MACROECONOMIC FACTORS AND FIRM PERFORMANCE: AN EMPIRICAL INVESTIGATION FROM LISTED FIRMS OF PAKISTAN AUTOMOBILE INDUSTRY

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ABSTRACT

This study examines the impact of macroeconomic variables on the performance of listed firms in Pakistan's automobile industry from 2010 to 2021. The OLS (Fixed, Random) estimation method is used to gauge the impact of macroeconomic variables on firm performance. Results indicate that inflation, interest rates and GDP growth have insignificant effects on performance proxies (i.e., return on assets, return on equity and market-to-book ratio). This study tries to fill a gap in the literature, to investigate the impact of macroeconomic factors on firm performance in the context of the automobile industry in Pakistan.
Keywords: *macroeconomic, firm performance, automobile industry.*

INTRODUCTION

This paper defines firm performance as a multi-dimensional construct that depends on internal and external antecedents. Microeconomic factors which include leadership, product quality, organization culture, and operating efficiency explain how a firm can cope with change (Broadstock et al., 2011). On the other hand, macro business factors such as inflation, interest rates, GDP, and government policies form part of the external environment, which holds both opportunities and risks for firms (Adidu & Olanye 2006). Knowledge of the mutually reinforcing effects of micro and macro environments is fundamental in strategies aimed at improving the competitiveness of firms and their corresponding sustainability. It is noticeable even more so during the transitional or the managerial upheavals or drastic economic changes occurring around the business. For instance, firms' operational risks have been evidenced through global occurrences like the 2007/2008 financial crises or regional shocks like exchange rate fluctuation (Issah & Antwi, 2017). In developing countries like Pakistan, those macroeconomic factors have even higher impact where structural problems like inflation, interest rate fluctuation and unstable Policies are dominant factors Zeitun et al. (2007). Waqas et al., (2024) have found that inflation has a positive, while interest rates are negatively related to market-to-book ratio firms belonging to the Pakistan textile industry. They just investigated the macroeconomic variables like

inflation, interest rates and GDP growth on the Market-to-Book ratio and ignored accounting measure of performance like ROA and ROE.

Among various performance indicators, economic constructs like Return on Asset or ROA and Return on Equity or ROE are most relevant in the context of firm performance. ROA shows the firm's effective investment in generating profit and actual profit earned on assets, while ROE shows the firm's ability to give returns to shareholders on their investments in the firm. These indicators are normally used jointly with other market-based measures such as the market/ book (M/B) ratio to assess the overall performance and market value of firms. The nature of these dynamics can be best explained with the help of an example, and, thus, the subject matter of the given paper – the Pakistani automobile industry. Being one of the key industries of manufacturing this industry promotes employment, contributes to technological advancement, and plays a role of a powerful stimulus to GDP increase. However, its production cost is high, energy crises, depreciation of currency and policy incompatibilities presents some of the major challenges to it. It also amplifies operations challenges by the inflation rates and interest rates that reduce the funding possibilities. However, internal environments such as leverage, return on assets, and firm age affect firms' competitiveness. It is the research agenda of this study to examine the role of macroeconomic factors (inflation, interest rates, and growth rate of GDP) and micro factors (firm age, leverage, ROA, ROE and profitability) on the automobile firms in Pakistan. Thus, the study will fill a gap in the literature and contribute towards the understanding of factors affecting firm valuation and operational performance in an emerging economy.

It is therefore important for policymakers, investors, and managers of the firm to have an insight into the factors that affect firm performance. Despite the existence of many theoretical and empirical investigations of the macroeconomic and microeconomic association in different industries. Because the automobile industry is vital to the Pakistan economy, understanding the combined impact of the internal and external environment may assist its stakeholders in determining ways of enhancing the industry's competitiveness and profitability. Moreover, ROA and ROE as important constructs of the operational and financial efficiency of firms improve the effectiveness of the study's measurement. Through the establishment of these relations, the study seeks to fill a research gap and support the analysis of firm performance in developing economies.

2. Review of Literature

2.1: Macroeconomics factors and firms' performance

There has been consistent literature showing the effect of several macroeconomic factors on firm performance. In the same article, Issah and Antwi (2017) analyzed how real GPD, unemployment and exchange rates affected firms' performance in the UK and observed high predictive capability of the variables (coefficients of determination of 0.91). In the same regard, Mwangi and Wekesa (2017) concluded that interest rates and taxes largely impacted on performance of Kenya Airways. However, Kiganda (2014) noted that the GDP, inflation and exchange rates did not affect the profitability of Equity Bank in Kenya. In the Pakistani context, through the systematic literature review, Mirza and Javed (2013) found that inflation and exchange rate risk had negative impacts on corporate performance while Kanwal and Nadeem (2013) established interest rate as having a significant influence on banking performance. These results show how macroeconomic factors affect industries and regions differently.

2.2 Microeconomic Factors and Firm Performance

Throughout the literature, several firm-specific factors which include leverage, profitability, return on assets (ROA), and return on equity (ROE) are as essential determinants of performance. Kuntluru et al (2008) & Pavelková & Knápková (2009), the study observed that the use of Leverage as well as Profitability has a dominant influence to the valuation of firms. For instance, improved profitability (as shown by ROA and ROE) means better resource use hence

better market value. Nonetheless, high leverage may affect firm performance by raising the financial risk and constraining the growth prospectively (Lasisi et al., 2017; Mohammed & Usman, 2016).

The overall age of a firm has also been looked at as an element that would influence its performance. Bhutta and Hasan (2013) also found that there was no significant and direct relationship between firm age and profitability in Pakistan's food sector noting industry peculiarities.

2.3 Market-to-book ratio, ROA and ROE as Performance Constructs

The formula used to evaluate firm performance is Return on Assets (ROA) and Return on Equity (ROE). ROA on the other hand refers to the ability of a firm to harness the value of its assets and bring out the profit on them. In contrast, ROE showcases the quantity of returns that is established on shareholders' equity. These measures provide broad insight into a firm's efficiency and economic performance. Optimising ROA and ROE has gained a lot of attention based on several types of research. For example, Sambasivam and Ayele (2013) showed positive

and significant evidence of ROA, ROE and firm-specific factors in Ethiopia's insurance industry. Similar findings were made by Sumaira & Amjad (2013) in their study of the position of the insurance industry in Pakistan. The results of this study stress the significance of ROA and ROE as performance constructs, from which one can compare the efficiency of certain kinds of firms with others. Waqas et al., (2024) have found that inflation has a positive, while interest rates are negatively related to market-to-book ratio firms belonging to the Pakistan textile industry. So, this finding provides a basis to test in detail other listed industries located in Pakistan.

3.Data, Variables and Methodology
1.1 Data

The purpose of this study is to identify the variables affecting Pakistan's auto industry's performance. Along with panel data regression analysis, the study uses the OLS, Fixed Effects (FE), and Random Effects (RE) models. From 2011 to 2020, the panel data includes 110 observations from 11 cross-sectional units representing different companies within the Pakistani automobile sector.

1.2 Variables and its measurement
Table 1 displays the variables and its measurement.

Table 1: Variables and its measurement	
Variables	**Measurement**
Dependent variable	
Market to book ratio (MBR)	= (Total share outstanding plus book equity) / (Total debt plus shares outstanding as of the fiscal year's last day)
Return of assets (ROA)	Net profit divided by total assets of the firm
Return of equity (ROE)	Net profit divided by equity of the firm
Independent variables	
Inflation (INF)	Information taken from the World Bank database and trading economies.
GDP growth rates(GDPG)	Information taken from the World Bank database and trading economies.
Interest rates(INTR)	Information taken from the World Bank database and trading economies.
Profitability(EBIT)	= EBIT divided by total assets
Leverage MDR	= Total debt divided by total debt plus the fiscal year-end price × outstanding shares.
Firm age (AGE)	=Natural log of the years since the establishment of the business
Beta (BETA)	β is equal to the covariance of market and individual stock returns divided by the variance (market return).

3.3 Estimation method

Because panel estimating takes into account both time-series and cross-sectional variables, it offers

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a robust framework for researching longitudinal data. The basic model is improved by using Ordinary Least Squares (OLS) regression to take into consideration variations among enterprises and time periods. By using firm-specific fixed effects to detect within-firm differences across time and take unobserved heterogeneity into account, fixed effects regression enhances the study. By assuming that firm-specific effects are uncorrelated with the independent variable, random effects regression, on the other hand, accounts for unobserved variation across companies. These techniques offer a comprehensive approach to panel data analysis and shed light on the relationships between independent and dependent variables by taking into consideration both within-firm and inter-firm changes over time.

The impact of GDP growth rates, interest rates, and inflation on company performance is estimated using the following equation.

$$MBR_{it}=\alpha+\beta_1 INF_{it}+ \beta_2 INTR_{it}+ \beta_3 GDPG_{it}+ \beta_4 AGE_{it}+ \beta_5 EBIT_{it}+ \beta_6 BETA_{it}+ \beta_7 MDR_{it}+\mu_{it} \dots\dots 1$$

$$ROA_{it}=\alpha+\beta_1 INF_{it}+ \beta_2 INTR_{it}+ \beta_3 GDPG_{it}+ \beta_4 AGE_{it}+ \beta_5 EBIT_{it}+ \beta_6 BETA_{it}+ \beta_7 MDR_{it}+\mu_{it} \dots\dots 2$$

$$ROE_{it}=\alpha+\beta_1 INF_{it}+ \beta_2 INTR_{it}+ \beta_3 GDPG_{it}+ \beta_4 AGE_{it}+ \beta_5 EBIT_{it}+ \beta_6 BETA_{it}+ \beta_7 MDR_{it}+\mu_{it} \dots\dots 3$$

4. Results and discussion

Table 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
MBR	110	1.31	0.63	0.55	2.73
ROA	110	0.07	0.08	-0.21	0.23
ROE	110	0.12	0.20	-0.60	0.62
INF	110	9.89	5.02	3.77	20.29
GDPG	110	3.92	1.43	0.40	5.50
INTR	110	10.08	3.11	5.75	14.50
AGE	110	3.25	0.36	2.71	3.87
BETA	110	0.72	0.37	0.07	1.46
TMDR	110	0.41	0.24	0.10	0.86
EBIT	110	0.13	0.10	-0.05	0.29

The study's descriptive data are displayed in Table 2. The mean market-to-book ratio is 1.31 for the automobile sector of Pakistan. The average ratio of return on assets is 0.07. The average ratio of return on equity is 0.12. 9.89 is the average rate of inflation. 3.92 is the average GDP growth rate. Throughout the study period, the average interest rate was 10.08. 3.25 is the average firm age. Leverage is 0.41 on average. The mean profitability is 0.13. The average beta value for the automotive industry is 0.72.

Table 3: Correlation Matrix

	MBR	ROA	ROE	INF	GDPG	INTR	AGE	BETA	TMDR	EBIT
MBR	1									
ROA	0.422***	1								
ROE	0.373***	0.894***	1							
INF	-0.462***	-0.196*	-0.144	1						
GDPG	0.469***	0.277**	0.228*	-0.361***	1					

INTR	-0.544***	-0.219*	-0.150	0.948***	-0.510***	1				
AGE	0.476***	0.450***	0.386***	-0.288**	0.184	-0.286**	1			
BETA	0.347***	-0.165	-0.0604	-0.231*	0.134	-0.225*	-0.0258	1		
TMDR	-0.541***	-0.672***	-0.478***	0.381***	-0.399***	0.463***	-0.419***	0.0696	1	
EBIT	0.457***	0.945***	0.828***	-0.164	0.261**	-0.193*	0.481***	-0.123	-0.646***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The study's correlation matrix is displayed in Table 3. A test for determining multi-collinearity between variables is correlation. ROA, ROE, GDP growth rates, firm age, profitability, and beta all have a positive and strong correlation with the market to book ratio. The market-to-book ratio is negative and strongly correlated with leverage, interest rates, and inflation. ROE, GDP growth rates, firm age and profitability all have a positive and strong correlation with the ROA. The ROA is negative and strongly correlated with leverage, interest rates, and inflation. GDP growth rates, firm age and profitability all have a positive and strong correlation with the ROE. The ROE is negative and strongly correlated with leverage. Multi-collinearity between the variables in this study is not possible, according to correlation analysis.

Table 4: Regression results from equation 1

	OLS	Fixed	Random
INF	0.0118	0.0229	0.0229
	(0.0266)	(0.0227)	(0.0227)
GDPG	0.0304	0.0328	0.0328
	(0.0319)	(0.0284)	(0.0284)
INTR	-0.0477	-0.0681	-0.0681
	(0.0399)	(0.0399)	(0.0399)
AGE	0.133	0.261	0.261
	(0.704)	(0.271)	(0.271)
BETA	0.187	0.308**	0.308**
	(0.121)	(0.114)	(0.114)
TMDR	-1.656***	-1.323***	-1.323***
	(0.296)	(0.273)	(0.273)
EBIT	0.957	1.003	1.003
	(0.568)	(0.556)	(0.556)
CONS	1.552	0.990	0.990
	(2.373)	(0.959)	(0.959)
N	110	110	110

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 shows the regression results of equation 1. This study investigates the influence of macroeconomic variables on the performance of listed firms in Pakistan's automobile industry over the period 2010 to 2021. Using the Ordinary Least Squares (OLS) estimation method with fixed and random effects models, the analysis focuses on understanding how key macroeconomic indicators, such as inflation, interest rates, and GDP growth, affect firm performance, specifically measured through the market-to-book ratio. The findings reveal that inflation, interest rates, and GDP growth exert an insignificant impact on the market-to-book ratio, suggesting that the broader economic environment may not play a substantial role in shaping firm valuations within this industry. In contrast, firm-specific factors demonstrate more significant results. Firm beta, a

measure of market risk, shows a positive and significant effect on the market-to-book ratio, indicating that higher market risk corresponds to increased investor valuations. On the other hand, leverage has a negative and significant effect, highlighting that higher debt levels reduce firm value, likely due to increased financial risk. Additionally, firm age and profitability exhibit positive but statistically insignificant effects on

the market-to-book ratio, suggesting that while these factors may contribute to firm valuation, their influence is not strong enough to yield significant results. Overall, the study underscores the dominance of firm-specific factors, such as risk and leverage, over macroeconomic variables in determining firm performance within Pakistan's automobile sector.

Table 5: Regression results from equation 2 and 3

Equation	2			3		
	OLS	Fixed	Random	OLS	Fixed	Random
INF	-0.00282	-0.00279	-0.00282	-0.00891	-0.00533	-0.00891
	(0.00172)	(0.00219)	(0.00172)	(0.00750)	(0.00942)	(0.00750)
GDPG	0.00233	0.00299	0.00233	0.00791	0.00176	0.00791
	(0.00221)	(0.00263)	(0.00221)	(0.00954)	(0.0113)	(0.00954)
INTR	0.00414	0.00301	0.00414	0.0159	0.0169	0.0159
	(0.00308)	(0.00329)	(0.00308)	(0.0134)	(0.0141)	(0.0134)
AGE	-0.00639	-0.0281	-0.00639	-0.00630	0.204	-0.00630
	(0.00960)	(0.0580)	(0.00960)	(0.0560)	(0.249)	(0.0560)
BETA	-0.0134	-0.0111	-0.0134	0.0240	0.0181	0.0240
	(0.00736)	(0.00994)	(0.00736)	(0.0350)	(0.0427)	(0.0350)
TMDR	-0.0311	-0.0108	-0.0311	0.0391	0.0108	0.0391
	(0.0170)	(0.0244)	(0.0170)	(0.0824)	(0.105)	(0.0824)
EBIT	0.738***	0.760***	0.738***	1.877***	1.905***	1.877***
	(0.0384)	(0.0468)	(0.0384)	(0.179)	(0.201)	(0.179)
_CONS	-0.00178	0.0643	-0.00178	-0.242	-0.934	-0.242
	(0.0386)	(0.196)	(0.0386)	(0.211)	(0.839)	(0.211)
N	110	110	110	110	110	110

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 shows the regression results of equation 2 and 3.This research examines the effect of macroeconomic variables on the performance of listed firms in Pakistan's automobile industry from 2010 to 2021, using the Ordinary Least Squares (OLS) with fixed and random effects in model. The research studies the relationship between firm performance proxies (return on assets, ROA, and return on equity, ROE) in macroeconomic indicators like inflation, interest rates, and GDP growth. In addition, the results indicate that the broader economic conditions, captured by inflation, interest rates, and GDP growth, have no statistically significant relationship with both ROA and ROE in the apparel sector. Moreover, factors firm specific, which include firm age, betta (market risk) and

leveraged, have negative but insignificant effects on ROA and ROE implying that this factor does not significantly diminish firm performance. But profitability is a key determinant that positively and significally affects ROA, ROE and is very important in enhancing firm performance. Results indicate that macroeconomic variables and some firm specific variables are less significant, whereas profitability continues being a strong indicator of financial performance in the automobile industry of Pakistan.

5. Conclusion
The study concludes that the macroeconomic variables like inflation, interest rate and GDP growth do not have any significant effect on the performance of listed firms in Pakistan's automobile industry either as indicated by market to book ratio, return on assets (ROA) or return on

equity (ROE). This indicates that firm level performance within the sector is largely independent of the broader economic environment. In the converse, firm specific factors are differently impactful. Market to book ratio positively and significantly relates to firm beta, suggesting that investors are optimistic about firms with higher market risk, while leverage negatively and significantly affects market to book ratio, suggesting that too much debt reduces firm value. Results for some other variables including firm age and profitability are mixed, and profitability is found to be the most significant determinant and a positive and significantly related to both ROA and ROE. We find that more profitable and better risk managers proved to be the more crucial factors in determining firm performance than the macroeconomic factors. Therefore, managers and policymakers of Pakistan automobile sector should be concerned with increasing the profitability, as it sets the main principle of growth and also ensuring financial stability for sustainable growth

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