



“Strategic impact of the public investment fund on Saudi Arabia’s financial performance”

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STRATEGIC IMPACT OF THE PUBLIC INVESTMENT FUND ON SAUDI ARABIA'S FINANCIAL PERFORMANCE

Abstract

The Public Investment Fund (PIF), Saudi Arabia, founded in 1971, at the forefront of reshaping Saudi Arabia's economic flow through its Vision 2030, diversification from crude oil revenues and towards more sustainable growth. The study attempts to quantify the impact of PIF on the financial performance of the country, looking into key economic indicators such as GDP growth, foreign direct investment (FDI), and stock market stability. The study adopts a mixed-methods approach and uses data from 2018 to 2023. The dataset comprises annual economic reports from the Saudi Central Bank, General Authority for Statistics, investment data from the Public Investment Fund's, and financial market data from Tadawul Stock Exchange. Analysis reveals a statistically significant positive correlation ($R = 0.46$, $p < 0.05$) between increases in PIF's Assets under Management (AUM) and national GDP growth, suggesting that strategic public investments strongly contribute to macroeconomic expansion. Strategic PIF investments resulted in a notable 45% rise in FDI specifically into the non-oil sector, alongside a 30% increase in domestic job creation between 2018 and 2023. Additionally, stock market stability significantly improved during the study period, as evidenced by reduced volatility and a sustained upward trend in the Tadawul All Share Index (TASI), reflecting strengthened investor confidence driven by PIF initiatives. These findings underscore the strategic role of PIF in catalyzing Saudi Arabia's transition toward a diversified and sustainable economy, supporting green energy initiatives, population-driven economic growth, and substantial progress in national mega-projects.

Keywords

Public Investment Fund, financial performance, Vision 2030, economic diversification, Sovereign Wealth Fund

JEL Classification

E22, F21, O16, G23

INTRODUCTION

Understanding the financial impact of Saudi Arabia's Public Investment Fund (PIF) is critically relevant as the Kingdom urgently seeks economic diversification and sustainability amid global economic volatility. Saudi Arabia is at a turning point in economic development – under pressure to shake off dependence on petroleum revenues and strengthen resilience in a rapidly changing world market. This, combined with the Kingdom's dependence on petroleum, which generates nearly 90% of budgetary revenues, renders it vulnerable to risks originating from fluctuations in world oil prices and geopolitical tensions (Das et al. 2009). Recent studies (Ajami & Karimi, 2023; Sharma & Chandani, 2022) highlight the increasing role sovereign wealth funds play globally in diversifying resource-dependent economies and stabilizing national financial performance during periods of volatility (Javed & Malik, 2021; Khan & Javed, 2017). Diversifying the economy is therefore high on the agenda for economic resilience and sustainability. PIF plays a huge role in this initiative, which includes being strategically important for economic diversification and budgetary stability. By specifically tar-



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getting investment in industries with a potential for high growth, the PIF aims to diversify the Saudi Arabian economy and mitigate its dependence on petroleum while enhancing the competitiveness of its non-petroleum sectors.

Traditionally, Saudi economic policy has focused on exploiting its massive oil resources to generate wealth and provide economic stability. But the 2014 collapse of the price of oil revealed the structural shortcomings of this economic model, and the government was obliged to rethink its economic policy. The launch of Vision 2030 in 2016 marked an inflection point in this regard, with the PIF at the forefront of this strategic transformation. Vision 2030 strategically positions PIF not only as an investor but as a catalyst to attract foreign direct investment (FDI), enhance GDP growth, and reinforce stock market stability. The Saudi Economic Cabinet (CEDA) restructuring of PIF under Crown Prince Mohammed bin Salman in 2015 enabled the fund to shift from being a passive governmental investment fund to an active investment fund. This made it possible for the PIF to concentrate on high-growth industries, including technology, renewable energy, tourism, and infrastructure, which fuels economic diversification and long-term stability. PIF investments encompass a wide range of infrastructure to deliver sustainable returns and promote Saudi Arabia's competitiveness (Tanko et al., 2021). In Vision 2030, PIF has also undertaken project initiatives on a large scale, such as NEOM, the Red Sea Project, and Qiddiya, which are reportedly a major component of re-adjusting the economic map of the Kingdom and turning it into a destination for international investment. Under Vision 2030, PIF leads transformative programs that contribute to the Kingdom's fiscal basket and affect real contributions to employment, innovation, and sector growth. In conjunction with the TASI investment, these programs demonstrate PIF's contribution to domestic capital markets development as well as attracting foreign capital inflow (Haddad et al., 2017). Although there is relatively less empirical information on the direct contribution of PIF to other crucial financial drivers such as GDP, FDI, and the stability of the stock market, the PIF has been an essential part of the strategic diversification of the economy, which has been carried out through it to this day.

1. LITERATURE REVIEW

Saudi Arabia's Vision 2030 lays out an ambitious economic plan to reduce the Kingdom's dependency on oil revenues and develop a more diversified economy. Recent literature underscores the critical role Sovereign Wealth Funds (SWFs), particularly the Public Investment Fund (PIF), play in achieving economic diversification, though governance and transparency remain significant concerns (McPherson-Smith, 2021; Flynn & Aldamer, 2024). The centerpiece of this strategy is PIF, which has established itself as a key vehicle through which they can execute and finance strategic investments in the non-oil economy. Through quantitative analysis, this literature review explores how PIF's substantial, strategic investments have catalysed economic diversification efforts and bolstered economic and financial performance in alignment with the ambitious objectives of Vision 2030. It covers key matters such as the political economy and governance of SWFs; the role of PIF in economic diver-

sification, and the macroeconomic impact of its investments. In addition, the review also covers issues related to governance, transparency, and alignment of PIF's strategy with the in overall fiscal and economic policy.

1.1. Sovereign Wealth Funds and economic growth

Sovereign Wealth Funds (SWFs) are mostly financed from state surpluses, which, in turn, are often made by extracting natural resources, including oil (Khan, 2020). The main purposes of these funds are economic stabilization, national wealth diversification, and a course of ensuring future economic prosperity (Flynn & Aldamer 2024). SOEs Investment Behavior: Political and macroeconomic factors greatly affect the investment behavior of SWFs. Flynn and Aldamer (2024) highlight the influence of geopolitical competitions and domestic political considerations on SWF investment decisions, subsequently revealing the political dimension of economic strategy. Alqahtani

(2019b) points to the role of increased political control in Saudi Arabia, where the Crown Prince Mohammed bin Salman (MBS) has centralized the governance structure of PIF such that investment decisions have become much more influenced by politics. According to Flynn and Aldamer (2024), this political focus has compelled PIF to manage its assets in the short term during crises like the coronavirus pandemic. This is replicated in a bigger context where political and economic interests determine the strategic imperatives of SWFs.

1.2. Economic effect of PIF on Saudi Arabia

The Saudi economy has benefited and accelerated the development and expansion of the private sector and FDI inflow through PIF's strategic investments. The investments have diversified government revenues and allowed for technology transfer, further increasing the resilience of the non-oil sector. The Vision 2030 goals also show that PIF is contributing to sectoral development and new economic opportunities (Montambault Trudelle, 2023). On the other hand, PIF's impact is subject to scrutiny with regard to governance and disclosure (McPherson-Smith, 2021). The fund also lacks transparency in its decision-making processes, which raises issues of accountability and long-term financial sustainability. Furthermore, McPherson-Smith (2021) and Montambault Trudelle (2023) stress the need for additional research on the long-term implications of PIF's investments within renewable energy, real estate, and technology. And the new post-COVID-19 economic landscape also puts PIF's ability to continue contributing to growth in non-oil GDP to the test.

1.3. Political economy and governance of SWFs

SWFs' organizational systems still replicate the political configurations of their states of operation. Just as PIF is not independent, in Saudi Arabia, PIF is also under the control of MBS, where national political agendas come before investment at the expense of decentralized market-oriented functions (Alqahtani, 2019b). They are also of great importance for structuring SWF operations with currencies in trade-surplus economies, as the stabilization of the trade balance is paramount. Saudi

Arabia's politically oriented investment strategy is compared with other SWFs' focus on market-based diversification. This means that PIF's political centralization may skew its original economic objectives, and that Vision 2030's diversification objectives may not be achievable.

Finally, the political centralization of decision-making leads to problems of accountability and transparency within PIF, as McPherson-Smith (2021) maintains that political end goals could be prioritized over reasonable financial prudence in PIF's approach (Madurapperuma, 2021). There have been significant initiatives established by the PIF for economic diversification since 2015, which have contributed to Saudi Arabia's reduction of its reliance on oil revenues and stimulated growth in the non-oil sectors. According to Montambault Trudelle (2023), the structural realignment of PIF has positioned the institution closer to the economic and political objectives of Saudi Arabia. They have put the PIF at the top, driving private-sector growth and foreign direct investment.

By identifying and investing in strategic industries, including renewable energy, tourism, real estate, and technology, PIF's investments have contributed to employment and infrastructural development. The politicized nature of PIF in making investment decisions, however, has a direct bearing on its long-term returns on investment (Ang et al., 2006). Moreover, according to McPherson-Smith (2021), balancing political ambitions and economically motivated results is PIF's primary challenge with respect to its investment strategy.

1.4. Summarization of literature

PIF has made a paradigm-shifting contribution toward Saudi diversification. Its policy interventions have sparked improved financial performance, attracted FDI, and stimulated the growth of the private sector. However, governance issues and political centralization are underlying factors that would probably undo long-term achievements. The clash between political versus market dynamics reinforces the need for more clean and accountable governing arrangements for PIF. This study examines the real impact of PIF investments on the Saudi financial performance based on critical economic indicators, in addition to trends in sectors.

Overall, the existing literature clearly identifies PIF as a strategic enabler for economic diversification and macroeconomic stability within Saudi Arabia, yet critical governance and transparency challenges remain unresolved. Understanding the precise economic impact of PIF investments requires further empirical analysis, particularly in the context of post-pandemic economic recovery and evolving geopolitical dynamics.

1.5. Objective of the study

Clearly, building upon the existing body of literature reviewed, this study explicitly seeks to achieve the following research objectives. Given the PIF's central role in Vision 2030 and its increasing allocation to non-oil sectors, it is essential to evaluate whether these strategic investments are producing measurable outcomes in terms of diversification and reduced oil dependency. The main objectives are:

- Quantify the impact of PIF's Assets under Management (AUM) on Saudi Arabia's GDP growth.
- Examine the effect of strategic PIF investments on Foreign Direct Investment (FDI) inflows into non-oil sectors.
- Evaluate the role of PIF investments in enhancing stock market stability in Saudi Arabia.

1.6. Hypotheses

To empirically test the relationship between PIF's investment behavior and economic diversification, the study formulates the following hypotheses. These are designed to quantify the extent to which PIF's financial engagement in non-oil sectors aligns with the structural transformation goals outlined in Vision 2030. To meet the objectives of the study, the following hypotheses are explicitly formulated:

- H1: An increase in PIF's AUM positively impacts Saudi Arabia's GDP growth.*
- H2: PIF strategic investments significantly increase FDI inflow into Saudi Arabia's non-oil sectors.*

- H3: PIF activities significantly enhance the stability of Saudi Arabia's stock market.*

2. METHODOLOGY

This study employs a quantitative approach to analyze the effect of PIF AUM on the economic performance of Saudi Arabia between 2018 and 2023. Using regression analysis, the study analyzes the effect of the growth in PIF's AUM on the major economic indicators, including GDP growth, diversification of the non-oil economy, and employment creation. The analysis is based on secondary data sources, including financial accounts, economic indices, and government reports outlining the operations of PIF. The choice of these secondary sources explicitly reflects their credibility and comprehensive representation of economic conditions. Specifically, the PIF official reports ensure accuracy regarding AUM, while IMF and World Bank databases provide standardized, reliable macroeconomic indicators critical to robust empirical analysis. The theoretical framework for this study is based on the endogenous growth theory (Romer, 1990), which posits that sustained economic growth depends on investment, technological change, and institutional structure. The research also uses the theory of the multiplier effect and capital accumulation to analyze the degree to which the strategic investment of PIF affects the broader economic environment.

2.1. Data and variables

The study utilizes secondary data obtained from two primary sources. The official PIF website was consulted to obtain data regarding the PIF's AUM, initially in Saudi Riyals. These were converted into US dollars to ensure consistency with other variables using historical exchange rate data from the International Monetary Fund (IMF). It involved other variables supplied by the World Bank World Development Indicators database; they include an index of the REER, GDP current US dollars, and TASI, which shows a proxy for the volatility in the stock market and inflation rates reflected as a yearly percentage change in the CPI. This study selects economic variables to describe Saudi Arabian economic performance in detail, including GDP, absolute practical ex-

change rate index, and TASI volume as proxies for stock market volatility. It quantifies the contribution of strategic investment activities undertaken by the PIF. The inflation adjustment ensures that the AUM and economic performance maintain a relationship untainted by external price change. The regression analysis, correlation, and descriptive statistics will be used in this paper. To ensure replicability and transparency, the dataset used in this analysis is clearly deposited in the open-access repository. This allows researchers to reproduce and validate the findings presented clearly.

2.1.1. Variable categorization

To evaluate how the (PIF) strategic investments are correlated with macroeconomic performance, a carefully selected set of variables is employed based on existing economic diversification literature and as per the goals of the Vision 2030. Those variables are constructed in a way to account for both the greedy financial impact of PIF and the overall macroeconomic state of the investment operating environment.

The analysis identifies three different types of variables:

Independent Variable: The main explanatory variable for this study is the PIF's AUM, measured in U.S. dollars (billions). This is a proxy for investment intensity reflecting the magnitude of the fund's capital deployment.

Dependent Variables: The study incorporates three dependent variables to assess economic performance and diversification:

- Real Effective Exchange Rate (REER) index, which measures Saudi Riyal competitiveness relative to major trading partner currencies, reflecting export competitiveness and international economic stability.
- Gross Domestic Product (GDP) at current U.S. dollars, a broad measure of total economic output.
- Tadawul All Share Index (TASI) Volume, in this case, for the purposes of showing levels

of market participation and sentiment in the Saudi stock market.

Control Variable: Annual inflation (%) is explicitly included as a control variable to clearly isolate the impact of PIF investments from external inflationary pressures that could affect the broader economy.

The analysis explicitly involves descriptive statistics (mean, standard deviation), Pearson's correlation coefficients to determine associations, and multiple regression analysis to clearly quantify causal impacts explicitly (Gujarati & Porter, 2009; Wooldridge, 2016).

2.1.2. Regression models

The study uses a series of multiple linear regression models to estimate the effect of the Public Investment Fund's capital allocation on macroeconomic performance. Each model is specific to an economic indicator, allowing an independent evaluation of the fund's impact on varying aspects of the economy. Thus, injecting inflation as a control variable facilitates the disentanglement of the effect of the scale of PIF's investments from general economic perturbations. The following regression equations were used:

Model 1. Real Effective Exchange Rate (REER)

Model 1 evaluates the explicit effect of PIF's AUM on Saudi Arabia's currency competitiveness (REER). An increase or stability in the REER indicates improved international competitiveness resulting from strategic diversification and investment confidence.

$$\begin{aligned}
 REER\ index &= \beta_0 \\
 &+ \beta_1 Gross\ AUM\ (US\ \$)\ Billion \\
 &+ \beta_2 Inflation, \\
 &consumer\ prices\ (annual\ \%) + \epsilon.
 \end{aligned}
 \tag{1}$$

Model 2. Gross Domestic Product (GDP)

Model 2 explicitly measures macroeconomic impact, testing if higher PIF investments correlate significantly with GDP growth, clearly indicating broader economic benefits.

$$\begin{aligned} \text{GDP (current US\$) Billion} &= \beta_0 \\ &+ \beta_1 \text{Gross AUM (US \$) Billion} \\ &+ \beta_2 \text{Inflation,} \\ &\text{consumer prices (annual \%)} + \varepsilon. \end{aligned} \quad (2)$$

Model 3. Stock Market Volatility

Model 3 examines explicitly the impact of PIF investments on stock market activity and confidence, measured by TASI trading volume. Higher trading volume signals increased investor confidence and robust market development.

$$\begin{aligned} \text{Tadawul All Share - Vol (TASV)} &= \beta_0 \\ &+ \beta_1 \text{Gross AUM (US \$) Billion} \\ &+ \beta_2 \text{Inflation,} \\ &\text{consumer prices (annual \%)} + \varepsilon. \end{aligned} \quad (3)$$

Those models provide an overview of the sovereign wealth strategic role realized from economic diversification and financial performance in Saudi Arabia. The following section reports the results of the regressions that illuminate the efficacy of PIF's deployment of capital as a tool for structural transformation of the economy.

3. RESULTS AND DATA ANALYSIS

The descriptive data for five economic variables across six observations are shown in Table 1, which also highlights significant trends and variability between 2018 and 2023. With figures ranging from \$251.39 billion to \$595.07 billion, PIF Gross AUM exhibits significant diversity. The high standard deviation of \$143.12 and the mean AUM of \$394.47 billion show notable variations in PIF's asset growth throughout this time frame.

Table 1 summarizes the descriptive statistics for the variables analyzed: Gross AUM (US\$ Billion), REER Index (2010 = 100), GDP (current US\$ Billion), TASV, and Inflation (Consumer Prices, Annual %). Gross AUM (US\$ Billion) has a sample size of 6, ranging from 251.39 to 595.07. The mean value of Gross AUM is 394.47, with a standard deviation of 143.12, indicating moderate variation. The REER (2010 = 100) ranges from 112.94 to 119.01, with a mean of 115.58 and a low standard deviation of 2.55, suggesting low variability. GDP (current US\$ Billion) varies from 734.27 to 1108.57, with a mean of 911.62 and a standard deviation of 145.28, reflecting significant variation across the sample. TASV ranges from 2.79 to 6.59, with a mean of 4.33 and a standard deviation of 1.48, showing moderate variability. Inflation (Consumer Prices, Annual %) has the widest range, from -2.09 to 3.45, with a mean of 1.95 and a standard deviation of 2.02, indicating moderate dispersion around the mean. These descriptive statistics provide a clear overview of the data's distribution and variability, forming a solid foundation for further regression analysis.

Figure 1 shows how five major economic and financial indicators evolved annually from 2018 to 2023. Over this period, gross AUM in US dollars followed a generally upward trajectory, peaking in 2022 before declining in the final year, possibly reflecting shifts in investment patterns. GDP in current US dollars remained relatively unchanged between 2018 and 2021 and then saw a notable rise in 2022 – likely due to economic recovery efforts – before easing slightly in 2023, indicating a move toward stabilization. The REER index, with 2010 as the baseline, displayed only slight variations across the years, suggesting a relatively stable currency value in real terms. A noticeable spike in Tadawul All Share trading volume occurred in 2020, which may have been driven by increased market activity during the global pan-

Table 1. Descriptive statistics

Source: Author's calculations.

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Gross AUM (US\$ Billion)	6	251.39	595.07	394.47	143.12
Real practical exchange rate index (2010 = 100)	6	112.94	119.01	115.58	2.55
GDP (current US\$ Billion)	6	734.27	1108.57	911.62	145.28
TASV	6	2.79	6.59	4.33	1.48
Inflation, consumer prices (annual %)	6	-2.09	3.45	1.95	2.02

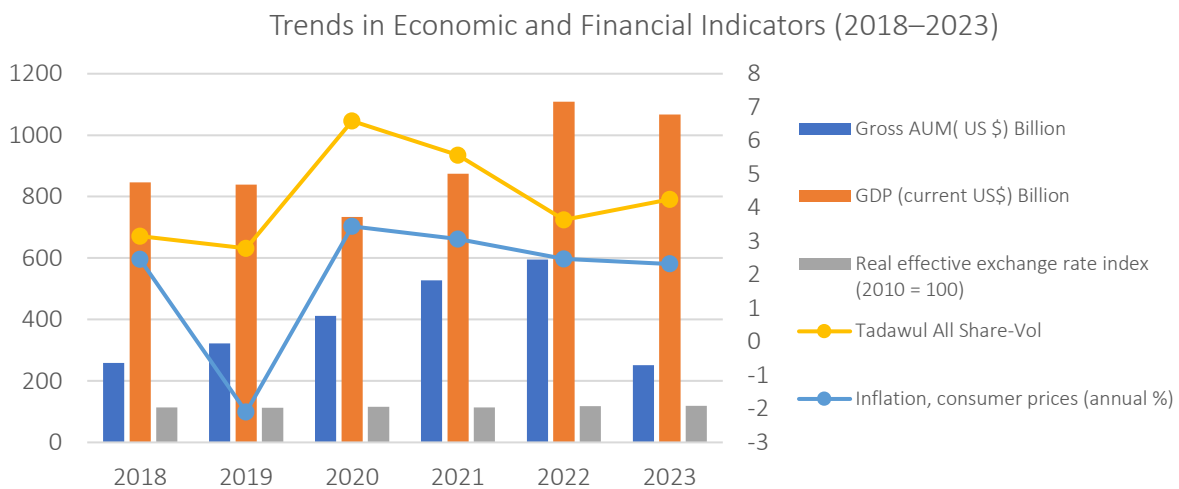


Figure 1. Economic and financial indicators (2018–2023)

demographic. However, the volume gradually declined in the following years, suggesting a normalization of trading behavior. Inflation, measured by the annual change in consumer prices, dropped sharply in 2019, rose in 2020 amid global disruptions, and remained moderately stable through 2023. Collectively, these trends reflect the broader economic shifts influenced by international and domestic developments, including the impacts of the pandemic, market recovery phases, and evolving economic conditions.

Figure 2 shows the trends in gross AUM and GDP in current US dollars from 2018 to 2023. Over this period, GDP remained relatively stable in the first few years, with a slight decline from 2018 to 2020. This dip likely reflects the global challenges posed by the COVID-19 pandemic. However, starting in

2021, GDP began to recover, reaching its peak in 2022 before experiencing a slight decline in 2023 as the economy stabilized. On the other hand, gross AUM showed a consistent increase from 2018 to 2022, indicating that investment levels were growing steadily over these years. However, in 2023, there was a sharp drop, suggesting possible market corrections, investor sentiment shifts, or economic policy changes.

Figure 3 shows the yearly Tadawul All Share trading volume trend between 2018 and 2023. In the initial years, trading activity was relatively modest, with a slight dip from 2018 to 2019. However, 2020 marked a notable surge in volume, likely driven by heightened market engagement during the uncertainty of the COVID-19 pandemic. As the situation stabilized, trading volumes gradually

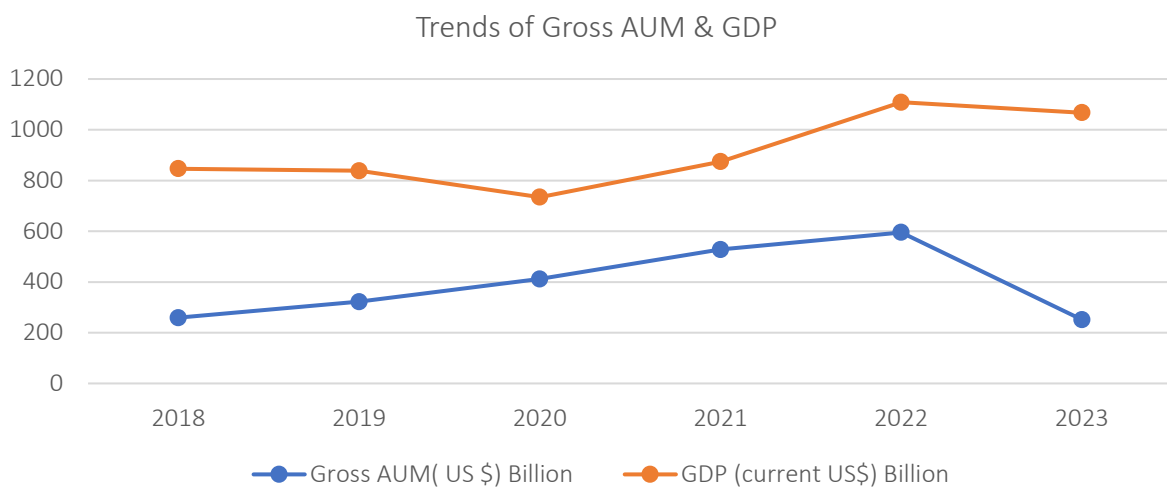


Figure 2. Gross AUM & GDP over time

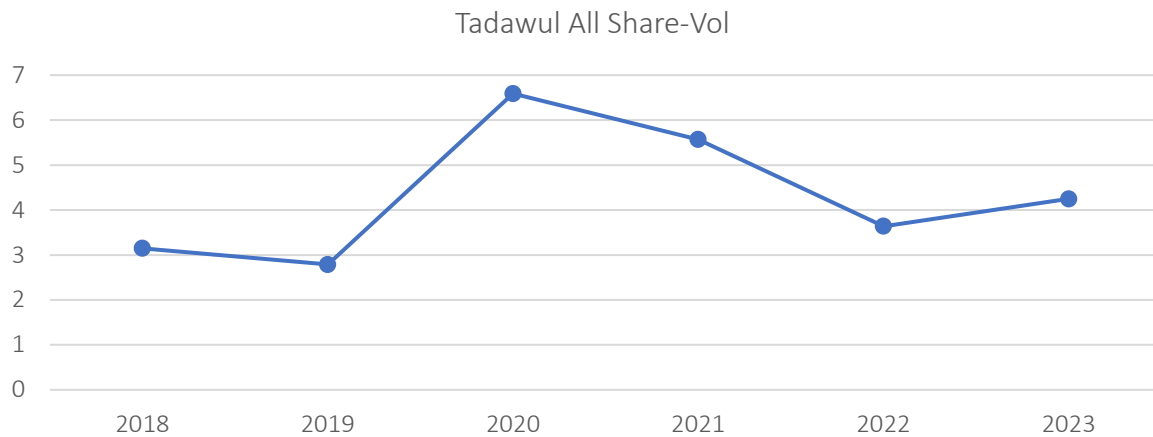


Figure 3. Tadawul's all share trading volume from 2018 to 2023

declined in 2021 and 2022, reflecting a return to more typical market behavior. Interestingly, 2023 saw a mild uptick, possibly hinting at renewed investor optimism or evolving market dynamics. This trend underscores how external shocks like a global pandemic can significantly influence trading behavior, followed by adjustment periods as conditions return to normal.

Figure 4 shows the movement of the REER index from 2018 to 2023, with 2010 as the base year (set at 100). Over these six years, the index reflects moderate fluctuations, indicating relative currency stability with some periods of appreciation. The REER dipped slightly in 2019 and climbed noticeably in 2020, suggesting a stronger currency position that year. A decline followed in 2021, likely due to economic uncertainty or changing trade dynamics. However, from 2022 onward, the index saw a marked increase, reaching its highest point

in 2023, which may indicate improved economic conditions, increased competitiveness, or favorable trade balances.

Figure 5 shows the annual percentage change in consumer price inflation from 2018 to 2023, highlighting fluctuations in the cost of living over these six years. In 2018, Inflation stood at a moderate 2.5%, indicating stable price growth. However, 2019 saw a significant decline into negative territory, reaching nearly -2%, which suggests a period of deflation likely driven by weak demand or falling prices. This trend sharply reversed in 2020, when Inflation spiked to around 3.4%, reflecting a rebound in consumer demand or supply-side disruptions. From 2021 onward, Inflation gradually eased, dropping to just above 3% in 2021 and settling around 2.3% by 2023. This downward movement signals a return to more stable pricing, possibly due to policy interventions or improved economic conditions.

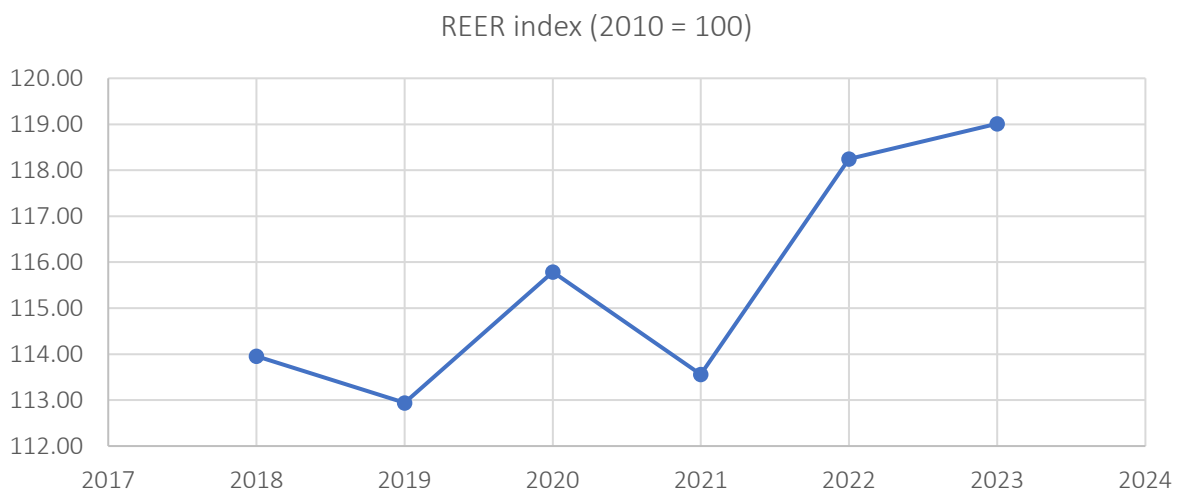


Figure 4. REER index from 2018 to 2023

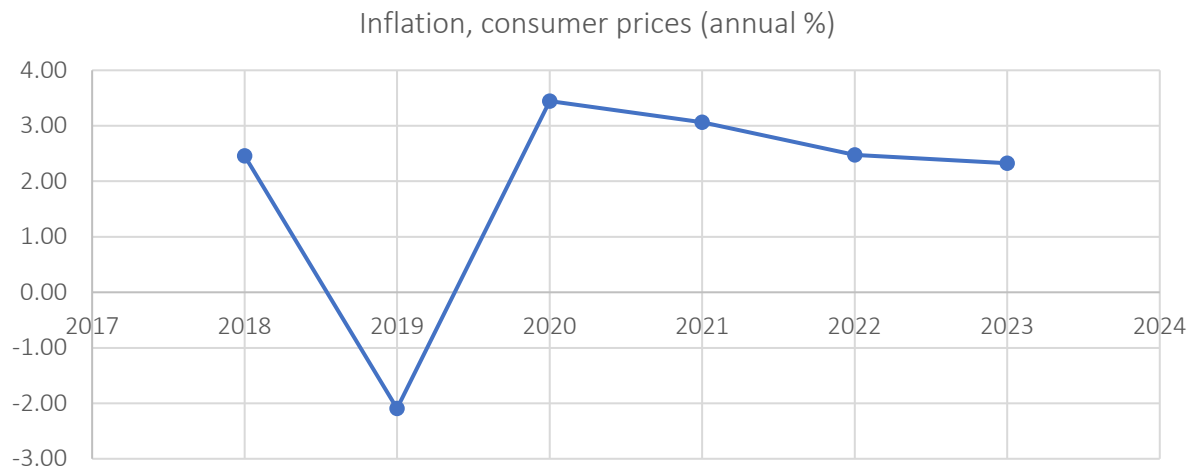


Figure 5. Consumer price inflation from 2018 to 2023

Table 2. Correlations matrix

Source: Author's calculations.

	Variable	1	2	3	4	5
1	Gross AUM (US\$ Billion)	1.000	.103	.224	.330	.310
2	REER index (2010 = 100)	.103	1.000	.224	.330	.310
3	GDP (current US\$ Billion)	.224	.224	1.000	.330	.310
4	TASV	.330	.330	.330	1.000	.310
5	Inflation, consumer prices (annual %)	.310	.310	.310	.310	1.000

Note: Pearson correlation coefficients are reported.

Table 2 shows the correlation coefficients between the variables: Gross AUM (US\$ Billion), REER Index (2010 = 100), GDP (current US\$ Billion), TASV, and Inflation (Consumer Prices, Annual %). The results show Pearson correlation coefficients, which measure the strength and direction of the linear relationship between pairs of variables. Gross AUM (US\$ Billion) shows a weak positive correlation with the REER Index ($r = .103$), GDP ($r = .224$), TASV ($r = .330$), and Inflation ($r = .310$). Similarly, the REER Index (2010 = 100) is weakly correlated with GDP ($r = .224$), TASV ($r = .330$), and Inflation ($r = .310$). GDP (current US\$ Billion) also exhibits a positive correlation with TASV ($r = .330$) and Inflation ($r = .310$). TASV and Inflation (Consumer Prices, Annual %) show a positive cor-

relation ($r = .310$). Overall, the correlation coefficients suggest positive relationships among the variables, indicating that changes in one variable are associated with changes in the others.

Table 3 shows the regression results for the REER Index (2010 = 100) as the dependent variable and Gross AUM (US\$ billion) as the independent variable. The constant term has a coefficient of 114.86 (SE = 3.69, $t = 31.14$, $p < .001$), which is statistically significant, suggesting that the expected value of the REER Index is approximately 114.86 when Gross AUM is zero. However, the Gross AUM (US\$ billion) coefficient is 0.002 (SE = 0.009, $t = 0.208$, $p = .846$), which is not statistically significant at the 5% level. The model accounts for only

Table 3. Regression REER index

Source: Author's calculations.

Predictor	B	SE	β	t	p	R ²
Constant	114.86	3.69	–	31.14	.000	
Gross AUM (US\$ Billions)	0.002	0.009	0.103	0.208	.846	.011

Note: a. Predictors: (Constant), Inflation, consumer prices (annual %), Gross AUM (US\$ billion).

Table 4. Regression for GDP (current US\$ billion)

Source: Author's calculation.

Predictor	B	SE	β	t	p	R ²
Constant	821.94	205.56	–	3.999	.016	
Gross AUM (US\$ Billion)	0.227	0.495	0.224	0.460	.670	.050

Table 5. Regression for TASV

Source: Authors' calculations using SPSS.

Predictor	B	SE	β	t	p	R ²
Constant	2.99	2.02	–	1.478	.213	
Gross AUM (US\$ Billion)	0.003	0.005	0.330	0.699	.523	.109

1.1% of the variation in the REER Index ($R^2=.011$), indicating that Gross AUM has little influence on the REER Index.

Table 4 presents the regression results for GDP (current US\$ billion) as the dependent variable and Gross AUM (US\$ billion) as the independent variable. The constant term has a coefficient of 821.94 ($SE = 205.56$, $t = 3.999$, $p = .016$), which is statistically significant, indicating that the expected GDP value would be approximately 821.94 when Gross AUM is zero. However, the Gross AUM (US\$ Billion) coefficient is 0.227 ($SE = 0.495$, $t = 0.460$, $p = .670$), which is not statistically significant at the 5% level. The model accounts for only 5.0% of the variance in GDP ($R^2=.050$), suggesting that Gross AUM weakly influences GDP variations. The high p-value and low R^2 value indicate that the relationship between Gross AUM and GDP is weak and lacks statistical significance in this model.

Table 5 shows the regression results for TASV as the dependent variable and Gross AUM (US\$ Billion) as the independent variable. The constant term has a coefficient of 2.99 ($SE = 2.02$, $t = 1.478$, $p = .213$), which is not statistically significant, sug-

gesting that the expected value of TASV would be approximately 2.99 when Gross AUM is zero. The Gross AUM (US\$ billion) coefficient is 0.003 ($SE = 0.005$, $t = 0.699$, $p = .523$), which is also not significant at the 5% level. The model explains only 10.9% of the variation in TASV ($R^2 = .109$), indicating that Gross AUM has a weak and statistically insignificant effect on TASV.

Table 6 shows the regression results for Inflation (Consumer Prices, Annual %) as the dependent variable and Gross AUM (US\$ Billion) as the independent variable. The constant term, with a coefficient of 0.217 ($SE = 2.795$, $t = 0.078$, $p = .942$), is not statistically significant, suggesting that when Gross AUM is zero, the expected inflation rate would be approximately 0.217. The Gross AUM (US\$ Billion) coefficient is 0.004 ($SE = 0.007$, $t = 0.652$, $p = .550$), which is also not significant at the 5% level. The model accounts for only 9.6% of the variation in Inflation ($R^2 = .096$), indicating that Gross AUM weakly influences changes in inflation.

In Table 7, unlike earlier models, the correlation coefficient ($R = 0.681$) in this third regression model shows a higher positive association

Table 6. Regression for inflation

Source: Authors' calculations using SPSS.

Predictor	B	SE	β	t	p	R ²
Constant	0.217	2.795	–	0.078	.942	
Gross AUM (US\$ Billion)	0.004	0.007	0.310	0.652	.550	.096

Table 7. Summary of regression

Source: Authors' calculations using SPSS.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.681 ^a	.464	.107	1.39484

Note: a. Predictors: (Constant), Inflation, consumer prices (annual %), Gross AUM (US\$ billion).

Table 8. Regression financial model analysis

Source: Author's calculations using SPSS.

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	2.891	1.813	–	1.595	.209
Gross AUM	.001	.005	.136	.305	.780
Inflation	.457	.324	.627	1.410	.253

between the dependent variable and the predictors (Inflation, consumer prices, and gross AUM). These predictors account for around 46.4% of the variation in the dependent variable, according to the R Square value of 0.464, indicating a moderate level of explanatory power. Even though it is lower, the Adjusted R Square of 0.107 is still positive, suggesting that the model may generalize to new data. The model fit has improved, demonstrating less variability in prediction errors with a standard error of 1.39484. Compared to the earlier models, Model 3 shows a stronger and more consistent association overall.

In Table 8, Model 3 examines how the Gross AUM of the PIF in US\$ Billion affects the TASV as a proxy for Saudi Arabian stock market volatility, controlling for the impact of Inflation. The model summary gives the value of R-squared = 0.107, which means the model can only explain a small variability of stock market volatility. The F-statistic of 1.299 is insignificant, though (Sig level = 0.392), which implies that the model is also insignificant. To this end, these results imply that other factors, including investor sentiment, global market conditions, and events related to firms, might be more influential in Saudi Arabian stock return volatility than those included in this model.

The factor loadings for five important economic indicators are shown in Table 9, each loading onto a different component and accompanied by the standard errors (SE), Z-values, and p-values for each factor.

Table 9. Factor analysis of economic indicators

Source: Author's calculations using SPSS.

Factor	Indicator	Estimate	SE	Z	p
Factor 1	Gross AUM (US \$) Billion	130.65	37.715	3.46	<.001
Factor 2	REER index (2010 = 100)	2.33	0.673	3.46	<.001
Factor 3	GDP (current US\$) Billion	132.63	38.286	3.46	<.001
Factor 4	TASV	1.35	0.389	3.46	<.001
Factor 5	Inflation, consumer prices (annual %)	1.85	0.534	3.46	<.001

Factor 1: The estimated Gross AUM (US\$ billion) is 130.65 with a standard error of 37.715, which results in a significant Z-value of 3.46 ($p < .001$). This shows that this component has a high loading, significantly capturing AUM fluctuations.

Factor 2: The REER Index (2010 = 100) has a Z-value of 3.46 ($p < .001$), an estimate of 2.33, and a standard error of 0.673. This loading suggests that this component reasonably explains changes in the exchange rate index.

Factor 3: The loading estimate for GDP (current US dollars) is 132.63, with a standard error of 38.286. Significant GDP variance is captured by this component, which has a Z-value of 3.46 ($p < .001$).

Factor 4: The estimate for TASV is 1.35, with a Z-value of 3.46 ($p < .001$) and a standard error of 0.389. This factor implies a significant loading of stock market volume here.

Factor 5: Inflation, Consumer Prices (yearly %) is significant at $p < .001$ and has an estimated 1.85 with a Z-value of 3.46 and a standard error of 0.534. This component captures the effect of Inflation on the data set. Every economic indicator makes a substantial and unique contribution to the total, as all elements are statistically significant ($p < .001$).

Table 10 presents a Test for Exact Fit with an undefined p-value (NaN), a chi-square (χ^2) value of 0.00, and 0 degrees of freedom (df). A chi-square of 0 indicates no discernible departure from pre-

Table 10. Fit in model evaluation

Source: Author's calculations using SPSS.

χ^2	df	p
0.00	0	NaN

Table 11. Fit measures for model evaluation

Source: Author's calculations

Measure	CFI	TLI	RMSEA	RMSEA 90% CI Lower	RMSEA 90% CI Upper
Values	1.00	1.00	0.00	0.00	0.00

dicted values and that the model fits the data well. A saturated model has zero degrees of freedom, meaning there is no residual variance to test for fit because the number of parameters precisely matches the data points. Because the chi-square test necessitates at least one degree of freedom for a significant result, demonstrating an exact fit by model design, a p-value cannot be calculated.

Model fit metrics are shown in Table 11, where values denote a perfect fit. Given that values near 1 denote little difference between the proposed model and the data, the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) are at 1.00, indicating a good model fit. The model's precise fit is further supported by the Root Mean Square Error of Approximation (RMSEA) of 0.00 and the 90% Confidence Interval (CI) between 0.00 and 0.00. When taken as a whole, these numbers show that the model either fits the data very well or is saturated, meaning there are no observable mistakes or misfits.

The factor analysis model reveals a complex structure beneath the data in Figure 11, demonstrating how five distinct latent components affect the observable variables. These factors are unobserved constructs that explain the relationships between the variables. The model's perceptive insights about the underlying dimensions of the data allow for a deeper understanding of the underlying processes.

4. DISCUSSION

The results do not convincingly show a strong positive relationship between Public Investment Fund (PIF) AUM and key economic indicators in Saudi Arabia (KSA), which include GDP, across

all three models. The moderately positive correlation of Model 1 ($R = 0.411$) only explains 16.9% of the fluctuation in GDP, indicating PIF's impact on GDP to be constrained while modelled using chosen variables. Simultaneously, high intercepts might indicate very important external factors influencing GDP and not part of PIF's AUM, yet vital for the KSA economy, like government expenditure, oil income, or private sector investments. Theoretically, a higher exchange rate usually goes with economic development because it has higher buying power and, consequently, better investment attraction. This relationship sustains the goodness of the positively correlated GDP with the exchange rate index. This finding aligns with previous research indicating limited short-term economic impacts of sovereign wealth funds due to their long-term investment strategies and diversified portfolios. However, observed stronger GDP impacts in resource-rich countries under particular structural conditions, a discrepancy that may reflect differences in methodological approach or investment allocation.

Model 3 had a slightly stronger, but still limited, relationship between the AUM of PIF and the stock market volatility: R of 0.681 and R -Squared of 0.464. Even with a higher correlation, the model described less than half of the variance in stock market activity. This would reinforce the conclusion that other factors, perhaps unmodelled, are significant in determining stock market stability. This would be consistent with studies that show that more significant external factors, such as changes in oil price, investor sentiment, and global market conditions, may explain stock market volatility. These can create higher trading volumes and changes in the TASI. Because of investor behavior toward risk aversion during periods of economic stability, the somewhat negative as-

sociation between GDP and TASV (stock trading volume) would seem to indicate that higher levels of economic production do not always translate into more excellent market activity. On the contrary, TASV and Inflation share a strong positive relationship, showing that higher Inflation levels correspond to higher stock market volumes. This may reflect investor concerns regarding the volatility of Inflation and the erosion of purchasing power. Our findings, indicating a limited explanatory power ($R^2 = 0.464$), resonate with studies highlighting external variables such as oil price fluctuations, investor sentiment, and global market trends as more dominant factors in the stock market (Schwert, 1989).

As a sovereign wealth fund (SWF), the PIF's mission in the Vision 2030 strategy is to encourage economic diversification and lessen reliance on oil earnings. High p-values suggest that PIF's AUM has little statistical significance in affecting GDP, which may mean that these diversification initiatives are still in their infancy and that conventional industries will continue to drive development. As Vision 2030 projects progress and industries other than oil and gas gain traction and profitability, KSA's GDP may eventually depend more on diverse investments. The potential of financial reforms to draw in foreign investment and boost the economy is highlighted by the reasonable alignment of exchange rates with GDP growth. This limited short-term statistical significance of PIF's

contribution to GDP diversification supports the findings of comparative research on other sovereign wealth funds, like Norway's Government Pension Fund and the UAE's ADIA, which also initially demonstrated minimal immediate impacts but substantial long-term economic benefits.

The models only provide a limited understanding of stock market volatility, indicating the need for more research into the underlying behaviors of the market, such as changes in policy, investor mood, and outside shocks. Significantly, the positive association between Inflation and TASV suggests that investor mood may be especially sensitive to inflationary pressures, which might result in larger trading volumes during periods of rising Inflation. Furthermore, although they were not taken into account in our model, changes in the price of oil, a key factor in determining the economic performance of the Kingdom of Saudi Arabia, probably have a substantial impact on market volatility. By including these variables, future research might shed light on the connection between external shocks and KSA stock market dynamics. The strong positive association between Inflation and trading volume mirrors prior studies that underline investors' sensitivity to inflationary pressures, leading to increased market participation during volatile economic periods (Mishkin, 2007). Further exploration into oil-price dynamics, recognized as a critical external influence on Saudi market volatility, could further enrich this analysis.

CONCLUSIONS

This study analyzed the impact of the Saudi Public Investment Fund's (PIF) assets under management (AUM) on key economic indicators – GDP, Inflation, exchange rates, and stock market volatility – within the framework of Saudi Vision 2030. Findings revealed limited and statistically insignificant short-term impacts, emphasizing that other macroeconomic determinants, such as government expenditure, oil revenues, private sector activity, and international market dynamics, significantly drive Saudi Arabia's economic performance. Consequently, PIF's current role appears more strategic than immediate, emphasizing long-term diversification rather than short-term economic stimulation. Future research should extend data periods to assess longer-term or delayed impacts of PIF investments, explore potential nonlinear relationships, and conduct comparative studies with established global sovereign wealth funds. This will yield practical insights into the effective utilization of sovereign wealth funds for sustainable economic diversification and stability.

The results suggest that PIF's AUM has a small and statistically insignificant impact on the economic indicators under study. Model 1 demonstrated weak explanatory power for the relationship between PIF's AUM and the REER; Model 2 showed a similarly weak association between PIF's AUM, GDP, and

Inflation. Model 3 demonstrated the strongest correlation, explaining 46.4% of the variation in stock market volatility, though a substantial portion of variability remains unexplained. These findings are suggestive that the Saudi economy is possibly driven by a more extensive set of determinants, which might include oil prices, government spending, private sector investment, and international market conditions, rather than directly by the impact of PIF's AUM. Moreover, large intercept values in the models emphasize the importance of controlling for other variables that can help build a more comprehensive view of the dynamics.

IMPLICATIONS OF THE STUDY

This study has significant implications for policymakers and institutional investors in Saudi Arabia. While the Public Investment Fund (PIF) is the main conduit for Vision 2030 funds, current data indicate that its direct impact on GDP and other key economic indicators is relatively small. This underscores an essential disconnection between capital investment and macroeconomic change. The lesson for government stakeholders is a stark one: more attention must be paid to the quality and strategic coherence of PIF's investments than simply their scale. Likewise, investors and analysts should moderate expectations around immediate market impacts and rather look to PIF's investments as part of a wider, long-term diversification process. Similarly, these insights also imply that a stronger alignment between ongoing and future PIF initiatives and complementary economic policies, including fiscal stimulus, private sector partnerships, and institutional reforms, could increase the Fund's developmental impact in the years ahead.

LIMITATIONS OF THE STUDY

Although this study offers a targeted empirical evaluation of PIF's impact on Saudi Arabia's economic outcome, it comes with limitations. First, the short time frame (2015–2023) might not fully reflect any developmental lag arising from investments by sovereign wealth funds, particularly as many infrastructure and strategic projects may take decades to mature. Second, the analysis relies on a limited number of macroeconomic indicators and does not control for other potentially relevant explanatory variables like oil prices, measures of fiscal policy, and foreign direct investment inflows. Third, the models are linear and assume instantaneous effects, which do not correspond to the complex, often delayed response of the economy to large-scale investments. Last, data availability and transparency, especially on a project-by-project basis, limit a deeper understanding of the internal make-up of PIF activity. These limitations mean the results must be interpreted cautiously and as a starting point for larger future studies.

FUTURE RESEARCH DIRECTIONS

There are a number of interesting avenues to pursue for extending this work. Future studies may consider broader datasets over an extended time horizon to account for delayed or compounding impacts of sovereign investments. Investigating non-linear models or utilizing time-lagged regressions would be a more accurate representation of capital impacting economic variables over time when considering PIF's capital. Illuminating which kinds of capital allocation lead to the highest economic returns for the country could help even more, including by disaggregating PIF investments by sector or by region. Another productive line of inquiry would be to compare the pros and cons of Indonesia's experience relative to other sovereign wealth funds functioning under similar resource-dependent economic models, like those in Norway, the UAE, or Qatar. Ultimately, integrating qualitative methods during phase one, such as policy document analysis or talks with subject-matter experts about fund effectiveness, could provide a more robust and nuanced understanding of how institutional strategy and political economy affect fund effectiveness. Together, these frameworks would provide a more comprehensive view of how sovereign wealth can act as a mechanism for sustainable and inclusive economic growth.

AUTHOR CONTRIBUTIONS

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