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**Economic Fluctuations and Mutual Fund Performance in Pakistan: A Comprehensive Analysis Including the COVID-19 Period****Abdul Mateen¹, Rana Yassir Hussain², Shujah-ur-Rahman³****Abstract**

This study delves into a decade-long analysis of mutual fund performance in Pakistan, spanning from July 2012 to June 2022. It encompasses the role of macroeconomic determinants on performance of mutual funds (i.e., Shariah-compliant and conventional funds). The objective is to provide precise insights for investors and fund managers, enhancing their ability to navigate the complex mutual fund landscape. Our empirical investigation unearths macroeconomic factors affecting mutual funds. Factors such as Gross Domestic Product (GDP), inflation, and the disruptive influence of the COVID-19 pandemic have presented formidable challenges. Conversely, the study identifies resilience in mutual fund performance linked to population trends, the KSE100 index's enduring strength, worker remittances, fiscal policy effectiveness, and trade prosperity. Importantly, these patterns hold true for both Shariah-compliant and conventional mutual funds, underlining their consistency across a range of performance metrics. Our findings offer invaluable guidance for investors and contributes to the decision-making toolkit and empowering them with actionable insights.

Keywords: Macroeconomic Determinants, Mutual Funds, Sharp Ratio, GMM, Pakistan

1. Introduction

Mutual funds serve as primary financial institutions, enabling individuals to transform their savings into lucrative investments (Babalos et al., 2015). Mutual funds offer investors the chance to diversify their portfolios across a range of assets, including debts, equity, government securities, and money market instruments (Asad & Siddiqui, 2019). It represents the most practical platform for managing savings and is particularly attractive to investors who prefer not to make their own portfolio decisions (Cagnazzo, 2022). Mutual funds gained popularity, distinct from other financial institutions, primarily because the general public often lacks the necessary information for effective portfolio investments and encounters difficulties in making their investment decisions. These funds are managed by teams of highly trained financial experts with specialized expertise in fund management. They carefully allocate assets and strive to generate income or capital gains for investors. Unlike traditional deposits and savings, mutual funds have the potential to deliver superior returns over an extended period.

It's crucial to acknowledge that every investment carries inherent risk, and we cannot expect mutual funds to be exempt from this. The level of risk and potential return offered by each mutual fund may hinge on its specific nature and category. Some mutual funds may present lower risk and return profiles, while others may offer higher levels of both. Nevertheless, in comparison to bonds and stocks, investments in mutual funds offer significantly greater benefits while carrying relatively lower risks. Sipra, (2004) emphasized three key advantages for mutual fund investors. According to his analysis, mutual funds mitigate investment risk in market instruments through diversification. Skilled financial experts within the stock market professionally manage investors' funds. Additionally, mutual funds provide opportunities for small investors to obtain returns by holding diversified portfolios, facilitated by the pooling of speculative funds.

Over an extended period, financial market investors had been in pursuit of stable returns. It was during the 1980s and 1990s that mutual funds emerged as regulated and professionally managed investment vehicles, offering remarkable returns. During this period, developed economies witnessed an unprecedented surge in mutual fund activity. To illustrate, in 1992, 1.6 trillion US dollars is the total assets which were managed by mutual funds, and by 1998, it had surged to a staggering USD 5.5 trillion. European Union nations also experienced remarkable growth rates, ranging from 35 percent in countries like Ireland, Finland, Denmark, and Belgium to 48 percent in Italy, and as high as 78 percent in Greece (Gyimah et al., 2021a).

Investment size of mutual fund globally in 2011 stood at USD 28.4 trillion, as per the data of investment firms. With such substantial volume and growth potential, it becomes imperative for financial regulators and investors alike to comprehend the potential performance drivers of mutual funds, especially in emerging economies like Pakistan. Indeed, amidst the current financial crisis, the dynamics of changes in economic conditions and investment flows within the financial market hold significant relevance for both the government and policymakers in Pakistan. Consequently, in Pakistan, there exists a pressing need to identify the factors capable of attracting stable investment returns, an achievement made possible through robustly performing funds.

Mutual funds made their debut in Pakistan in 1962 with the establishment of the country's first Asset Management Company (AMC), known as the National Investment Trust. At present, it stands as the sole public sector entity offering mutual funds with open ended in the market. The Investment Corporation of Pakistan was founded in 1966, offering various close-ended mutual funds; however, it underwent privatization in June 2000 (Afza & Rauf, 2009). Since then, Pakistan's economy has great influence of mutual funds. The mutual fund sector in Pakistan has experienced significant expansion over the last decade, witnessing a remarkable 13.4 percent rise as per the mutual funds association of Pakistan (Siddiqi, 2014; Alvi & Rehan, 2020). Despite the notable growth, mutual fund assets in Pakistan remain considerably smaller when compared to neighboring India. In December 2013, Pakistan's mutual fund assets were valued at USD 3,159 million, whereas India reported assets worth USD 114,489 million, and the global valuation stood at USD 26,837,407 billion (Pham et al., 2021). Presently, the mutual fund assets in Pakistan have increased to USD 7,418 million, but this figure still falls significantly short of India and other developing countries (Maurya, 2015).

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Several factors contribute to this disparity. Firstly, Pakistan's mutual fund market is relatively young, characterized by lower liquidity and a lower level of information efficiency. Secondly, the industry has yet to attract sufficient attention from researchers, hindering efforts to explore the determinants of the performance of mutual funds in Pakistan. The mutual funds' performance can be influenced by both external (macroeconomic) and internal (firm-specific) factors. Previous literature has provided evidence of relationships between internal factors, such as the flow of investors' funds (Zheng, 1998; Asif & Simsek, 2014; Wang & Rehman, 2015), their volatility (Rakowski, 2002), expense ratio (de Bello et al., 2010; Shahbaz, 2015; Hamid, 2015), fund size (Muridili et al., 2022), age of fund, size, and growth (Janes et al., 2018), economies of scale, and expertise (Belgacem et al., 2021), and performance of funds. In contrast, Cheng & Dewi, (2020), Gusni et al., (2018), and Gyimah et al., (2021b) focused the impact of variables related to macroeconomics on the operational effectiveness and expansion of mutual funds has been a focal point. Gyimah et al., (2021b) examined the connection of factors that are economic determinants (exchange rate, inflation, GDP and T-bills) and fund performance in Ghana using data from 2007 to 2016. (Cheng & Dewi, 2020) explored the influence of inflation, risk and money supply on fund performance using data from 2015 to 2017. Kaur, (2018) examined the correlation between macroeconomic developments and the mutual funds returns. The study accompanied on performance of mutual fund in these studies has produced inconclusive outcomes, and scholars have put forward numerous factors that can affect the mutual funds' performance in various economic contexts. Thus, there is a pressing need to identify the determinants of performance in the context of Pakistan.

The present study makes distinctive contributions to the current understanding in numerous significant ways. First, it assesses the influence of economic determinants on performance of mutual fund in Pakistan. Furthermore, it delves into the COVID-19 influence on performance of funds. Thirdly, this impact analysis is conducted separately for both types of funds, one is conventional and other is Islamic funds. Fourthly, this study stands out by employing a combination of static and dynamic panel techniques, ensuring the robustness of the models employed.

2. Literature Review

The mutual fund industry's rapid growth, even during challenging economic conditions, has garnered significant attention from researchers. A comprehensive review of the existing literature reveals a predominant emphasis on two primary areas: performance evaluation and the identification of factors that exert influence on mutual fund performance (Gusni et al., 2018). In this section, we will delve into the literature pertinent to the determinants of mutual fund performance, with a specific focus on macroeconomic determinants. Given the limited body of literature within the Pakistani context, we have also gathered evidence from diverse global economies to enrich our understanding of performance determinants.

Meziane et al., (2013) conducted an investigation into the ramifications of macroeconomic factors, namely GDP, interest rate, and inflation on the returns from stock of Both less developed and more developed economies. Their study crossed over the span of December 1991 to August 2012, utilizing monthly data in conjunction with the EGARCH model. The outcomes of their analysis revealed a robust correlation between macroeconomic indicators and stock market performance. Specifically, their findings indicated a causal bond between share market and inflation, while a unidirectional link was observed among share returns and interest rates.

Yadav et al., (2017) observed the correlation amid macroeconomic advancements and the returns of funds. The investigations into performance of mutual fund in these studies have produced inconclusive outcomes, with research suggesting a multitude of features that can influence mutual fund performance in a variety of economic settings. The research utilized various regression and correlation methods to ascertain connections between variables. It was observed that the CPI and exchange rates exhibited an inverse correlation, whereas foreign reserves demonstrated a notably positive association.

Gusni et al., (2018) identification of performance factors of mutual funds and evaluation of equity funds has attracted investors attention in Indonesia. Using Treynor risk-adjusted approach for performance evaluation, The research investigated the elements affecting performance. By analyzing data spanning from 2011 to 2015 for 19 mutual funds, it was determined that the proficiency in stock selection and the presence of inflation positively affect the performance of mutual funds in equity section, In contrast, a larger fund size has an adverse effect.

Sumantyo & Savitri, (2019) made a significant contribution by examining the influence of macroeconomic indicators on Shariah-compliant mutual funds, with a primary focus on the prominent Shariah markets of Malaysia and Indonesia. Utilizing data for the duration of January 2012 through December 2016, the study revealed the effects of Inflation, GDP, and money supply on the Net Asset Value of funds within the Islamic finance-compliant capital market. The research findings indicated that all these aspects exhibited a favorable influence on the performance of Shariah-compliant funds. Alvi & Rehan, (2020) they undertook an investigation aimed at identifying the aspects influencing the mutual fund effectiveness in Pakistan. To achieve this, they gathered quarterly data spanning from March 2013 to 2018, encompassing 16 Asset Management Companies (AMC) and 114 mutual funds. The findings derived from their regression analysis indicated that KSE100 returns, fund risk, and assets under management all exhibit positive associations with the mutual fund effectiveness in Pakistan.

Saleh et al., (2019) studied the impact of the stock market benchmark and inflation on Islamic fixed income mutual funds. They used secondary data i.e. inflation, share price index, and historical data applying Net asset value. The study used panel regression. The findings align with existing research, highlighting a simultaneous and significant influence of inflation and equity price indices linked to the net asset value of Sharia-compliant mutual funds. Additionally, the study unveiled a detrimental effect of inflation on NAV and a favorable effect of equity price on NAV in mutual funds.

Saleh et al., (2019) analyzed the power of macroeconomic causes on Islamic and conventional funds. The study also included systematic factors to check their impact on Assets, income and equity mutual funds. Research evidence suggest significant influence of macroeconomic factors on Islamic and conventional funds. Market index and trade reported positive relation with overall funds. GDP, discount rate and inflation reported negative impact on asset, income and equity funds. Cheng & Dewi, (2020) examined the macroeconomic factors (money supply, risk rate and inflation) impact on Indonesian mutual funds for the data from 2015 to 2017. The study documents that impact of money supply and inflation on Indonesian funds is negative and significant. The correlation among rate of risk and Indonesian mutual funds is positive and major.

In Ghana, research on mutual fund have also attracted researchers' attention. Gyimah et al., (2021b) examined the acting factors of mutual funds in Ghana. The research focused on identifying the macroeconomic factors that influence performance. The ARDL method using Pooled mean group estimation is used to test the hypothesis. Information pertaining to mutual funds operating in Ghana has been gathered from the period spanning 2007 to 2016. It is observed that GDP growth exerts a favorable influence, while the policy rate is found to have an contrary outcome on the mutual funds performance. Ansari & Zaman, (2021) also attempted to examine the industry growth factors of mutual fund in Pakistan. After collecting data for the period 2011 to 2020, SPSS is used to perform regression analysis. Ansari and Zaman identified that inflation, interest rate and GDP growth rate negatively influence Pakistan mutual fund industry growth. The also identified that exchange rate positively influence Pakistan mutual funds growth.

Hussain et al., (2016) showed a research on the performance of mutual funds in the Pakistani market. Their study encompassed an analysis of 27 mutual funds, utilizing data from July 2005 to June 2013. The findings of the study indicate that mutual funds underperformed when compared to industry performance. More specifically, the research identified a weakness in the selection abilities of fund managers. Bilawal et al., (2016) examined the optimize the efficacy of funds with a predetermined market capital limit. in Pakistani markets, utilizing five different measures, during the period from January 2009 to December 2013. Their study encompassed five closed-end mutual funds. The findings revealed a period of underperformance among closed-ended mutual funds. The results indicate that the widely used measure called Treynor ratio and the Information methods reflected acceptable success, while other metrics revealed significant underperformance by these mutual funds.

Qasim et al., (2015) conducted an analysis of income fund performance and the timing abilities of managers in Pakistan. Their study employed the Treynor and Mazuay measures, covering a dataset spanning five years from July 2009 to June 2014 and encompassing 30 income funds. The results showed that 23 of these income funds exhibited positive Treynor values, indicating strong performance and effective diversification. Furthermore, the study revealed that approximately two-thirds of the managers demonstrated proficiency in timing abilities.

Biswas, (2023) conducted a effectiveness assessment of funds in Indian markets, with a emphasis on lower to mid-sized capitalization funds. The research utilizes samples from 20 funds, with 10 in each category, to measure the effectiveness of selected Indian funds over an eight-year period from 2015 to 2022. The outcomes confidently suggest that micro-cap mutual funds represent a compelling investment choice for stockholders who are seeking significant investment chances and are poised for accelerated growth, as indicated by a comparison with mid-cap mutual funds. Nursanita & Pratiwi, (2023) conducted a relative effectiveness assessment of conventional and Islamic mutual funds for the period of start from 2017 to the year 2021. This measureable study examined the effectiveness of both types of mutual funds during this timeframe. The findings indicate that mutual funds from diverse traditions received a progressive evaluation, being categorized as good.

Mustaqim et al., (2023) investigate the planning, budgeting, and monitoring processes involved in using village funds to prevent and manage COVID-19. Data is collected through interviews, and the initial findings encompass the planning process for preventing COVID-19 with village funds, as well as the budgeting process, which includes reallocating funds and providing emergency financing. Artamonov & Kurbatskii, (2023) explored the factors influencing the higher effectiveness of funds related to the market, focusing on macroeconomic indicators as the primary variables of interest. The results suggest that both positive and negative shifts in the spread between corporate bond yields have substantial and favorable impacts across various time periods, carrying practical implications for prospective investors.

Petridis et al., (2023) investigated the influence of ESGs effectiveness on mutual fund proficiency in the context of the COVID-19 virus. Using DEA and assumption testing, the research shown that funds with less ESG contention assessments, indicating a lower frequency of ESG controversies, yielded better results than those with higher scores. Funds with less ESG controversies established better financial proficiency, irrespective of their terrestrial focus. Ishak et al., (2022) examined the influence of the Covid-19 virus on the effectiveness of compartive mutual funds in Malaysian market. This research utilized more than one analytical approaches, empirical breakdown and a comprehensive effectiveness analysis. The results revealed that both types of funds displayed relatively strong success, surpassing established benchmarks during virus.

Muridili et al., (2022) collected secondary data covering the period from September 30, 2018, to August 31, 2021, for the purpose of assessing and comparing the risk-adjusted performance of five hedge funds and five mutual funds operating in the South African context. The findings indicate that both hedge and mutual funds demonstrated stronger risk-optimized return. before the onset of the Covid-19 pandemic, in contrast to the pandemic period. Significantly, hedge funds outperformed mutual funds in this aspect during the Covid-19 period.

3. Methodology

This segment addresses the dataset and the identification of factors utilized in the research. It also delves into the empirical model and provides an overview of the analysis particulars within this section.

3.1. Data, Sample and Variables

Presently, Pakistan boasts 19 Asset Management Companies (AMCs) operating within its borders, collectively offering a total of 48 funds in both the equity and Shariah-compliant equity mutual fund segments. Among these, 28 are of the conventional variety, while the remaining 20 adhere to Shariah-compliant principles. Our sample comprises mutual funds registered prior to July 2012 that continued to exist through June 2022. We excluded funds with incomplete data for this specified period from our analysis. Out of the initial 48 funds, 21 were established after July 2012 and were consequently omitted from our study, as our focus is exclusively on funds with a tenure exceeding 10 years. Consequently, our finalized sample comprises 27 funds, each equipped with comprehensive data spanning the study period. This encompassing sample consists of 19 conventional funds and 8 Shariah-compliant funds. Data pertaining to these mutual funds was meticulously gathered from the Mutual Fund Association of Pakistan website and the Karachi Stock Exchange (KSE). Macroeconomic data was meticulously sourced from economic surveys and the Ministry of Finance website.

In our present research, we have created two distinct models to achieve our goals. The initial model employs the Overall Performance (OP) of mutual funds as the dependent variable, with historical return data serving as the proxy for measuring OP.

The second model, on the other hand, utilizes the Sharpe ratio of mutual funds as the dependent variable. This model is employed to assess the resilience of the influence of aggregate economic determinants on mutual fund performance in Pakistani market. The Sharpe ratio is measured as follows:

$$\text{Sharpe Ratio} = \frac{(R_p - R_f)}{\sigma_p} \quad \text{.....} \quad (1)$$

Where

R_p estimates portfolio return, R_f estimates the risk-free return while σ_p indicates portfolio standard deviation.

3.2. Empirical Strategy

Our analytical approach unfolds in two key phases. Initially, we employ regression called OLS which stand for ordinary least squares, to check the influence macroeconomics aspects on the effectiveness of mutual funds. Subsequently, we employ a fixed effect regression model, a selection validated through the Hausman test to discern whether fixed or random effects are more appropriate. Nonetheless, as our model is subject to continuous changes, employing conventional OLS estimators might result in potential bias owing to the inherent association between unobserved panel-level effects and past dependent variables. Arellano & Bond, (1991) and Yitayaw et al., (2023) developed an advanced model for dynamic panel based on GMM which were known as innovative estimation procedure.

This method effectively tackles issues related to endogeneity and unobserved heterogeneity, which have the potential to introduce bias into research results. Their approach encompasses the integration of additional instruments within the dynamic panel framework, along with the incorporation of various transformations. Blundell & Bond, (1998) and Ullah et al., (2018) enhanced the estimator by introducing supplementary constraints on early situations, thereby facilitating the integration of extra tools to increase the competence of estimation. This approach resulting in a pair of equations known as the System GMM. One of these equations is the original, while the other is a modified version.

Bond, (2002) suggests that the existence of a unit root stuff in the figures can lead to a bias in the estimation results when using the Difference Generalized Method of Moments also known as Difference GMM estimator. In contrast, the System GMM method is argued to produce more accurate and precise results. The Difference GMM method aims to moderate internal causality through differencing all explanatory variables and eliminating fixed effects. Nevertheless, this initial differencing process has a limitation, as it involves subtracting the previous data point from the current one, which may potentially accentuate data gaps and have some impact on the projected results (Ullah et al., 2018).

In order to address concerns related to endogeneity, the System GMM method incorporates a larger set of tools designed for both the lagged response variable and somewhat other potentially internal causality factor. This expansion significantly improves the efficiency of estimation. Furthermore, the System GMM technique applies a transformation to these instruments to maintain their uncorrelated (exogenous) status with fixed effects. In contrast to the Differenced GMM approach, which withdraws the previous reflection from the existing one, the System GMM method computes the difference between the averages of all forthcoming variable observations, thereby distinguishing its approach (Yitayaw et al., 2023). Consequently, in our study, to address concerns related to heteroscedasticity, autocorrelation, and endogeneity, we have opted to utilize the System GMM approach.

The empirical model for the regression analysis with overall performance as a proxy for mutual fund performance is represented by equation 2.

$$\text{OP}_{it} = \alpha_0 + \beta_1 \text{GDP}_{it} + \beta_2 \text{POP}_{it} + \beta_3 \text{CPI}_{it} + \beta_4 \text{WR}_{it} + \beta_5 \text{KSE100}_{it} + \beta_6 \text{FP}_{it} + \beta_7 \text{TO}_{it} + \beta_8 \text{COVID19}_{it} + \varepsilon_{it} \quad \text{.....} \quad (2)$$

The empirical model for the regression analysis with Sharpe Ratio as a proxy for effectiveness of mutual funds is presented as follows:

$$\text{SR}_{it} = \alpha_0 + \beta_1 \text{GDP}_{it} + \beta_2 \text{POP}_{it} + \beta_3 \text{CPI}_{it} + \beta_4 \text{WR}_{it} + \beta_5 \text{KSE100}_{it} + \beta_6 \text{FP}_{it} + \beta_7 \text{TO}_{it} + \beta_8 \text{COVID19}_{it} + \varepsilon_{it} \quad \text{.....} \quad (3)$$

Where

The independent variables used are inflation measured by consumer price index (CPI), worker remittances measured by total foreign remittances received in the country, fiscal policy (FP), trade openness (TO), gross domestic product (GDP), population in the country (POP), Karachi stock exchange 100 index (KSE-100) returns, and Covid19. The Covid19 is a dummy variable with the year 2019=1, otherwise 0.

4. Empirical Results and Discussion

Within this section, we undertake a comprehensive examination of the variables employed in our study. Furthermore, we perform diagnostic assessments, such as the Pearson correlation and VIF test, and present the results of OLS, Fixed Effect, and System GMM analyses for a thorough analysis.

4.1. Descriptive Analysis

To gain deeper insights into the characteristics of our dataset, we conducted a comprehensive descriptive statistical analysis, the results of which are outlined in Table 01. This table offers valuable insights into various key metrics. Initially, it is noteworthy that the mean value of overall performance (OP) stands at -0.863365, indicating a negative trend, suggesting less-than-optimal performance in this sector. The standard deviation, measuring data spread from the mean, is calculated at 0.0304062. The dataset encompasses values ranging from a low of -1.529349 to a high of -0.0586546. In examining the Sharpe ratio (SR), we find its mean value to be -7.612748, displaying a higher standard deviation of 3.299872 compared to OP. The SR's minimum and maximum values are -17.76403 and -0.7310051, respectively.

Additionally, our analysis extends to crucial economic indicators, including consumer price income (CPI), workers' remittances (WR), Karachi Stock Exchange (KSE), fiscal policy (FP), trade openness (TO), gross domestic product (GDP), and population

(POP). The mean values for these indicators are 7.03, 9.45, 14.78, 5.9, 4.67, 4.11, and 206.846, respectively. Notably, the standard deviations for FP, GDP, and CPI are 1.396863, 1.922652, and 2.636255, respectively. In contrast, WR, TO, POP, and KSE exhibit larger standard deviations, measuring 8.0344, 8.09844, 14.48718, and 22.80002, respectively. When exploring the minimum values for these indicators, we find that KSE, TO, WR, GDP, CPI, FP, and POP register at -19.1, -2.87, -2.8, -0.9, 2.9, 3.8, and 184.4, respectively. On the other end of the spectrum, the maximum values for GDP, FP, CPI, TO, WR, KSE, and POP reach 6.1, 8.2, 11, 25.55, 27.3, 52.2, and 224.78, respectively.

Table 1: Descriptive Statistics

Variable	No. of Obs.	Mean	Std. Dev.	Min.	Max.
OP	270	-.086	.030	-.151	-.058
SR	270	-7.61	3.29	-17.76	-.731
CPI	270	7.03	2.63	2.9	11
WR	270	9.45	8.03	-2.8	27.3
KSE	270	14.78	22.80	-19.1	52.2
FP	270	5.9	1.39	3.8	8.2
TO	270	4.67	8.09	-2.87	25.55
GDP	270	4.11	1.922	-.9	6.1
POP	270	206.846	14.48	184.4	224.78

For a deeper understanding of the dataset, we employed Pearson correlation analysis to evaluate the relationships among the variables. The results, presented in Table 02, shed light on potential multicollinearity. The findings indicate that overall performance (OP) is positively correlated with Sharpe ratio (SR), Karachi Stock Exchange (KSE), and trade openness (TO), with statistical significance observed for SR and KSE. Conversely, OP displays negative correlations with Gross Domestic Product (GDP), population (POP), consumer price index (CPI), workers' remittances (WR), and fiscal policy (FP). Among these, statistically significant negative correlations are detected only with POP and CPI. Regarding the Sharpe ratio (SR), it demonstrates positive correlations with workers' remittances (WR), Karachi Stock Exchange (KSE), and trade openness (TO), with statistical significance observed for KSE and TO. Conversely, SR exhibits negative correlations with GDP, POP, CPI, and fiscal policy (FP), with statistically significant negative correlations found for GDP, POP, and CPI.

Table 2: Correlation Matrix

Variables	OP	SR	GDP	POP	CPI	WR	KSE	FP
OP	1							
SR	0.7338*	1						
GDP	-0.1178	-0.2373*	1					
POP	-0.2675*	-0.1719*	0.0037	1				
CPI	-0.5696*	-0.3096*	-0.3084*	-0.4535*	1			
WR	-0.0864	0.0029	0.1386*	0.0851	0.2520*	1		
KSE	0.2715*	0.1386*	0.1059	-0.5644*	0.0551	0.3203*	1	
FP	-0.0330	-0.0829	-0.5247*	-0.1037	0.1894*	0.0198	0.1312*	1
TO	0.0293	0.1584*	-0.5372*	0.5805*	0.6828*	-0.0813	-0.2079*	0.0315

In order to check is there any multi-collinearity between variable or not? Variance inflation factor (IF) values are obtained. Table 03 demonstrates the results of multi-collinearity test. The values for VIF are much lower than the dangerous value, which specifies that there is no multicollinearity between the factors. The maximum value for VIF is 6.03 which is less than 10. And if the VIF value is less than 10 the multi-collinearity does not exist (R. Y. Hussain et al., 2022; Pham et al., 2021).

4.2. OLS and Fixed Effect for overall performance

To thoroughly examine how effectiveness of mutual funds is impacted by the macroeconomics determinates, our analytical process began by employing Ordinary Least Squares (OLS) and fixed effect regression models on the complete mutual fund dataset. Following this, we expanded our comprehensive analysis to specifically explore the effects on traditional mutual funds and Shariah-compliant mutual funds, offering a holistic view of the factors influencing their performance. The encapsulated findings of our multiple regression analysis on mutual fund performance can be discerned in Table 04. Beyond merely advocating OLS regression, the F-statistic (Prob > F = 0.0000) vehemently endorses the appropriateness of fixed effect regression over panel OLS. To further bolster this stance, we subjected the models to the Hausman test, which unequivocally reinforced the superiority of fixed effects.

The F-statistics, serving as litmus tests for model goodness-of-fit, unequivocally vindicate the robustness of our models. For the all-encompassing dataset, the F-statistic for panel OLS stands at a staggering 4704.58, with a p-value that leaves no room for doubt, firmly pegged at 0.00. When we transition to fixed effects, the F-statistic ascends to a formidable 201720.7, continuing to uphold a p-value of 0.00. In the domain of conventional mutual funds, the F-statistic for panel OLS is equally resolute at 31911.43 (p-value: 0.00), and it fortifies its stance in the realm of fixed effects with an F-statistic of 209820.33 (p-value: 0.00). The domain of Shariah-compliant funds maintains its consistency with the panel OLS F-statistic at 1357.42 (p-value: 0.00) and the fixed effects F-statistic at 1227.45 (p-value: 0.00). Our models persistently sustain formidable R-squared values, steadfastly anchoring our results in robustness.

Table 3: Multi-Collinearity Test

Variable	VIF	Tolerance (1/VIF)
TO	6.03	0.165953
POP	4.53	0.220914
GDP	3.90	0.256267
KSE	2.72	0.367642
CPI	2.66	0.376590
FP	2.07	0.482318
WR	1.55	0.482318
Mean	3.35	

The results of our painstaking analysis, whether observed through the lens of panel OLS or fixed effects, resolutely divulge that an array of factors, including population size (POP), worker remittances (WR), Karachi Stock Exchange (KSE100), fiscal policy (FP), and trade openness (TO), exude a pronounced and positive influence on mutual fund performance. In essence, these variables form the bedrock upon which mutual fund success is built, amplifying their importance in the financial landscape. For instance, the coefficient for POP consistently holds its positive sway, registering as 0.0013643 in OLS and 0.0013643 in fixed effects, both paired with the unequivocal p-value of 0.000. In simpler terms, this signifies that an expanding population has the inherent potential to invigorate mutual fund performance. Likewise, WR's coefficient stands firm at 0.0012551 in OLS and 0.0012551 in fixed effects, with the p-value steadfastly held at 0.000. This affirms that as worker remittances to their home country swell, a tide of favorable economic conditions swells, ultimately benefiting mutual fund performance. Meanwhile, KSE100's coefficient retains its positive aura, clocking in at 0.0005883 in OLS and 0.0005883 in fixed effects, bolstered by a p-value clinging resolutely to 0.000. This asserts that rising returns in the Karachi Stock Exchange correlate positively with mutual fund performance. Nonetheless, the storyline contains elements of pessimism, with GDP, CPI, and the lingering presence of the COVID-19 pandemic all playing a role in exerting a detrimental influence on mutual fund performance, as indicated by their adverse coefficient values. In the case of GDP, the coefficient records a disheartening -0.0037535, signifying a definite negative influence. The rationale behind this might be the allure of burgeoning business opportunities overshadowing investor interest in mutual funds as GDP rises.

Table 4: Multiple Regression Results

Variable	Overall data		Conventional funds		Shariah complaint	
	Panel OLS	Fixed effect	Panel OLS	Fixed effect	Panel OLS	Fixed effect
GDP	-.003753*** (0.0002)	-.003753*** (0.0001)	-.003823*** (0.0003)	-.003823*** (0.0001)	-.003886*** (0.0005)	-.003586*** (0.00004)
POP	.0013643*** (0.00006)	.0013643*** (0.00002)	.0023809*** (0.00008)	.0013809*** (0.00004)	.0013247*** (0.0001)	.0013247*** (0.00001)
CPI	-.011967*** (0.0002)	-.011967*** (0.0001)	-.011911*** (0.0002)	-.011911*** (0.0002)	-.012101*** (0.0004)	-.012101*** (0.00006)
WR	.0012551*** (0.0012)	.0012551*** (0.00001)	.0012567*** (0.00003)	.0012567*** (0.00001)	.0012511*** (0.0005)	.0012511*** (0.00001)
KSE	.0005883*** (0.00001)	.0005883*** (0.0000)	.0005899*** (0.00001)	.0005899*** (0.0000)	.0005843*** (0.00002)	.0005843*** (0.0000)
FP	.0036994*** (0.0001)	.0036994*** (0.00004)	.0036826*** (0.0001)	.0036826*** (0.00005)	.0037393*** (0.0003)	.0037393*** (0.00005)
TO	.0029585*** (0.0029)	.0029585*** (0.00004)	.0029369*** (0.0001)	.0029369*** (0.0006)	.0030098*** (0.0001)	.0030098*** (0.00001)
COVID-19	-.049743*** (0.0021)	-.049743*** (0.0011)	-.050261*** (0.0025)	-.050261*** (0.0016)	-.048512*** (0.0039)	-.048512*** (0.0005)
F stat	4704.58***	201720.7***	31911.43***	209820.33***	1357.42***	1227.45***
No. of obs	270	270	190	190	80	80
R-squared	0.9931	0.9931	0.9930	0.9930	0.9935	0.9935
BP/CW test	36.97***		112.33***		14.31***	
LM test	0.00 (1)		18.06 (0.00)		0.00 (1)	
Hausman t.			0.00			

Note: *** indicates significance at 1%

The CPI, which gauges inflation, mirrors this pessimism with a coefficient of -0.0119677, signifying a noteworthy negative correlation. The nadir of this trio is the COVID-19 pandemic, with a coefficient of -0.0497431, signaling its pernicious impact on mutual fund performance.

4.3. Robust check with Sharpe Ratio

In this segment, we evaluate the resilience of our analysis by investigating how macroeconomic factors influence the mutual funds effectiveness, when dependent factor is Sharpe ratio. Our methodology encompasses the utilization of OLS and fixed-effect regression models within three distinct classifications: the entire dataset, strictly conventional and Islamic funds. Table 05 displays the outcomes of our analysis. For the overall dataset, the F-statistic for panel OLS is 68.62, while for fixed effects, it stands at 196.08, both yielding a resounding p-value of 0.00. Conventional mutual funds exhibit a panel OLS F-statistic of

37.93 and a fixed effect F-statistic of 458.97, while Shariah-compliant mutual funds yield respective values of 40.80 and 43.47. The R-squared value for the overall dataset remains robust at 0.6778 for both OLS and fixed effects. Conventional mutual funds maintain an R-squared value of 0.6264, while Shariah-compliant funds impress with an R-squared value of 0.8214, again consistent for both OLS and fixed effect models.

Table 5: Regression Outcomes with Sharpe Ratio

Variable	Overall data		Conventional funds		Shariah complaint	
	Panel OLS	Fixed effect	Panel OLS	Fixed effect	Panel OLS	Fixed effect
GDP	-1.99635	-1.99635	-1.9657	-1.9657	-2.0690	-2.0690
	(0.2105)	(0.2303)	(0.2710)	(0.2682)	(0.3025)	(0.4983)
POP	.4335875**	.4335875**	.4194*	.4194*	.4671*	.4671*
	(0.0490)	(0.0464)	(0.0631)	(0.0564)	(0.0705)	(0.0905)
CPI	.4203979	.4203979	-.4855	-.4855	.2656	.2656
	(0.1752)	(0.1520)	(0.2257)	(0.1677)	(0.2519)	(0.3526)
WR	.2637643**	.2637643**	.2640**	.2640**	.2630**	.2630**
	(0.0227)	(0.0232)	(0.0292)	(0.0306)	(0.0326)	(0.0347)
KSE100	.013571***	.013571***	.0103**	.0103***	.0211**	.0211**
	(0.0085)	(0.0068)	(0.0110)	(0.0083)	(0.0122)	(0.0129)
FP	-.260460	-.260460*	-.2868	-.2868	-.1977	-.1977
	(0.1205)	(0.0980)	(0.1552)	(0.125)	(0.1732)	(0.1659)
TO	-.159223	-.159223*	-1.6802*	-1.680*	-.1383*	-.1383
	(0.6320)	(0.0556)	(0.0813)	(0.0599)	(0.0908)	(.1354)
COVID-19	-16.3139	-16.3139	-16.0456	-16.0456	-16.951	-16.9510
	(1.5804)	(1.5707)	(2.0350)	(1.9311)	(2.2713)	(3.0046)
F stat	68.62***	196.08***	37.93***	458.97***	40.80***	43.47***
No. of Obs.	270	270	190	190	80	80
R-squared	0.6778	0.6778	0.6264	0.6264	0.8214	0.8214
BP/CW test	112.33 (0.00)		87.75 (0.00)		16.78 (0.00)	
LM test	18.06 (0.00)		15.35 (0.00)		1.29 (0.12)	
Hausman t.	0.00					
Note: ***, **, * indicates significance at 1%, 5%, and 10% level, respectively						

Note: ***, **, * indicates significance at 1%, 5%, and 10% level, respectively

Analyzing the OLS regression results for the overall dataset, Column 2 of Table 5 reveals that two independent variables, namely, population size (POP) with a coefficient of 0.4335875 and worker remittances (WR) with a coefficient of 0.2637643, display a statistically significant relationship at the 5% level with mutual fund performance. Additionally, the coefficient for Karachi Stock Exchange (KSE100) at 0.013571 indicates a statistically important relation at the level of 1%. However, the OLS method suggests that GDP, CPI, fiscal policy (FP), trade openness (TO), and the COVID-19 variable have an insignificant influence on the effectiveness of mutual funds in Pakistani markets. Turning to the fixed effect results for the overall dataset in Column 3, they affirm the positive and statistically significant relationship of KSE100 with mutual fund performance at the 1% level. WR and POP continue to exhibit positive and significant relationships with performance at the 5% level. However, FP and TO, though statistically important at the level of 1%, have a bad influence on fund performance. GDP, CPI, and COVID19 appear to have an insignificant relationship with mutual funds in Pakistan.

Columns 4 and 5 in Table 05 present the OLS and fixed effect regression results for conventional mutual funds. The OLS regression suggests that POP and WR maintain positive and statistically significant relationships with fund performance, with coefficients of 0.4194 and 0.264, respectively, at the 10% and 5% levels. KSE100 also shows a positive and there exists a statistically meaningful association at the 5% significance level, even though the coefficient is modest at 0.0103. Trade openness, while significant at the 10% level, reveals a negative relationship with a coefficient of -1.6802. Conversely, GDP, CPI, FP, and COVID19 exhibit an insignificant relationship with conventional mutual fund performance. Fixed effect results in Column 5 for conventional funds align closely with the OLS findings.

Columns 6 and 7 of Table 05 elucidate the results for panel OLS and fixed effect regressions for Shariah-compliant mutual funds. Panel OLS results in Column 6 highlight the positive impact of POP, WR, and KSE100 on Shariah mutual funds, with trade openness exhibiting a significant, yet negative relationship. However, GDP, CPI, FP, and COVID19 are insignificantly related to Shariah fund performance. The highest coefficient value is attributed to POP at 0.4671, significant at the 10% level, followed by WR at 0.2630 and KSE100 at 0.0211, both significant at the 5% level. Fixed effect results in Column 7 for Shariah funds mirror the OLS findings.

4.4. Endogeneity Checks

In this segment, we unveil the outcomes of system GMM regression analysis conducted on the complete dataset, as well as on both conventional and Shariah-compliant funds individually. Table 06 exhibits the results obtained from the SARGAN test, which is employed to evaluate the association between macroeconomic variables and fund performance. The SARGAN test operates under the assumption that residuals or error terms do not exhibit any correlation with instrumental variables. Based on the findings presented in Table 06, it is noteworthy that the SARGAN test (with a p-value of 0.9958) suggests the absence of any over-identification issues in the GMM estimation, thereby affirming the validity of the system GMM methodology.

Furthermore, both the Sargent test (p-value of 0.9958) and the AR (2) test (p-value of 0.5230) yield non-significant results, indicating that the concerns related to endogeneity have been effectively addressed, and the GMM approach is deemed suitable for the model.

Table 6 presents the outcomes of the two-step system GMM. These results show a noteworthy adverse influence of GDP on fund performance within all three datasets, corroborating previous research by (Ahmed & Siddiqui, 2019; Asad & Siddiqui, 2019), both of whom observed an inverse relationship between GDP and mutual fund returns. Within Table 6, specifically in Row 4, we present the outcomes regarding the connotation among inflation and effectiveness of funds.

Table 6: Outcomes Through Two Step System GMM Regression

Variable	Overall data	Conventional funds	Shariah complaint
GDP	-.0091021*** (0.00008)	-.0088837*** (0.0002)	-.0095331*** (0.0002)
POP	.0003662*** (0.0000)	.0003507*** (0.00001)	.0003902*** (0.00001)
CPI	-.0116599*** (0.00003)	-.0117672*** (0.0001)	-.011479*** (0.0001)
WR	.0025202*** (0.00001)	.0024695*** (0.00003)	.0026212*** (0.0000)
KSE100	.0002756*** (0.0000)	.0002895*** (0.0000)	.0002475*** (0.00001)
FP	.0001346*** (0.00004)	.0003201*** (0.0001)	.0000907*** (0.0001)
TO	.0049564*** (0.0000)	.00494558*** (0.0000)	.0049838*** (0.00001)
COVID-19	-.0510922*** (0.0003)	-.0498793*** (0.0009)	-.0511745*** (0.0012)
SARGAN test	22.49359 (0.9958)	11.6453 (1.0)	37.6336 (0.7026)
No. of instrument		51	
AR(1)		-2.1793 (0.0293)	
AR(2)		-0.6388 (0.5230)	

Note: ***, **, * indicates significance at 1%, 5%, and 10% level, respectively.

The coefficients for the overall data and Consumer Price Index (CPI) disclose a statistically noteworthy harmful influence on effectiveness of funds, aligning with outcomes found in studies showed by Wasseja & samwel, (2015); Ali & Taylor, (2014), then Martínez et al., (2015) all of which exposed an adverse correlation among inflation and equity market performance. Likewise, inflation exerts an adverse influence on the effectiveness of both conventional and Islamic funds. To put it succinctly, there exists an inverse relationship among inflation and fund profitability, signifying that as inflation escalates, mutual fund returns diminish. Elevated inflation implies heightened investment risk and decreased returns, ultimately affecting new investments and dampening overall supply and demand. The connection between remittances and fund performance exhibits a noteworthy and affirmative correlation across the entire dataset, as well as within both conventional and Shariah-compliant funds. Heightened remittance inflows contribute to the strengthening of foreign currency reserves, ultimately augmenting the buying capacity of local consumers, thereby stimulating greater consumption and a surge in the request for numerous goods and facilities. This, in turn, can result in investments in mutual funds. (Dorman et al., (2018) also found a positive significant impact of worker remittances on both conventional and Islamic funds. The size of the population uses a statistically noteworthy optimistic effect on the performance of macroeconomic funds, encompassing both conventional and Islamic funds. This observation suggests that as the population grows, there is an enhancement in mutual fund performance, aligning with the results reported (Khorana et al., 2005).

The Karachi Stock Exchange 100 index (KSE100) exhibits a positive relationship with mutual fund performance for overall data, conventional funds, and Shariah-compliant funds. As the KSE100 index performs better, mutual fund performance improves as (Ahmed and Siddiqui 2019). Fiscal policy (FP) and trade openness (TO) also show positive significant relationships with fund performance across all data categories, in line with (El-Gebali et al., 2019). On the flip side, the effectiveness of funds has been markedly affected in a detrimental way by the COVID-19 pandemic. This can be attributed to the economic downturn, shutdowns of businesses, and investment setbacks that transpired during the COVID-19 era. These outcomes align with prior research findings, observed across various data analysis methods, including OLS and fixed effect models.

5. Conclusion

The present study makes valuable contributions to the current body of information in several dimensions. It delves into the examination of how macroeconomic factors influence mutual fund performance in Pakistan. The overarching findings highlight the positive effects of population growth, the influx of worker remittances, KSE100 (Karachi Stock Exchange 100) returns, fiscal policies, and trade openness on the effectiveness of mutual funds. Additionally, this research sheds light on the adverse impact of inflation, GDP, and the pandemic on mutual funds' performance within the Pakistani context. While there's ample literature on the influence of GDP, KSE100, and inflation on the effectiveness of mutual fund, The influence of worker remittances, fiscal policies, and trade openness on mutual fund performance has received limited attention compared to the more extensively studied effects of inflation. An important area of study involves the groundbreaking research on how the pandemic has affected the effectiveness of mutual funds in Pakistan. This investigation provides strong evidence that conditions marked by uncertainty, especially those stemming from the pandemic, can have a notable adverse effect on the effectiveness of mutual funds, even though they typically exhibit lower risk levels in comparison to individual stocks. During economic downturns, worker remittances have proven to be a pivotal source of capital inflow for Pakistan. This research underscores that these remittances not only aid the government in reducing current account deficits and boosting domestic spending but also contribute

to savings and enhance the effectiveness of mutual funds. Moreover, throughout economic recessions, the government of Pakistan has historically implemented stringent trade policies and imposed import bans a practice that erodes investor confidence and heightens investment risk. This study demonstrates that the effectiveness of mutual funds in Pakistan is positively impacted by trade openness and strong fiscal policies. It is imperative for central banks, governmental bodies, and policymakers to recognize that trade restrictions and excessive development controls can be detrimental to economic vitality. Additionally, this research expands its investigation to analyze how macroeconomic variables influence the effectiveness of both conventional and Islamic funds. The results reveal that factors such as population growth, worker remittances, and the performance of KSE100, fiscal policies, and trade openness have a progressive effect on the effectiveness of both types of funds. Furthermore, the study verifies that GDP, inflation, and the influence of the pandemic have detrimental effects on the effectiveness of both conventional and Islamic funds. The robustness of these findings is further validated by exploring various proxies for mutual fund performance. When using the Sharpe ratio as an alternative measure of performance, the study reveals that GDP, inflation, and the COVID-19 pandemic exhibit insignificant relationships. Conversely, population growth, KSE100 performance, and worker remittances demonstrate positive impacts, while trade openness and fiscal policies display negative influences on mutual fund success. Significantly, there is a lack of a meaningful correlation between fiscal policy and the effectiveness of both conventional and Islamic funds. Similarly, the significance of trade openness in relation to the effectiveness of Islamic funds is also absent. However, it's important to acknowledge certain limitations in this study. These limitations include the utilization of a limited set of macroeconomic variables and a dataset encompassing only 27 mutual funds with a minimum tenure of 10 years, observed between 2012 and 2022. Future research endeavors may consider expanding the scope by incorporating a more extensive array of macroeconomic variables, utilizing larger datasets, and extending the study's temporal coverage. Additionally, while this study primarily focused on external factors, there's potential for future research to delve into internal factors. The scope may also be broadened to encompass neighboring countries, such as India, and explore other regional contexts.

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