

Navigating Economic Growth in Saudi Arabia: A Comparative Study of Public and Private Investment Over Four Decades

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Abstract

This study investigates the impact of private and public investments on non-oil economic growth in Saudi Arabia. Analyzing data from 1980 to 2022 and employing a co-integration approach to identify significant relationships between non-oil GDP and various macroeconomic variables, we find that private investment significantly influences economic growth compared to public investment. Factors such as efficiency, privatization initiatives, and market responsiveness contribute to this result. Policymakers should prioritize creating an enabling environment for private sector development, fostering innovation, enhancing access to finance, and promoting entrepreneurship. Additionally, policies targeting public investment should complement private sector initiatives, fostering an environment where both sectors thrive and contribute to sustained growth. This study underscores the importance of research-based policy approaches that leverage the strengths of each sector to maximize economic potential and optimize resource allocation.

Keywords: economic growth, investment, public investment, private investment, economic growth, labor, exports, imports

1. Introduction

1.1 *The Interplay of Investment and Economic Growth in Saudi Arabia*

Investment and economic growth are closely interconnected and pivotal for prosperity. Within macroeconomics, public and private investments play a central role in driving economic expansion by directing resources towards the production of goods and services, thus boosting output and fostering overall growth (Dreger & Reimer, 2016). Evidence suggests that inadequate public investment can hinder private investment and impede GDP growth, which is particularly evident in regions like the euro area (Dreger & Reimer, 2016). In economies reliant on oil revenues, such as Saudi Arabia, investment choices are linked to global economic and political developments. The substantial fluctuations of commodity markets, particularly crude oil, play a crucial role in shaping investment decisions. Events like the Global Financial Crisis of 2008-2009 and the European sovereign debt crisis of 2010-2012 illustrate the vulnerability of such economies to external shocks, resulting in fluctuations in investment patterns and economic growth trajectories.

Saudi Arabia, as the largest economy in the GCC and a major global oil producer, exemplifies the profound impact of oil prices on investment dynamics and economic performance. The drop in oil prices in 2014 led to a significant downturn in investment and growth, prompting the Saudi government to embark on ambitious reforms and initiatives aimed at diversifying the economy away from oil dependency.

At the heart of this transformational agenda is Saudi Vision 2030, which aims to diversify the economy by stimulating private investment and strengthening non-oil GDP. This strategic shift reflects a broader trend among GCC oil-exporting nations towards prioritizing non-oil sectors as growth drivers, with Saudi Arabia leading this shift.

This study seeks to explore the distinct contributions of private and public investment to non-oil economic growth in Saudi Arabia, which in turn can optimize resource allocation strategies. Thus, it aligns with the objectives outlined in Saudi Vision 2030, shedding light on the drivers of economic diversification in the Saudi economy while recognizing the potential synergy between public and private investments in promoting growth, particularly in developing economies like Saudi Arabia. Therefore, it is essential to analyze the interaction between these variables.

The relationship between public and private investment depends on various factors, including the role of

state-owned enterprises, fiscal policy, and the broader macroeconomic environment. While public investment may stimulate private investment under certain conditions, the effectiveness of such policies in driving long-term growth requires empirical examination.

By developing a growth model that disentangles the impacts of public and private sector investments, this study aims to provide empirical insights into their respective roles in shaping Saudi Arabia's economic trajectory over the past four decades. Our empirical evidence is essential for informing policy decisions aimed at promoting sustainable and inclusive growth, thereby guiding Saudi Arabia towards its envisioned economic transformation.

The distinction between public and private investments is crucial for several reasons. Firstly, as demonstrated by Khan et al. (1997), analyzing the comparative impacts of public and private investment is crucial for both policy formulation and theoretical exploration. From a policy perspective, if private investment demonstrates a significantly stronger influence on economic growth, it highlights the importance of optimizing public investment strategies and supports the privatization of state-owned enterprises. Simultaneously, recent academic research on long-term economic growth and the convergence of real per capita incomes across nations, spearheaded by Barro (1991), Barro and Sala-i-Martin (1992), and Mankiw, Romer, and Weil (1992), among others, underscores the central role of aggregate investment. If observable disparities in the growth impact of public versus private investment materialize, it would have substantial implications for understanding the trajectory of steady-state growth and the rate of convergence towards it.

Secondly, recognizing the differences between public and private investment sheds light on the role of government in driving economic development. On the other hand, private investment tends to prioritize ventures that offer the potential for financial returns. By elucidating the respective roles of government and the private sector in investment decisions, this paper provides insights into the optimal allocation of resources and the promotion of economic efficiency.

Moreover, distinguishing between public and private investment allows for a nuanced analysis of policy interventions and their implications for economic outcomes. For instance, while public investment in infrastructure may stimulate private sector activity through improved productivity and connectivity, excessive reliance on public investment may crowd out private investment and distort market dynamics. By disentangling the effects of public and private investment, the empirical evidence of this paper facilitates a comprehensive evaluation of policy trade-offs and helps design strategies that balance short-term necessities with long-term sustainability.

The question of whether policy emphasis should lean towards fostering private-sector investment or bolstering public-sector investment remains contentious. Despite theoretical arguments positing the intensive impact of private investment for long-term economic growth, empirical evidence validating or refuting this assertion is limited. Consequently, proposals advocating for the significant influence of private sector investment in growth-oriented strategies appear to rest more on theories than empirical evidence.

This paper aims to bridge this gap by devising a methodologically robust empirical growth model that disentangles the distinct impacts of public and private sector investments, through examining the role of private investment and other related macro variables in boosting economic growth in Saudi Arabia. The research question can be elucidated from a twofold perspective. On the one hand, private investment can induce extra outputs to the production process, which, in turn, can widen the country's production capabilities and, therefore, add value to GDP. On the other hand, private investment can also play a fundamental role for consumers who benefit from better job opportunities, increases in wages, and improved life conditions. This twofold perspective indicates that consumption is encouraged and demand accelerated.

The objectives of this research can be stated as follows:

- The investigation of the distinct impacts of private investment, public investment, and other related macro fundamentals on non-oil GDP.
- The determination of whether the identified relationships are indicative of long-run phenomena, short-run phenomena, or both.

To understand the evolving dynamics of investment in Saudi Arabia, it is crucial to examine the historical trends and shifts in both public and private investment. Over the past decade, significant changes have occurred in the structure of investment contributions to the economy, reflecting broader economic reforms and strategic policy shifts. These trends highlight the growing importance of private investment, the reallocation of public expenditure, and the changing role of government investment, particularly in the context of the nation's efforts to diversify its economy under Saudi Vision 2030. The following sections delve into these developments and their

implications for economic growth and stability.

1.2 Declining Public Investment and Shifts in Capital Allocation

The contribution of public investment to real GDP has declined from 2010 to 2022, reaching approximately 3.9 percent in 2022. Similarly, the contribution to real non-oil GDP decreased over the same period, reaching 6.9 percent. This is in contrast to the average contributions to real GDP and non-oil GDP, which were about 8.7 percent and 16 percent, respectively, from 2010 to the end of 2017. Additionally, the ratio of public investment to total investment declined to 14.9 percent in 2022, compared to an average of 35.3 percent during the period from 2010 to the end of 2017. This decline is attributed to the reduced contribution rate of public investment in recent years. This trend is influenced by new reforms aimed at enhancing the role of the Public Investment Fund (PIF) to boost capital spending. Moreover, efforts are underway to promote private investment spending and partnerships to support projects and capital spending, diversifying sources of investment and reducing reliance on a single source.

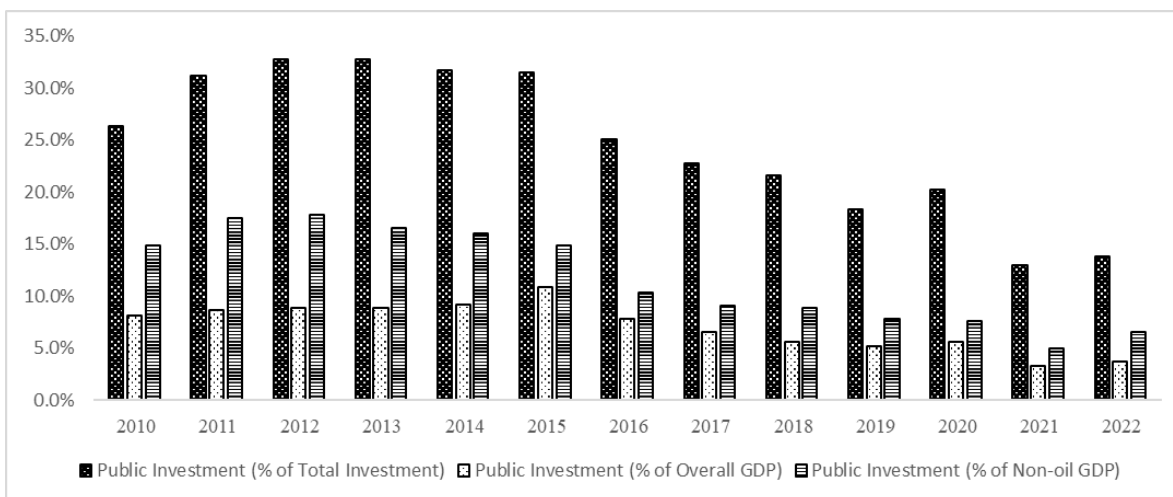


Figure 1. Public investment compared to selected economic indicators

1.3 Changes in Public Expenditure Priorities and Fiscal Reallocation

The dotted line in Figure 2, illustrates a decline in the ratio of public capital expenditure’s contribution to total public expenditure, reaching approximately 12.3 percent in 2022. This contrasts with the figure of about 26 percent in 2010 and an average of 23.9 percent from 2010 to 2017.

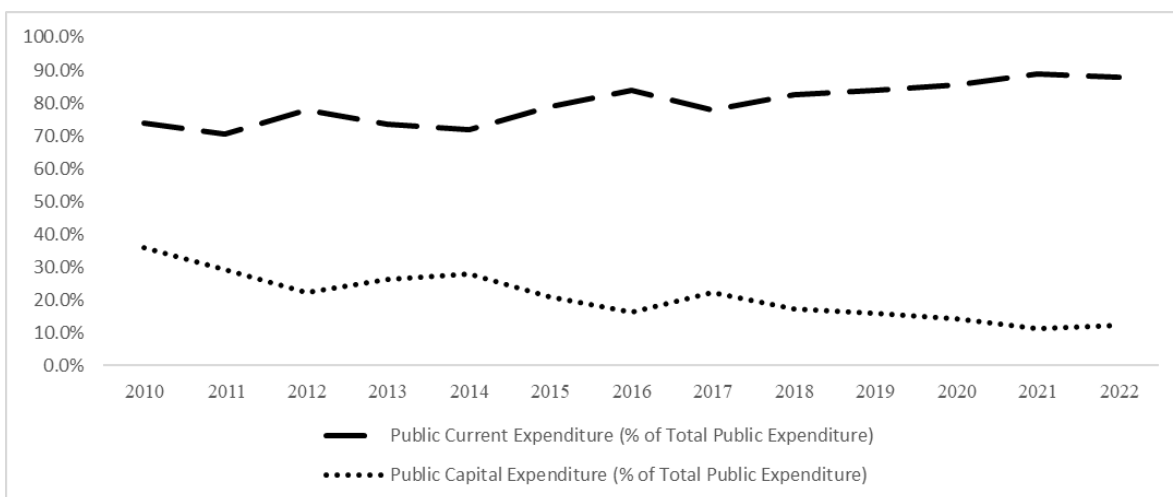


Figure 2. Public expenditure breakdown: capital vs. current expenditure

Furthermore, the dashed line depicts an increase in public current expenses, rising to 87.7 percent in 2022 compared to 74 percent in 2010. The average from 2010 to 2017 was 76.1 percent. This shift may be attributed to several factors. On the one hand, there could be a strategic reallocation of public spending priorities, with a greater emphasis on current expenses over capital investments. This might be driven by immediate necessities such as social welfare programs, public sector salaries, or operational costs. On the other hand, it can reflect efforts to streamline capital expenditure, possibly as part of fiscal consolidation measures or efficiency improvements in public spending. Additionally, the decline in the ratio of capital expenditure to total expenditure may also indicate a transition towards more sustainable and efficient utilization of resources, aligning with broader economic reform agendas such as Saudi Vision 2030 in Saudi Arabia.

1.4 Rising Private Investment and Vision 2030's Impact on Economic Growth

The ratio of private investment contribution to GDP and non-oil GDP has increased in recent years, reaching approximately 22.4 percent and 39.2 percent, respectively, compared to an average of 16.2 percent and 28.9 percent between 2010 and 2017. Similarly, the contribution rate of private investment spending relative to total capital formation has risen to 85.1 percent in 2022, compared to an average of 64.7 percent during 2010-2017.

This trend reflects Saudi Arabia's structural changes and the implementation of Vision 2030. The Vision aims to diversify the economy, reduce reliance on oil revenues, and promote private sector growth. As a result, there has been a concerted effort to attract private investments, foster entrepreneurship, and create an environment conducive to business expansion. These initiatives have led to an increased share of private investment in the economy, contributing to its overall growth and development.

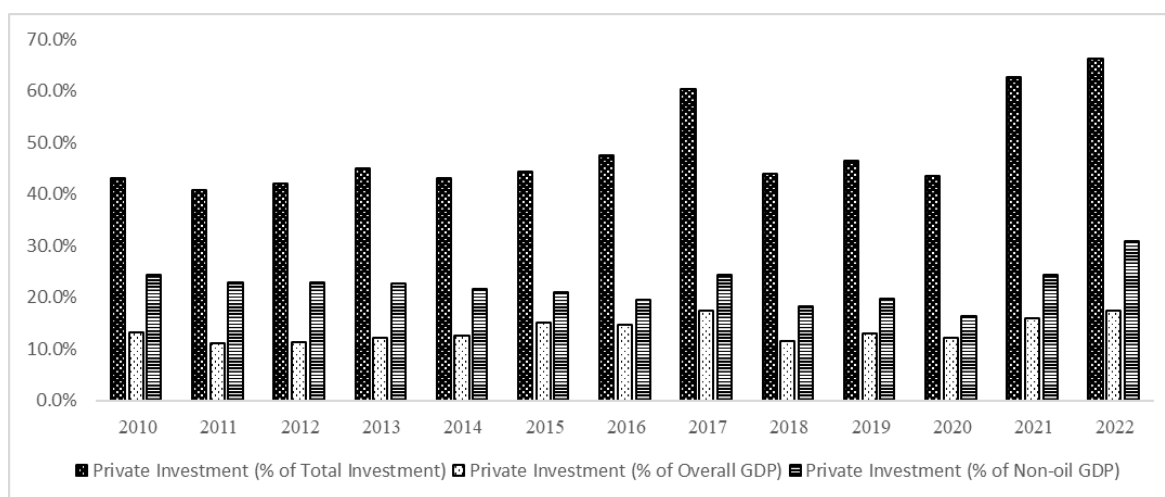


Figure 3. Private investment compared to selected economic indicators

The remainder of the paper is structured into five sections. Section 2 provides a comprehensive review of the existing literature. Section 3 outlines the empirical methodology employed. Section 4 presents the empirical results. Finally, Section 5 concludes.

2. Literature Review

2.1 The Role of Public Investment in Driving Economic Growth

Research on the impact of public investment on economic growth has been extensive, with Aschauer's (1989a) pioneering study in the USA shedding light on its crucial role in shaping productivity and GDP growth. By analyzing state-level data from 1949 to 1985, Aschauer (1989a) identified a significant positive correlation between public investment in non-military infrastructure and economic growth. However, the decline in infrastructure investment during 1970-85 was recognized as a key factor contributing to diminished output per capita in the United States (Aschauer, 1989b). Subsequent studies by Munnell (1990, 1992) further supported these findings, reporting a notable increase in aggregate output for every rise in economic infrastructure public investment.

Despite the positive results, criticisms emerged regarding the methodology and econometric concerns of Aschauer's (1989a) study. Scholars like Gramlich (1994) and Haughwout (2002) raised issues regarding data

non-stationarity and the direction of causality, suggesting potential biases in the results. This led to further investigations employing different econometric techniques and methodologies, such as first-difference level data and translog cost and profit functions (Aron, 1990; Finn, 1993; Lynde & Richmond, 1991, 1993).

Moreover, studies using vector autoregressive models (Cullison, 1993; McMillin & Smyth, 1994; Pereira, 2000) highlighted the complementary relationship between public and private investment in promoting economic growth. Pereira (2000) found that public investment complemented private investment in the long-run, with core infrastructure investments showing higher marginal returns. Diverse studies by Fisher (1997) and Mittnik and Newman (2001) reinforced the importance of public investment in driving economic growth, both at regional and industrialized economy levels.

Empirical studies focusing on specific countries, such as Ireland (Denny & Guiomard, 1997), the Netherlands (Sturm et al., 1999), India (Mallick, 2002), and Portugal (Lighthart, 2000), provided further evidence of the positive impact of public investment on economic growth. For instance, Denny and Guiomard (1997) demonstrated the significant role of public capital in bolstering productivity within Irish manufacturing. Sturm et al. (1999) revealed compelling evidence indicating that investments in transport infrastructure had a beneficial impact on Dutch GDP.

Mallick (2002) focused on the Indian economy, using the VAR model to emphasize the significance of both public and private investment in contributing to economic growth, with public investment playing a more significant role. Similarly, Lighthart (2000) explored the growth impact of public capital in Portugal through an investigation spanning from 1965 to 1995, utilizing both a production function and a vector autoregressive model. The study revealed that public capital emerges as a significant long-term determinant of output growth.

Moreover, Hussein and Benhin (2015) applied co-integration and error correction tools to test the co-integration relationship over the period 1970-2010. They demonstrated a positive and statistically significant long-term impact of public investment on economic growth in Iraq, emphasizing the importance of government support directed towards revenue-generating sectors. Their findings suggested that real public investment was more effective in encouraging GDP growth compared to real private investment, attributed to the crowding-out effect.

2.2 Unlocking the Potential: Private Investment's Leading Role in Economic Growth

A growing body of research has recently underscored the distinction between the effects of public and private investment on economic growth, with a consensus emerging on the critical role of private investment in driving economic activity. Initially, the influential work of Khan and Reinhart (1989) laid the foundation for this line of research by emphasizing the comparative impact of public and private investments on economic growth. Their neoclassical production function approach, analyzing a cross-section sample of 24 developing economies, highlighted the pivotal role of private investment in fostering growth over public investment.

This perspective was further supported by subsequent studies. Serven and Solimano (1989) provided econometric evidence indicating a remarkable reaction of investment to fluctuations in output, supporting the hypothesis of short-term investment horizons. Similarly, Coutinho and Gallo (1991) confirmed the greater effectiveness of private investment in enhancing economic growth compared to public investment, attributing it to higher efficiency and job creation potential.

However, challenges to the previously mentioned studies have been found. Khan and Kumar (1997) criticized the limitations of sample size and time duration in previous studies, conducting an expanded analysis encompassing 95 developing economies from 1970 to 1990. Their findings reiterated the importance of both public and private investments in the growth process, with private investment exhibiting higher returns. Ghali (1998) provided a different perspective, revealing a negative short-term impact of public investment on private investment and economic growth in Tunisia, which was attributed to inefficient state-owned enterprises and internal debt financing mechanisms.

In a comparative study by Yang (2006) involving the USA and Japan, substantial contributions to Japanese economic growth were observed from both public and private investments. However, private investment appeared to play a more pronounced role than public investment in the United States. Aka (2007) examined the effect of public and private investment on the economic performance of Côte d'Ivoire, finding that private investment exerted a more immediate effect on economic growth, while public investment gained prominence in the long term.

Moreover, Phetsavong and Ichihashi (2012) explored 15 Asian economies, highlighting the greater contribution of private domestic investment to economic growth compared to public investment, particularly in cases of low public investment. Hague (2013) revealed a substantial impact of public and private investments on economic

growth in Bangladesh, with a higher significance attributed to private investment.

Utilizing a time series sample spanning over the period 1963-1996 in Cameroon, Ghura (1997) showed that an increment in private investment had a remarkable positive, significant impact on economic growth, surpassing the impact of government investment. Similarly, Tawiri (2010) investigated the impact of domestic investment on economic growth in Libya, finding evidence of a positive relationship between the two variables.

Additionally, Bakari (2017) explored the causality relationship between domestic investment, exports, labor, and economic growth in Malaysia, demonstrating a positive impact of these variables on economic growth in the long-run. Kandenge (2007) studied the effect of private investment, public investment, imports, exports, economic freedom, labor, and human capital on economic growth in Namibia, confirming a positive relationship between private investment and economic growth in both the short and long-run.

2.3 Navigating the Nexus: Exploring Various Perspectives

Numerous studies by Greene and Villanueva (1991), Ramirez (1996), Chakraborty (2007), and Hunt (2012) have examined the relationship between public and private investments, revealing that public investment does not necessarily crowd out or crowd in private investment but rather is complementary. Furthermore, Odedokun (1997) studied the impact of public and private investments on economic efficiency and growth in 48 economies. He concluded that infrastructural public investment promotes private investment, particularly in the long-run.

Beddies (1999) focused on the Gambian economy and found a significant positive impact of both private and public investments on economic growth. Similarly, Ramirez and Nazmi (2003) explored Latin American economies and demonstrated that public investment in health care and education, specifically, stimulates private capital formation and economic growth.

Belloc and Vertova (2004) investigated highly indebted poor countries (HIPC) and revealed the positive impact of public investment on economic growth, emphasizing its role in promoting private investment. Similarly, Erden and Holcombe (2005) reported a complementary relationship between public and private investments in developing countries.

Samake (2008) highlighted the importance of both public and private investment in economic growth, providing evidence of public investment crowding in on private investment. Additionally, Aubyn and Afonso (2008) employed a VAR approach for European countries, Japan, Canada, and the USA, demonstrating the positive effects of both public and private investment on output, with varying complementarity effects.

2.4 The case of Saudi Arabia

The studies that investigated the distinct role of investment components in shaping economic growth in Saudi Arabia are limited. This highlights the importance of this study in enriching the existing literature and providing further insights for policymakers in order to design research-based policies that may affect each public and private investment direction, in turn promoting economic growth outlook.

A study conducted by Alshahrani and Alsadiq (2014) examined the impact of different types of government expenditures on economic growth in Saudi Arabia. Using various econometric techniques and annual data from 1969 to 2010, the findings revealed that domestic private investments have a positive effect on economic growth, both in the short and long term. Alodadi and Benhin (2015) examined the determinants of economic growth in non-oil sectors in Saudi Arabia from 1970 to 2011; they found that private investment, public investment, and international tourist arrivals significantly influence economic growth, with private investment being the most significant factor. Surprisingly, non-oil exports showed a negative effect on economic growth. The study suggested that there is a need for further development in the non-oil sector to diversify the economy away from oil dependency and promote sustainable economic growth.

2.5 Contribution to the Existing Literature

This paper has several contributions to the existing literature. First, the separate effects of private and public investment on non-oil GDP are examined, which is a continuation of previous studies that typically treated both investment components together as explanatory variables. Second, our contribution adds to the previous literature by bringing further evidence based on long sample data spanning over 40 years, allowing for more informative insights that are closer to reality.

Third, it is considered to be the first paper that analyzes the impact of private and public investment separately after seven years of the Saudi Vision Program 2030. Fourth, the results of this paper can serve as a baseline for policy decisions targeting either public or private investment. Understanding how each investment component contributes to economic growth can inform policymakers on how to design policies that promote investment

without negatively impacting growth, thereby ensuring a more reliable decision-making process.

2.6 Comparative View of Public and Private Investment Studies

The examination of the literature dealing with the impact of investment on economic growth reveals an interesting trend. The focus of recent literature has shifted towards analyzing the effects of private investment on economic growth. To illustrate this trend, we summarize the key findings from selected studies. Several factors may contribute to the recent emphasis on private investment in the literature on economic growth. First, the recognition of the limitations of traditional Keynesian approaches to economic policy has prompted a reevaluation of the role of government in stimulating growth. With concerns about fiscal sustainability and the efficacy of government spending, there has been a growing emphasis on the importance of private sector-led growth strategies.

Second, the rise of neoliberal economic paradigms, characterized by a belief in the efficiency of market mechanisms and the importance of minimizing government intervention, has influenced scholarly discourse on economic development. This ideological shift has led to increased interest in the role of private investment as a driver of economic growth, with a focus on policies that promote entrepreneurship, innovation, and market competition.

Third, globalization and technological advancements have reshaped the global economic landscape, leading to increased integration of economies and heightened competition. In this context, private investment is considered essential for enhancing competitiveness, attracting foreign direct investment, and fostering technological innovation, all of which are critical for sustaining long-term economic growth. Overall, the recent emphasis on private investment in the literature reflects broader shifts in economic thought and policy priorities, with a greater emphasis on market-oriented approaches to economic development and a recognition of the importance of private sector dynamism in driving growth and prosperity.

4. Empirical Method

We employed the fundamental neoclassical framework proposed by Solow (1956) by examining the production function and determining the proportion of output attributed to factor inputs and other variables that represent total factor productivity. This is demonstrated by the Cobb-Douglas production function:

$$Y_t = Af(K_t, L_t, Z_t) \quad (1)$$

where Y represents the level of output, K is the stock of capital, L denotes the labor force, and Z is a vector of other variables that impact economic growth. The parameter A captures the level of productivity, which is assumed to be exogenous and grows at a constant rate, i.e., $A > 0$.

Following Khan and Reinhart (1990), we inferred the partial derivative as expressed in Equation (2):

$$\frac{dY}{Y} = \left[A \frac{\partial Y}{\partial K} \right] \frac{dK}{Y} + \left[A \frac{\partial Y}{\partial L} \right] \frac{dL}{L} + \left[A \frac{\partial Y}{\partial Z} \right] \frac{dZ}{Z} + \left[\frac{dA}{A} \right] \quad (2)$$

All partial derivatives of Y are expected to have positive coefficients, which can be explained by increased levels of capital, labor, and other variables leading to higher output levels. Equation (3) can be expressed as a growth model as follows:

$$\frac{dY}{Y_{t-1}} = \left[A \frac{\partial Y}{\partial K} \right] \frac{1}{Y_{t-1}} + \left[A \frac{\partial Y}{\partial L} \right] \frac{dL}{L_{t-1}} + \left[A \frac{\partial Y}{\partial Z} \right] \frac{dZ}{YZ_{t-1}} + \frac{dA}{A} \quad (3)$$

To specify a specification for estimation purposes, Equation (3) can be rewritten as follows:

$$\frac{\Delta Y}{Y_{t-1}} = \beta_0 + \beta_1 \frac{\Delta K}{Y_{t-1}} + \beta_2 \frac{\Delta L}{L_{t-1}} + \beta_3 \frac{\Delta Z}{YZ_{t-1}} \quad (4)$$

where:

$\beta_0 = \frac{dA}{A}$ denotes the constant term capturing the growth rate in productivity,

$\beta_1 = A \frac{\partial Y}{\partial K}$ is the marginal productivity of capital,

$\beta_2 = A \frac{\partial Y}{\partial L}$ represents the elasticity of output for labor, and

$\beta_3 = A \frac{\partial Y}{\partial Z}$ represents the elasticity of output for other factors.

Since the investment, denoted as I, in a given country corresponds to the variation of capital, i.e., ΔK , Equation (4) can be transformed into a more general specification that has been commonly used, especially for developing

countries. Numerous previous studies explored the impact of public investment and private investment on long-run economic growth in developing countries, such as Khan and Kumar (1997), Khan and Khan (2007) Khan and Reinhart (1990), Baghebo and Edoumiekumo (2012), and Jwan and James (2015). Other studies suggested that public and private investment should be distinguished due to the different functions and productivity levels that belong to each type (Zou, 2006; Khan and Reinhart, 1990; Khan and Kumar, 1997; and Ghura, 1997). Therefore, denoting I^p and I^g as private investment and public investment, respectively, with $I = I^p + I^g$, we can rewrite Equation (4) as follows:

$$\frac{\Delta Y}{Y_{t-1}} = \gamma_0 + \gamma_1 \frac{I^p}{Y_{t-1}} + \gamma_2 \frac{I^g}{Y_{t-1}} + \gamma_3 \frac{\Delta L}{L_{t-1}} + \gamma_4 \frac{\Delta Z}{YZ_{t-1}} \quad (5)$$

In equation 5, The betas parameters are replaced with gammas because they cannot be interpreted similarly in Equation 4, after dividing investment into public and private. Moreover, if the impacts on the growth of private and public investment are statistically equal, this would imply that the respective marginal productivities are equal, $\gamma_1 = \gamma_2$. However, if private investment is more efficient and effective than public sector investment, then the estimated coefficient on private investment would be larger than the public investment coefficient, i.e., $\gamma_1 > \gamma_2$, and vice versa (Zou, 2006; Khan & Reinhart, 1990; Kandenge, 1997; and Mallick, 2002).

In particular, the significance of the relative size of coefficients γ_1 and γ_2 is stressed as there is still some debate about the interplay between public-sector investment and private-sector investment.

Several studies, such as Sayef et al. (2019) and Khan and Reinhart (1990), argued that exports and imports are essential to economic growth. Their findings suggested that, over the short run, imports, exports, and domestic investment cause economic growth and that economic growth causes exports (Sayef et al., 2019). Furthermore, Balassa (1978), Tyler (1981), and Ram (1985) demonstrated that exports have a very significant role in infrastructure development, transportation, and communication since they facilitate the production of other goods and services. For this reason, we added imports to the model as suggested by Bardhan and Lewis (1979) and Khan and Reinhart (1990) since the Saudi economy heavily depends on imports of capital and intermediate goods as inputs into the manufacturing process. According to recent data, during the last ten years, capital goods represented an average of 21.5% of total imports, while intermediate goods accounted for an average of about 41.3% of total imports.

The empirical methodology was inspired by Khan and Reinhart (1990). We investigated the impact of public and private investment and other macroeconomic factors on economic growth in Saudi Arabia. Furthermore, we empirically analyzed the long-run relationship among the variables in this study. We estimated our model using the Autoregressive distributed lag (ARDL) model and a cointegration procedure due to several advantages of this approach. According to Nkoro and Uko (2016), the estimation of the ARDL model does not require pretests for stationarity issues since this technique can deal with variables that are integrated of a different order, such as $I(0)$ or $I(1)$. In addition, it is suitable to test the robust cointegration when there is a single long-run relationship in a small sample size, which is ideal for our case. Finally, it has the advantage of selecting the appropriate lags to overcome the possible serial correlation and endogeneity issues. The main specification is given as follows:

$$\ln GDP = \beta_0 + \beta_1 \ln PRINV + \beta_2 \ln GOVINV + \beta_3 \ln LABOUR + \beta_4 \ln EXP + \beta_5 \ln IMP + \varepsilon_t \quad (6)$$

4.1 Data

We utilized an annual time-series dataset spanning throughout 1980-2022, where LGDP represents the natural logarithm of non-oil gross domestic product. LPRINV represents the natural logarithm of real private gross capital formation, measured at 2010 prices (millions SAR); LGOVINV represents the natural logarithm of real government gross capital formation, measured at 2010 prices (millions SAR); LLABOR represents the natural logarithm of the number of people employed in the labor market (in millions); LEXP represents the natural logarithm of real gross exports, measured at 2010 prices (millions SAR); LIMP represents the natural logarithm of real gross imports, measured at 2010 prices (millions SAR); ε_t is the error term assumed to be normally and independently distributed with mean of zero and a constant variance, which captures all other omitted variables that are not considered in the model but has an impact on economic growth. The parameters β_1 , β_2 , β_3 , β_4 , and β_5 correspond to the elasticities of the independent variables.

The dataset is collected from the General Authority for Statistics (GASTAT), the World Economic Outlook (WEO) database, and the Federal Reserve Economic Data (FRED). All variables are transformed in real terms using a GDP deflator index (2010=100). We employ a dummy variable, Vision 2030 (0 for pre-implementation and 1 for post-implementation), to capture the structural changes in the Saudi economy following the Vision's application.

Table 3 shows each variable used and a brief explanation:

Table 3. Description of variables

Variable	Symbol	Measurement & Explanation
Gross Domestic Product	lnGDP	GDP is the dependent variable. Using the natural logarithm of GDP, it reflects Saudi Arabia's economic performance. We used non-oil GDP rather than total GDP because the oil sector is highly affected by external factors, such as oil market volatility.
Public investment	lnGOVINV	Public investment reflects the government spending policy, and the fixed capital formation for the public sector was used as an index of public investment. It is expected to exhibit a positive sign for the estimated coefficient, which is the marginal productivity of public capital.
Private investment	lnPRIVN	Private investment reflects non-government investment, and the fixed capital formation for the private sector was chosen as an index of private investment. It is expected to exhibit a positive sign for the estimated coefficient, which is the marginal productivity of private capital.
Labor	lnLABOR	This variable represents the number of persons engaged in the labor market (in millions). It is expected to exhibit a positive sign for the estimated coefficient, the elasticity of output for labor.
Exports	lnEXP	It represents the real gross exports (goods and services), measured at 2010 prices (millions SAR). It is expected to exhibit a positive sign for the estimated coefficient, the elasticity of output for exports.
Imports	lnIMP	It represents the real gross imports (goods and services), measured at 2010 prices (millions SAR). It is expected to exhibit a positive sign for the estimated coefficient, the elasticity of output for imports.

4.2 Hypothesis Development

In economic theory and several empirical studies, private investment, public investment, labor size, imports, and exports are considered key determinants of economic growth; it is expected that their corresponding coefficients exhibit positive signs (Erden & Holcombe, 2006; Blejer & Khan, 1984; Khan & Reinhart, 1990; Ghura, 1997; Ramirez & Nazmi, 2003; Lee & Fernando, 2019; Sayef, 2016). Our main hypothesis emanates from this theoretical background and empirical regularities.

5. Empirical Results

5.1 Assessing Time Series Stationarity

The starting point in time-series econometrics is to study the time-series properties of variables under consideration to avoid any spurious relationships among them and have biased estimated coefficients (Griffiths, 2008). If these properties are satisfied, then it is possible to explore the long-term relationships or cointegration among the variables under consideration. For the application of cointegration, it is important for the variables to be integrated in the same order (Alhowsaish, 2014). The authors began to examine the stationarity of the time series in the form of unit root test by applying Augmented Dickey-Fuller (ADF) test and Philips-Perron test to all variables. The primary purpose of these tests is to verify the null hypothesis of non-stationarity, which allows for a negative and meaningful test statistic to be rejected.

Table 4 displays the results of the ADF and PP tests utilized to determine the stationarity for each variable individually. The models include a constant, and the results show that all variables are stationary after taking the first differences. As a result, the null hypothesis of non-stationary is rejected for all first differenced variables. This means that all the mentioned variables are integrated of the I(1) in the first differences at a 1 percent significance level.

Table 4. Unit root tests

Variables	ADF - Constant		Philips-Perron - Constant	
	Level	First Differences	Level	First Differences
lnGDP	-0.927	-7.042***	-0.896	-7.066***
lnGOVINV	-1.342	-5.886***	-1.656	-6.123***
lnPRIVN	-0.707	-5.226***	0.077	-17.197***
lnLABOR	0.621	-6.949***	0.261	-7.076***
lnEXP	-1.156	-4.421***	-1.421	-4.403***
lnIMP	-0.899	-6.393***	-0.761	-6.571***

Note. *** p<0.01, ** p<0.05, * p<0.1.

5.2 Cointegration Analysis

After confirming that all variables are integrated at I(1) and not integrated with order I(2), we can apply the bound test developed by Pesaran et al. (2001). Based on the results in Table 5, we can reject the null hypothesis and accept the alternative hypothesis, indicating a cointegration relationship (long-run equilibrium relationship) among variables.

Table 5. Bound test results

Test Statistics	Value	Significance level	I(0)	I(1)
		10%	2.08	3
F-statistic	4.1706	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

5.3 Results Discussion

5.3.1 Long-Term Coefficient Estimates

Table 6 shows the long-run relationship among the variables, including the results expressed in terms of the normalized cointegrating coefficients of the model. The equation will provide a benchmark to show our results when we disaggregate the total investment into public and private components. According to the estimation results, at least 2 variables are statistically significant at the 5 percent level and 1 significant variable at the 10 percent level. The drivers of growth in the Saudi economy are determined primarily by private and government investment and exports, consistent with macroeconomic activities.

We found that the coefficient of private investment is positive and significantly different from zero at the 5 percent level. In addition, the marginal productivity of public investment is positive and significant at the 10 percent level. As the coefficient shows, when private investment rises by 1 percent, non-oil GDP is enhanced by 1.7 percent. In the same manner, when government investment increases by 1 percent, non-oil GDP goes up by 0.99 percent.

To sum up, public and private investment in Saudi Arabia plays an important role in economic growth in the long run. Nonetheless, the coefficient of the real private investment variable is significantly higher than the coefficient of the real public investment variable. Therefore, in the long run, real private investment is more efficient than real public investment in encouraging non-oil GDP growth during the sample period of this study. As a result, it would be incorrect to assume that $\beta_1 = \beta_2$. Therefore, our results are in line with several studies, such as Khan and Reinhart (1989), Serven and Solimano (1989), Phetsavong and Ichihashi (2012), Alodadi and Benhin (2015), and Alili Sulejmani and Alili (2020).

The labor factor is negatively signed and statistically insignificant, which means that labor does not necessarily have a direct contribution to economic growth in the long term. This is not consistent with economic theory which argues that when labor and labor productivity grow, more goods and services are produced, leading to an increase in output. Although there has been a noticeable growth in the number of employees engaging the Saudi labor market recently, the insignificant effect of labor in relation to the non-oil GDP can be attributed to a reduction in labor productivity. Alternatively, the reason is that the increase in the number of persons employed might be directed toward low-productivity sectors, which constitute mostly low-skill workers. Another possible reason is that they could be dependent on public subsidies.

These findings align with multiple studies; a report by UNCTAD (2013) highlighted a decline in employment elasticity in least-developed countries from 2004 to 2008 compared to 1996-2000. Similarly, ILO (2020) noted reduced employment elasticity from 2008 to 2018, suggesting minimal impact of GDP growth on employment. Kapsos (2005) found a global decline in employment intensity of growth, indicating a weakening relationship between GDP growth and job creation. Additionally, Ball et al. (2016) concluded that unemployment is less responsive to GDP growth in developing countries, likely due to structural issues and labor market inefficiencies. Similarly, Slimane (2015) supported this finding, highlighting the complexities of the relationship between economic growth and employment in developing economies. According to recent data from the Saudi labor market, employees in the private sector recorded 59.4 percent as a percentage of the total employees. In comparison, the public sector registered a share of 28.1 percent of the total employees. Amongst the economic activities, many employed workers belong to low-skill sectors, such as wholesale and retail trade.

Similarly, we have comparable findings for imports exhibiting a negative and insignificant impact on the non-oil

GDP in the long run. However, they accounted for about a quarter of the GDP, 23.3 percent, in 2022. This might be attributed to the type of imports. Consumer goods dominated with an average of around 37.2 percent of total imports during the past ten years, while capital goods accounted for an average of about 21.5 percent.

It should be mentioned that exports appear to hurt non-oil GDP, and they are statistically significant at 5 percent in the long run. A one percent increase in the exports tends to reduce the non-oil-GDP by 0.71 percent. Broadly speaking, export growth can encourage GDP; however, our empirical evidence does not confirm this fact, which can be interpreted in relation to whether the exports of the economy are driven by oil resources. Therefore, oil-based trade can show that exports have a positive impact on economic growth. The negative correlation between exports and non-oil GDP is supported by the economic theory of the paradox of the plenty, claiming that sometimes a country focuses more on exporting only one lucrative export that does not have a value added to its economy and ignores the rest of its resources, leading to a decline in the GDP. This condition might fit the Saudi context since it depends more on oil exporting than other types of exports, as proven by Kartikasari (2017). Furthermore, Saudi Vision 2030 aims to significantly increase the contribution of non-oil exports to the economy, with a goal of raising the percentage from 16% to 50% of GDP. This ambitious target is part of a broader strategy to diversify income sources and achieve a more sustainable economic model. Several key initiatives have been launched to support this transition. One of the main initiatives focuses on improving the efficiency of the export environment, streamlining processes to foster a more export-friendly climate. Another initiative aims to enhance the export capacity of Saudi enterprises, providing the necessary tools, training, and resources to help them thrive in international markets. Moreover, the initiative to instill an export culture and raise awareness about the importance of exporting is crucial to promoting this shift. Public campaigns and educational programs are designed to highlight the role of exports in economic development and encourage more businesses to engage in international trade. Additionally, initiatives are in place to assist exporters in obtaining supportive logistical services and access to qualified human resources, ensuring that Saudi companies can meet global demand effectively. Raising awareness of Saudi products through projects like the “Made in Saudi Arabia” strategy is another critical component of the plan. This strategy seeks to enhance the reputation and visibility of Saudi-made goods, positioning them as competitive in the global market. However, it is important to note that the successful implementation of these initiatives will take time. Only with sustained effort can Saudi Arabia realize its goal of transforming its economic structure and achieving long-term sustainability.

Table 6. Estimation results of the long run relationship

Variable	Coefficient
PRI	1.714** (0.681)
GOV	0.987* (0.488)
LAB	-0.086 (0.192)
IMP	-1.619 (1.016)
EXP	-0.716** (0.332)
Constant	9.905*** (3.111)

Note. Standard errors are reported in parentheses. Significance levels are indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.

5.3.2 Results from Error-Correction Model Estimation

After confirming the cointegration, we proceeded with the error-correction model to prove a stable long-run relationship. The coefficient of error-correction term measures the speed of adjustment towards long-run equilibrium. It must satisfy specific conditions, such as having a negative sign and having a value between 0 and 1 and statistically significant.

As shown in Table 7, the mentioned conditions were met. As a result, a stable long-run behavior towards the equilibrium could be confirmed. The coefficients of the speed of adjustment suggest that when the economic system experiences a shock, there is a correction of about 22 percent each year to restore its equilibrium among these variables. This means that when output (non-oil GDP) deviates in the short term in the previous period (t-1)

from the value of equilibrium in the long run, the equivalent of (22%) of this deviation is corrected in the subsequent period (t), i.e., the shocks need a longer time of adjustment to return to the equilibrium. In the short term, the independent variables (private and public investment) do not impact the output fluctuation directly. This differs from the result of the long-run behavior among variables as public and private investment might take more than a single period lag to reflect the effect on non-oil GDP.

The short-run estimation reveals an interesting phenomenon, while the long-run estimation suggests that a 1 percent increase in labor supply from the previous year leads to a 0.09 percent decline in non-oil GDP (significant at the 10 percent level). This decrease rate seems to contradict theoretical expectations. The discrepancy can be attributed to diminishing returns—the declining marginal productivity of each additional worker as labor supply increases. However, it is essential to consider the impact of labor market policies. For instance, spending on employment incentives and training, along with direct job creation, can lead to a short-term rise in the number of employees. Surprisingly, this increase in labor supply may cause a temporary decline in output. One possible explanation lies in the labor-intensive nature of certain low-productivity sectors, such as construction and wholesale and retail trade. Despite high costs (including labor market incentives and salaries), these sectors may not experience a noticeable revenue increase since this can occur as labor supply increases. A sudden rise in labor supply can contribute to a decrease in non-oil GDP.

In addition, the exports factor in the previous year will cause a decrease of 0.31 percent in the non-oil GDP (t) at the 1 percent significance level. However, previous positive import shocks at (t-1) did not significantly increase the non-oil GDP in the current period.

Table 7. Estimation results of error-correction model representation for the ARDL approach

Variable	Coefficient
D(LN_LAB_)	-0.088** (0.042)
D(LN_IMP_)	0.071 (0.409)
D(LN_EXP_)	-0.309*** (0.043)
CointEq(-1)	-0.223*** (0.035)

Note. Standard errors are reported in parentheses. Significance levels are indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.

4. Conclusion

In our examination of the dynamics between private and public investment, along with other macroeconomic variables, we explored their impact on long-term economic growth in Saudi Arabia within a neoclassical growth framework. By employing rigorous empirical analysis and a cointegration approach with time-series data spanning from 1980 to 2022, significant relationships between non-oil GDP and the examined variables have been discovered.

The findings highlight the varying impact of private and public investment on economic growth. While both forms of investment play crucial roles, private investment has emerged as the primary driver of growth, exhibiting remarkable impact over short and long terms. Several factors contributed to this result, including government policies that increasingly incentivize private sector participation and investment. Notably, ambitious privatization initiatives aligned with the transformative Vision 2030 further emphasized the importance of private investment in stimulating economic growth.

In addition, the analysis highlights various impacts of other macroeconomic variables. Notably, while labor initially appears insignificant in the long run, its negative influence becomes more pronounced in the short term. To address this area, labor market reforms should focus on policies that enhance workers' skills, bridging the gap between labor market demands in non-oil sectors and workers' abilities. This, in turn, can contribute to the growth of employment share in non-oil GDP.

To promote sustained economic growth in Saudi Arabia, it is essential to achieve a balance between public and private investment. Policymakers should prioritize incentivizing private investment through targeted regulations and customized incentives, creating an environment favorable to businesses. For example, introducing more flexible labor laws and expanding vocational training programs can enhance workforce mobility and align skills

with emerging sectors. Additionally, implementing export promotion strategies can attract private investment and diversify markets.

Furthermore, streamlining administrative processes for business registration and licensing, as well as improving contract enforcement mechanisms, will enhance investor confidence. Policies such as R&D tax credits and stronger partnerships between universities and businesses can drive innovation and technological advancements. Encouraging private investment in renewable energy and promoting circular economy initiatives align with global sustainability goals and contribute to economic growth.

Moreover, fostering entrepreneurship by establishing more incubators and accelerators and facilitating access to seed funding can spur innovation and economic diversification. Leveraging public-private partnerships for large-scale infrastructure projects optimizes resource allocation and promotes overall economic development. By addressing these areas, Saudi Arabia can enhance its economic resilience and ensure sustained growth. Additionally, we recognize the limitations of our study and propose avenues for future research. For instance, our analysis sheds light on the varying impact of private and public investment on economic growth in Saudi Arabia, but further disaggregation of data and exploration of sector-specific effects and institutional factors remain important areas for future investigation.

Competing Interests

Sample: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Alhawaish, A. K. (2014). Does the Service Sector Cause Economic Growth? Empirical Evidence from Saudi Arabia. *Global Studies Journal*, 7(2). <https://doi.org/10.18848/1835-4432/CGP/v07i02/40900>
- Alili Sulejmani, L., & Alili, A. (2020). Nexus among Private Investment, Public Investment and Economic Growth. *Journal of Science and Innovative Technologies*, 234.
- Alodadi, A., & James, B. J. (2015). The Main Determinants of Economic Growth and the Role of Non-Oil Sectors in Oil Countries' Economies: The Case of Saudi Arabia. *International Journal of Business Tourism and Applied Science*, 2(2), 1-7.
- Alshahrani, M. S. A., & Alsadiq, M. A. J. (2014). *Economic growth and government spending in Saudi Arabia: An empirical investigation*. International Monetary Fund. <https://doi.org/10.5089/9781484348796.001>
- Aschauer, D. A. (1989a). Is public expenditure productive? *Journal of Monetary Economics*, 23(2), 177-200. [https://doi.org/10.1016/0304-3932\(89\)90047-0](https://doi.org/10.1016/0304-3932(89)90047-0)
- Aschauer, D. A. (1989b). Does public capital crowd out private capital? *Journal of Monetary Economics*, 24(2), 171-188. [https://doi.org/10.1016/0304-3932\(89\)90002-0](https://doi.org/10.1016/0304-3932(89)90002-0)
- Aschauer, D. A. (1990). *Public investment and private sector growth*. Washington, DC: Economic Policy Institute.
- Aka, B. F. (2007). Relative effects of public and private investment on Cote D'Ivoire's economic performance. *Applied Econometrics and International Development*, 7(1).
- Afonso, A., & ST. Aubyn, M. I. G. U. E. L. (2009). Macroeconomic rates of return of Public and Private investment: Crowding-in and Crowding-out effects. *The Manchester School*, 77, 21-39. <https://doi.org/10.1111/j.1467-9957.2009.02117.x>
- Baghebo, M., & Edoumiekumo, S. (2012). Domestic private capital accumulation and economic development in Nigeria 1970-2010. *International Journal of Academic Research in Business and Social Science*, 295, 69-88.
- Bakari, S. (2017). The relationship between export, import, domestic investment and economic growth in Egypt: Empirical analysis. *Euro Economica*, 36(02), 34-43.
- Balassa, B. (1978). Exports and economic growth: further evidence. *Journal of Development Economics*, 5(2), 181-189. [https://doi.org/10.1016/0304-3878\(78\)90006-8](https://doi.org/10.1016/0304-3878(78)90006-8)
- Ball, L., Leigh, D., & Loungani, P. (2017). Okun's law: Fit at 50?. *Journal of Money, Credit and Banking*, 49(7), 1413-1441. <https://doi.org/10.1111/jmcb.12420>
- Bardhan, P., & Lewis, S. (1970). Models of growth with imported inputs. *Economica*, 373-385. <https://doi.org/10.2307/2551937>

- Beddies, M. C. H. (1999). *Investment, capital accumulation, and growth: Some evidence from the Gambia 1964–98*. International Monetary Fund. <https://doi.org/10.5089/9781451853995.001>
- Belloc, M., & Vertova, P. (2004). *How does public investment affect economic growth in HIPC? An empirical assessment* (No. 416). Department of Economics, University of Siena.
- Blejer, M. I., & Khan, M. S. (1984). Government Policy and Private Investment in Developing Countries (Politique des pouvoirs publics et investissement privé dans les pays en développement). (Política estatal e inversión privada en los países en desarrollo). *Staff Papers-International Monetary Fund*, 379-403. <https://doi.org/10.2307/3866797>
- Chakraborty, T. (2007). Foreign institutional investment flows and Indian stock market returns-A cause and effect relationship study. *Indian Accounting Review* 11(1), 35-48. <https://doi.org/10.5958/2249-7315.2016.00034.4>
- Cullison, W. (1993). Public investment and economic growth. *FRB Richmond Economic Quarterly*, 79(4), 19-33.
- Coutinho, R., & Gallo, G. (1991). *Do public and private investment stand in each other's way*. WDR Background Paper, World Bank.
- Denny, K., & Guiomard, C. (1997). *Road infrastructure and productivity in Irish manufacturing 1951-1994* (No. 97/06).
- Dreger, C., & Reimers, H. (2016). Does public investment stimulate private investment? Evidence for the euro area, *Economic Modelling*, 58(C), 154-158. <https://doi.org/10.1016/j.econmod.2016.05.028>
- Erden, L., & Holcombe, R. G. (2005). The effects of public investment on private investment in developing economies. *Public Finance Review*, 33(5), 575-602. <https://doi.org/10.1177/1091142105277627>
- Finn, M. G. (1993). Is all government capital productive? *FRB Richmond Economic Quarterly*, 79(4), 53-80.
- Fisher, R. C. (1997). The effects of state and local public services on economic development. *New England Economic Review*, 53-66.
- Ghali, K. H. (1998). Public investment and private capital formation in a vector error-correction model of growth. *Applied Economics*, 30(6), 837-844. <https://doi.org/10.1080/000368498325543>
- Ghura, M. D. (1997). *Private investment and endogenous growth: Evidence from Cameroon*. International Monetary Fund. <https://doi.org/10.5089/9781451980004.001>
- Gramlich, E. M. (1994). Infrastructure investment: A review essay. *Journal of Economic Literature*, 32(3), 1176-1196.
- Greene, J., & Villanueva, D. (1991). Private investment in developing countries: an empirical analysis. *Staff Papers*, 38(1), 33-58. <https://doi.org/10.2307/3867034>
- Hague, S. T. (2013). Effect of Public and Private Investment on Economic Growth in Bangladesh: An Econometric Analysis. *Research Study Series No FDRS05/2013*, Finance Division, Ministry of Finance.
- Haughwout, A. F. (2002). Public infrastructure investments, productivity and welfare in fixed geographic areas. *Journal of Public Economics*, 83(3), 405-428. [https://doi.org/10.1016/S0047-2727\(00\)00164-X](https://doi.org/10.1016/S0047-2727(00)00164-X)
- Hussein, J., & Benhin, J. (2015). Public and private investment and economic development in Iraq (1970-2010). *International Journal of Social Science and Humanity*, 5(9), 743-751. <https://doi.org/10.7763/IJSSH.2015.V5.550>
- International Labour Organization. (2017). *World employment and social outlook: Trends 2017* (p. 2017). Geneva: Ilo. <https://doi.org/10.1002/wow3.93>
- Kandenge, F. T. (2007). *Public and private investment and economic growth in Namibia*. Available at SSRN 1310595. <https://doi.org/10.2139/ssrn.1310595>
- Kapsos, S. (2006). The employment intensity of growth: Trends and macroeconomic determinants. In *Labor markets in Asia: Issues and perspectives* (pp. 143-201). London: Palgrave Macmillan UK. https://doi.org/10.1057/9780230627383_4
- Khan, M. S., & Reinhart, C. M. (1990). Private investment and economic growth in developing countries. *World Development*, 18(1), 19-27. [https://doi.org/10.1016/0305-750X\(90\)90100-C](https://doi.org/10.1016/0305-750X(90)90100-C)
- Khan, M. S., & Kumar, M. S. (1997). Public and private investment and the growth process in developing countries. *Oxford Bulletin of Economics and Statistics*, 59(1), 69-88.

<https://doi.org/10.1111/1468-0084.00050>

- Kuppusamy, M., Raman, M., & Lee, G. (2009). Whose ICT investment matters to economic growth: Private or public? The Malaysian perspective. *The Electronic Journal of Information Systems in Developing Countries*, 37(1), 1-19. <https://doi.org/10.1002/j.1681-4835.2009.tb00262.x>
- Lee, H. A. (2014). Book Review-The Least Developed Countries Report 2011. *Institutions and Economies*, 157-160.
- Ligthart, J. E. (2000). Public capital and output growth in Portugal: An empirical analysis. *IMF Working Paper, WP/00/11*. <https://doi.org/10.5089/9781451842777.001>
- Lynde, C., & Richmond, J. (1991). Public capital and total factor productivity. *International Economic Review*, 32(2), 401-414. <https://doi.org/10.2307/2526921>
- Lynde, C. (1992). Private profit and public capital. *Journal of Macroeconomics*, 14(1), 125-142. [https://doi.org/10.1016/0164-0704\(92\)90021-Y](https://doi.org/10.1016/0164-0704(92)90021-Y)
- Makuyana, G., & Nicholas, M. O. (2016). Public and private investment and economic growth: A review. *Journal of Accounting and Management*, 6(2), 25-42.
- Mallick, S. K. (2002). Determinants of long-term growth in India: A Keynesian approach. *Progress in Development Studies*, 2(4), 306-324. <https://doi.org/10.1191/1464993402ps043ra>
- McMillin, W. D., & Smyth, D. J. (1994). A multivariate time series analysis of the United States aggregate production function. *Empirical Economics*, 19, 659-673. <https://doi.org/10.1007/BF01205822>
- Mensi, W., Shahzad, S. J. H., Hammoudeh, S., & Al-Yahyaee, K. H. (2018). Asymmetric impacts of public and private investments on the non-oil GDP of Saudi Arabia. *International Economics*, 156, 15-30. <https://doi.org/10.1016/j.inteco.2017.10.003>
- Mitnik, S., & Neumann, T. (2001). Dynamic effects of public investment: Vector autoregressive evidence from six industrialized countries. *Empirical Economics*, 26, 429-446. <https://doi.org/10.1007/s001810000064>
- Munnell, A. H. (1992). Policy watch: infrastructure investment and economic growth. *Journal of Economic Perspectives*, 6(4), 189-198. <https://doi.org/10.1257/jep.6.4.189>
- Munnell, A. H. (1990). Why has productivity growth declined? Productivity and public investment. *New England Economic Review*, 3-22.
- Nguyen, C. T., & Trinh, L. T. (2018). The impacts of public investment on private investment and economic growth: Evidence from Vietnam. *Journal of Asian Business and Economic Studies*, 25(1), 15-32. <https://doi.org/10.1108/JABES-04-2018-0003>
- Odedokun, M. O. (1997). Relative effects of public versus private investment spending on economic efficiency and growth in developing countries. *Applied Economics*, 29(10), 1325-1336. <https://doi.org/10.1080/00036849700000023>
- Phillips, P. C., & Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I (1) processes. *The Review of Economic Studies*, 57(1), 99-125. <https://doi.org/10.2307/2297545>
- Phetsavong, K., & Ichihashi, M. (2012). *The impact of public and private investment on economic growth: Evidence from developing Asian countries*. Hiroshima University.
- Pereira, A. M. (2000). Is all public capital created equal? *The Review of Economics and Statistics*, 82(3), 513-518. <https://doi.org/10.1162/rest.2000.82.3.513>
- Ram, R. (1985). Exports and economic growth: Some additional evidence. *Economic Development and Cultural Change*, 33(2), 415-425. <https://doi.org/10.1086/451468>
- Ramirez, M. D., & Nazmi, N. (2003). Public investment and economic growth in Latin America: An empirical test. *Review of Development Economics*, 7(1), 115-126. <https://doi.org/10.1111/1467-9361.00179>
- Ramirez, M. D. (1996). Public and private investment in Mexico and Chile: An empirical test of the complementarity hypothesis. *Atlantic Economic Journal*, 24, 301-320. <https://doi.org/10.1007/BF02298433>
- Sahoo, P., Dash, R. K., & Nataraj, G. (2010). Infrastructure development and economic growth in China. *Institute of Developing Economies Discussion Paper*, 261, 1-33.
- Samak é I. (2008). Investment and growth dynamics: An empirical assessment applied to Benin. *IMF Working Paper Series, WP/08/120*. <https://doi.org/10.5089/9781451869804.001>

- Serven, L., & Solimano, A. (1992). Private investment and macroeconomic adjustment: A survey. *The World Bank Research Observer*, 7(1), 95-114. <https://doi.org/10.1093/wbro/7.1.95>
- Sial, M. H., Hashmi, M. H., & Anwar, S. (2010). Role of investment in the course of economic growth in Pakistan. *World Academy of Science, Engineering and Technology*, 66, 160-164.
- Slimane, S. B. (2015). The relationship between growth and employment intensity: Evidence for developing countries. *Asian Economic and Financial Review*, 5(4), 680-692. <https://doi.org/10.18488/journal.aefr/2015.5.4/102.4.680.692>
- Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65-94. <https://doi.org/10.2307/1884513>
- Stock, J. H., & Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. *Econometrica: Journal of the Econometric Society*, 783-820. <https://doi.org/10.2307/2951763>
- Tawiri, N. (2010, August). Domestic investment as a drive of economic growth in Libya. *In International Conference on Applied Economics, ICOAE* (pp. 759-767).
- Tyler, W. G. (1981). Growth and export expansion in developing countries: Some empirical evidence. *Journal of Development Economics*, 9(1), 121-130. [https://doi.org/10.1016/0304-3878\(81\)90007-9](https://doi.org/10.1016/0304-3878(81)90007-9)
- Vijverberg, W. P., Vijverberg, C. P. C., & Gamble, J. L. (1997). Public capital and private productivity. *Review of Economics and Statistics*, 79(2), 267-278. <https://doi.org/10.1162/003465397556629>
- Zou, Y. (2006). Empirical studies on the relationship between public and private investment and GDP growth. *Applied Economics*, 38(11), 1259-1270. <https://doi.org/10.1080/00036840500392649>

Appendix A

Table A1 provides a synthesis of findings from seminal studies on public investment and its impact on economic growth:

Table A1. Public investment

Author(s)	Year of Publication	Country	Main Findings
Aschauer	(1989a)	USA	Public investment contributes positively to driving economic growth.
Munnell	1990	7 OECD countries	Public infrastructure investment is a key factor in promoting economic growth.
Lynde and Richmond	1991	USA	Public investment is complementary to private capital and plays a significant role in cost savings.
Munnell	1992	USA	Investments in public infrastructure have a substantial and positive impact on economic growth.
Finn	1993	USA	Public investment contributes positively to driving economic growth.
Lynde and Richmond	1993	USA	Public capital contributes significantly in enhancing production levels and economic growth.
Denny and Guiomard	1997	Ireland	Public capital contributes significantly in enhancing production levels and economic growth.
Fisher & Turnovsky	1997	USA	In the long-run, public investment enhances private capital.
Sturm et al.	1999	Netherlands	Investments in infrastructure contributed to higher GDP levels.
Lighthart	2000	Portugal	The economic growth was influenced positively and significantly by public capital.
Mittnik and Newman	2001	6 industrial countries	Public investment contributes positively to driving economic growth.
Mallick	2002	India	Growth is more dependent on public investment than on private investment.
Belloc & Vertova	2004	Selected HIPC	For economic growth, public investment is more significant than private investment.
Aka	2007	Côte d'Ivoire	In the long run, public investment surpassed private investment in terms of contribution to economic growth.

In contrast, Table A2 presents a summary of recent studies that predominantly examine the role of private investment in fostering economic development:

Table A2. Private investment

Author(s)	Year of Publication	Country	Main Findings
Khan & Reinhart	1989	24 developing economies	Compared to public investment, private investment is more effective at accelerating economic growth.
Serven & Solimano	1989	Cross-section of developing economies	Compared to public investment, private investment is more effective at accelerating economic growth.
Coutinho & Gallo	1991	33 developing economies	Compared to public investment, private investment is more effective at accelerating economic growth.
Beddies	1999	Gambia	Compared to public investment, private investment is more effective at accelerating economic growth.
Zou	2006	USA, Japan	For the Japanese economy, both public and private investments are equally significant; nevertheless, for the US economy, private investment boosts the economy more than public investment.
Kuppusamy et al.	2009	Malaysia	Compared to public investment, private investment is more effective at accelerating economic growth.
Phetsavong & Ichihashi	2012	15 developing Asian countries	Private investment plays a significant role in promoting growth compared to public investment.
Alodadi and Benhin	2015	Saudi Arabia	Private investment makes a greater contribution to economic growth than public investment.
Alshahrani and Alsadiq	2014	Saudi Arabia	Private investment contributes positively to economic growth in the short-run and the long-run.
Alili Sulejmani & Alili	2020	The Republic of North Macedonia	Compared to public investment, private investment is more effective at accelerating economic growth.

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