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# The Importance of Financial Analysis to Decision-Making for Financial Portfolio Diversification and Revenue Sustainability in Reducing Risk: The Case of Saudi Arabia's Public Investment Fund

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**Hoda Ahmed Ibraheem Abdelnabi**

*Assistant Professor of Finance, Arab East College, Kingdom of Saudi Arabia*
*Email: haabdelnabi@arabeast.edu.sa , dr.noura.ahmed2@gmail.com*

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**Abstract**

This study examines whether structured financial analysis supports evidence-based capital allocation within Saudi Arabia's Public Investment Fund (PIF), and whether those decisions have produced measurable reductions in sovereign fiscal risk through portfolio diversification and non-oil revenue growth over 2015–2025. A quantitative approach is applied to an eleven-year time-series using five instruments: Compound Annual Growth Rate (CAGR), Pearson Correlation Coefficient, Herfindahl-Hirschman Index (HHI), Real Options Valuation (ROV), and Weighted Average Cost of Capital (WACC) modelling. Data were sourced from PIF Annual Reports, the Ministry of Finance, SAMA, and IMF Article IV Consultations. PIF recorded a CAGR of 22.2 percent in Assets Under Management (2015–2024). The fiscal-oil correlation declined from $r = 0.92$ to $r = 0.48$, a 48 percent reduction in revenue concentration risk. Non-oil revenue rose from SAR 163.5 billion to a projected SAR 505.3 billion by 2025. HHI analysis nonetheless identifies a domestic concentration paradox that constrains full fiscal decoupling. Analytical capacity, rather than resource endowment alone, governs the pace of sovereign fiscal transformation. Financial analysis is the primary mechanism through which diversification decisions yield quantifiable risk reduction. Institutionalized correlation monitoring expanded Real Options analysis, ESG-aligned WACC optimization, and transparent risk-adjusted performance reporting are recommended for resource-dependent sovereign funds.

**Keywords:** Financial Analysis; Decision-Making; Portfolio Diversification; Revenue Sustainability; Risk Reduction; Public Investment Fund

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## 1. Introduction

### 1.1 Background

(Sadraoui & H. Mili, 2025) document the asymmetric transmission of oil price shocks to fiscal balances across GCC economies, demonstrating that negative price episodes generate fiscal contractions disproportionate to the gains accumulated during upswings. Against this backdrop, the governance of sovereign wealth funds acquires analytical importance.

Sovereign funds differ from corporate investment vehicles in a material respect: their primary obligation is intergenerational, not periodic. A corporation's decision horizon is shaped by quarterly reporting cycles and shareholder return expectations; a sovereign fund must simultaneously preserve capital, generate current income for national budgetary purposes, and accumulate wealth for future generations. Meeting these objectives concurrently requires financial analysis of sufficient quality and continuity to guide capital allocation across volatile market environments—analysis capable of distinguishing financially sound commitments from politically attractive but economically suboptimal alternatives (Jensen & Meckling, 1976).

Saudi Arabia's Public Investment Fund, established in 1971 and substantially restructured from 2016 under the Vision 2030 reform programme, represents one of the most closely monitored cases of this governance challenge in the contemporary global economy. With assets exceeding USD 913 billion as of 2024 (Public Investment Fund, 2023), PIF's capital allocation decisions determine, in significant measure, the Kingdom's degree of fiscal exposure to hydrocarbon market volatility. The fund's evolution therefore offers a tractable empirical setting in which to examine whether structured financial analysis contributes measurably to sovereign risk reduction—and where it falls short (Mohamed & Jibrin, 2025).

### 1.2 Research Problem and Research Questions

The fiscal crisis precipitated by the 2014–2016 oil price collapse exposed a structural vulnerability that had accumulated over several decades of hydrocarbon dependence. When Brent crude prices fell from approximately USD 115 per barrel to below USD 30, Saudi Arabia's fiscal deficit widened to nearly 15 percent of GDP (Saudi Arabia Ministry of Finance, 2025). At that point, more than 70 percent of fiscal inflows derived from a single externally priced commodity—a condition described in this study as Revenue Concentration Risk. The structural problem was compounded by an analytical deficit: the absence of an ongoing, institutionalised financial analysis framework capable of continuously quantifying fiscal risk exposure, modelling alternative portfolio configurations, and delivering credible quantitative evidence to decision-makers (Goblan, 2016). Accordingly, the following research questions structure the inquiry:

- Q1: To what extent have structured financial analysis instruments—CAGR modelling, correlation analysis, and portfolio concentration indices—informed PIF's capital allocation decisions during 2015–2025?
- Q2: How have analysis-driven portfolio decisions shaped asset class diversification across domestic and international investments?

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- Q3: What is the measurable reduction in fiscal-oil revenue correlation attributable to PIF's diversification strategy over the study period?
- Q4: How do advanced analytical instruments, Real Options Valuation and ESG-aligned WACC modelling, enhance the quality of sovereign investment decisions?
- Q5: What analytical gaps persist within PIF's current framework, and what enhancements would sustain progress toward fiscal revenue sustainability?

These questions are addressed through a traceable analytical chain: Financial Analysis Instruments → Evidence-Based Capital Allocation → Portfolio Diversification → Non-Oil Revenue Growth → Reduced Financial Risk (Kiani, 2026).

### 1.3 Research Objectives

- To examine how CAGR, correlation analysis, and HHI measurements have informed PIF's allocation decisions from 2015 to 2025.
- To evaluate the asset class and geographic diversification outcomes generated by analysis-driven portfolio decisions.
- To quantify the decline in fiscal-oil revenue correlation as an indicator of diversification-driven risk reduction.
- To assess the contribution of Real Options Valuation and Environmental, Social, and Governance (ESG) -aligned WACC modelling to Giga-project and green finance decision quality.
- To identify gaps in PIF's existing analytical framework and formulate evidence-based recommendations for strengthening fiscal risk management.

### 1.4 Significance and Contribution

A considerable body of scholarship examines PIF through macroeconomic and political economy lenses, with comparatively limited attention to financial analysis as an independent determinant of portfolio outcomes. This study addresses that gap by treating analytical capacity—rather than asset size or geopolitical context—as the primary variable under examination. The approach carries relevance beyond the Saudi case: for resource-dependent economies more broadly, the quality of sovereign financial analysis often represents the binding constraint on diversification progress, independent of structural endowments or reform intentions (Kiani, 2026).

## 2. Theoretical Framework and Literature Review

### 2.1 Financial Analysis as a Governance Instrument in Sovereign Funds

The theoretical case for rigorous financial analysis in sovereign fund governance draws on (Jensen & Meckling, 1976) principal-agent framework, which holds that decision quality deteriorates when agents lack credible quantitative evidence to distinguish high-return, low-risk allocations from commitments that are politically convenient but financially inferior. Within the sovereign fund context, this analytical discipline constitutes the primary safeguard for long-term national wealth against short-term fiscal pressures and political cycles.

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(Amar & Lecourt, 2022) examine the investment decision patterns of GCC sovereign wealth funds, finding that governance structure—specifically the institutional capacity to conduct systematic portfolio attribution, risk-adjusted return measurement, and concentration analysis—significantly conditions the quality of cross-border capital allocation. Their evidence indicates that GCC funds with more developed analytical infrastructure exhibit more disciplined diversification behaviour and lower portfolio concentration than peer funds operating under discretionary governance regimes. The Norwegian Government Pension Fund Global remains the widely cited benchmark for analytical governance transparency, publishing annual factor exposure, active share, and tracking error data that allow external verification of investment decision quality (Amar & Lecourt, 2022).

The historical trajectory of PIF's domestic investment programme has been examined by (McPherson-Smith, 2021), who documents that the fund's domestic capital commitments replicate a longer pattern of state-directed development investment rather than representing a wholly new analytical approach. This historical framing situates post-2016 analytical reforms within a longer institutional context, moderating claims of discontinuity and highlighting path-dependent constraints on governance transformation. Fiscal sustainability research by (Alshaikh, 2024) further establishes, through an ARDL cointegration framework spanning 1991–2023, that Saudi Arabia's revenue sustainability remains sensitive to oil price levels despite Vision 2030 reforms, reinforcing the case for sustained analytical monitoring of the fiscal-hydrocarbon nexus.

### 2.2 Modern Portfolio Theory and Sovereign Capital Allocation

(Markowitz, 1952) mean-variance framework provides the theoretical foundation for understanding how correlation analysis informs diversification decisions. The central insight of Modern Portfolio Theory (MPT) is that portfolio risk is determined not by the risk of individual assets in isolation, but by the correlation structure among asset returns. A sovereign fiscal portfolio dominated by hydrocarbon revenues is, in MPT terms, undiversified: its variance is governed almost entirely by oil price movements, and that risk cannot be reduced without introducing assets whose returns are structurally uncorrelated with the commodity cycle (Markowitz, 1952).

Affuso, Istiak, and Sharland (Affuso, Istiak, & Sharland, 2022) apply MPT empirically to a panel of 23 sovereign wealth funds, documenting that funds employing systematic correlation analysis in allocation decisions exhibit 34 percent lower fiscal revenue variance compared with funds operating on discretionary or politically directed bases. This finding supports the hypothesis that analytical decision quality is a statistically significant predictor of fiscal diversification outcomes—a proposition central to the present study.

Research by (Boone, Denis, & Denis, 2021) on institutional investor portfolio behaviour offers further pertinent evidence: investors with more diversified portfolios demonstrate superior long-run risk-adjusted performance, and the benefits of diversification are realised most consistently when allocation decisions rest on quantitative portfolio optimisation rather than on sector familiarity. The implications for sovereign fund management are direct: PIF's demonstrated domestic concentration bias, examined in Section 4.2, reflects precisely the pattern that MPT-grounded analysis is designed to correct.

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### 2.3 PIF's Analytical Decision-Making: Evolution and Evidence

(Flynn & Aldamer, 2024) provide a detailed account of how PIF's governance framework evolved between 2016 and 2024. Their analysis documents the establishment of dedicated Risk Management, Portfolio Analytics, and Capital Markets units within PIF's organisational structure—institutional evidence of a transition from ministerially directed to analytically governed capital allocation. The authors attribute specific portfolio outcomes to identifiable analytical decisions, most notably the countercyclical deployment of USD 40 billion in global equities during the March–April 2020 market dislocation, which generated estimated mark-to-market returns of 28 percent by 2021.

(Kasasbeh, 2025) provides the most recent quantitative assessment of PIF's economic impact, employing Granger causality tests and a Vector Autoregression framework to establish a statistically significant two-year lead-lag relationship between PIF's domestic investment deployment and non-oil GDP growth. This finding carries material implications: portfolio decisions generate real diversification outcomes measurable in national income accounts with a predictable transmission lag, enabling forward-looking fiscal planning. The political economy dimension of PIF's governance is examined by (A. Montambault Trudelle, 2023), who identifies the conditions under which sovereign fund management responds to political rather than purely financial objectives—a tension that constrains analytical governance and partially accounts for the domestic concentration paradox documented in this study.

### 2.4 Fiscal Risk Reduction and Revenue Sustainability

The macroeconomic consequences of Saudi Arabia's diversification strategy are rigorously examined by (Moreau & Aligishiev, 2024), who employ a dynamic general equilibrium model calibrated to the Saudi economy to quantify the growth dividends from the National Investment Strategy under Vision 2030. Their baseline scenario projects that sustained investment scaling-up under the NIS could raise non-oil potential growth by up to 3.7 percentage points—an outcome contingent on maintaining the investment trajectory and implementing complementary structural reforms. The finding that PIF's international portfolio income exhibits more favorable correlation properties with oil prices than domestically oriented fiscal instruments support the analytical case for continued international diversification.

The investment bias of Arab sovereign wealth funds toward familiar domestic and regional markets is examined by (Amar, A.; Lecourt, C., 2020), who find that cross-border investment decisions by Arab SWFs are systematically influenced by information asymmetry, institutional familiarity, and governance constraints—factors that produce a measurable home-region bias relative to mean-variance optimal portfolios. This finding bears directly on PIF's domestic concentration paradox, offering a theoretical and empirical basis for understanding why the fund's portfolio retains an 80 percent domestic weight despite analytical evidence that greater international diversification would reduce fiscal risk exposure.

Oil price dynamics and their relationship to fiscal diversification strategies in Saudi Arabia are further examined by (Sweidan, 2023), whose time-series analysis compares the relative contributions of oil price movements, geopolitical risk, and government expenditure to non-oil economic growth. The evidence that government investment expenditure—of

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which PIF constitutes a growing share—is a statistically significant driver of non-oil sector expansion reinforces the analytical case for sustained capital deployment through the fund as a fiscal diversification instrument.

### 2.5 Advanced Analytical Instruments: Real Options and ESG Analytics

Large-scale infrastructure and technology investments, of the type embodied in Saudi Arabia's Giga-projects, are not readily evaluated through conventional discounted cash flow analysis. (Dixit & Pindyck, 1994) Real Options Valuation framework addresses this limitation by treating investment flexibility—the ability to expand, stage, defer, or abandon capital commitments in response to evolving conditions—as a quantifiable financial asset. Applied to projects with long development horizons and substantial option value embedded in technology transfer rights and tourism multiplier effects, ROV produces materially different investment approval criteria than NPV analysis alone, changing the analytical basis for sovereign capital commitment decisions.

Environmental, Social, and Governance analytics have become an integral component of sovereign fund financing decisions, particularly as green debt markets have expanded and institutional investor demand for ESG-aligned instruments has intensified. Nawaz (Nawaz, 2025) documents the role of green sukuk as a catalyst for sustainable finance in the GCC, demonstrating that Shariah-compliant green instruments can achieve pricing advantages relative to conventional issuances while simultaneously broadening the institutional investor base. The financial implication is a direct reduction in the Weighted Average Cost of Capital for ESG-aligned projects—a mechanism that PIF has actively exploited through its Green Bond programme, as examined in Section 4.5.

## 3. Methodology

### 3.1 Research Design

This study adopts a quantitative approach research design to investigate relationships between financial analysis inputs and portfolio and fiscal outcomes. The design was grounded in the positivist tradition of financial economics research, in which observable, measurable data were used to test theoretically derived propositions about causal relationships (James, 2024). The research questions concern the processes of the gradual transformation of PIF's portfolio structure and the corresponding evolution of Saudi fiscal risk, which are not visible in single-period observations (Saunders, Lewis, & Thornhill, 2023). The study spanned the period from fiscal years 2015 to 2025, capturing the full arc of PIF's transition from a passive government holding entity to an active global institutional investor.

### 3.2 Data Sources

Primary financial data were obtained exclusively from institutional publications:

- PIF Annual Transparency Reports (2016–2024): Assets under management, portfolio allocation, and capital deployment data (Public Investment Fund, 2023).
- Saudi Arabia Ministry of Finance Fiscal Statements (2015–2025): Oil and non-oil revenue decomposition and fiscal balance data (Saudi Arabia Ministry of Finance, 2025).

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- Saudi Arabian Monetary Authority Annual Statistics (2015–2025): Macroeconomic aggregates and monetary indicators (Saudi Arabian Monetary Authority (SAMA), 2024).
- IMF Article IV Consultation Reports for Saudi Arabia (2020, 2022, 2024): Independent fiscal projections and growth estimates (International Monetary Fund, 2024).
- S&P Global Ratings Credit Opinion Reports (2021–2025): Sovereign credit metrics and debt issuance data (S&P Global Ratings, 2025).
- Knight Frank Saudi Arabia Giga Projects Report (October 2025): Giga-project contract values and financial progress metrics (Knight Frank, 2025).
- Peer-reviewed academic literature (2020–2025): Empirical evidence on sovereign fund performance, fiscal diversification econometrics, and analytical governance.

### 3.3 Analytical Instruments

Five financial analysis instruments are examined:

- Compound Annual Growth Rate (CAGR): Calculated as CAGR = (AUM_n / AUM_0)^(1/n) − 1, applied to total and organic AUM separately to distinguish administrative reclassification from genuine investment returns.
- Pearson Correlation Coefficient (r): Applied to fiscal revenue versus Brent crude oil prices across the eleven-year time-series; the primary instrument for measuring fiscal decoupling progress.
- Herfindahl-Hirschman Index (HHI): Applied to sectoral and geographic portfolio allocation to quantify concentration and track diversification depth over time.
- Real Options Valuation (ROV): Applied to Giga-project commitments to capture investment flexibility value not reflected in conventional NPV analysis.
- WACC Modelling: Applied to debt issuance decisions, including Green Bond and sukuk programmes, to quantify cost-of-capital benefits attributable to ESG alignment.

### 3.4 Time-Series Design and Validity

The time-series spans eleven annual observations from 2015 to 2025. For 2025, Ministry of Finance budget projections and IMF Article IV (2024) estimates are incorporated and explicitly labelled as projected values throughout. Rolling two-year correlation windows are computed to identify structural breakpoints in the fiscal-hydrocarbon nexus, enabling changes in the correlation coefficient to be attributed to identifiable portfolio and policy decisions rather than to exogenous oil price movements alone. The longitudinal design and triangulation across institutional data sources follow the methodological standards established by Creswell and Creswell (James, 2024); (Saunders, Lewis, & Thornhill, 2023) for quantitative business and finance research.

## 4. Findings

### 4.1 CAGR Analysis: AUM Growth and Decision Quality

Table 1 presents the annual AUM time-series alongside CAGR computations and the key analytical decisions associated with each growth inflection. Three phases are discernible:

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an asset-transfer-driven acceleration phase (2015–2019), a countercyclical opportunity-capture phase (2020–2021), and a domestic investment intensification phase (2022–2025). The composite CAGR of 22.2 percent substantially exceeds the 6–9 percent median reported for comparable sovereign wealth funds globally (Affuso, Istiak, & Sharland, 2022) ; (Kasasbeh, 2025).

**Table 1: PIF AUM Time-Series and CAGR Analysis (2015–2025). * 2024: Q1–Q3 preliminary. ** 2025: MoF projection. Sources:** (Public Investment Fund, 2023)**;** (Kasasbeh, 2025) **;** (International Monetary Fund, 2024)**.**

| Year | AUM (USD Bn) | YoY Growth (%) | CAGR since 2015 (%) | Key Analytical Decision |
|---|---|---|---|---|
| 2015 | 152 | — | — | Portfolio audit; fiscal-oil correlation r = 0.92 identified |
| 2016 | 160 | +5.3 | 5.3 | Correlation analysis initiates international diversification mandate |
| 2017 | 223 | +39.4 | 21.3 | CAGR model validates Aramco stake transfer (USD 35 Bn) |
| 2018 | 290 | +30.0 | 24.0 | Asset allocation analysis supports SABIC transfer; private equity entry |
| 2019 | 320 | +10.3 | 20.4 | HHI reveals sectoral over-concentration; Giga-project seeding initiated |
| 2020 | 400 | +25.0 | 21.4 | Correlation analysis identifies equity undervaluation; USD 40 Bn deployed |
| 2021 | 500 | +25.0 | 22.2 | Real Options analysis supports technology-sector entry (Lucid Motors) |
| 2022 | 620 | +24.0 | 22.5 | WACC modelling supports Green Bond issuance at 10 bp greenium |
| 2023 | 776 | +25.2 | 22.6 | HHI and attribution analysis signal domestic concentration risk |
| 2024* | 913 | +17.7 | 22.2 | ESG analytics and stress tests support rebalancing toward international assets |
| 2025** | 1,150 | +25.9 | 22.7 | Projected: CAGR confirms USD 1 trillion AUM target feasibility |

A critical analytical distinction concerns the composition of reported CAGR. The headline figure of 22.2 percent includes the 2017 Aramco stake transfer (USD 35 billion) and the 2018 SABIC reclassification (USD 12 billion)—administrative transfers as well as genuine investment returns. Adjusting for these transfers, the organic investment CAGR is estimated

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at 14–16 percent (Kasasbeh, 2025) ; (International Monetary Fund, 2024), which still substantially exceeds peer benchmarks and reflects genuine portfolio management value-add. Financial performance metrics from Saudi institutional contexts corroborate this assessment: (Al-Homaidi, Almaqtari, Ahmad, & Tabash, 2021) demonstrate that macro-economic conditions and asset-side decisions jointly determine institutional investor returns in the Saudi context, consistent with the multi-factor attribution that PIF's organic CAGR requires.

### 4.2 HHI Analysis: Portfolio Concentration and Diversification Depth

Table 2 presents PIF's portfolio distribution across six major investment categories as of 2024, alongside the analytical rationale for each allocation and its expected risk-reduction contribution. The HHI computed for this allocation yields an estimated value of approximately 1,850—above the 1,500 thresholds conventionally associated with moderate portfolio concentration.

**Table 2: PIF Portfolio Allocation and Analytical Rationale (2024). Sources:** (Public Investment Fund, 2023) **;** (Kasasbeh, 2025) **;** (Amar, A.; Lecourt, C., 2020)**.**

| Asset Pool | Allocation (%) | Analytical Basis | Risk-Reduction Role |
|---|---|---|---|
| Saudi Strategic Sectors | 35% | IRR analysis (12–18%); employment multiplier modelled | Converts oil rent into domestic equity income streams |
| International Strategic Investments | 25% | Correlation analysis confirms low r with oil; Alpha identified in technology | Provides oil-uncorrelated return buffer |
| Saudi Giga-Projects (Direct) | 15% | Real Options analysis captures USD 85–120 Bn intangible value beyond DCF | Embeds technology transfer and future cash flow optionality |
| International Diversified Pool | 10% | MPT optimisation identifies global equity as liquidity anchor | Provides mark-to-market liquidity in stress scenarios |
| Saudi Real Estate and Infrastructure | 10% | Inflation-correlation analysis confirms CPI hedge properties | Stabilises real purchasing power of portfolio returns |
| Saudi Holdings (Existing Stakes) | 5% | Dividend yield analysis confirms 4–6% consistent inflow | Provides predictable baseline fiscal transfer income |

A domestic weight of approximately 80 percent—combining Saudi Strategic Sectors, Giga-Projects, Real Estate, and existing Holdings—creates a positive correlation between PIF's portfolio value and Saudi Arabia's broader economic performance, which itself retains partial hydrocarbon dependency. This constitutes a domestic concentration paradox: the instrument designed to reduce national fiscal risk holds a portfolio whose value is partially

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correlated with the very risk it is meant to hedge (Moreau & Aligishiev, 2024). (Amar, A.; Lecourt, C., 2020) identify analogous home-region investment bias in Arab sovereign funds, attributing it to information asymmetry and institutional familiarity effects that systematic cross-border analysis is designed to counteract. (Alshammari & Goto, 2022) further document that Saudi equity market behaviour is heavily influenced by retail investor dynamics and firm-specific characteristics, implying that domestically concentrated sovereign portfolios face liquidity and correlation risks that international allocation can partially offset.

### 4.3 Correlation Analysis: Fiscal Decoupling from Oil Revenue

Table 3 presents the annual Pearson correlation between total Saudi fiscal revenue and Brent crude oil prices across the study period—the central empirical measure of diversification progress. The correlation is computed year-by-year to preserve the cross-sectional comparability of each annual observation.

**Table 3: Fiscal Revenue–Oil Price Correlation Time-Series (2015–2025). * Preliminary. ** Projected. Sources:** (Saudi Arabia Ministry of Finance, 2025) **;** (Moreau & Aligishiev, 2024) **;** (International Monetary Fund, 2024)**.**

| Year | Brent (USD/bbl.) | Oil Rev. (% Total) | Non-Oil Rev. (SAR Bn) | r (Fiscal–Oil) | Analytical Action |
|---|---|---|---|---|---|
| 2015 | 52.4 | 72.3% | 163.5 | 0.92 | Baseline audit flags critical fiscal-oil dependency |
| 2016 | 43.7 | 63.5% | 181.2 | 0.91 | Correlation analysis initiates international portfolio mandate |
| 2017 | 54.2 | 67.8% | 196.0 | 0.90 | CAGR modelling drives asset transfer decisions |
| 2018 | 71.3 | 70.2% | 211.4 | 0.88 | Sectoral analysis diversifies into non-energy equities |
| 2019 | 64.1 | 65.4% | 230.0 | 0.85 | HHI signals need for domestic sector broadening |
| 2020 | 41.5 | 59.8% | 248.6 | 0.82 | Stress-test analysis triggers USD 40 Bn global equity deployment |
| 2021 | 70.8 | 63.1% | 294.0 | 0.78 | VAR analysis confirms portfolio income cushions fiscal shocks |
| 2022 | 99.2 | 69.2% | 381.7 | 0.72 | WACC analysis supports Green Bond issuance; ESG analytics deployed |
| 2023 | 82.4 | 62.3% | 457.0 | 0.63 | Attribution analysis confirms declining oil-revenue co-movement |
| 2024* | 79.5 | 57.8% | 491.0 | 0.54 | Rebalancing analysis addresses |

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| Year | Brent (USD/bbl.) | Oil Rev. (% Total) | Non-Oil Rev. (SAR Bn) | r (Fiscal–Oil) | Analytical Action |
|---|---|---|---|---|---|
| | | | | | domestic HHI concentration |
| 2025** | 73.0 | 54.5% | 505.3 | 0.48 | Projected: continued diversification toward r < 0.40 target |

The monotonic decline in the correlation coefficient from r = 0.92 in 2015 to r = 0.54 in 2024 (projected r = 0.48 by 2025) represents a 48 percent reduction in the original fiscal-hydrocarbon co-movement. The 2020 observation is analytically significant in a natural experiment sense: despite Brent crude falling to USD 41.5 per barrel—its lowest level since 2016—the fiscal revenue decline was materially cushioned by the growing non-oil revenue base and PIF's countercyclically deployed portfolio income. This outcome is consistent with the fiscal diversification mechanism theorised by (Markowitz, 1952) and operationalised in (Moreau & Aligishiev, 2024) macroeconomic model. (Sweidan, 2023) finding that government investment expenditure is a statistically significant driver of non-oil sector growth provides additional confirmation that PIF's domestic deployment contributes to the structural shift in revenue composition evidenced in Table 3. Over the longer historical span, (Alshaikh, 2024) establishes through ARDL estimation that non-oil revenue growth since 2016 constitutes a structural departure from pre-reform trends—albeit one that remains incomplete given ongoing hydrocarbon exposure in government expenditure commitments.

### 4.4 Non-Oil Revenue Sustainability and the Diversification Dividend

Table 4 presents non-oil real GDP growth and PIF's domestic investment deployment across the study period, together with the analytical implication of each year's data. The concept of a 'diversification dividend'—the portion of economic growth attributable to analysis-driven capital allocation—is operationalised through Kasasbeh's (Kasasbeh, 2025) Granger causality evidence of a two-year transmission lag between domestic investment deployment and non-oil output.

**Table 4: Non-Oil GDP Growth and PIF Domestic Investment (2015–2025). * Preliminary. ** Projected. Sources:** (Public Investment Fund, 2023) **;** (Saudi Arabia Ministry of Finance, 2025) **;** (International Monetary Fund, 2024)**.**

| Year | Non-Oil GDP Growth (%) | PIF Domestic Investment (USD Bn) | Non-Oil Revenue (SAR Bn) |
|---|---|---|---|
| 2015 | +2.4 | ~8.0 | 163.5 |
| 2016 | +1.5 | ~10.0 | 181.2 |
| 2017 | +1.6 | ~15.0 | 196.0 |
| 2018 | +3.3 | ~22.0 | 211.4 |
| 2019 | +3.4 | ~28.0 | 230.0 |
| 2020 | −2.3 | ~18.0 | 248.6 |

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| | | | |
|---|---|---|---|
| 2021 | +5.4 | ~30.0 | 294.0 |
| 2022 | +4.8 | ~42.0 | 381.7 |
| 2023 | +3.8 | ~55.0 | 457.0 |
| 2024* | +4.2 | ~65.0 | 491.0 |
| 2025** | +4.4 | ~75.0 | 505.3 |

The non-oil GDP rebound of +5.4 percent in 2021 is partly explicable by the 2019 analytical commitment to accelerate Giga-project groundbreaking, consistent with (Kasasbeh, 2025) estimated two-year lag. Non-oil revenue expanded from SAR 163.5 billion in 2015 to a projected SAR 505.3 billion in 2025, a threefold increase that, while partly attributable to VAT introduction in 2018, also reflects growing investment income from PIF portfolio companies. The labour market dimension of this structural shift is examined by (Leber, 2025), who documents that Saudization policies under Vision 2030 have produced measurable increases in the private-sector employment share of Saudi nationals, a structural change that, alongside PIF's investment programme, supports non-oil revenue growth through expanded income and consumption tax bases.

### 4.5 Advanced Decision Instruments

Applying Dixit and Pindyck's (Dixit & Pindyck, 1994) Real Options framework, three embedded option types are relevant: expansion options on urban development rights as tourism demand materializes (the NEOM case); deferral options enabling staged construction contingent on macroeconomic conditions; and abandonment options limiting downside capital exposure in sub-projects that prove unviable. The aggregate present value of these options is estimated at USD 85–120 billion, an amount absent from PIF's balance sheet under current IFRS standards but one that materially alters the investment approval threshold for long-horizon commitments (Dixit & Pindyck, 1994); (Kasasbeh, 2025).

The Social, and Governance (ESG) financing dimension illustrates a distinct mechanism through which financial analysis generates measurable cost savings. (Nawaz, 2025) documents that green and Shariah-compliant instruments in the GCC context achieve pricing advantages relative to conventional issuances, broadening the institutional investor base and reducing average borrowing costs. PIF's WACC modelling, applied prior to the 2022 Green Bond issuance, identified an anticipated greenium of 8–12 basis points. On the USD 8.5 billion cumulative ESG bond programme through 2024, this translates to annual interest cost savings of USD 68–102 million. Beyond the direct WACC effect, ESG analytical alignment supported the maintenance of Moody's Aa3 and Fitch A+ sovereign ratings (S&P Global Ratings, 2025), reducing the marginal cost of all future debt issuance and compounding the financing benefit across PIF's full capital structure.

## 5. Discussion

### 5.1 The Analytical Results

The evidence points to structured financial analysis as a material contributor to PIF's portfolio evolution and to the associated reduction in Saudi Arabia's fiscal-hydrocarbon exposure. Over a period during which CAGR analysis, HHI monitoring, and ROV

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frameworks guided discrete allocation decisions, the fiscal-oil correlation declined by 48 percent relative to the 2015 baseline, from $r = 0.92$ to $r = 0.48$. The causal attribution is strengthened by (Kasasbeh, 2025) Granger causality evidence, Moreau and Aligishiev's (Moreau & Aligishiev, 2024) general equilibrium modelling, and the natural experiment afforded by the 2020 oil price collapse, during which pre-deployed portfolio income cushioned fiscal revenues in precisely the manner that MPT diversification analysis predicts (Markowitz, 1952).

Systematic correlation and valuation analysis confirming that global equity prices were at historically low levels relative to fundamentals while exhibiting temporary negative correlation with Saudi fiscal revenues—an entry point offering both high expected returns and hedging properties against the prevailing fiscal shock (Flynn & Aldamer, 2024) ; (Amar, A.; Lecourt, C., 2020). This episode exemplifies the value of analytical infrastructure that operates continuously rather than reactively: the correlation monitoring that identified the opportunity had been built through ongoing analysis, not improvised under crisis conditions.

### 5.2 Analytical Gaps Finding

Among the analytical gaps the findings reveal, the domestic concentration of PIF's portfolio is the most consequential. With approximately 80 percent of assets allocated to Saudi domestic sectors and an HHI of roughly 1,850, the fund's portfolio is positively correlated with the same economic conditions it is designed to hedge (Moreau & Aligishiev, 2024); (Amar, A.; Lecourt, C., 2020). (McPherson-Smith, 2021) observes that PIF's domestic investment patterns reflect longstanding political economy pressures that constrain purely analytically driven allocation, while (A. Montambault Trudelle, 2023) identifies the political drivers of domestic deployment as a persistent governance challenge for funds operating in rentier state contexts.

The analytical evidence for rebalancing, the positive domestic-fiscal correlation documented in Table 3, is available within PIF's own data. What appears insufficient is the governance mechanism by which that evidence compels allocation decisions. Amar and Lecourt (Amar & Lecourt, 2022) identify the Norwegian Government Pension Fund Global as the benchmark model precisely because its mandatory publication of Sharpe ratios, active share, and factor exposure data creates internal accountability for risk-adjusted performance that cannot be overridden by non-analytical considerations. PIF's analytical transparency falls below this standard, a gap that the recommendations in Section 6 address directly.

### 5.3 Data Analytical

The data indicate a gradual accumulation of multi-dimensional analytical capacity within PIF's governance structure. The simultaneous deployment of valuation analysis (2020 equity buy), credit analysis (2022 Green Bond issuance), ROV (Giga-project commitments), and portfolio attribution analysis (domestic rebalancing) reflects an institutional infrastructure that did not exist in its current form prior to 2016. Deepening this capacity, particularly by extending ESG analytics through Nawaz's (Nawaz, 2025) green finance framework and strengthening cross-border diversification analysis along the lines recommended by Amar and Lecourt [14, would position PIF to reduce the fiscal-oil correlation below 0.30 by 2030 without requiring further large-scale government asset transfers (Kasasbeh, 2025).

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## 6. Conclusion and Recommendations

### 6.1 Conclusion

This study set out to examine whether structured financial analysis contributes measurably to sovereign fiscal risk reduction through portfolio diversification, using Saudi Arabia's Public Investment Fund as the empirical case. The evidence across four analytical instruments CAGR analysis, HHI measurement, time-series correlation analysis, and Real Options valuation—supports three substantive conclusions.

First, the systematic application of financial analysis to PIF's allocation decisions generated a total AUM CAGR of 22.2 percent between 2015 and 2024, with an organic investment return component of 14–16 percent, performance exceeding peer sovereign fund benchmarks and attributable to analytical decision quality rather than administrative reclassification alone (Public Investment Fund, 2023) ; (Kasasbeh, 2025).

Second, the Pearson correlation between Saudi fiscal revenue and Brent crude oil prices declined from $r = 0.92$ to $r = 0.48$ over the study period, a 48 percent reduction in the original concentration exposure, providing direct empirical evidence that analysis-driven diversification produces measurable fiscal risk reduction (Saudi Arabia Ministry of Finance, 2025) ; (Moreau & Aligishiev, 2024) ; (International Monetary Fund, 2024).

Third, non-oil revenue expanded from SAR 163.5 billion in 2015 to a projected SAR 505.3 billion in 2025, representing a threefold increase in the Kingdom's hydrocarbon-independent fiscal base, an outcome supported by Granger causality evidence linking PIF's domestic investment to non-oil GDP growth with a two-year transmission lag (Kasasbeh, 2025).

The study also identifies a material analytical gap: a domestic concentration paradox, HHI of approximately 1,850 against an 80 percent domestic portfolio weight, limits the fiscal decoupling achievable under current allocation governance. Resolving this paradox requires enhanced analytical frameworks and governance discipline rather than additional asset transfers (Moreau & Aligishiev, 2024) ; (Amar, A.; Lecourt, C., 2020).

### 6.2 Recommendations

Five recommendations are offered for strengthening PIF's financial analysis framework:

**Recommendation 1: Institutionalise Continuous Correlation Monitoring.** A formal Financial Risk Analysis Committee should be mandated to compute and publish quarterly the fiscal-oil correlation coefficient, portfolio HHI by geography and sector, and rolling tracking error against a custom diversification benchmark.

**Recommendation 2: Expand Real Options Analysis Across Major Capital Commitments.** Real Options Valuation should be applied systematically to all capital commitments exceeding USD 1 billion, capturing the investment flexibility value, estimated at USD 85–120 billion across the current Giga-project portfolio, that conventional NPV analysis omits.

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**Recommendation 3: Accelerate ESG-Aligned Financing Through WACC Analysis.** Building on the 8–12 basis point greenium documented in the 2022 Green Bond programme, systematic WACC modelling across the full capital structure should identify additional projects where ESG alignment reduces financing costs and compresses sovereign borrowing spreads.

**Recommendation 4: Design a Maturity-Linked Fiscal Transfer Policy.** PIF should develop a formal fiscal transfer framework linking the timing and magnitude of portfolio income distributions to the prevailing fiscal-oil correlation coefficient. When the correlation exceeds a defined threshold—such as $r > 0.70$—transfers to the central budget should be supplemented by countercyclical reserve accumulation, thereby reducing the procyclical fiscal exposure that an undiversified transfer policy would perpetuate.

**Recommendation 5: Adopt a Transparent Risk-Adjusted Performance Reporting Standard.** PIF should publish annual Sharpe ratios, portfolio standard deviations, active share, and factor exposure data, consistent with the Norwegian GPFG governance benchmark documented by Amar and Lecourt (Amar & Lecourt, 2022). Greater analytical transparency would strengthen accountability for risk-adjusted performance, narrow informational asymmetries with international investors, and support the ongoing compression of sovereign borrowing spreads.

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