in Pakistan that need to be addressed. Respondents highlighted not only the uncertainty in investment-related policies but also the uncertainty in other economic policies. This collective uncertainty negatively impacts the firm performances and country's

economy. These policy uncertainties also adversely affect firm growth. The quantitative section of this study also demonstrates a negative relationship between firm age and firm performance, which increases the reliability of the results. Experts from the BOI and the Ministry of Finance suggest that strong policies are needed to support the growth of firms as they age. This would reduce the likelihood of a decline in firm performance and mitigate policy uncertainty. According to experts, as firms age, their performance begins to decline due to poor policies and economic and political instability. This is supported by our qualitative results, which show that in Pakistan, firms stop performing well as they grow.

CHAPTER 6

CONCLUSION AND POLICY IMPLICATIONS

6.1 Summary and Conclusion

The main aim of this study was to investigate the correlation between the age of a company and its investment, as well as the age of a company and its performance, utilizing data from all non-financial companies registered on the Pakistan Stock Exchange (PSE). During the time span from 2010 to 2022, a grand total of 298 companies were chosen for examination.

6.1.1 Over all results

This study addressed three objectives. The first objective is to investigate the correlation between firm age and investment. Specifically, we assessed whether investment levels increase or decrease with firm age. Our primary investment variables include working capital and non-current assets. The results indicate that, overall, investment of firms tends to increase over time. The increase in working capital suggests that older firms are more likely to have well-established operations and may manage their short-term assets and liabilities more efficiently, thereby maintaining higher levels of working capital. The positive correlation between firm age and non-current assets underscores the significance of firm maturity in the development of long-term investment strategies. In Pakistan, older firms have demonstrated the ability to make more significant investments in non-current assets due to their established reputations, economies of scale, and stronger relationships with financial institutions. There are very limited studies we can find on firm age and firm investment we cannot find any paper on the internal investment of firm but according to (Azam & Shah, 2012) if we talk about internal and external financial constraints there is a negative relationship between firm age and investment.

The second objective is to scrutinize the impact of firm age on firm performance. The results indicate that, overall, firm performance declines with age. Several factors, such as potential complacency, bureaucratic inefficiencies, and increased operational rigidity, can contribute to this adverse relationship, which may impact firm performance as their age increases. It is also observed that older firms may encounter difficulties in adapting to rapidly evolving market dynamics and technological advancements. The efficiency and profitability of older firms may be diminished

due to established routines and processes that impede innovation and flexibility. (Majumdar, 1997) says that in India, older firms are found to be less profitable, while larger firms are more profitable.

The findings demonstrate that for Pakistani firms, as firm age increases, investment also grows, yet overall performance declines with age. This is because firms often overinvest in assets that do not immediately contribute to revenue generation, creating an imbalance between operational needs and capital expenditures. For instance, if non-current assets like machinery are underutilized, the additional costs can weigh down profitability. This issue could be addressed through asset retrenchment.

Additionally, when a firm's product design becomes outdated, shifting to the dominant design and investing in it can significantly boost market share and enhance survival prospects. If firms with declining performance reduce costs while competitors increase spending, they risk falling behind in innovation and losing ground in customer service and market share. Moreover, when firm-specific investments are involved, profitably exiting a declining industry becomes highly challenging. These assets are typically specialized and serve ongoing roles that are difficult to repurpose. The unique, human-specific investments often associated with these assets make it challenging to transfer the scale economies achieved in their acquisition. (Morrow et al., 2004)

6.1.2 Sector-Specific results

The first objective is to investigate the correlation between firm age and investment. Specifically, we assessed whether investment levels increase or decrease with firm age. However, sector-specific analysis reveals a nuanced picture while investment generally rises across in all sectors, the Information, Communication, and Transport Services sector exhibits a decline in non-current assets with increasing firm age because firms in this sector frequently replace outdated technology, leading to a reduced value of long-term assets while all other sectors textile, paper, food, information, communication, and transport services, minerals manufacturing, petroleum, and motor vehicles, trailers, and auto parts, sugar, cement, chemical products and pharmaceuticals, and electrical machinery and apparatus shows a positive trend. We cannot find studies which tell us the impact of age on non-current assets and working capital but as firms grow in Pakistan, they invest in new machinery, land and technology to increase the production resulting in a rise in non-current assets. Additionally, larger operations require more working capital to manage increased

inventory and production volumes of the firms while according to (Azam & Shah, 2012) if we talk about internal and external financial constraints there is a negative relationship between firm age and investment.

The second objective is to check the impact of firm age on firm performanc. Where a sector-wise analysis reveals a more nuanced perspective in the textile, paper, food, information, communication, and transport services, minerals manufacturing, petroleum, and motor vehicles, trailers, and auto parts sectors, firm age negatively impacts performance. (Majumdar, 1997) says that in India, older firms are found to be less profitable, while larger firms are more profitable due to market restricting policies.Conversely, in the sugar, cement, chemical products and pharmaceuticals, and electrical machinery and apparatus sectors, there is a slight improvement in firm performance over time. (Do, 2013c) also discusses in Turkey that younger firms start experiencing a decline in their profitability right from the beginning but they may become profitable again at an old age because of their experience.

6.2 Policy Recommendation

The following policy recommendations can be made based on the findings of this study:

- Innovation Fund (Innofund) may be introduced by Governing Authorities to provide the funding to older firms at lower rate from Technologically Advancing sectors to promote the productivity and performance while maintaining the control to use the funds for technological advancement by measuring sale from new product, patents and exports. Unable to deliver the innovation will lead to revision of interest rate at market rate.
- Policy Makers of Mature firms from sectors should focus on asset retrenchment and sale the underperforming assets. Meanwhile, Investment may be made new innovative assets enabling the production of innovative products and increasing the profits.
- Pakistani Firms should invest on R&D instead of conventional sectors (like real state, financial services, and power & energy where is return is guaranteed and include the government support in form of tax-breaks, subsidies, and energy tariffs). It will increase the competitiveness in the international market and increase the export.

6.3 limitations of the study

There are few limitations are mentioned below:

- There is a scarcity of research in Pakistan that examines the correlation between firm age and investment and company performance.
- The analysis exclusively encompasses all non-financial companies listed on the PSX.
- The analysis exclusively focuses on the firm's internal investment in non-current assets and working capital.
- There is no established theory that explains the correlation between the age of a corporation and its investment and performance.

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APPENDIX

Sectoral Summary Statitics and Correlation Tables

1- Textile Sector

Table A1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	263,758.5	-3,686	17,144,871	-12,351,940	2,304,539	1,441
Non-Current Assets	4,227,543	1,353,451	88,532,128	10	8,754,232	1,441
Return On Asset	1.59	2.01	319.53	-164.31	18.07	1,441
Firm Age	38.35	34	104	6	15.03	1,441
Return On Equity	6.49	6.39	2,134.99	-1,411.77	132.22	1,441
Sales	6,844,425	2,629,107	1.22E+08	0.000	11,706,336	1,441
Debt Equity Ratio	1.69	1.54	112.99	-88.43	9.36	1,441
Net Profit	39,8190.9	43,794	12,907,285	-5,960,621	1,318,010	1,441
Real Interest Rate	2.52	3.28	7.76	-4.45	3.22	1,441

Table A2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.48*	1							
ROA	0.19*	0.07*	1						
FA	0.09*	0.26*	0.02*	1					
ROE	0.04*	0.01*	0.15*	-0.05*	1				
SALES	0.63*	0.85	0.15*	0.22*	0.03*	1			
D/E	-0.08*	0.03*	0.03*	-0.2	-0.14*	0.03*	1		
NP	0.67*	0.68*	0.27*	0.18*	0.07*	0.79*	-0.01	1	
RIR	-0.16*	-0.07*	-0.13*	-0.09*	-0.03*	-0.15*	0.03*	-0.23*	1

2- Sugar sector

Table B1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	-541,876.6	-154,625	4,108,907	-9,594,166	1,704,281	338
Non-Current Assets	4,142,719	2,628,482	28,565,376	301,039	4,916,837	338
Return On Asset	1.75	1.95	40.05	-30.54	9.14	338
Firm Age	40.30	38	78	18	13.45	338
Return On Equity	-6.11	6.33	328.74	-995.46	100.34	338
Sales	6,690,101	4,271,568	65,255,756	0	9,194,835	338
Debt Equity Ratio	2.21	2.07	64.59	-98.24	9.57	338
Net Profit	190,203.4	86,533	4,760,746	-1,170,655	662,477.5	338
Real Interest Rate	2.51	3.27	7.76	-4.45	3.22	338

Table B2 : Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	-0.53*	1							
ROA	0.37*	-0.02	1						
FA	0.25*	-0.16*	0.03	1					
ROE	0.24*	-0.01	0.34*	0.04*	1				
SALES	-0.28*	0.88*	0.20*	-0.12*	0.09*	1			
D/E	-0.01	0.03	-0.02	-0.04*	0.25*	0.05*	1		
NP	0.23*	0.48*	0.58*	-0.02	0.29*	0.74*	0.04	1	
RIR	-0.03	-0.09*	-0.03	-0.11*	0.06*	-0.08*	0.00	-0.08*	1

3- Paper sector

Table C1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	175,1175	999,910.5	11,939,923	-692,319	2,215,132	78
Non-Current Assets	12,811,832	2,907,329	90,562,241	224,906	22,691,049	78
Return On Asset	6.07	5.84	21.29	-14.83	6.65	78
Firm Age	44.66	43.50	71	18	15.56	78
Return On Equity	7.31	11.19	36.35	-100.83	20.34	78
Sales	11,563,902	4,155,491	80,322,297	322,026	17,239,936	78
Debt Equity Ratio	1.57	1.25	8.05	0.16	1.57	78
Net Profit	1,257,472	515,239.5	12,258,219	-769,441	2,287,169	78
Real Interest Rate	2.51	3.27	7.76	-4.45	3.24	78

Table C2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.59*	1							
ROA	0.24*	-0.07	1						
FA	0.14*	0.03*	0.30*	1					
ROE	0.23*	0.02	0.83*	0.04	1				
SALES	0.58*	0.85*	-0.03	-0.17*	0.10*	1			
D/E	-0.39*	-0.18*	-0.72*	-0.43*	-0.74*	-0.15*	1		
NP	0.63*	0.80*	0.23*	0.03*	0.23*	0.76*	-0.26*	1	
RIR	-0.23*	-0.02	0.04	-0.09*	0.08*	-0.22*	0.06	-0.13*	1

4- Information, Communication and Transport Services Sector

Table D1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	-18,384,644	556,581	2,671,0684	-283,000,000	60,785,123	143
Non-Current Assets	42,878,466	4,710,813	3.03E+08	226,127	77,457,666	143
Return On Asset	2.47	1.34	70.25	-61.8	22.63	143
Firm Age	29.63	21	76	5	21.11	143
Return On Equity	15.83	11.17	1,268.95	-644.8	143.92	143
Sales	26,140,385	4,708,374	1.65E+08	0.0	44,260,623	143
Debt Equity Ratio	0.17	0.49	7.38	-38.32	3.95	143
Net Profit	-2,316,780	168,151	30,434,728	-6,757,1397	13,860,043	143
Real Interest Rate	2.51	3.27	7.76	-4.5	3.233	143

Table D2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	-0.64*	1							
ROA	0.30*	-0.19*	1						
FA	-0.60*	0.90*	-0.19*	1					
ROE	-0.01	0.00	0.06*	-0.03	1				
SALES	-0.61*	0.96*	-0.19*	0.88*	0.06*	1			
D/E	0.17*	0.02	0.27*	0.00	-0.09*	-0.02	1		
NP	0.93*	-0.42*	0.42*	-0.41*	-0.03	-0.41*	0.21*	1	
RIR	0.03	-0.07*	-0.07*	-0.07*	-0.04	0.02	-0.08*	0.00	1

5- Food Sector

Table E1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	107,313	275,803.0	10,437,119	-22,103,466	3,935,377	169
Non-Current Assets	5,279,416	1,193,385	34,363,432	10	8,787,143	169
Return On Asset	10.28	8.881	67.59	-95.04	19.67	169
Firm Age	53	45	162	20	34.86	169
Return On Equity	44.63	19.57	754.10	-164.62	103.87	169
Sales	16,137,515	6,029,292	1.33E+08	600	27,960,780	169
Debt Equity Ratio	2.245	1.50	21.48	-10.49	3.61	169
Net Profit	1,835,453	321,410	20,988,505	-4,253,029	3,922,309	169
Real Interest Rate	2.51	3.27	7.76	-4.45	3.23	169

Table E2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	-0.56*	1							
ROA	0.07*	0.10*	1						
FA	0.32*	-0.11*	0.13*	1					
ROE	-0.38*	0.34*	0.30*	-0.02	1				
SALES	-0.60*	0.93*	0.22*	-0.15*	0.36*	1			
D/E	-0.55*	0.45*	0.06*	-0.07*	0.18*	0.52*	1		
NP	-0.45*	0.78*	0.38*	-0.06*	0.31*	0.93*	0.46*	1	
RIR	-0.07*	-0.08*	0.07*	-0.04	-0.13*	-0.09*	0.02	-0.06*	1

6- Cement Sector

Table F1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	1,495,465	194,061	39,132,725	-9,811,324	6,998,162	195
Non-Current Assets	28,154,287	19,355,291	3.28E+08	851,985	39,977,281	195
Return On Asset	6.54	7.01	37.68	-18.22	9.79	195
Firm Age	36.26	33	70	17	13.41	195
Return On Equity	13.38	13.38	277.69	-117.81	28.85	195
Sales	19,872,949	11,297,213	3.31E+08	0.00	33,189,847	195
Debt Equity Ratio	0.83	0.76	6.91	-8.24	1.43	195
Net Profit	3,496,436	1,532,491	47,036,084	-3,934,493	6,170,112	195
Real Interest Rate	2.51	3.27	7.76	-4.45	3.23	195

Table F2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.42*	1							
ROA	0.31*	0.05*	1						
FA	-0.15*	-0.18*	-0.11*	1					
ROE	0.10*	-0.01	0.32*	-0.12*	1				
SALES	0.56*	0.93*	0.16*	-0.17*	0.06*	1			
D/E	-0.09*	0.08*	0.09*	0.09*	-0.70*	0.04	1		
NP	0.66*	0.78*	0.38*	-0.24*	0.18*	0.88*	-0.03	1	
RIR	0.15*	-0.22*	0.33*	-0.11*	0.22*	-0.18*	-0.19*	0.00	1

7- Motor Vehicles, Trailers and Auto Parts Sector

Table G1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	335,5561	1,498,708	30,458,149	-4,670,746	6,027,341	221
Non-Current Assets	3,232,871	1,800,974	24,926,516	43,062	4,306,974	221
Return On Asset	9.31	8.85	57.32	-28.88	12.88	221
Firm Age	37.11	34	69	12	12.73	221
Return On Equity	15.46	15.91	140.33	-384.83	48.94	221
Sales	25,042,782	9,636,109	2.76E+08	144	38,895,380	221
Debt Equity Ratio	1.53	1.07	26.26	-6.63	3.39	221
Net Profit	1,983,909	564,784	25,452,576	-4,951,744	3,917,703	221
Real Interest Rate	2.51	3.27	7.76	-4.45	3.22	221

Table G2: Corrrelation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.61*	1							
ROA	0.28*	-0.02	1						
FA	0.30	0.32*	-0.16*	1					
ROE	0.15*	0.06*	0.62*	-0.09*	1				
SALES	0.83*	0.88*	0.17*	0.33	0.15*	1			
D/E	-0.04	-0.03	-0.21*	0.13	-0.69*	0.00	1		
NP	0.83*	0.51*	0.41*	0.23	0.27*	0.79*	-0.03	1	
RIR	-0.02	-0.22*	0.16*	-0.01*	0.15*	-0.14*	-0.14*	0.00	1

8- Chemical Products and Pharma Sector

Table H1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	554,521	206,660.5	75,406,819	-44,662,318	9,902,560	429
Non-Current Assets	11,185,921	1,948,285	1.26E+08	2707	22,668,828	429
Return On Asset	6.08	6.06	53.13	-156.67	15.57	429
Firm Age	39.67	35	89	3	19.56	429
Return On Equity	13.26	14.29	303.22	-613.85	52.64	429
Sales	13,999,092	3,311,193	1.22E+08	0	24,031,252	429
Debt Equity Ratio	1.40	0.94	64.25	-47.46	4.81	429
Net Profit	2,304,672	230,061	45,738,157	-5,153,160	6,516,129	429
Real Interest Rate	2.51	3.27	7.76	-4.45	3.22	429

Table H2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.01	1							
ROA	0.19*	0.09*	1						
FA	0.38*	-0.13*	0.11*	1					
ROE	0.10*	0.07*	0.42*	0.05*	1				
SALES	0.42*	0.76*	0.28*	0.20*	0.20*	1			
D/E	0.02	0.07*	-0.01	0.01	-0.05*	0.05*	1		
NP	0.29*	0.75*	0.30*	0.04*	0.24*	0.86*	0.00	1	
RIR	-0.12*	-0.06*	-0.05*	-0.07*	-0.04*	-0.14*	0.06*	-0.13*	1

9- Minerals Sector

Table I1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	257,165	17,690	5,112,908	-1,229,440	1,106,254	104
Non-Current Assets	2,983,863	1,497,704	18,077,581	177,203	3,828,169	104
Return On Asset	3.00	2.29	30.92	-25.61	11.08	104
Firm Age	33	35	55	5	11.23	104
Return On Equity	12.55	9.60	188.61	-54.04	24.83	104
Sales	4,403,313	1,392,672	30,827,262	168,926	6,018,908	104
Debt Equity Ratio	0.99	1.34	3.89	-6.56	1.64	104
Net Profit	463,143	27,100	6,268,094	-598,460	1,161,921	104
Real Interest Rate	2.51	3.27	7.76	-4.45	3.23	104

Table I2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.77*	1							
ROA	0.57*	0.36*	1						
FA	-0.11*	0.01	0.21*	1					
ROE	0.10*	0.16*	0.13*	0.11*	1				
SALES	0.76*	0.96*	0.44*	0.05	0.18*	1			
D/E	0.13*	-0.05	0.31*	0.05	-0.61*	0.01	1		
NP	0.83*	0.87*	0.57*	0.00	0.17*	0.93*	0.04	1	
RIR	-0.11*	-0.20*	-0.18*	-0.13	-0.11*	-0.23*	0.15*	-0.25*	1

10- Manufacturing Sector

Table J1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	781,991	105,466	17,962,003	-7,447,770	2,678,390	364
Non-Current Assets	3,244,906	1,187,339	27,954,076	438	4,578,277	364
Return On Asset	5.97	3.08	337.91	-119.77	28.15	364
Firm Age	46.03	45	145	6	23.69	364
Return On Equity	10.10	6.53	1,063.52	-697.4	74.49	364
Sales	6,993,105	2,068,813	74,987,751	0	11,181,324	364
Debt Equity Ratio	1.54	1.30	37.68	-19.22	3.61	364
Net Profit	818,443	51,011.50	26,207,048	-2,492,990	3013,012	364
Real Interest Rate	2.51	3.27	7.76	-4.45	3.22	364

Table J2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.41*	1							
ROA	0.12*	0.03	1						
FA	0.14*	0.19*	0.00	1					
ROE	0.09*	0.05*	0.01	-0.01	1				
SALES	0.46*	0.78*	0.14*	0.30*	0.15*	1			
D/E	-0.11*	0.01	-0.14*	0.14*	-0.13*	0.02	1		
NP	0.53*	0.50*	0.20*	0.20*	0.18*	0.81*	-0.04*	1	
RIR	-0.01	-0.11*	0.07*	-0.06*	-0.05*	-0.07*	-0.02	-0.05*	1

11- Electrical Machinery & Appratus Sector

Table K1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	2,564,764	983,418	19,137,919	-516,135	4,437,790	78
Non-Current Assets	490,1381	1,660,156	25,608,208	14,753	7,161,722	78
Return On Asset	0.86	1.75	51.28	-26.92	10.23	78
Firm Age	69.16	61	145	26	33.44	78
Return On Equity	-1.54	4.56	198.35	-189.59	43.19	78
Sales	9,053,341	6,724,536	42,887,364	0	10,231,445	78
Debt Equity Ratio	3.90	1.92	135.89	-4.06	15.25	78
Net Profit	485,059	129,646	4,119,442	-1,802,160	1,004,454	78
Real Interest Rate	2.51	3.27	7.76	-4.45	3.24	78

Table K2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.82*	1							
ROA	0.21*	0.13*	1						
FA	-0.01	0.09*	-0.01	1					
ROE	0.15*	0.11*	0.83*	0.04	1				
SALES	0.89*	0.84*	0.24*	-0.01	0.20*	1			
D/E	-0.10*	-0.12*	-0.12*	-0.13*	-0.49*	-0.14*	1		
NP	0.76*	0.49*	0.37*	-0.03	0.26*	0.70*	-0.08*	1	
RIR	-0.08*	-0.13*	-0.19*	-0.04	-0.16*	-0.16*	-0.12*	0.05	1

12- Petroleum Sector

Table L1: Descriptive Statistics

Variables	Mean	Median	Max	Min	STD	N
Working Capital	1.98E+07	2383294	6.39E+08	-9.79E+07	7.78E+07	312
Non-Current Assets	5.56E+07	1.95e+07	5.09E+08	12842	8.30E+07	312
Return On Asset	5.48	6.44	43.8	-122.28	12.74	312
Firm Age	42.54	36	109	3	25.36	312
Return On Equity	19.79	17.54	784.79	-455.3	67.94	312
Sales	1.47E+08	9.25e+07	2.45E+09	0	2.47E+08	312
Debt Equity Ratio	1.96	1.38	131.9	-84.92	13.58	312
Net Profit	1.33E+07	3078862	2.33E+08	-1.68E+07	3.14E+07	312
Real Interest Rate	2.52	3.28	7.76	-4.45	3.23	312

Table L2: Correlation Matrix

COR	WC	NCA	ROA	FA	ROE	SALES	D/E	NP	RIR
WC	1								
NCA	0.40*	1							
ROA	0.21*	0.09*	1						
FA	0.07*	0.53*	0.02	1					
ROE	-0.02	0.08*	0.27*	-0.03	1				
SALES	0.18*	0.28*	0.02	0.21*	0.09*	1			
D/E	0.00	0.03	0.02	0.03	-0.41*	0.07*	1		
NP	0.86*	0.568	0.33*	0.16*	0.05	0.27*	0.02	1	
RIR	-0.12*	-0.08*	-0.05*	-0.06*	-0.06	-0.12*	0.09*	-0.06*	1

Questions for interview

1. Can we use working capital as a variable of investment in case of Pakistan?
2. What is the relationship between firm age and investment in Pakistan?
3. How does firm age influence firm performance within all non-financial firms in Pakistan?
4. Which firms invest more (old firms or new firms)?