

UNIVERSITI TEKNOLOGI MARA

**DETERMINANTS OF PENSION
FUND ASSETS ON ECONOMIC
GROWTH AND ITS LINK TO
FISCAL POSITION AND
MONETARY CONDITIONS
IN MALAYSIA**

**SYED SHANIFF
BIN SAID ALI BATU SHAH**

MSc

August 2026

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SYED SHANIFF BIN SAID ALI BATU SHAH

Thesis submitted in fulfilment
of the requirements for the degree of
Master of Science
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CONFIRMATION BY PANEL OF EXAMINERS

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ABSTRACT

This study investigates the impact of pension asset investments on Malaysia's economic growth, with particular emphasis on their role in supporting fiscal and monetary sustainability. Specifically, the analysis examines how total retirement fund investments contribute to gross domestic product (GDP), while controlling for key macroeconomic determinants, including gross fixed capital formation, domestic credit to the private sector, inflation, public debt, population dynamics, and interest rates. The study utilises secondary time-series annual data spanning 25 years (2000–2024), sourced from the Department of Statistics Malaysia and relevant national institutions such as the Ministry of Finance, Ministry of Economy, Bank Negara Malaysia, the Employees Provident Fund, Kumpulan Wang Persaraan, and Lembaga Tabung Angkatan Tentera, alongside international databases from the World Bank and the International Monetary Fund. Employing regression-based static econometric techniques, the findings demonstrate that the accumulation of pension fund assets contributes negatively and significantly to economic growth. Meanwhile, gross fixed capital formation, public debt, interest rates, and domestic credit significantly influence Malaysia's economic growth, whereas inflation and population do not exhibit statistically significant effects. These results provide robust empirical evidence that pension fund investment activity represents an important channel through which long-term institutional savings can enhance macroeconomic performance and financial stability. From a policy perspective, the study highlights the importance of adopting an integrated pension funds framework that incorporates multiple retirement institutions rather than focusing on a single fund, thereby strengthening national development strategies and capital market deepening.

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LIST OF ABBREVIATIONS

Abbreviations

AR	Autoregressive Estimation
DB	Defined Benefit
DC	Defined Contribution
DV	Dependent Variable
IV	Independent Variable
PFA	Pension Fund Asset
GFCF	Gross Fixed Capital Formation
DCPF	Domestic Credit to Private Sector
INFL	Inflation

CHAPTER 1

INTRODUCTION

1.1 Introduction

In recent decades, a growing body of scholarly research has highlighted the significant role that pension system design plays in shaping private savings behaviour and influencing macroeconomic outcomes. The structure of pension arrangements affects household intertemporal consumption decisions and contributes, through pension fund asset accumulation and investment strategies, to a country's net foreign asset position and exposure to international financial markets. Staveley-O'Carroll (2017) provide empirical evidence that government-managed pension systems can materially influence the allocation of international capital flows by altering domestic saving patterns. Their findings suggest that pension fund investment decisions have implications not only for portfolio risk distribution but also for the net foreign asset profile of the originating economy.

Pensions are a fundamental pillar of social security systems, designed primarily to protect individuals against income insecurity in old age, poverty, and other life-cycle uncertainties. Conceptually, pensions are deferred compensation – resources accumulated during an individual's active employment years to provide financial support in retirement. Employees who have served an organisation for an extended period are typically entitled to retirement benefits, including pensions or gratuities, financed either by employers or through joint contributions. As emphasised by Onyeonoru et al. (2013), pensions are both a legal obligation and an economic responsibility embedded within formal employment contracts. Pension provision is therefore a central component of labour market institutions and is offered across corporate entities as well as various tiers of government (Johnson & Johns, 2018).

A pension fund is a pool of financial resources accumulated to meet retirement commitments. These funds are built through contributions from employers, employees, or both, and are managed by professional fund administrators who invest the assets in a

conservative yet growth-oriented manner to ensure long-term solvency. Barr and Diamond (2009) argue that pension expenditure must remain compatible with a country's capacity to finance retirees' consumption while also sustaining the investment necessary for future economic growth. Excessive pension obligations, if not properly funded, may create fiscal pressures and threaten long-term sustainability.

At the macroeconomic level, pension financing has become an increasingly urgent policy issue, particularly as countries face demographic transitions marked by rising life expectancy and declining fertility rates. These demographic changes have accelerated population ageing, prompting many governments to reassess the viability of pension systems (Munnell, 2004). In response, several economies have implemented reforms involving a partial or full shift from unfunded pay-as-you-go (PAYG) systems to funded pension schemes, especially in emerging market economies, often with institutional support from the World Bank (Holzmann & Hinz, 2005). Under PAYG arrangements, pension benefits are financed through current revenues rather than accumulated assets (Barr & Diamond, 2009), while funded systems involve the accumulation of financial reserves to support future retirement consumption.

Theoretical and empirical literature has long debated the macroeconomic consequences of PAYG pension schemes. Classical contributions suggest that PAYG systems may reduce welfare by crowding out national savings, diminishing capital accumulation, and lowering long-term economic growth (Diamond, 1965; Samuelson, 1975; Bruce & Turnovsky, 2013; Harenberg & Ludwig, 2015). However, under incomplete financial markets, social security programmes may provide valuable intra- and intergenerational insurance against idiosyncratic and aggregate shocks, potentially offsetting their adverse growth effects (Bohn, 1999; Shiller, 1999; Krueger & Kubler, 2006; Harenberg & Ludwig, 2015). Thus, the welfare implications of PAYG schemes depend critically on institutional context and market completeness.

The sustainability of pension systems is also affected by the financing mechanism used to deliver benefits. Barr and Diamond (2009) state that benefit adequacy depends on the government's ability to raise revenue in PAYG systems or on investment returns in funded schemes. This underscores the financial fragility of defined benefit (DB) systems,

especially in developed economies facing rising pension expenditures due to increased longevity (Holzmann et al., 2005; Van der Auwera, 2006; Whitehouse & Palacios, 2006). If current pension structures are not reformed, they may lead to fiscal crises, requiring governments to increase taxation or reduce other public spending priorities (Holzmann et al., 2005).

In defined benefit pension arrangements, the employer holds ultimate responsibility for ensuring the promised retirement income. Benefits are usually determined by a formula linked to earnings history and years of service, providing retirees with guaranteed payments until death and protection against longevity risk and adverse economic conditions. In non-contributory civil service pension schemes, the government assumes the investment and fiscal risks associated with these obligations (Schwartz, 2006).

By contrast, defined contribution (DC) schemes determine retirement benefits based on accumulated contributions and realised investment performance. In these arrangements, both employers and employees contribute a proportion of wages, while investment risk is largely transferred to individuals. Darmaraj and Narayanan (2019) argue that DC systems are more market-oriented, encourage greater savings mobilisation, and are comparatively sustainable, allowing governments to focus on broader developmental and welfare objectives rather than ongoing pension financing challenges.

Given demographic pressures and the increasing adoption of funded and defined contribution-based pension structures, pension fund assets are expected to grow significantly in the coming decades. A key policy and research question is whether the accumulation of pension assets can generate macroeconomic benefits sufficient to alleviate fiscal sustainability pressures. This question has several dimensions. First, it concerns whether pension funding increases aggregate savings, thereby enabling higher capital formation. Second, it considers whether pension fund development enhances labour and capital market efficiency independently of its effect on savings. One possible channel is the promotion of financial sector development, which may improve capital allocation and productivity. Third, the broader issue is whether pension funding has a measurable and direct impact on long-term economic growth.

1.2 Background of the study

The relationship between pension fund asset accumulation and economic growth has become an increasingly important topic in both theoretical and empirical macroeconomic research. Pension funds are among the most significant institutional investors in modern financial systems, and their expansion has profound implications for national savings mobilisation, capital market development, and long-term economic performance. While pension funds are a critical mechanism for ensuring income security in retirement, they also generate substantial pools of long-term savings that can be channelled into productive investments. As Barr and Diamond (2009) argue, pension financing must be compatible with a country's ability to support retirees' consumption while sustaining investment that underpins future economic growth. Consequently, pension fund development is not merely a social policy issue but also a central macroeconomic concern.

From a macroeconomic perspective, pension funds influence growth through multiple transmission channels. First, pension systems can affect aggregate saving behaviour by encouraging households to defer consumption over the life cycle, thereby increasing the availability of domestic capital for investment (Diamond, 1965; Samuelson, 1975). Second, pension funds contribute to capital accumulation by investing contributions in a diversified portfolio of financial instruments, including government securities, corporate bonds, equities, and real estate. Through these investments, pension funds may enhance financial intermediation and deepen capital markets, potentially improving the efficiency of resource allocation and supporting productivity growth (Holzmann & Hinz, 2005). However, the growth impact of pension fund investments depends critically on the quality of fund governance, regulatory oversight, and the effectiveness of asset management strategies, as poorly managed pension assets may increase systemic risk or fail to generate adequate returns (Barr & Diamond, 2009).

In Malaysia, pension funds constitute a major component of the domestic financial system and have expanded significantly in recent decades, reflecting demographic pressures and structural changes in retirement financing. Pension fund institutions play an

increasingly important role in supporting Malaysia's financial stability, providing long-term liquidity, and contributing to national investment. As Malaysia aims to sustain economic resilience and achieve high-income status, understanding the macroeconomic implications of pension fund asset growth is essential. Examining the extent to which pension fund investments contribute to Malaysia's economic growth offers valuable insights into the interaction between retirement security, financial sector development, and broader macroeconomic performance.

Malaysia's pension system features a dual structure comprising defined benefit (DB) and defined contribution (DC) schemes. The primary pension institutions include the Civil Service Pension Scheme (CSPS), the Employees Provident Fund (EPF), and the Armed Forces Fund Board (Lembaga Tabung Angkatan Tentera, LTAT). These schemes operate under distinct institutional arrangements, reflecting differences in coverage, financing mechanisms, and risk allocation. Under DB arrangements, retirement benefits are determined by final salary and years of service, with the government bearing the ultimate liability for financing pension obligations. In contrast, DC schemes are funded through accumulated contributions and investment returns, with benefits depending on the performance of pension fund assets (Barr & Diamond, 2009).

The CSPS is the main pension scheme for Malaysia's public sector employees. It entitles eligible retirees to a monthly pension, a lump-sum gratuity, and additional benefits such as cash payments in lieu of accumulated leave (Jabatan Perkhidmatan Awam [JPA], 2021). This scheme operates as a non-contributory DB system, fully financed by government revenues. To strengthen the governance and sustainability of public pension financing, the Retirement Fund Incorporated (Kumpulan Wang Persaraan, KWAP) was established in 2007 under the Retirement Fund Act. KWAP manages pension fund investments, administers member accounts, and ensures the effective delivery of pension payments (KWAP, 2013). Contributions to the scheme are made primarily by the federal government and statutory bodies, while beneficiaries are not required to contribute. The CSPS covers approximately 1.5 million workers, representing nearly 10% of Malaysia's labour force (Holzmann, 2014; JPA, 2022, 2023).

In contrast, the Employees Provident Fund (EPF) is Malaysia's largest retirement savings institution for private sector employees and operates under a defined contribution (DC) framework. Established in 1951, the EPF was created to ensure that workers accumulate sufficient retirement income through mandatory savings (Narayanan, 2002). Under the Employees Provident Fund Act 1991, both employers and employees must contribute a proportion of wages into individual retirement accounts. According to recent contribution structures, employers contribute between 12% and 13% depending on wage levels, while employees contribute approximately 11%. The EPF provides retirement coverage for nearly 15 million Malaysian workers, making it one of the most significant pension funds in Southeast Asia (Employees Provident Fund [EPF], 2023). Given its scale, the EPF plays a crucial role in Malaysia's domestic capital market development and investment financing.

Another important pension institution operating under a DC structure is LTAT, established in 1972 to provide retirement savings for military personnel below officer rank. The contributions to LTAT are made jointly by employees and the government as employer. However, military officers and personnel with extended service durations are typically covered under the CSPS rather than LTAT, reflecting the segmented structure of pension provision within the armed forces. LTAT covers approximately 0.12 million members, reflecting its specialised scope within Malaysia's pension landscape (LTAT, 2023).

Taken together, Malaysia's pension framework is primarily structured around three mandatory schemes, each tailored to a specific segment of the workforce: the public sector (CSPS), the private sector (EPF), and the armed forces (LTAT). While additional schemes, such as the Private Retirement Scheme and the proposed Basic State Pension Scheme, exist, these remain relatively limited in scope or are still under policy discussion, and therefore are not the focus of this study.

Given the rapid growth of pension fund assets in Malaysia and their increasing importance in domestic investment activity, a critical research issue arises regarding the extent to which pension fund accumulation contributes to macroeconomic growth. As pension assets expand, understanding their role in savings mobilisation, financial market

deepening, and productive investment is essential for evaluating both economic sustainability and pension system effectiveness. This study therefore examines the relationship between pension fund assets and economic growth in Malaysia, contributing to broader debates on pension reform, fiscal sustainability, and long-term development strategy.

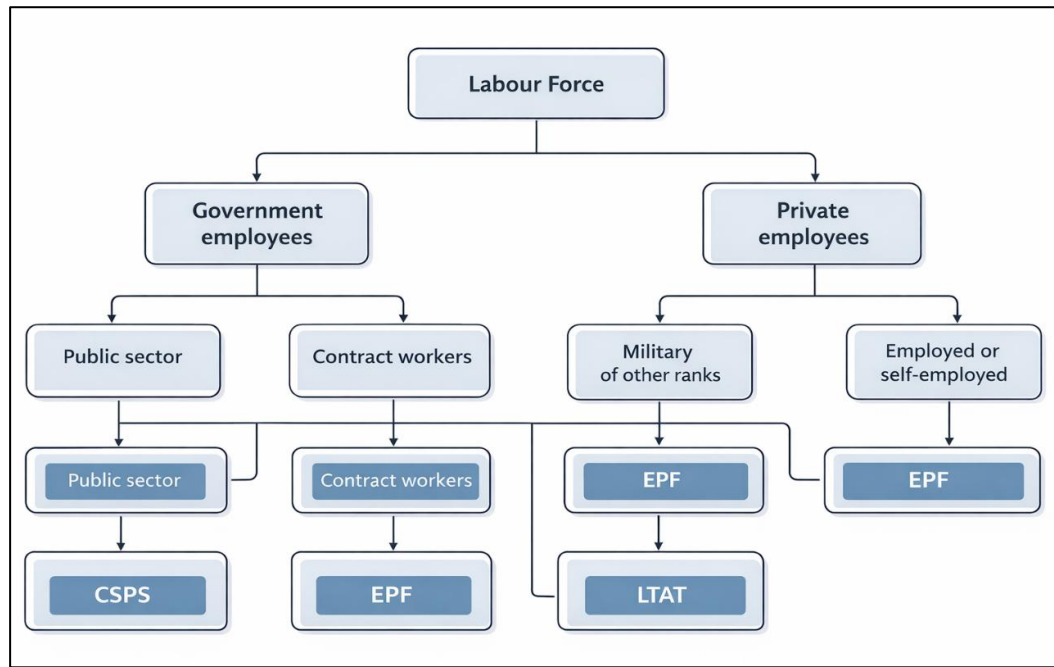


Figure 1.1 Mandatory Pension Framework in Malaysia

Source: Holzmann (2014); Darmaraj and Narayanan (2019)

1.2.1 Motivation of Study

This research is motivated by the limited and fragmented empirical evidence on the macroeconomic role of pension fund savings and investment in promoting economic growth, particularly in the Malaysian context. Although pension funds have increasingly become dominant institutional investors and important drivers of financial intermediation, the extent to which pension fund asset accumulation contributes to long-term economic performance remains insufficiently examined in many emerging economies. Hassan et al. (2018) note that only a small number of empirical studies explicitly investigate the relationship between economic growth, savings mobilisation, and pension fund investment

from the perspective of pension scheme contributions. Existing Malaysian evidence is especially narrow, as previous research has largely focused on the Employees Provident Fund (EPF) alone, thus limiting broader conclusions about the aggregate pension system and its institutional diversity.

Accordingly, this study is essential in complementing the existing literature by extending the analytical scope beyond a single pension institution. Malaysia's pension landscape comprises several major schemes with distinct structures and coverage – namely, the Civil Service Pension Scheme (CSPS), the EPF, and the Armed Forces Fund Board (LTAT). These schemes differ fundamentally in their financing mechanisms, benefit structures, and risk allocation, operating under both defined benefit (DB) and defined contribution (DC) frameworks (Barr & Diamond, 2009). A comprehensive investigation incorporating these heterogeneous pension institutions is therefore necessary to provide a more accurate and policy-relevant understanding of how pension fund assets influence Malaysia's macroeconomic trajectory. Disaggregating pension funds by institutional category allows for the identification of scheme-specific channels through which pension funds may affect growth outcomes, thereby offering insights unavailable from aggregate-only approaches.

Furthermore, international empirical findings on the pension–growth nexus remain inconclusive, providing further justification for this research. The literature reveals divergent and often contradictory results regarding whether pension fund asset investment promotes or dampens economic growth. For example, Rousseau and Wachtel (2011) find no significant relationship between pension fund development and growth, whereas Ndugbu et al. (2015) report a negative association. Conversely, Ofoeda et al. (2016) present evidence of a positive, growth-enhancing effect of pension asset accumulation. These inconsistencies suggest that the macroeconomic impact of pension funds may be context-dependent, shaped by institutional design, regulatory effectiveness, financial market maturity, and national economic structure (Holzmann & Hinz, 2005). Therefore, further country-specific research is required to clarify these dynamics in Malaysia.

More recently, Fisnik and Grima (2022) provide global evidence on the relationship between pension assets and economic outcomes across various economies. However, their

study acknowledges data limitations in some countries, including Malaysia, which constrain the credibility and validity of their conclusions and policy recommendations. This highlights the need for Malaysia-focused empirical research supported by comprehensive and high-quality institutional data, particularly given the expanding scale of pension fund assets in the country.

A further motivation for this study lies in its unique sample design. Unlike previous Malaysian studies that have relied primarily on EPF data (Davis & Hu, 2008; Hassan et al., 2018), this research uses a broader dataset covering the major pension schemes across Malaysia's public, private, and military workforce segments over a twenty-year period. This approach allows analysis of pension fund effects both individually and collectively, enabling more nuanced conclusions regarding the differential growth contributions of DB and DC schemes and sector-specific pension structures.

The central research questions motivating this study are therefore twofold: (1) Are pension fund assets and their investment performance positively associated with economic growth in Malaysia? and (2) To what extent do pension fund assets have a statistically significant and economically meaningful impact on Malaysia's macroeconomic performance? Addressing these questions is crucial, as conventional growth theory suggests that higher savings and investment contribute to greater capital accumulation, productivity improvements, and stronger economic growth (Diamond, 1965; Samuelson, 1975). Pension funds, by mobilising long-term savings, may therefore represent an important mechanism through which domestic investment and growth can be stimulated.

In addition, pension fund investment outcomes are closely linked to broader financial variables such as interest rates, credit conditions, and monetary policy indicators, including the overnight policy rate. These macro-financial variables influence returns on pension assets and may mediate the relationship between pension funds and economic growth. Consequently, incorporating such control variables is essential for developing a more robust econometric model capable of capturing the true pension–growth relationship (Barr & Diamond, 2009). Understanding the economic implications of pension fund asset accumulation is crucial for Malaysia's long-term fiscal sustainability, financial development, and growth strategy. Pension funds can generate positive spillovers by

deepening capital markets and enhancing investment financing, but they may also pose risks if mismanaged or inadequately regulated. Despite these considerations, a clear gap remains in the Malaysian literature, which this study aims to address by providing comprehensive theoretical and empirical evidence on the growth impact of pension fund assets. The findings are expected to contribute meaningfully to academic discourse and inform policy debates on pension reform, investment governance, and sustainable economic development.

1.3 Problem Statement

The rapid growth of pension fund assets in recent decades has fundamentally reshaped retirement financing and capital market structures in both developed and emerging economies. In Malaysia, this transformation is taking place amid significant demographic and macroeconomic challenges, including population ageing, increasing longevity, and rising fiscal pressures related to retirement obligations. As Malaysia seeks to maintain long-term economic growth while ensuring retirement adequacy, understanding the macroeconomic implications of pension fund asset accumulation has become an increasingly important concern for policymakers and academics (OECD, 2020; World Bank, 2019). Pension funds, as major institutional investors, mobilise substantial long-term savings that can influence domestic capital formation, financial market deepening, and overall macroeconomic stability (Davis & Hu, 2008). Despite their growing importance, the extent to which pension fund assets contribute to Malaysia's economic development remains insufficiently understood.

A major problem is the limited scope of existing empirical research on the pension–growth nexus in Malaysia. While international studies have examined the relationship between pension assets and economic performance, their findings remain inconsistent and context-dependent, with evidence ranging from positive to negligible or even negative effects (Rousseau & Wachtel, 2011; Ndugbu et al., 2015; Ofoeda et al., 2016). This divergence suggests that the macroeconomic impact of pension funds may depend heavily on institutional structure, regulatory quality, financial market maturity, and investment

governance frameworks (Holzmann & Hinz, 2005). However, Malaysia-specific evidence remains fragmented, and most studies have focused narrowly on individual schemes, particularly the Employees Provident Fund (EPF), without capturing the broader pension system as an integrated national financial institution (Hassan et al., 2018; Yusof et al., 2016). Consequently, the aggregated and comparative impact of Malaysia's multiple pension institutions, including the Civil Service Pension Scheme (CSPS) and the Armed Forces Fund Board (LTAT), remains underexplored.

Furthermore, the literature often fails to adequately address the interaction between pension fund investment behaviour and Malaysia's broader macroeconomic policy environment. Pension funds do not operate in isolation; their investment strategies are influenced by fiscal conditions, the monetary policy stance, interest rate dynamics, and capital market development. As Barr and Diamond (2009) emphasise, pension sustainability must be assessed alongside a country's capacity to finance retiree consumption while maintaining the investment required for growth. In Malaysia, where the government acts as both regulator and sponsor of public pension liabilities, pension asset accumulation may have significant implications for fiscal consolidation, public debt sustainability, and long-term macroeconomic management.

Although Malaysian policymakers have introduced initiatives to strengthen retirement savings participation, such as tax incentives and awareness programmes, the macroeconomic effectiveness of pension fund expansion remains unclear. Specifically, the extent to which pension fund asset growth translates into productive investment, enhanced financial intermediation, and measurable economic growth has not been sufficiently modelled within empirical macroeconomic frameworks (Abidin et al., 2019). Existing studies often omit critical determinants, including fund performance indicators, portfolio allocation structures, reinvestment efficiency, and policy transmission mechanisms, limiting their explanatory power and policy relevance. The problem is further compounded by the limited availability of disaggregated institutional data across Malaysia's diverse pension schemes. Differences in scheme design, such as defined benefit arrangements for civil servants and defined contribution structures for private sector workers, imply that pension funds may exert heterogeneous effects on economic outcomes through distinct

channels (Barr & Diamond, 2009). However, empirical estimation of these differentiated impacts has been constrained by data fragmentation and the absence of comprehensive comparative modelling. At the same time, growing fiscal pressures from public pension liabilities, combined with demographic ageing, intensify the need for rigorous research to evaluate the sustainability and macroeconomic consequences of pension financing.

Given these significant gaps in understanding the overall contribution of Malaysia's pension fund assets to economic growth, particularly when considering the combined influence of multiple pension institutions, there is a pressing need for a more integrative and comprehensive assessment of the pension-growth nexus and for informing policies that enhance the effectiveness of pension funds in supporting sustainable economic development under varying fiscal. Furthermore, a notable gap in the literature concerns the relationship between pension fund assets and monetary policy, particularly in Malaysia, where pension funds represent some of the largest institutional investors and their investment decisions are highly sensitive to changes in monetary conditions. Such an inquiry is particularly relevant for policymakers seeking to enhance Malaysia's fiscal resilience, strengthen capital market development, and ensure long-term economic stability in the face of demographic transition. To address this problem effectively, comprehensive econometric modelling is required. Incorporating key macroeconomic control variables such as pension fund returns, fund size, inflation, interest rates, and government debt is essential to generate reliable and unbiased estimates of the pension-growth relationship and to inform evidence-based policy formulation. Ultimately, identifying the mechanisms through which pension fund assets influence Malaysia's macroeconomic performance is crucial for guiding strategic decision-making in pension reform, public finance sustainability, and monetary policy management.

1.4 Objectives of the Study

The primary objective of this study is to examine the relationship between pension fund assets and economic growth. Specifically, the study investigates how the accumulation and investment of pension fund assets affect key macroeconomic indicators, including

gross domestic product (GDP), inflation, investment, fiscal, and monetary conditions such as interest rates. Given their large asset holdings and long-term investment horizons, pension funds can play an important role in promoting capital market development, supporting infrastructure investment, and enhancing financial stability (Davis & Hu, 2008; Impavido et al., 2003).

Secondly, the study explores the fiscal implications of pension fund growth, particularly in relation to public debt, as pension savings may alleviate pressure on government budgets by reducing reliance on unfunded pension schemes (World Bank, 1994). In Finally, the research will assess the impact of pension fund operations on monetary stability, including interest rate volatility and inflationary pressures, recognising the potential bidirectional causality between financial intermediation by pension funds and macroeconomic indicators (Catalán, Impavido, & Musalem, 2000). The insights from this study are expected to inform policymakers, institutional investors, and relevant stakeholders on how to optimise pension fund management strategies. Such optimisation is essential for enhancing long-term economic prosperity, promoting sustainable development, and reinforcing the financial stability of both emerging and developed economies.

Building these analyses is key to achieving all the specific objectives, which are as follows:

1. To examine the impact of pension funds' assets on economic growth in Malaysia.
2. To identify the link between pension funds' assets and economic growth with fiscal position in Malaysia.
3. To identify the link between pension funds' assets and economic growth with monetary conditions in Malaysia.

1.4.1 Research Objective 1: To Examine the Impact of Pension Funds' Assets on Economic Growth in Malaysia

This objective aims to examine the extent to which pension fund assets contribute to Malaysia's economic growth trajectory. Pension funds, as institutional investors, manage substantial pools of long-term savings that are strategically allocated across various financial instruments and sectors. By mobilising domestic savings into productive investments, pension funds can stimulate capital formation, enhance financial market development, and ultimately drive economic growth (Davis & Hu, 2008; Catalán et al., 2000). In Malaysia, the pension system plays a crucial role in social protection and retirement security, particularly through institutions such as the Employees Provident Fund (EPF). The scale and investment patterns of these funds have become increasingly important for macroeconomic stability and growth (Asher, 2011).

1.4.2 Research Objective 2: To Identify the Link Between Pension Funds' Assets and Economic Growth with Fiscal Position in Malaysia

This research objective seeks to examine the interrelationship between the accumulation of pension fund assets, economic growth, and the fiscal position of the Malaysian government. Specifically, the study aims to explore how pension funds, through their influence on savings mobilisation and capital market development, can affect macroeconomic growth while simultaneously shaping the country's fiscal sustainability. Pension funds, particularly in a middle-income economy such as Malaysia, serve as critical vehicles for financing public and private sector investments, thereby influencing both GDP growth and fiscal balances (Davis & Hu, 2008; World Bank, 1994). Malaysia's pension system, anchored by the Employees Provident Fund (EPF), holds significant assets under management relative to the size of the national economy. These assets can indirectly affect fiscal outcomes by potentially reducing the government's future pension liabilities, mitigating the need for budgetary allocations to support retirement income, and lowering reliance on debt-financed social expenditure (Holzmann, Palacios, & Zviniene, 2004).

1.4.3 Research Objective 3: To identify the link between pension funds' assets and economic growth with monetary conditions in Malaysia

This research objective seeks to examine the complex relationship between pension fund assets, economic growth, and monetary conditions in Malaysia. Pension funds, due to their size and long-term investment horizon, have the potential to influence monetary variables such as interest rates, inflation, and liquidity conditions. The study aims to analyse how the expansion of pension fund assets through capital market participation and allocation strategies interacts with broader monetary dynamics, thereby shaping macroeconomic performance. Pension funds often act as stabilising agents in financial markets because of their counter-cyclical investment behaviour, which can have significant implications for monetary policy transmission mechanisms (Davis & Hu, 2005). In Malaysia, where the pension fund system is relatively mature and asset accumulation continues to grow, understanding how these funds influence key monetary indicators is essential. For example, large-scale investment in government securities or fixed-income instruments by pension funds may affect the yield curve, influencing both short- and long-term interest rates (Impavido et al., 2003). Furthermore, their demand for financial assets can alter money supply conditions and interact with the central bank's monetary stance.

1.5 Research Questions

This study seeks to answer the following questions in accordance with the previous research problem statements. The questions are:

1. Does pension fund assets (PFA) have a significant effect on economic growth in Malaysia?
2. Do the macroeconomic variables, namely inflation, gross fixed capital formation, and population, have a significant effect on economic growth in Malaysia?
3. Does the fiscal variable, public debt, have a significant effect on economic growth in Malaysia?

4. Do the monetary variables, interest rate and domestic credit to the private sector have a significant effect on economic growth in Malaysia?

1.6 Significance of the Study

This study is conducted in response to growing interest in the impact of pension fund assets on Malaysia's economy. The assets under management (AUM) of the three main Malaysian pension funds (EPF, KWAP, and LTAT) now exceed 70% of the nation's GDP, amounting to more than MYR1 trillion (various pension fund financial reports, 2024). Understanding the relationship between pension funds and economic growth is therefore essential for policymakers, investors, and researchers. Recognising the significance of pension funds, the findings of this study may provide valuable guidance for policymakers in designing improved regulatory frameworks and making informed policy decisions. For investors, the importance of this study extends beyond financial returns to include broader economic, social, and policy implications. This knowledge enables investors to make informed decisions that align with their financial objectives while contributing to sustainable economic development. The study also enriches economic and financial theory and empirical research, offering insights to researchers interested in topics related to pension funds, economic growth, fiscal sustainability, and monetary stability.

Many studies have been conducted on pension liabilities globally, including a few that specifically focus on the civil service pension scheme (CSPS) in Malaysia. Lee (1997) discussed the rising cost of pension bills for the Government, while Ibrahim and Siri (2012) examined the impact of increasing the retirement age on pension liabilities. Another recent study by Darmaraj and Narayanan (2019) explored possible reforms to the current CSPS to reduce pension liabilities for employees. The performance of pension funds, asset investments, productivity, corporate governance, pension reforms, capital market performance, and the effects on economic growth in various developed and developing countries have been examined by several authors, including Patel (1997), Schmidt-Hebbel (1999), Barajas et al. (2007), Catalan (2004), Borsch-Supan (2005), Sun and Hu (2014), Ahmeti and Mazreku (2020), and Ho (2017). These studies show that investments in

pension fund assets positively impact the economies of different countries, leading to deeper and more efficient capital markets and, consequently, economic growth.

However, it was found that almost none of the research clearly focused on how Malaysia's budgetary sustainability and economic growth are affected by the assets held by pension funds. In Malaysia, pension funds have become significant financial institutions with a profound influence on the country's macroeconomic environment. As these funds accumulate substantial assets over time, their investment behaviour and portfolio allocations have important implications for the conduct and effectiveness of fiscal and monetary policy, both of which are central to Malaysia's economic growth strategy. From a fiscal policy perspective, the assets held by pension funds can alleviate public sector financial burdens. By providing a partial substitute for unfunded public pension liabilities, the growth of pension assets reduces the government's future expenditure obligations for retirement benefits (Holzmann et al., 2004). This shift contributes to improved fiscal sustainability and allows for more productive use of government resources, potentially enabling greater investment in infrastructure, education, and healthcare as key drivers of long-term economic growth.

Moreover, pension funds frequently invest in government bonds and infrastructure projects, providing a stable source of domestic financing for public expenditure. This role is particularly valuable during periods of fiscal constraint, when borrowing costs might otherwise increase. In Malaysia, the EPF's involvement in financing large-scale national projects such as highways, housing, and utilities exemplifies this symbiotic relationship (Asher, 2011). These investments not only reduce the government's reliance on external borrowing but also stimulate aggregate demand and capital formation, thereby positively affecting GDP growth. Pension funds also play a crucial role in shaping Malaysia's monetary conditions. Their preference for long-term investment instruments, including government securities and fixed-income assets, influences market interest rates and the transmission mechanisms of monetary policy. As large institutional investors, pension funds can affect the slope of the yield curve and the demand for monetary instruments issued by the central bank (Impavido et al., 2003).

In the context of monetary stability, the long-term nature of pension fund investments enhances market predictability and reduces capital flow volatility, supporting the central bank's ability to manage inflation and interest rates effectively. During periods of economic uncertainty or tightening monetary conditions, the consistent investment behaviour of pension funds can serve as a stabilising force, cushioning the economy against capital flight or sharp interest rate increases (Catalán et al., 2000). This stabilisation promotes an environment conducive to sustainable economic growth. Furthermore, the interaction between pension fund growth and monetary expansion can create feedback loops. For example, low interest rates used as monetary stimulus may prompt pension funds to shift asset allocations in search of higher yields, potentially encouraging private sector investment and consumption. However, this can also expose the system to asset bubbles or increased risk if not carefully regulated (OECD, 2019).

Malaysia presents a compelling case where pension funds are deeply integrated with macroeconomic policy implementation. The EPF's assets amount to over 60% of GDP, making it one of the largest pension funds in Asia relative to national output (EPF Annual Report, 2023). This scale gives pension funds considerable influence over financial markets and policy outcomes. For example, during economic downturns such as those experienced during the COVID-19 pandemic, early withdrawals from pension funds served as a fiscal buffer for households but also introduced liquidity and long-term adequacy risks, highlighting the delicate balance between short-term fiscal stimulus and long-term pension sustainability (World Bank, 2021).

In summary, pension fund assets in Malaysia significantly influence the effectiveness of fiscal and monetary policies. Through their investments and long-term financial planning roles, pension funds enhance the government's capacity to support economic growth and maintain financial system stability. However, this interdependence also requires robust regulatory oversight and strategic policy alignment to mitigate potential risks and ensure the resilience of both macroeconomic management and retirement security.

1.7 Scope and Limitation of the Study

The growing burden of pension liabilities and their implications for fiscal sustainability have emerged as significant policy concerns in both advanced and emerging economies. Concurrently, pension funds have evolved into major institutional investors, playing a crucial role in mobilizing long-term savings, enhancing financial intermediation, and supporting economic growth. Their expanding asset base enables them to influence domestic investment, capital market development, and overall macroeconomic performance. In this regard, Malaysia presents a particularly relevant case study due to its substantial growth in pension fund assets, the coexistence of defined benefit and defined contribution pension schemes, and mounting demographic pressures associated with population ageing. These developments underscore the importance of understanding the role of pension fund assets in shaping economic growth and their interactions with the country's fiscal position and monetary conditions.

Accordingly, this study focuses specifically on Malaysia and provides a comprehensive empirical assessment of the extent to which pension fund asset accumulation contributes to national economic growth. It examines pension funds not only as instruments of retirement security, but also as macroeconomic actors whose investment strategies may influence capital formation, financial stability, and fiscal sustainability. In particular, the research investigates the interaction between pension fund investments and key macroeconomic indicators, thereby generating evidence-based insights for policymakers on the strategic role of pension fund governance and investment allocation.

The primary objective of this study is to empirically assess whether pension fund assets in Malaysia have acted as effective drivers of economic growth and whether pension funds performances contribute meaningfully to macroeconomic stabilisation. The study also aims to determine the magnitude of pension fund returns and asset growth required to have a statistically significant impact on economic performance. To achieve these objectives, the study uses time-series econometric analysis with secondary data from 2000 to 2024, covering approximately 25 years. This period is particularly relevant as it encompasses the establishment and operational expansion of key pension institutions such

as KWAP, as well as major global and domestic economic events that may affect both pension fund performance and growth dynamics.

In this study, economic growth is represented by Malaysia's Gross Domestic Product (GDP), which serves as the dependent variable. GDP data are sourced primarily from the Ministry of Finance (MOF) and supplemented by official macroeconomic databases such as the World Bank. The key independent variable is pension fund asset accumulation, measured by the total assets value held by Malaysia's major pension institutions. To account for broader macroeconomic determinants and improve model robustness, several control variables are included, such as:

- Gross fixed capital formation (GFCF)
- Domestic credit to the private sector (DCPS)
- Public debt
- Inflation rate
- Population growth
- Interest rate indicators

These variables are widely recognised in the growth and pension finance literature as important channels through which pension fund investments may affect economic performance. Data for the study are obtained from credible official sources, including the Ministry of Finance (MOF), Jabatan Perkhidmatan Awam (JPA), Employees Provident Fund (EPF), Kumpulan Wang Persaraan (KWAP), Lembaga Tabung Angkatan Tentera (LTAT), Department of Statistics Malaysia (DOSM), Bank Negara Malaysia (BNM), and the World Bank Group (WBG).

Despite its contributions, this study has several limitations. First, the research scope is limited to Malaysia's three principal pension fund institutions: EPF, KWAP, and LTAT, which together represent the dominant retirement savings and pension asset base in the country. Smaller schemes, such as the Private Retirement Scheme (PRS) and the proposed Basic State Pension Scheme, are excluded due to their relatively limited coverage and the lack of consistent long-term data. While this focus enhances analytical clarity, it may limit the generalisability of the findings to the entire retirement ecosystem. Secondly, the study relies on secondary aggregate institutional data, which may constrain the ability to capture

micro-level behavioural effects, such as household savings responses or heterogeneity in retirement adequacy. In addition, disaggregated portfolio allocation data across pension schemes are not always publicly available, limiting deeper examination of asset composition and investment efficiency. Finally, while the study considers fiscal sustainability through variables such as public debt and government expenditure, fiscal analysis is confined strictly to the federal government level. State-level fiscal dynamics are not incorporated, which may overlook certain decentralised fiscal pressures within Malaysia's broader public finance framework. Future research could therefore extend the analysis using panel data approaches, structural modelling, or comparative cross-country frameworks.

Despite these limitations, the study makes an important contribution by providing one of the most comprehensive empirical assessments of pension fund assets and economic growth in Malaysia. By focusing on the country's major pension institutions and incorporating macroeconomic control variables, the research aims to generate policy-relevant evidence to support sustainable pension reform, improved investment governance, and long-term economic resilience.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Numerous studies have examined national savings, asset investments by these funds, and their effects on economic growth. However, a review of the literature reveals that empirical research on the relationship between the expansion of pension funds and economic growth is very limited and uses a wide range of summary metrics to quantify economic success. Given the importance of this topic for shaping pension fund investment policy in relation to economic growth and fiscal sustainability, the author focuses specifically on Malaysia to examine the impact of pension fund assets on economic growth and fiscal sustainability. The study uses identified independent variables to control for the impact of pension assets on economic growth, namely pension fund assets, gross fixed capital formation, domestic credit to the private sector, inflation, public debt, population, and interest rate. Most of the literature reviewed shows varied results. However, none of the studies were designed specifically for Malaysia.

2.2 Classical Economic Surplus Theory

The Classical Economic Surplus Theory is a foundational concept in classical political economy, primarily associated with economists such as Adam Smith, David Ricardo, and Karl Marx, and later formalised by economists like François Quesnay and Piero Sraffa. This theory posits that a nation's wealth and capacity for growth are rooted in the production of a surplus – the output remaining after the essential costs of production (such as wages, rent, and input costs) have been met. In classical terms, economic surplus refers to the difference between the total output of an economy and the necessary subsistence consumption required to sustain the productive workforce. This surplus can be appropriated by various social classes, primarily capitalists (profits), landowners (rents),

and sometimes the state (taxes), and is the central driver of capital accumulation and economic development (Ricardo, 1817/2004).

According to Ricardo's framework, land rent arises due to the differential productivity of land, and surplus is distributed as rent to landlords, wages to labour, and profits to capitalists. For classical economists, economic growth and capital accumulation are fuelled by the reinvestment of profits – the primary form of surplus – into production (Sraffa, 1960). Thus, surplus not only indicates wealth creation but also signals a society's potential for future development and investment. Classical surplus theory diverges from neoclassical marginalist analysis by focusing on the physical and social relations of production, rather than utility and individual optimisation. It emphasises the distribution of surplus among social classes and views production and distribution as historically contingent and politically influenced processes (Garegnani, 1970). Importantly, François Quesnay's "Tableau Économique" (1758) introduced the idea of surplus in an agrarian economy, where the productive class (farmers) generated more output than was consumed. This "net product" was seen as the basis of national wealth and the source of investment and taxes.

In contemporary applications, surplus theory is revisited in heterodox economics, particularly in Post-Keynesian and Marxian analyses of income distribution, capital accumulation, and macroeconomic stability. It provides a valuable lens for examining issues such as inequality, fiscal policy, and the sustainability of economic growth in modern capitalist economies. In contemporary economic thought, classical surplus theory has found renewed relevance through its integration into heterodox economic paradigms, particularly Post-Keynesian and Marxian frameworks. These schools of thought adopt the surplus approach not merely as a historical curiosity, but as a robust analytical tool for understanding modern issues of income distribution, capital accumulation, and macroeconomic stability in capitalist economies.

In Post-Keynesian economics, the surplus concept is used to analyse the relationship between income distribution and aggregate demand. Unlike neoclassical models, which assume market-clearing wages and full employment, Post-Keynesians argue that economic output and employment are demand-driven, and that profits (as surplus) play

a crucial role in investment and growth (Kalecki, 1971; Lavoie, 2014). In this view, the distribution of surplus between wages and profits affects consumption and saving behaviour, which in turn influences macroeconomic dynamics. A higher profit share may increase savings but reduce consumption, potentially leading to demand shortfalls unless offset by investment or government spending. Meanwhile, Marxian economics builds directly on classical surplus theory by framing surplus as surplus value – the unpaid labour appropriated by capitalists in the production process. Marxian theorists argue that the accumulation of this surplus value drives capital accumulation but also leads to inherent contradictions, such as overaccumulation, falling profit rates, and economic crises (Marx, 1867/1990; Foley, 1986). From this perspective, surplus analysis is essential for diagnosing systemic instability and class conflict within capitalist societies.

Both Post-Keynesian and Marxian approaches view surplus not merely as a static measure of output exceeding subsistence, but as a dynamic and politically contested economic category. They emphasise that how the surplus is generated, distributed, and utilised (e.g., reinvestment, consumption, speculation) has direct implications for long-term growth trajectories and the resilience of the economic system. Moreover, recent heterodox scholarship incorporates surplus theory into macroeconomic modelling, focusing on the fiscal and monetary conditions that affect surplus distribution. For example, government deficits can be seen as a mechanism to absorb surplus and maintain demand (Mitchell et al., 2019), while financialisation may lead to misallocation of surplus into speculative channels rather than productive investment (Stockhammer, 2004). Thus, the contemporary revival of surplus theory provides a valuable lens to critique mainstream economic assumptions and to propose more realistic, historically grounded, and socially aware models of economic functioning.

2.2.1 Public Pension Systems, Conflicts and Economic Stability

Public pension systems are a vital tool for addressing income distribution issues, particularly those affecting retirees and the elderly. Public institutions play a key role in managing conflicts arising from the distribution of economic surpluses and in maintaining

social stability. Public pensions serve as a mechanism for redistributing income from the working population to retirees, helping to reduce income disparities caused by differences in earning potential and savings capacity. Pensions provide a safety net for individuals who can no longer earn income through employment, thereby lowering the risk of destitution among the elderly. Conflicts can occur over the distribution of economic surplus, especially regarding the fairness and financing of public pensions.

The funding mechanisms of pension systems, which include contributions from current workers and government funding, are designed and regulated by public institutions. The sustainability of the pension system depends on maintaining this balance. Governments also adjust policies to respond to demographic changes, such as population ageing, as well as economic conditions and fiscal constraints. This may involve changing retirement ages, adjusting benefits, or reforming contribution rates.

Public institutions aim to ensure that pension systems are fair, providing adequate support to all retirees while considering their contributions during their working lives. By overseeing the distribution of income through pensions and other welfare programmes, public institutions help maintain economic stability. Pensions ensure that retirees receive a steady income, which stabilises the economy and moderates their consumption patterns. By redistributing income, pensions also help to reduce income inequality and promote social cohesion.

In conclusion, the classical economic theory of surplus highlights the production and distribution of wealth among different groups within an economy. Public pension systems, among other mechanisms, are essential for managing conflicts arising from income distribution. They contribute to broader economic stability, address fairness, and regulate the balance between contributions and benefits. By ensuring that all members of society, particularly the elderly, have access to a stable income, these institutions help mitigate disparities resulting from the unequal distribution of economic surplus.

2.3 Overview of Pension Fund Assets and Economic Growth

While some studies have found little or no association between pension fund assets and economic growth, others have provided evidence and data indicating a positive relationship between these variables. For example, Davis (2002) examined the relationship between institutionalisation, measured by the percentage of institutional investors' equity holdings in total corporate equity, and macroeconomic performance, measured by GDP growth and Total Factor Productivity (TFP), using a dataset that included pension funds and life insurance companies. He finds no direct relationship between GDP growth and the amount of equity held by life insurance and pension funds, although his results are consistent with increased TFP as institutions' share of equity rises. Meanwhile, Hu (2005b) shows that Panel Granger Causality tests indicate homogeneous causality from pension assets to GDP growth in 38 countries, as well as in the subgroups of OECD (18 countries) and EMEs (19 countries), using the methodology developed by Hurlin and Venet (2001) and Hurlin (2005). The evidence that GDP growth homogeneously generates pension assets is weaker for reverse causality, particularly in emerging markets.

In contrast, Davis and Hu (2008) found that the growth of pension funds positively affects economic growth, measured in their study by output per head. The study also showed that this significant effect is greater in emerging market economies than in OECD countries. Similarly, using econometric models and statistical tests such as linear regression, random effects, and fixed effects, a recent study by Morina and Grima (2022) found that in several non-OECD countries, investments in pension assets and economic growth are positively associated and show an upward trend. The authors concluded that encouraging institutional investors to increase investment in pension assets leads to a more efficient and expanding financial market, which improves the financial performance of pension funds and increases rates of return on financial investments. Consequently, this positively impacts the economic growth of these countries.

Most national studies examining the direct relationship between pension reform and growth have focused on Chile. Holzmann (1997) identified a link between economic expansion and pension reform. Strengthening financial market conditions following

pension reform was found to have a significant positive impact on total factor productivity (TFP), using the standard Solow residual specification of TFP. However, the low "t" values in this model may result from multicollinearity between independent variables, such as the stock market index and the unemployment rate. Schmidt and Hebbel (1999) estimated a single regression to obtain the parameter coefficients, which were then used to calculate the increase in each variable attributed respectively to structural reform (e.g. tax reform) and pension reform. Overall, they concluded that pension reform in Chile had a positive impact on the private investment rate, average productivity of capital, and the TFP growth rate.

Pension funds have the potential to enhance economic growth through improved corporate governance, which can lead to better capital management. According to Clark and Hebb (2003), the industry's widespread use of indexation procedures, which prevents "exit" through the sale of shares in underperforming index companies, is one reason supporting pension funds' corporate engagement. Another reason is the increasing demand from owners for greater accountability and transparency, especially following the Enron, Worldcom, and Parmalat crises. A third factor is the pressure on pension funds to engage in socially responsible investment (SRI). Fourth, concerns about rates of return are now accompanied by pressures to "humanise" capital with social, moral, and political objectives. At least in the US, there is ample evidence that pension fund activism improves business performance at the firm level. However, most recent pensions research ignores or dismisses the question of whether pension fund development can drive economic growth through its effect on company performance at the macro level, which is the focus of this study.

Davis (2002, 2004) is an exception, arguing that institutional investors' governance initiatives may affect the entire economy, not just the "target firms." This is because unaffected companies are naturally motivated to improve their performance to fend off potential threats from pension fund activism (Marsh, 1990). Therefore, if a significant proportion of firms, whether directly or indirectly affected by pension fund activism, improve their performance, the overall effect could be higher economic growth by making the capital stock more productive. Consistent with this, Davis found that higher institutional

holdings of total corporate equity boost Total Factor Productivity (TFP) and research and development in seven major countries. Consequently, increased economic growth could result from greater capital stock productivity if a substantial percentage of businesses, whether directly or indirectly impacted by pension fund activism, perform better. In line with this, Davis found that in seven major countries, greater institutional ownership of total corporate equity increases Total Factor Productivity (TFP) and research and development.

2.3.1 Inflation

Theories of inflation are highly diverse, ranging from structuralist to classical approaches. The quantity theory of money (QTM), as used by monetarists, explains inflation as the result of high liquidity. In this view, expansionary monetary policy shocks are the sole factor driving long-term inflation rates. Over the long term, this argument supports money neutrality when an economy is assumed to be operating at maximum efficiency. It can be argued that in this economic condition, a change in the money supply leads to a corresponding change in the rate of inflation (Keynes, 1936; Leeson & Schiffman, 2010; Aydın et al., 2016). The relationship between inflation, unemployment, and economic growth is explained by the intertemporal replacement model in terms of rational expectations and continuous market clearing. In this model, rational workers demonstrate a positive relationship between unemployment and output growth by supplying more labour as real wages (not nominal) rise, and/or by consuming more leisure as real wages fall. As a result of these effects on real wages, an implicit inverse relationship between inflation and output is recognised (Phillips, 1958; Lucas & Rapping, 1969; Azizi, 2018).

Using ARDL regression (1996–2012), Mohseni and Jouzaryan (2016) modelled the effects of unemployment and inflation on the growth of the Iranian economy. According to Umair and Ullah's (2013) analysis of Pakistani data from 2000 to 2010, inflation had a negligibly negative effect on each response variable. The authors conclude that, over time, output is declining in relation to both unemployment and inflation. Nevertheless, their research strongly suggests that the Phillips curve theory does not apply to Pakistan. On the

other hand, Tatoglu (2011) examined the relationship between unemployment and economic growth for both individual economies and the European Union as a whole between 1977 and 2008. The author found some evidence of unemployment hysteresis, as well as changes in the composition of unemployment and economic growth, in each of the sample economies. All of this suggests that, regardless of different economic structures, there are discrepancies in the empirical support for the Phillips curve and Okun's law.

2.3.2 Population

Theoretically, demographic factors such as income, marital status, employment, education, and other characteristics are considered to have a significant impact on economic growth and pension schemes. Due to their large populations and contributions to global GDP, the economic performance and circumstances of China and India are of worldwide interest, according to Yunker (2024). The relationship between population growth and per capita income is examined, with the suggestion that China's higher per capita income growth compared to India can be attributed to its slower rate of population expansion. This concept is supported by research using economic models, highlighting the importance of considering population dynamics in economic analysis. In contrast, Wang and Conesa (2022), in their study using a quantitative two-sector model, argue that from around 2020, the increasing ageing of China's population and the decline in rural migration will significantly slow the country's urban labour force and economic growth. Furthermore, the study finds that population ageing is the cause of the slowdown in economic growth between 2020 and 2040, using a counterfactual with a fixed age distribution. It is evident that population determines output, as labour is a factor of production and is proportional to population.

2.4 Pension Fund Assets and Fiscal Position

2.4.1 Public Debt

Public debt is an obligation of a country's central government. Public debt may be domestic, owed to the country's residents, or external, financed by foreign lenders. Theoretically, domestic debt carries lower risk because it can be repaid by raising taxes, reducing expenditure, or increasing the money supply (Hull, 2018). There is no clear correlation between debt and growth; instead, a variety of factors influence a nation's debt performance and growth, and no specific debt ratio distinguishes good debt from bad (IMF, 2012). The literature also indicates that the relationship between the public debt-to-GDP ratio and economic growth is typically negative or inverted U-shaped. For example, Schclarek (2004) finds no statistically significant correlation between per capita GDP growth in developed countries and gross public debt. Reinhart and Rogoff (2010) conclude that for debt-to-GDP ratios below a threshold of 90%, the relationship between government debt and real GDP growth is weak. Their research, covering both advanced countries and emerging markets, including Turkey, found that high debt-to-GDP levels (90% and above) are associated with notably lower growth outcomes.

According to Kumar and Woo (2010), who also find some evidence of nonlinearity in the relationship between initial debt and subsequent growth, only high levels of debt (over 90% of GDP) have a significant negative impact on growth. Checherita-Westphal and Rother (2012) argue that a higher public debt-to-GDP ratio is generally associated with lower long-term growth rates at debt levels in the range of 90–100% of GDP, identifying a concave (inverted U-shaped) relationship between the variables. Panizza and Presbitero (2013) state that it remains an empirical question whether high levels of public debt have a detrimental impact on long-term growth. They argue that the relationship between debt and growth is non-monotonic and depends on data and methodology. Among others, Smyth and Hsing (1995), Cohen (1997), Pattillo et al., (2002), and Clements et al., (2003) also find a non-linear effect of external debt on economic growth. Dreger and Reimers (2013)

report that the negative impact of the debt-to-GDP ratio is particularly strong for unsustainable debt ratios.

Greiner and Fincke (2015), on the other hand, examine the relationship between public debt and economic growth in South Africa, Thailand, Turkey, Mexico, Brazil, India, Indonesia, Malaysia, and Mexico, and find a very minor but statistically significant positive correlation. This serves as an example of counter-evidence. Using the extended method of moments approach for dynamic panels on a panel data set of 38 nations, Thumrongvit et al. (2013) find a positive relationship between government bonds and economic development. Debt ratios of 90% and 60%, respectively, have been suggested by Reinhart and Rogoff (2010), whose research has attracted considerable attention, to be harmful to economic growth in developed nations and emerging market economies. To further support their empirical findings, Baum et al. (2013) show that interest rates come under increased pressure when the debt-to-GDP ratio rises above 70%. Abbas and Christensen (2007) estimate that modest amounts of non-inflationary domestic debt have a beneficial effect on economic growth, based on data from 93 low-income and developing markets collected between 1975 and 2004. Using a two-regime model developed by Hansen (1999, 2000), Caner et al., (2010) found that when public debt levels in 101 countries reach approximately 77% of the debt-to-GDP ratio, a negative nonlinear relationship between debt and economic growth emerges. These authors state that this effect is more pronounced in less developed countries such as Malaysia, where the threshold is around 64%.

At the domestic level, the growth implications of public debt are also shaped by the structure and development of financial markets. In this regard, Nordin and Nordin (2016) examine stock market capitalisation and the debt market in Bursa Malaysia between 1981 and 2014, using public and private debt as proxies for the debt market. Their findings highlight the role of debt instruments in influencing financial market depth and capital allocation, which in turn affect economic performance. Consistent with this perspective, Morina and Grima (2022) report a negative relationship between public debt and economic growth, particularly when debt accumulation is not supported by productive investment. From a fiscal sustainability standpoint, well-managed public debt contributes positively to the sustainability of a country's pension system, whereas excessive public debt constraints

the scope for deficits in public social security systems. Therefore, in theory, there is a correlation between public debt, pension fund assets, and economic growth.

2.4.2 Fiscal Sustainability

Since public accounts have been shown to be a useful instrument for fostering economic growth and preserving welfare over time, they represent a fundamental issue in economics and public policy for governments. The intertemporal budget constraint (IBC) of the government forms the foundation of the typical methodology used to examine the behaviour of a country's fiscal stance (Mahdavi & Westerlund, 2011). The present-value IBC is satisfied when the current debt level equals the present discounted value of primary surpluses, and fiscal policy is then deemed sustainable. A common method used by researchers to assess the sustainability of budget deficits is the application of unit-root tests, the rejection of which implies sustainability. Concerns regarding fiscal deficits are heightened by fears that state debt levels have reached a point that may hinder economic growth. The privatisation of pension funds and the reversal of pension reforms in Argentina were examined by Bertranou et al., (2018). Their analysis found an overall favourable impact of pension privatisation, with higher coverage, improved sufficiency, and greater financial sustainability. The Argentine economy has performed well since the crises of 2001–2002, and the additional funds from general taxation allocated to the pension system have provided the government with the resources needed to enhance citizens' social security. In a different setting, Casey (2014) examines the pension system reforms implemented by the governments of the European Union. These reforms and programmes were only able to achieve their goals because the national accounts system does not consider that the majority of fiscal benefits are matched by future fiscal commitments.

De-Mesa and Mesa-Lago (2006) argue that Chile's pension reforms have incurred significant costs that outweigh capital accumulation. Pension reforms in Chile have substantially impacted the development of capital financial markets and the diversification of investment portfolios, but these high fiscal expenditures have negatively affected national savings. According to James (2005), countries that successfully reform their social

security systems achieve higher rates of return on investment. This analysis indicates that pension fund assets could contribute to an increase in public debt if a government allocates them solely to Treasury bills. Meanwhile, the EU fiscal framework recognises that governments in its member states use various fiscal policy instruments to manage their income and expenditure to achieve national objectives, including promoting economic growth, utilising societal resources, and maintaining price stability (Auerbach & Kotlikoff, 1987). This is further corroborated by Trachanas and Katrakilidis (2014), highlighting the importance of a balanced budget deficit to maintain fiscal discipline, and, enable more effective implementation of monetary policy both within and outside a monetary union.

2.5 Pension Fund Assets and Monetary Stability

2.5.1 Credit

For a considerable period, financial development has been a major topic in discussions of economic progress. Patrick (1966) argued that financial institutions promote economic progress by allocating financial capital in innovative ways. This claim is empirically supported by Rajan and Zingales (1998), who used a panel of 44 countries from 1980 to 1990 to demonstrate that countries with more developed financial systems experience higher rates of new firm growth, and those with more developed financial markets see higher relative growth rates for businesses reliant on external funding. These authors conclude that improved financial development enables businesses to obtain external financing, which promotes the formation and expansion of enterprises, thereby stimulating economic growth.

Building on this line of reasoning, the finance–growth nexus has been commonly conceptualised in terms of the direction of causality between financial development and economic growth. The term "supply-leading" refers to a causal relationship running from financial development to growth, as financial institutions' activities are believed to increase the supply of financial services, which in turn stimulates economic growth (McKinnon, 1973). Similarly, "demand-leading" describes the situation where economic growth

increases demand for financial services, thereby driving financial development (Gurley & Shaw, 1967). Some scholars argue that causality can run in both directions (Demetriades & Hussein, 1996).

To further investigate the relationship between bank credit and economic growth, Thierry et al., (2016) used time series analysis and a Vector Error Correction Model (VECM) to study Cameroon. According to their findings, bank loans and other forms of financial development promote economic growth, supporting the supply-leading hypothesis in Cameroon over the long term. The report also argues that Cameroon's economic growth could be significantly aided by implementing policies that promote the development of bank credit. Carlson et al., (2011) demonstrate that, through loan and capital investment channels, the overall health of the financial sector significantly affects the health of the real sector. The authors construct a financial stability index using a VAR model with US data from 1973 to 2007 and show that changes in the index Granger-cause changes in lending terms and standards in a positive direction. In the financial industry, credit extension is used to allocate capital. Consequently, some authors have suggested that raising regulatory capital requirements could limit the amount of credit that can be extended and impede economic expansion (Fidrmuc & Lind, 2020).

2.5.2 Interest Rate and Amount of Capital

As a primary tool of monetary policy, the interest rate is a significant macroeconomic variable that positively correlates with the growth of the national economy. It is often described as the cost of capital, representing the amount paid for money borrowed over a specific period (Ahmed et al., 2018). Typically, banks charge interest for their financial products and services, distinguishing them from other financial organisations. Gul et al. (2011) investigated the influence of macroeconomic factors and bank-specific attributes on bank profitability in Pakistan. The study classified return on assets (ROA), return on equity (ROE), return on capital employed (ROCE), and net interest margin (NIM) as dependent variables, and size, capital, loans, and deposits as independent variables. External factors included GDP, inflation, and market capitalisation. The overall findings

indicated that these macroeconomic and bank-specific variables affected the profitability of Pakistani banks.

According to Nuhuman (2017), the classical theory states that the supply and demand for capital determine the rate of interest. Time preference and predicted capital productivity control the supply and demand for capital, respectively. The demand for capital arises from both production and consumption needs. Investors take out loans up to the point where the interest rate equals the marginal productivity of capital. This implies that the demand for capital decreases at higher interest rates and increases at lower interest rates. Additionally, the author found that the supply of capital depends on individuals' ability and willingness to save. Under normal circumstances, savings and the availability of capital are expected to increase as interest rates rise, and decrease as interest rates fall.

Given that the supply and demand for capital determine the interest rate, as the rate declines, investment increases and the economy prospers. Using partial least squares (PLS), Samuel and Nurina (2015) examined the effects of interest rates on economic growth in Indonesia from 2005 to 2013 and found a strong negative relationship between interest rates and growth. Similarly, Saymeh and Orabi (2013) used the cointegration approach to analyse data from 2000 to 2010 and concluded that interest rates significantly impede real economic development. By applying Ordinary Least Squares (OLS), Jilani and Asim (2010) also assessed the influence of macroeconomic variables on economic growth from 1980 to 2011 and concluded that interest rates had a negative impact on growth in Pakistan. In this context, this study can adopt the view that the larger the size of pension funds, the greater the capital supply in the market due to their investment mandates. This scenario will lower the interest rate and cost of borrowing, thereby increasing economic activity and ultimately having a positive impact on growth.

2.5.3 Overall Financial Market

In discussions of economic policy, it is typically asserted that financial market development resulting from pension reform has a favourable impact on both capital formation and national savings (IMF, 1995). The overall result should be the same in a

closed economy, but it may lead to a different allocation of savings and investments between the public and private sectors. In an open economy, foreign saving can also offset imbalances in industry investment or saving. The conventional view is that financial market deepening positively affects saving and capital formation. However, international empirical data and other theoretical considerations suggest that these impacts may offset each other or vary in direction. Improved incentives for long-term investment, better risk allocation, and easier access to finance – meaning fewer borrowing constraints – all suggest a positive relationship between financial market indicators and capital formation, as measured by changes in real capital stock. However, a more efficient market may also lead economic agents to reroute their wealth into pre-existing equity claims rather than new capital investment, due to lower transaction costs and higher returns across all investment projects (Bencivenga et al., 1996).

While cross-country evidence yields mixed conclusions, country-specific data provide clearer insights into the pension–finance–growth nexus. In this regard, Holzmann (1997) reports that the links between financial market indicators, total factor productivity, and capital accumulation are surprisingly strong in Chile. Schmid-Hebbel (1999), however, concluded that Chile's pension reform increased private investment, improved capital productivity on average, and raised the TFP growth rate. Nevertheless, the pension reform programme implemented in Chile requires a comprehensive reform package that addresses nearly every aspect of macroeconomic and microeconomic policy, as well as institution building, while maintaining strict fiscal discipline.

The evolution of Egypt's financial system and the primary patterns in the country's financial development are examined in a study by Mohieldin et al. (2019). The empirical results of this study show that the money supply as a percentage of GDP and real economic growth are strongly positively correlated with financial development. Real GDP per capita and market capitalisation are positively associated in the financial markets, as is the number of bond issuers. Kidd and Tran (2017) argue that a functioning market economy depends on investments in tax-funded pensions for the elderly. The report states that while increasing Uganda's investment in old-age pensions would come at a relatively low cost (up to 0.4% of GDP), the effects on labour productivity and economic growth would be

significant. Impavido et al. (2001) found that as pension funds grew, banks faced greater competition, which improved bank operating efficiency. According to Gillan and Starks (2000), pension funds enhance corporate governance. Additionally, Bodie (1989) has shown that pension funds encourage financial innovation.

Most empirical panel data analyses focus on the effects of contractual savings, using as explanatory variables either the contractual savings to GDP ratio or the percentage of contractual savings assets in total financial assets (Impavido et al., 2001, 2003). This approach makes it difficult to accurately analyse the distinctiveness of pension funds, given the differences in industrial organisation and fund administration between pension funds and life insurance. Furthermore, Oseni and Enilolobo's (2011) Granger causality tests between the ratios of stock market capitalisation to GDP and pension fund assets to GDP do not account for the influence of other variables such as interest rates, inflation, the real economy, and demographics, which affect stock market growth. Beyond these measurement and specification concerns, the behaviour of pension funds as institutional investors also shapes their interaction with financial markets. Based on an analysis of OECD countries, Harichandra and Thangavelu (2004) argue that pension funds should operate more like mutual funds than follow "buy and hold" strategies. Consistent with this view, Miles (1993) shows that defined contribution pension funds use mutual fund investments to achieve attractive rates of return in a short period. Furthermore, Lakonishok et al. (1991) report that fund managers often engage in "herding" when they allocate assets to similar portfolios.

Davis (2003) showed that stock price volatility was present in nations with higher ratios of contractual savings assets to stock market capitalisation. Sias et al. (2001) also found significant volatility in the stock prices of companies with a large proportion of institutional investor ownership. However, these arguments focus solely on the irrational investment behaviour caused by agency problems, overlooking a broader equilibrium perspective. Therefore, to determine whether the effects are transitory or permanent, a general equilibrium perspective that considers the impact of pension funds on real sector investments is required. By improving resource allocation and economic efficiency, pension funds can positively influence growth by increasing the productivity of the capital

stock. Financial development, in turn, can further enhance resource allocation and economic efficiency.

Within this broader framework, the relationship between pension funds and capital market development has been extensively examined in the literature (Davis & Hu, 2005). In particular, both long-term financing prices and volumes could benefit, potentially increasing profitable investment and improving resource allocation. Focusing on emerging market economies, Walker and Lefort (2002) argue that pension funds can lower the cost of capital in emerging market economies (EMEs) through three distinct channels. First, a more developed capital market resulting from pension reforms reduces the cost of issuing securities. Second, the expected investment time horizon of pension funds is longer than that of individuals and businesses, even when short-term performance evaluation is considered (Davis and Steil, 2001), which reduces the "term premium." Third, the pooling of pension funds and professional management lowers the equity risk premium. A decline in both the term premium and the risk premium could lower the average cost of capital, encouraging profitable investment. Moreover, Walker and Lefort (2002) provide evidence that pension funds reduced the volatility of security prices, suggesting a lower risk premium for their panel of emerging market countries. However, empirical evidence on this effect is mixed: Davis (2004) found the opposite for the G-7, while Hu (2006) found the opposite for 16 OECD countries and eight EMEs.

Moving from prices to quantities, Catalan et al. (2000) provide evidence that contractual saving institutions (such as pensions) positively Granger-cause both value traded and equity market capitalisation, while Impavido et al. (2003) and Hu (2005a) find that contractual saving assets and bond market capitalisation to GDP are positively correlated. Overall, research to date indicates a favourable correlation between pension fund expansion and advancements in finance. Given that financial development and economic growth are generally considered to be positively correlated (Levine & Zervos, 1998; Beck & Levine, 2004), pension funds may, independently of their effect on national saving, contribute to economic growth through their influence on financial development.

2.5.4 Stock Market

Schumpeter (1912) emphasised the significance of the credit mechanism and the role of finance in economic growth. The literature also indicates that stock market growth can benefit the economy. Liquid and globally integrated stock markets, for instance, have the potential to stimulate productivity growth (Levine, 1991; Devereux & Smith, 1994; Obstfeld, 1994). However, most research on developed countries confirm a positive correlation between stock market expansion and economic growth. According to Hu (2012), the main findings of theoretical and empirical research using cross-country analysis depend on various factors, such as the countries selected, estimation techniques, frequency of data, functional form of the relationship, and proxy measures used in the analysis.

According to Atje and Jovanovic (1993), stock markets had a significant impact on subsequent development, whereas bank lending did not show a comparable effect. Even after accounting for political and economic variables, Levine and Zervos (1998) demonstrate that growth, capital accumulation, and productivity gains are positively predicted by both banking development and stock market liquidity. The study also finds no strong correlation between growth and the size, volatility, or international integration of the stock market. For nations with highly liquid and active stock markets, Ake (2010) demonstrates a positive correlation between economic growth and stock market activity. Underinvestment in the financial sector, according to Beck (2011), will have detrimental long-term effects on economic growth. However, the causality relationship is rejected for countries where the stock market is small and less liquid. Examining 146 countries over the period 1991–2011, Seven and Yetkiner (2016) find that the relationship between stock market development and economic growth is positive and significant in middle- and high-income countries.

Research also presents numerous contradictory arguments regarding the relationship between stock market expansion and development. For instance, Harris (1997) concludes that stock markets had little impact on growth in emerging nations after examining 49 countries between 1980 and 1991. Arestis et al. (2001) find that while both banks and stock markets can stimulate economic growth, banks have a stronger effect. They

also argue that research using cross-country growth regressions may have overstated the role of stock markets in stimulating economic growth. In 11 MENA region countries, Naceur and Ghazouani (2007) found no significant correlation between banking and stock market development and growth.

2.5.5 Other Assets in Capital Market

Institutional studies examine the evolution of capital market sub-components as well as the stock market. For example, the OECD (2011) argues that institutional investors, such as pension funds, insurance companies, mutual funds, and sovereign wealth funds, reduce dependency on the banking system, act as buffers during periods of financial hardship, and promote the development of the capital market and the expansion of the economy. Ong and Sy (2004) state that the rapid expansion of the local mutual fund industry in emerging nations has contributed to the development of local securities and derivatives markets, which has played a significant role in attracting investment from foreign funds. Few studies in the literature examine the relationship between growth and the sub-components of the capital market.

Fink et al. (2003) argue that the growth of the bond market has a considerable impact on real economic activity, using the Granger causality test and co-integration analysis. According to Nistor et al. (2013), investments in mutual funds and Romania's growth rate are causally related. Zandberg and Spierdijk (2013) found conflicting results about the long-term effects of changes in the level of pension funding, and did not find any effect on economic growth in a sample of 54 countries. The authors also found evidence of a relationship between real output growth in Finland, Italy and Japan and the growth of bond market capitalisation.

In the case of Chile, Holzmann (1997) and Fontaine (1997) examine the advantages of pension fund developments. Mishra (2011) states that inflows of foreign institutional investment, including foreign mutual funds and pension funds, could affect India's economic development. Bijlsma et al. (2014) found that larger assets held by pension funds

and other institutional investors are associated with more efficient financial markets, using data from 69 industrial sectors in 34 OECD countries over the period 2001–2010. Pradhan et al. (2016) used a panel vector autoregression model covering 35 countries between 1993 and 2011 to conclude that, in the long term, bond market development, along with other model variables, is what really drives economic growth. From a market development perspective, Mizen and Tsoukas (2014) demonstrate that regional initiatives have been an important step towards greater bond issuance by firms in Asia, mainly by fostering market deepening and improving liquidity.

2.6 Variables and Proxies

Table 2.1
Unit of Analysis

Variable	Description	Symbol	Proxy/unit analysis
Gross Domestic Product %	Measurement of economic growth rate	GDP_t	MYR or USD based on year 2000 (nominal)
Pension Fund Assets	Fund consist for retirement purpose	PFA_t	MYR or USD based on year 2000 (nominal)
Gross Fixed Capital Formation	Gross total country's investment of capital would consist with PFA	$GFCF_t$	MYR or USD based on year 2000 (nominal)
Domestic Credit to Private Sector	Financial resources provided to private sector	$DCPF$	MYR or USD based on year 2000 (nominal)
Inflation	Overall price level	$INFL_t$	Consumer price Index%
Public Debt	Obligation of federal government	PD_t	MYR or USD based on year 2000 (nominal)
Population	No of citizen and non-citizen in Malaysia	POP	Number in Millions
Interest rate	Interest rate in Malaysia	INT_t	Overnight policy rate %

Table 2.1 shows the unit of analysis for the variables used in the study. Gross domestic product (GDP) is the dependent variable, measured in Malaysian Ringgit or USD.

The main independent variable, PFA, represents the fund set aside for retirement purposes and is measured in Malaysian Ringgit. The second main independent variable is Gross Fixed Capital Formation (GFCF), which represents Malaysia's total gross capital investment, measured in Malaysian Ringgit. The third important variable is Domestic Credit to the Private Sector (DCPF), also measured in Malaysian Ringgit. Several other independent variables, which serve as economic control variables, include inflation (CPI%), public debt (MYR), population (millions), and interest rate (OPR%), all of which are analysed in this study.

2.6.1 Economic Growth

In this study, economic growth is measured using Gross Domestic Product (GDP), which serves as the primary proxy for assessing the overall performance and expansion of a nation's economy. GDP represents the market value of all final goods and services produced within a country's borders during a specified period, typically measured on a quarterly or annual basis (Mankiw, 2020). It is one of the most widely recognized and utilized indicators in macroeconomic analysis due to its comprehensive scope and comparability across countries and time periods (OECD, 2019).

GDP comprises several expenditure components, namely household consumption, investment, government expenditure, and net exports. Each of these components reflects a different aspect of economic activity and collectively contributes to national income generation and economic dynamism. For instance, household consumption indicates domestic demand and living standards; investment reflects future productive capacity; government expenditure demonstrates fiscal policy priorities; and net exports reveal competitiveness in the global market (Barro & Sala-i-Martin, 2004).

The use of GDP as a dependent variable in this analysis aligns with mainstream economic research on the determinants of long-term economic growth and short-term economic fluctuations. It provides a macro-level aggregate measure that can be quantitatively modelled to identify the influence of key explanatory variables, such as pension fund assets, monetary policy, fiscal conditions, and capital market performance

(Levine & Renelt, 1992; Solow, 1956). Moreover, GDP growth is closely linked to other macroeconomic objectives, including employment generation, poverty reduction, and fiscal sustainability, making it a suitable and policy-relevant indicator for evaluating the broader economic impacts of institutional investment mechanisms such as pension funds (World Bank, 2021). In this study, analysing GDP as a function of pension fund asset dynamics enables an empirical assessment of how long-term savings and investment structures affect the aggregate output of the Malaysian economy under prevailing macroeconomic conditions.

In synthesis, this study adopts Gross Domestic Product (GDP) as the definitive measure of economic growth, anchoring the empirical analysis within established macroeconomic frameworks (Mankiw, 2020; OECD, 2019). By capturing the comprehensive scope of national economic activity which spanning consumption, investment, government expenditure, and net exports (Barro & Sala-i-Martin, 2004) that GDP provides a robust dependent variable for modelling both short-term fluctuations and long-term macroeconomic determinants (Levine & Renelt, 1992; Solow, 1956). Ultimately, utilizing this aggregate metric provides the essential quantitative foundation to rigorously evaluate how institutional savings structures, specifically Malaysian pension fund assets, interact with prevailing fiscal positions and monetary conditions to drive aggregate output and shape broader socioeconomic outcomes (World Bank, 2021).

2.6.2 Pension Fund Assets

Pension Fund Assets (PFA) refer to the accumulated financial resources derived from mandatory or voluntary pension contributions, which are primarily managed and invested to secure the future retirement benefits of contributors. These assets are typically managed by pension fund institutions and represent one of the largest pools of long-term capital in both developed and developing economies (Morina & Grima, 2022). The core objective of these funds is not only to ensure the adequacy of retirement income but also to invest prudently in capital markets to generate returns that can sustain and enhance the value of pension benefits over time (OECD, 2023).

Globally, pension funds are key institutional investors, playing a vital role in financial market stability and economic development by mobilising and allocating long-term capital. They typically invest in a diverse portfolio of asset classes, including government and corporate bonds, equities, real estate, infrastructure, and alternative investments. Asset allocation strategies are often guided by risk-return profiles, demographic trends, and regulatory frameworks (Davis, 2005; Impavido, Musalem & Tressel, 2003). In the context of Malaysia, pension fund assets have grown significantly over recent decades, reflecting rising national savings, expanded formal employment coverage, and proactive government policies aimed at improving retirement security. For this study, the proxy for pension fund assets will be measured using the combined Assets Under Management (AUM) of the country's three main pension fund institutions:

1. Employees Provident Fund (EPF) – Malaysia's largest retirement savings institution, which manages mandatory contributions from the private and public sector employees under a defined contribution scheme.
2. Retirement Fund Incorporated (KWAP) – The main pension fund for public sector employees, operating under a hybrid defined benefit system.
3. Armed Forces Fund Board (LTAT) – A statutory body managing pension savings for members of the Malaysian armed forces.

The aggregation of AUM from EPF, KWAP, and LTAT provides a comprehensive measure of the total investable pension fund assets in the country, representing the scale of institutional capital available for long-term investment. This is particularly relevant as these funds are mandated to allocate a portion of their assets to domestic investments, which may include government bonds, infrastructure projects, and equity markets, thus directly influencing national economic performance (Yusof et al., 2018). Moreover, the investment behaviour of pension funds can be influenced by macroeconomic variables such as interest rates, inflation, and fiscal policy decisions, making their assets not only a financial metric but also an instrument of economic policy (Barr & Diamond, 2006). Therefore, examining PFA as an explanatory variable in relation to economic growth allows for a nuanced understanding of the role of institutional savings and capital formation in shaping Malaysia's macroeconomic trajectory.

2.6.3 Gross Fixed Capital Formation

Gross Fixed Capital Formation (GFCF) refers to the net investment in fixed assets within an economy, and it serves as a key indicator of productive capacity and long-term economic growth. According to the OECD (2021), GFCF is defined as the acquisition of produced fixed assets such as machinery, equipment, buildings, and infrastructure that used in the production of goods and services for more than one year, excluding purchases of land, natural resources, and second-hand assets. It includes both tangible and intangible fixed assets created through productive processes and is a major component of the expenditure approach to GDP.

As a measure of capital accumulation, GFCF reflects the level of productive investment in an economy and is crucial for understanding the mechanisms through which economies expand their output potential. Classical and neoclassical economic theories highlight the importance of capital formation as a driver of economic growth (Solow, 1956; Harrod, 1939). In endogenous growth models, capital accumulation is further linked to technological progress and productivity enhancement, which ultimately influence long-term growth trajectories (Romer, 1990). In this study, GFCF is used as an independent control variable, recognising its established role in macroeconomic models that examine the determinants of economic growth. It is included to account for the impact of physical capital investments that occur alongside other institutional and financial drivers, such as pension fund assets (PFA). Higher levels of GFCF generally indicate greater investment in infrastructure and production capabilities, which can complement pension fund investments, especially when such funds are allocated to domestic development projects (Levine & Zervos, 1998).

Moreover, a positive relationship is theoretically expected between GFCF and both PFA and economic growth, since pension funds often channel long-term capital into sectors that directly contribute to fixed capital formation, such as construction, infrastructure, and public utilities (Impavido et al., 2003). In emerging economies like Malaysia, this interaction becomes particularly important due to the dual challenge of financing development and ensuring financial sustainability. Incorporating GFCF into the empirical

model not only controls for the influence of capital investment on GDP but also allows the study to isolate and better estimate the independent effect of pension fund assets on economic performance. This makes the analysis more robust and policy-relevant in assessing the strategic role of institutional investors in national development.

In summary, Gross Fixed Capital Formation (GFCF) represents a vital measure of an economy's productive capacity, acting as a fundamental driver of long-term economic expansion in both classical and endogenous growth frameworks (Harrod, 1939; OECD, 2021; Romer, 1990; Solow, 1956). Within this study, GFCF serves as a crucial control variable to account for the overarching physical capital accumulation that runs parallel to financial and institutional drivers. Because pension funds frequently supply the long-term capital necessary to finance large-scale GFCF components like infrastructure and public utilities (Impavido et al., 2003; Levine & Zervos, 1998), integrating GFCF into the empirical model effectively isolates the specific macroeconomic impact of Malaysian pension fund assets. This ensures a more robust and precise evaluation of how institutional investments independently influence Gross Domestic Product when controlling for underlying fixed capital investments.

2.6.4 Domestic Credit to Private Sectors

Domestic Credit to the Private Sector (DCPS) refers to the financial resources made available by the banking sector and other financial institutions to private sector entities, including households, non-financial corporations, and in some cases, public enterprises. These financial resources are typically provided through various credit instruments such as loans, trade credits, purchases of non-equity securities, and other accounts receivable, all of which involve future repayment obligations (World Bank, 2021).

DCPS serves as a key indicator of financial intermediation in an economy, reflecting the extent to which the financial system channels savings into productive private sector investment. Higher levels of domestic credit provision typically indicate increased liquidity and financial support for private sector activities, which can enhance business expansion, consumer spending, and overall economic dynamism (Levine, 2005; Beck et

al., 2000). It is widely used in empirical literature to assess the efficiency and depth of financial markets and their contribution to economic growth. In this study, DCPS is used as a control variable and as an independent determinant in the model analysing the relationship between pension fund assets (PFA) and economic growth. The rationale for including DCPS is its ability to mediate capital flows and complement the role of pension funds as institutional investors. Both financial credit and long-term investment capital are critical for supporting the real economy, particularly in emerging markets such as Malaysia, where access to financing can significantly influence productive capacity and economic resilience (Arestis & Demetriades, 1997).

Furthermore, a positive relationship is expected between DCPS and both pension fund assets and economic growth. Pension funds, in many contexts, contribute to the stability and liquidity of capital markets, indirectly supporting the financial sector's capacity to provide credit. Conversely, a well-functioning credit system can enhance pension fund performance by improving macroeconomic stability and creating more investment opportunities (Allen & Gale, 2000). By incorporating DCPS into the empirical model, the study accounts for the role of domestic financial intermediation as a macroeconomic lever and helps isolate the specific effect of pension fund assets on GDP. This ensures a more accurate estimation of the determinants of economic growth and enhances the policy relevance of the study's findings, particularly in the context of fiscal planning, financial sector development, and pension reform strategies.

In conclusion, Domestic Credit to the Private Sector (DCPS) is incorporated as a critical control variable that captures the depth, liquidity, and efficiency of financial intermediation within the economy (Beck et al., 2000; Levine, 2005; World Bank, 2021). Because bank-issued credit and long-term institutional capital concurrently fuel private sector investment and economic resilience—especially in emerging markets like Malaysia (Arestis & Demetriades, 1997) DCPS serves as an essential complement to pension fund assets (PFA). This theoretical interdependence suggests a mutually reinforcing dynamic where a well-functioning credit system and stable institutional investments collectively drive aggregate output (Allen & Gale, 2000). Ultimately, by controlling for the broad macroeconomic influence of domestic credit provision, the empirical model effectively

isolates the specific impact of PFA on economic growth, ensuring precise and policy-relevant insights for future financial and pension reform strategies.

2.6.5 Inflation

Inflation (INFL) is defined as a sustained increase in the general price level of goods and services within an economy over a specified period of time. It is commonly measured as the annual percentage change in a country's Consumer Price Index (CPI), which tracks the price movements of a representative basket of goods and services consumed by households (Mankiw, 2018). Inflation erodes the purchasing power of money, thereby influencing consumption patterns, investment decisions, and the overall macroeconomic environment.

In economic theory, inflation serves a dual role as both a consequence and a driver of macroeconomic conditions. While mild inflation may indicate a growing economy, high and unpredictable inflation creates uncertainty, discourages long-term investment, and distorts financial planning (Fischer, 1993). This is particularly relevant for institutional investors such as pension funds, which depend on predictable returns and stable economic conditions to preserve the real value of retirement savings. In this study, inflation is included as a macroeconomic control variable that can negatively influence both pension fund assets (PFA) and economic growth. From the perspective of pension fund management, high inflation reduces the real returns on investments, especially those in fixed-income instruments such as government bonds. This can result in a decline in the real value of assets under management and may compromise the ability of pension funds to meet long-term liabilities (Impavido et al., 2003).

Moreover, inflation has an adverse effect on economic growth through its impact on real interest rates, investment, and savings behaviour. Empirical studies have shown that higher inflation is generally associated with lower economic growth, particularly in developing economies where inflation volatility can deter foreign direct investment, increase borrowing costs, and destabilise fiscal and monetary policy (Barro, 1995; Bruno & Easterly, 1998). Therefore, in this study, inflation is analysed as the fourth independent

variable, with the expectation of a negative correlation between inflation and pension fund asset accumulation, and consequently, a negative effect on gross domestic product (GDP). Its inclusion strengthens the robustness of the empirical model by accounting for price-level instability, which is crucial for assessing the effectiveness of institutional investment strategies under different macroeconomic conditions.

In synthesis, Inflation (INFL) is incorporated into the empirical model as a critical macroeconomic control variable to account for the dampening effects of price-level instability and the erosion of purchasing power (Mankiw, 2018). While mild inflation can accompany economic expansion, elevated and volatile inflation introduces severe uncertainty that deters long-term investment, destabilizes policy, and ultimately suppresses overall economic growth (Barro, 1995; Bruno & Easterly, 1998; Fischer, 1993). For institutional investors specifically, this inflationary environment is deeply detrimental; it erodes the real returns of conservative, fixed-income investments, directly threatening the long-term asset accumulation and liability management of pension funds (Impavido et al., 2003). By explicitly controlling for these adverse effects, the model robustly isolates the underlying relationship between pension fund assets and Gross Domestic Product, proceeding under the theoretical expectation that inflation exerts a negative impact on both institutional savings and aggregate economic performance.

2.6.6 Public Debt

Public Debt (PD) refers to the total financial obligations incurred by a national government, typically through the issuance of bonds and other debt instruments, to finance budget deficits and public expenditures. This includes both domestic debt, borrowed from within the country, and external debt, which is financed through foreign creditors such as international financial institutions, bilateral lenders, or foreign investors (Hull, 2018). Public debt is a key fiscal variable that reflects a government's borrowing behaviour and fiscal sustainability.

The impact of public debt on the economy and institutional sectors, such as pension funds, depends significantly on the level, composition, and management of the debt.

Theoretically, moderate and well-managed public debt can stimulate economic activity, especially if used to finance productive investments such as infrastructure, education, and healthcare. Conversely, excessive and poorly managed debt can crowd out private investment, increase borrowing costs, and reduce fiscal space for social and economic programmes, including retirement and pension systems (Reinhart & Rogoff, 2010; Checherita-Westphal & Rother, 2012). In the context of pension systems, public debt plays a critical role in shaping the financial sustainability of public retirement funds. Governments often rely on fiscal revenues to meet pension liabilities, and rising debt levels can limit their ability to support social security systems, particularly in countries with ageing populations and growing pension obligations (Holzmann, 2013). Furthermore, high debt levels may prompt austerity measures, including cuts to public pension contributions or benefits, which can negatively affect pension fund stability and asset accumulation.

From a macro-financial perspective, there is a dynamic and interdependent relationship between public debt, pension fund assets (PFA), and economic growth. Pension funds, as institutional investors, often hold significant portions of government bonds in their investment portfolios. Therefore, the performance and stability of public debt instruments directly affect the returns and value of PFA. At the same time, economic growth can enhance a country's capacity to service debt and finance pensions through increased tax revenues and employment-based contributions (Elmendorf & Mankiw, 1999). In this study, public debt is introduced as a control variable to assess its interaction with pension fund assets and its broader impact on Malaysia's economic growth. A negative correlation is theoretically anticipated between high levels of public debt and economic growth, as well as between high debt burdens and pension fund sustainability, particularly when fiscal resources are strained. Conversely, fiscally disciplined borrowing that supports productive investments may complement pension fund performance and promote long-term macroeconomic stability.

In summary, Public Debt (PD) is integrated into the empirical framework as a vital fiscal control variable that captures the complex, interdependent relationship between government borrowing, institutional investment, and overall macroeconomic stability (Hull, 2018). While moderate, properly managed debt can finance productive national

investments, excessive debt burdens threaten to crowd out private investment and severely constrain the fiscal space required to support public pension systems, particularly amid demographic pressures (Checherita-Westphal & Rother, 2012; Holzmann, 2013; Reinhart & Rogoff, 2010). Because pension funds act as major institutional holders of government bonds, their asset accumulation and long-term viability are directly tethered to sovereign debt performance and the government's fiscal discipline. By controlling for these dynamics, the model tests the theoretical expectation that elevated public debt negatively impacts both pension fund sustainability and aggregate economic growth (Elmendorf & Mankiw, 1999), ensuring a more precise evaluation of how fiscal constraints influence Malaysia's long-term economic expansion.

2.6.7 Population

Population (POP) serves as a fundamental demographic indicator in analysing macroeconomic trends and long-term financial sustainability, particularly in relation to pension fund assets (PFA) and economic growth. In economic research, population is often treated not merely as a count of individuals, but as a proxy for broader demographic dynamics which including age structure, labour force participation, dependency ratios, education levels, income distribution, and life expectancy. These all of which exert significant influence on the design, sustainability, and performance of pension systems (Bloom et al., 2011).

From a theoretical standpoint, demographic change plays a pivotal role in shaping both economic output and the demand for retirement savings mechanisms. A growing and youthful population contributes positively to economic growth by expanding the labour force, increasing consumption, and generating higher income and tax revenues. These factors, in turn, lead to greater contributions to pension schemes and enhance the accumulation of pension fund assets (Lee & Mason, 2010). Conversely, an ageing population may increase the outflows from pension systems and create fiscal pressures, necessitating higher contributions or policy reforms to ensure system sustainability (Gruber & Wise, 2007). In the context of this study, population is used as an independent (control)

variable to assess its impact on both pension fund assets and economic growth. The inclusion of this variable allows for a deeper understanding of how demographic structures affect financial behaviour and institutional performance. For instance, higher employment rates and income levels among a growing working-age population may lead to increased pension savings, while a well-educated population may be more likely to participate in formal retirement plans and make informed investment decisions (OECD, 2021).

Empirical studies also support the notion that a positive correlation exists between population dynamics, pension asset growth, and GDP performance. Bloom et al. (2007) demonstrated that favourable demographic trends, often referred to as the “demographic dividend”, can contribute substantially to economic development, particularly in developing countries such as Malaysia, which are undergoing demographic transitions. Furthermore, as pension funds often invest in domestic markets, a growing population can stimulate the financial sector, providing more opportunities for the productive investment of pension assets (Takayama, 2005). Therefore, in this study, population is examined to explore its mediating and moderating effects on the relationship between pension fund accumulation and economic performance. The findings can offer important insights for policymakers, particularly in designing pension systems that are demographically responsive and economically sustainable.

In synthesis, Population (POP) is incorporated into the empirical framework as a vital demographic control variable that encapsulates broader structural dynamics, including age distribution, labor force participation, and dependency ratios (Bloom et al., 2011). Theoretical and empirical evidence suggests that a youthful, expanding working-age population, which often yielding a "demographic dividend" that stimulates economic output and accelerates pension fund asset accumulation through increased contributions and robust domestic market participation (Bloom et al., 2007; Lee & Mason, 2010; OECD, 2021; Takayama, 2005). Conversely, an aging demographic profile introduces substantial fiscal pressures via elevated systemic outflows, threatening the long-term sustainability of retirement institutions (Gruber & Wise, 2007). By explicitly controlling for these profound demographic shifts, the model robustly evaluates the mediating effects of population dynamics on the relationship between institutional savings and aggregate economic

performance, thereby yielding critical insights for designing demographically responsive and economically sustainable pension policies in transitioning economies like Malaysia.

2.6.8 Interest Rate

Interest Rate (IR) is a critical macroeconomic variable representing the cost of borrowing or the return on lending capital, typically expressed as a percentage of the principal amount. Interest rates influence investment, consumption, savings behaviour, and overall economic activity, making them a fundamental tool of monetary policy. Central banks, such as Bank Negara Malaysia (BNM), use policy rates to manage inflation, stabilize the currency, and stimulate or restrain economic growth (Mishkin, 2016).

In economic theory, interest rates directly affect both pension fund assets (PFA) and economic growth through multiple transmission channels. Higher interest rates typically increase the return on fixed-income investments such as government bonds, which are commonly held by pension funds. This may boost short-term portfolio returns but can also reduce the market value of existing bond holdings (Bodie et al., 2014). Conversely, low interest rates, while potentially reducing returns on safer assets, often encourage investment in equities or alternative assets in search of higher yields, which may enhance long-term portfolio diversification. Furthermore, interest rates influence pension fund liabilities, particularly in defined benefit schemes, where future payouts are discounted using prevailing rates. Lower interest rates increase the present value of liabilities, potentially creating funding shortfalls and pressuring pension funds to revise contribution rates or asset allocations (OECD, 2021).

From a macroeconomic perspective, interest rates shape economic growth by affecting borrowing costs for consumers and businesses. Lower interest rates generally stimulate consumption and investment, leading to higher GDP, while higher rates may suppress these activities by increasing debt service burdens (Bernanke & Gertler, 1995). Thus, interest rates are a key determinant of the economic environment in which pension funds operate, influencing both the asset side (investment returns) and the liability side (payouts and obligations). In this study, interest rate is included as an independent (control)

variable to examine its role in the relationship between pension fund asset accumulation and economic growth in Malaysia. Given its centrality to financial markets and long-term investment strategies, interest rate fluctuations are expected to show a significant correlation with both PFA and GDP, making it a crucial factor in empirical modelling and policy implications.

In synthesis, the Interest Rate (IR) is integrated into the empirical model as a fundamental monetary policy control variable that dictates both the cost of capital and the broader macroeconomic climate (Mishkin, 2016). Through multiple transmission channels, IR fluctuations exert a profound, dual impact on institutional investors: they simultaneously dictate the yield and market valuation of fixed-income assets while inversely altering the present value of defined benefit liabilities, thereby reshaping portfolio strategies and funding adequacy (Bodie et al., 2014; OECD, 2021). Concurrently, by directly determining borrowing costs, interest rates serve as a primary lever for stimulating or restraining aggregate consumption, investment, and Gross Domestic Product (Bernanke & Gertler, 1995). By rigorously controlling for these critical monetary dynamics, this study captures the complex, interconnected relationship between prevailing interest rate environments, Malaysian pension fund asset accumulation, and overall economic growth.

Table 2.2
Data Sources

Type of Variable	Description	Source of data
Dependent variable	Gross Domestic Product	Eikon Datastream/LSEG
Independent variable	Pension Fund Assets	Eikon Datastream/LSEG
Independent variable	Gross Fixed Capital Formation	OECD annual report/World Bank
Independent variable	Domestic Credit to Private Sector	OECD annual report/World Bank
Independent variable	Inflation	Eikon Datastream/LSEG
Independent variable	Public Debt	Eikon Datastream/LSEG
Independent variable	Population	Eikon Datastream/LSEG
Independent variable	Interest rate	Eikon Datastream/LSEG

Table 2.2 shows the data sources for each variable. For the dependent variable, Gross Domestic Product, data are taken from Eikon Datastream/LSEG for the study period 2007–2024. This source is also used for the independent variables Pension Fund Assets, Inflation, Public Debt, Population, and Interest. The other two independent variables, Gross Fixed Capital Formation and Domestic Credit to Private Sector, are taken from the OECD Annual Report and the World Bank website.

2.7 Conceptual Framework

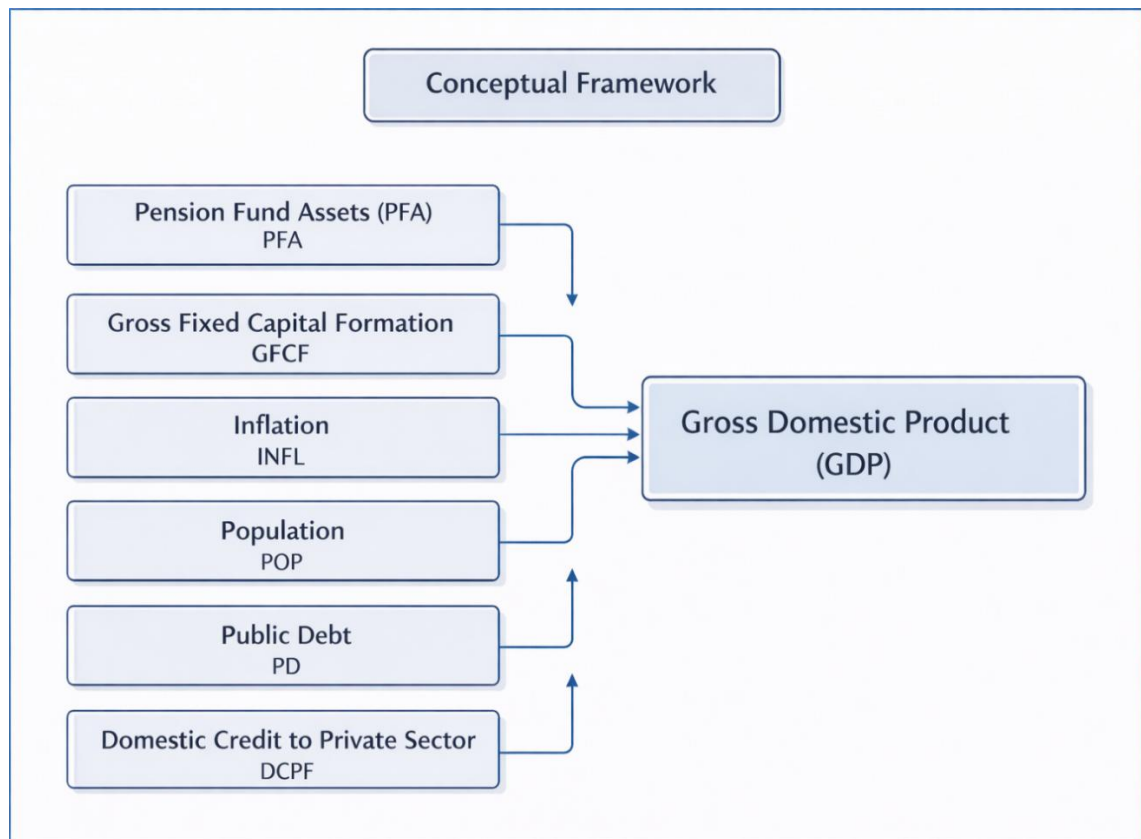


Figure 2.1 Conceptual Framework

2.8 List of Definition of Terms

2.8.1 Pension Fund

A pension fund is a pooled investment vehicle that accumulates capital contributions from employers, employees, or both, with the primary objective of providing retirement income to its members upon cessation of employment. Pension funds act as institutional investors, allocating their assets across a wide range of investment instruments, including equities, bonds, real estate, and infrastructure, to generate stable, long-term returns that secure the future financial well-being of retirees (Davis, 2005; World Bank, 1994). Pension funds are typically classified into two main categories: defined benefit (DB) and defined contribution (DC) schemes. In DB schemes, retirement benefits are predetermined based on factors such as salary and years of service, while in DC schemes, benefits depend on the contributions made and the investment performance of the fund (OECD, 2005).

In Malaysia, a prominent example is the Employees Provident Fund (EPF), which operates primarily as a defined contribution scheme. Established under the Employees Provident Fund Act 1991, the EPF serves as the main retirement savings institution for private sector and non-pensionable public sector employees. It collects mandatory contributions from both employers and employees and manages these funds to ensure retirement adequacy through diversified investment strategies (EPF, 2023). In recent years, the EPF has also played a broader role in national development by investing in infrastructure, real estate, and capital markets, thereby contributing to both individual retirement security and overall economic growth.

2.8.2 Financial Instruments

Financial instruments are legally binding contracts that represent monetary assets and obligations between parties, serving as essential tools for raising capital, transferring risk, and facilitating investment and financial intermediation. These instruments cover a

wide range of assets that can be traded in financial markets and are generally classified by their structure and function into categories such as equity instruments, debt instruments, derivatives, and foreign exchange contracts (Fabozzi, 2012). Financial instruments enable economic agents, including governments, corporations, and individuals, to allocate resources efficiently by providing mechanisms for borrowing, lending, investing, and hedging against financial risk. They are foundational components of the global financial system and play a critical role in liquidity creation, market pricing, and the overall functioning of capital markets (Mishkin & Eakins, 2015).

2.8.3 Asset Under Management (AUM)

Assets Under Management (AUM) refers to the total market value of all financial assets that an investment firm, financial institution, or portfolio manager manages on behalf of clients, including individuals, corporations, and institutional investors. This metric is a key indicator of an entity's scale, financial influence, and operational capacity in the asset management industry. AUM includes a broad range of asset classes such as equities, fixed-income securities, real estate, mutual funds, private equity, and alternative investments, depending on the firm's investment mandate and client objectives (Fabozzi, 2012; Reilly & Brown, 2012).

The value of AUM is dynamic and fluctuates over time due to several factors, including market appreciation or depreciation, net capital inflows (such as new investor contributions), and outflows (such as redemptions or withdrawals). Thus, AUM reflects not only current market conditions but also investor confidence, portfolio performance, and the effectiveness of fund management strategies. Higher AUM is often associated with greater economies of scale, increased revenue potential, and enhanced market credibility, although it may also introduce challenges related to portfolio liquidity and the complexity of managing diversified investments (Elton et al., 2014).

In the Malaysian context, institutions such as the Employees Provident Fund (EPF) and Retirement Fund Incorporated (KWAP) report assets under management (AUM) as a primary performance metric, reflecting the scale of their fiduciary responsibility and the

trust placed in them by contributors. For example, as of 2023, the EPF's AUM exceeded RM1 trillion, making it one of the largest pension funds in Asia by asset size, with a diversified portfolio across domestic and international markets (EPF, 2023).

2.8.4 Market Capitalisation

Market capitalisation refers to the total market value of a publicly traded company's outstanding shares of common stock. It is calculated by multiplying the current market price per share by the total number of outstanding shares. As a fundamental financial metric, market capitalisation is widely used to assess a company's size, market value, and overall prominence in the equity markets (Brealey et al., 2014). It serves as a benchmark for comparing companies and as a basis for portfolio diversification, risk assessment, and index construction. Companies are generally classified by market capitalisation into categories such as large-cap, mid-cap, and small-cap, each carrying different levels of risk and return potential. Large-cap firms are often more stable and have established market positions, while small-cap firms may offer higher growth potential but with increased volatility and investment risk (Reilly & Brown, 2012). From a macroeconomic perspective, market capitalisation is also used to gauge the depth and maturity of a country's capital markets. In emerging economies such as Malaysia, the total market capitalisation of listed companies on Bursa Malaysia is a key indicator of financial development and investor confidence (World Bank, 2020).

2.8.5 Fiscal Position

Fiscal position refers to the overall financial health and sustainability of a government's public finances, typically evaluated by the balance between government revenues (such as taxes, duties, and other income) and expenditures (including public spending, subsidies, and debt servicing). It reflects the government's capacity to meet its current and future financial obligations without resorting to excessive borrowing or compromising economic stability (Blanchard, 2008; IMF, 2014). A sound fiscal position is

characterised by a manageable budget deficit or surplus, sustainable public debt levels, and prudent fiscal management. Conversely, a weak fiscal position, marked by persistent deficits and rising debt, can undermine investor confidence, elevate borrowing costs, and limit the government's ability to implement counter-cyclical policies (Alesina & Perotti, 1996). Fiscal position is often assessed using indicators such as the budget balance as a percentage of GDP, the debt-to-GDP ratio, and fiscal deficit trends. In the context of developing and emerging economies such as Malaysia, maintaining a stable fiscal position is critical for macroeconomic resilience and long-term growth. The government's fiscal stance directly influences public investment, social spending, and its ability to respond to economic shocks, especially during periods of global financial uncertainty (Ministry of Finance Malaysia, 2023).

2.8.6 Monetary Conditions

Monetary condition refers to the overall stance of a country's monetary environment, encompassing interest rates, inflation expectations, credit availability, exchange rate movements, and liquidity in the financial system. It reflects the degree of ease or tightness with which money and credit are available in the economy and plays a pivotal role in influencing consumption, investment, and overall economic activity (Mishkin, 2016; Bernanke & Gertler, 1995). Monetary conditions are shaped primarily by the monetary policy decisions of a country's central bank. These decisions affect short-term interest rates, the money supply, and financial market expectations. A "loose" or "expansionary" monetary condition, characterised by low interest rates and ample liquidity, aims to stimulate economic growth and employment, especially during periods of economic slowdown. Conversely, a "tight" or "contractionary" monetary condition, marked by high interest rates and reduced credit availability, is used to curb inflation and stabilise financial markets (Svensson, 1997). In empirical studies, composite indicators such as the Monetary Conditions Index (MCI) are used to quantify monetary conditions by incorporating both interest rate levels and exchange rate variations. In the Malaysian context, Bank Negara

Malaysia (BNM) monitors monetary conditions closely to ensure price stability while supporting sustainable economic growth (Bank Negara Malaysia, 2023).

2.8.7 Monetary Policy Stance

Monetary policy stance refers to the orientation or direction of a central bank's monetary policy actions aimed at influencing macroeconomic variables such as inflation, interest rates, money supply, exchange rates, and overall economic activity. It represents the central bank's position on whether to stimulate or restrain economic growth based on current and projected economic conditions (Mishkin, 2016; Woodford, 2003). A monetary policy stance can be categorised as expansionary, neutral, or contractionary. An expansionary stance typically involves lowering policy interest rates or implementing quantitative easing to encourage borrowing, investment, and consumption, especially during periods of economic downturn. Conversely, a contractionary stance involves increasing interest rates or tightening liquidity to contain inflationary pressures and prevent overheating of the economy (Blinder, 1998). A neutral stance indicates that monetary policy is neither aimed at stimulating nor restraining the economy, reflecting a balanced economic outlook. Central banks, such as Bank Negara Malaysia (BNM), assess various indicators – including inflation trends, output gaps, financial market conditions, and external sector dynamics, to determine the appropriate policy stance. The monetary policy stance is communicated through instruments such as the Overnight Policy Rate (OPR) and monetary policy statements to guide market expectations and economic decisions (Bank Negara Malaysia, 2023).

2.8.8 Liquidity

Liquidity refers to the ease and speed with which an asset can be converted into cash without significantly affecting its market price. It is a key financial characteristic that reflects an asset's marketability, trading volume, and price stability during transactions. Assets that can be sold quickly with minimal loss in value, such as treasury bills or major

stocks, are considered highly liquid, while real estate or specialised financial instruments are typically less liquid (Fabozzi & Modigliani, 2009; Mishkin, 2016). Liquidity is crucial in both financial markets and institutional investment management, as it ensures that obligations can be met promptly and that portfolios can be adjusted in response to market developments. In macroeconomic terms, liquidity also refers to the overall availability of money and credit in the economy, influenced by central bank policies (Bank Negara Malaysia, 2023). For institutional investors such as pension funds, maintaining a balance between liquid and illiquid assets is essential to meet short-term liabilities while optimising long-term returns. Illiquid assets may offer higher yields, but excessive illiquidity can pose risks during financial distress or market volatility (IMF, 2019).

2.8.9 Asset Classes

Asset classes are distinct groups of financial instruments that share similar risk-return characteristics, economic behaviour, and regulatory frameworks. Each asset class responds differently to economic events, market conditions, and monetary policy, offering investors options for portfolio diversification and risk management (Bodie et al., 2014). Traditional asset classes include equities (ownership in corporations), fixed income securities (such as bonds and sukuk, which provide regular interest or profit payments), real estate (physical properties generating rental income or capital appreciation), and commodities (such as gold, oil, and agricultural products, which serve as hedges against inflation and economic uncertainty). In recent decades, the definition of asset classes has expanded to include alternative investments, such as private equity, hedge funds, venture capital, infrastructure, and cryptocurrencies, which often have low correlation with traditional markets and can enhance risk-adjusted returns (Reilly & Brown, 2012; CFA Institute, 2020). Understanding asset classes is fundamental to portfolio construction and institutional fund management, including for pension funds, which often allocate capital across a diverse set of asset classes to meet long-term liabilities and enhance returns within a specified risk tolerance (Brinson et al., 1986).

2.8.10 Portfolio

Portfolio investment is a form of cross-border or domestic capital allocation in which investors acquire equity or debt securities in foreign or domestic markets without intending to exert control or influence over the management of the entities in which they invest. It includes a wide range of financial instruments, such as stocks, bonds, mutual funds, and exchange-traded funds (ETFs), and is primarily motivated by the pursuit of risk-adjusted financial returns, diversification, and liquidity (Krugman & Obstfeld, 2012; Fabozzi, 2013). Unlike foreign direct investment (FDI), which involves a long-term interest and significant managerial control, portfolio investment is generally short to medium term and does not confer voting rights or decision-making power. It plays a significant role in the global financial system by enhancing market liquidity, enabling risk-sharing, and facilitating capital flows across borders (OECD, 2008). From a macroeconomic perspective, portfolio investment contributes to the development of capital markets, influences exchange rates, and can be sensitive to interest rate differentials, monetary conditions, and investor sentiment. For institutional investors such as pension funds, portfolio investment strategies are central to achieving long-term financial sustainability and aligning asset allocation with liability structures (Bodie et al., 2014).

2.8.11 Investment Strategy

An investment strategy is a structured and systematic plan that specifies how an individual or institutional investor allocates financial resources across asset classes, sectors, and instruments to achieve defined financial objectives within a set time frame and risk tolerance. It provides a framework for making consistent investment decisions, considering factors such as expected return, volatility, liquidity, macroeconomic conditions, and individual or institutional constraints (Bodie et al., 2014; Reilly & Brown, 2012). Investment strategies can be categorised by various approaches, including value investing (identifying undervalued assets), growth investing (targeting high-potential companies), index investing (tracking broad market indices), sector rotation (shifting allocations among

economic sectors), and socially responsible investing (SRI), which incorporates environmental, social, and governance (ESG) criteria into decision-making (CFA Institute, 2020; Fabozzi, 2013). In institutional contexts such as pension fund management, investment strategies are essential for achieving long-term financial sustainability, aligning assets with liabilities, and ensuring intergenerational equity. The selection and implementation of an investment strategy are typically governed by an investment policy statement (IPS), which sets out the investor's goals, constraints, asset allocation guidelines, and performance benchmarks (Elton et al., 2014).

2.9 Summary

Numerous studies have explored national savings, asset investments by funds, and their impact on economic growth. However, empirical research specifically investigating the relationship between pension fund expansion and economic growth is limited, often employing diverse metrics to measure economic success. Existing literature reveals mixed results: some studies report little or no association between pension fund assets and economic growth, while others indicate a positive relationship. Recognising the significance of this topic for shaping pension fund investment policies related to economic growth and fiscal sustainability, the author focuses on Malaysia to investigate the impact of pension fund assets on economic growth and fiscal sustainability. Various proxies for the variables are discussed for testing the impacts, and selective proxies are chosen to examine the relationship. It is crucial to identify which variables are significant within the study's scope. The empirical evidence on the impact of PFA could serve as a guideline for identifying the best investment strategies to promote stronger economic growth.

CHAPTER 3

RESEARCH FRAMEWORK AND METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology employed in the study, including the research design, study context, data sources, data collection procedures, and analytical techniques. The study relies on secondary data, defined as data previously collected for purposes other than the current research and subsequently utilised to generate new insights (Sekaran, 2003). In line with the objectives of the study, a quantitative research approach is adopted, drawing on numerical data to facilitate systematic measurement, statistical analysis, and empirical testing of the proposed relationships.

3.2 Research Design

The process of creating a research design ensures that the necessary data can be collected and analysed to provide a response (Sekaran, 2003). The researcher used an exploratory design for this investigation. An exploratory study is conducted when little is known about the current situation or when no information is available on previous research difficulties or similar problems.

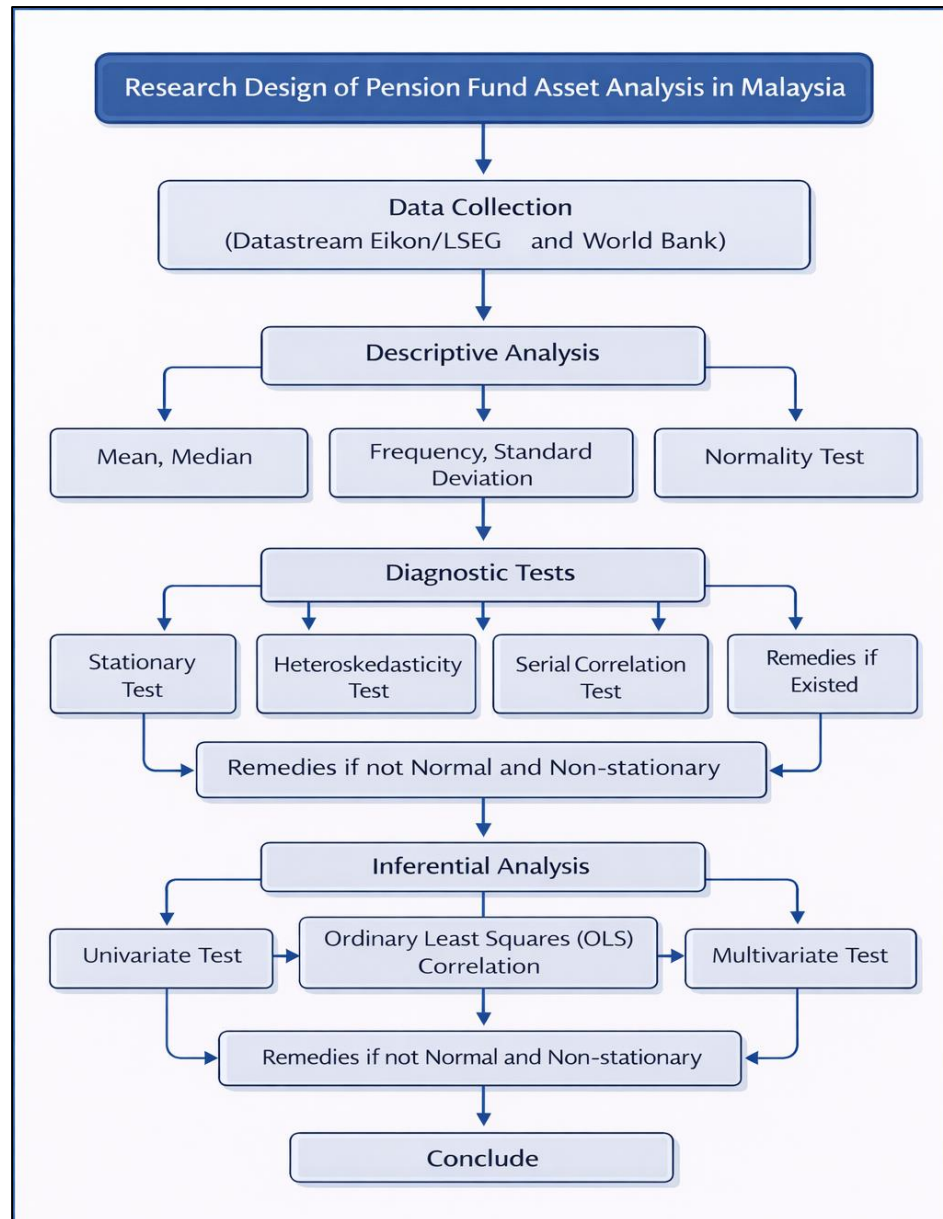


Figure 3.1 Research Design of Pension Fund Asset Analysis in Malaysia

3.3 Procedures of Data Analysis

This process has been implemented to collect comprehensive data from Eikon Datastream, the OECD annual report, and the World Bank website. Eight data series are to be collected: Gross Domestic Product (GDP); Pension Fund Assets (PFA), which include annual data for the Employee Provident Fund (EPF), Pension Fund Incorp (KWAP), and

LTAT (Lembaga Tabung Angkatan Tentera); Gross Fixed Capital Formation; Domestic Credit to the Private Sector; Consumer Price Index; Public Debt; Population; and Overnight Policy Rate. The collected information will be incorporated into software called E-Views for analysis and findings. In this analysis, the data are managed using Econometric Views (E-Views 13) to analyse and interpret the information. This system may also be used to process and execute supplementary data collected in this investigation. The software has the capability to execute several functions related to the analysis and presentation of information, such as statistical analysis and graphical representation of data. This project promotes the dissemination of accurate information and the identification of inconsistencies.

It is crucial to conduct data testing to ascertain the specific aspects to be achieved in this study. This will utilise accurate methodologies, such as descriptive statistics, correlation tests, time series analysis, and regression models, to examine reliable evidence and assess the hypotheses generated for the research. The purpose of this study is to determine the relationship between the independent variables, a few control variables, and the dependent variable. This is essential to address the research questions and achieve the objectives of the study.

3.3.1 Descriptive Analysis

Descriptive analysis or statistics highlight the significance of a course of action by providing concise and realistic measures that summarise a particular dataset, which may represent the entire period (year 2007–2023). The criteria used to determine the dataset consist of measures of central tendency and measures of variability or dispersion. Measures of central tendency include the mean, median, and mode, while measures of variability comprise the standard deviation (or variance), minimum and maximum values, kurtosis, and skewness. Each variable, both dependent (GDP) and independent (PFA, GFCF, DCPS, INFL, PD, POP, INT), is tested to determine whether it follows a normal distribution. In addition, the character of the data series can be identified, which helps to describe the trend of each variable.

3.3.2 Normality Test

Normality tests are used to determine whether a dataset is adequately represented by a normal distribution and to assess the likelihood that a random variable within the dataset follows a normal distribution. To evaluate the normality of the variables, the Jarque-Bera test may be conducted using E-views. The Jarque-Bera test is based on estimates of skewness and kurtosis, as proposed by Mardia (1970). If the Jarque-Bera test yields a p-value greater than 0.05, it can be concluded that the data series follows a normal distribution and is considered satisfactory. Transformation will be required if the data does not meet the significance level for normality.

3.3.3 Unit Root Test

The unit root test is used to examine the presence of a unit root in an autoregressive statistical model of a time series, where the autoregressive parameter is set to one. The Augmented Dickey-Fuller (ADF) test is commonly used to test for a unit root in the time series of each variable. The ADF statistic helps determine the significance of variables at different levels. The p-value indicates whether the variables are significant.

The Augmented Dickey-Fuller (ADF) test is used to determine whether the research variables are stationary or non-stationary. To assess the stationarity of the data, the unit root test was conducted. The unit root test was evaluated using E-views software, applying the Levin, Lin, and Chu (t-value) procedure. The use of both negative and positive numbers in the test indicates that the unit root test is fundamentally distinct. The null hypothesis of the unit root test by Augmented Dickey-Fuller (ADF) is considered significant at the 0.05 level, while the alternative hypothesis is considered insignificant at the 0.05 level. For example, if the t-value exceeds the ADF critical value, the null hypothesis is accepted, indicating the presence of a non-stationary unit root. If both sets of data are stationary and normal, descriptive analysis is completed and inferential analysis may follow.

P-value > α -value = Non-stationary (failed to reject null hypothesis)

P-value < α -value = Stationary (reject null hypothesis)

Hypothesis:

Ho: The data has a unit root.

Ha: The data has no unit root.

3.3.4 Correlation Test

To determine the relationship between variables, correlation is used. The ranges of correlation coefficients used to interpret the data in this study are presented in the table below; all p-values are below 0.05, which is considered acceptable (Malhotra, 2010). Additionally, the relationship between multicollinearity information and variables is found to be strong. Pearson correlation is used to test the relationship between variables.

Table 3.1
The Interpretation of Correlation Test

Size of Correlation	Interpretation
+0.70 to +1.00	Very Strong positive relationship
+0.40 to +0.69	Strong positive relationship
+0.30 to +0.39	Moderate positive relationship
+0.20 to +0.29	Weak positive relationship
+0.10 to +0.19	No or negligible relationship
-0.01 to -0.19	No negligible relationship
-0.20 to -0.29	Weak negative relationship
-0.30 to -0.39	Moderate negative relationship
-0.40 to -0.60	Strong negative relationship
-0.70 to -1.00	Very strong negative relationship

Using the coefficient of correlation, one can assess the degree of association between two or more variables. Its range is from -1 to +1. A result approaching 1 indicates a strong relationship between the variables, while a result approaching 0 indicates no relationship between the variables. The hypotheses for the test are shown below:

Ho: There is no correlation.

Ha: There is a correlation.

3.3.5 Auto-correlation Test

Autocorrelation analysis is used to characterise the structure and variability of the data. This autocorrelation test indicates that the Durbin-Watson value is between 1.5 and 2.0. The autocorrelation test is a statistical measure that detects the presence of error values in regression analysis with a first-order autoregressive component. The model is considered free from autocorrelation if its Durbin-Watson value is zero. The Breusch-Godfrey LM test (1978) was used as an alternative approach to identify the autocorrelation issue. This test is more comprehensive than other tests (Gujarati and Porter, 2010). A probability greater than 0.05 indicates the absence of an autocorrelation issue.

3.3.6 Regression Model

These are quantifiable methods for assessing the connection between variables. This approach uses several techniques to illustrate and analyse multiple factors, with particular focus on the correlation between a dependent variable and one or more independent variables (also known as 'indicators').

3.4 Ordinary Least Square

3.4.1 The Coefficient of Determination (R-squared) and Adjusted R-squared

The regression model was used to explain the percentage of the dependent variable in this test. The researcher had obtained the results by using E-Views software to conduct a regression analysis on the data. A more accurate approach is to consider the Adjusted R², which has been used to assess the proportion of the model explained in this research. The researcher investigated the relationship between the dependent variable and the independent factors to understand how the independent variables account for variations in the dependent variable.

3.4.2 T-Test

T-test is used to determine whether there is a significant association between a dependent variable and independent factors. The calculation involves dividing the coefficient value (β) by the standard error of the coefficient (S_b) to obtain the t-value. If the calculated t-value exceeds the critical value from the t-distribution table, the independent variable is statistically significant. However, if the t-value is less than the critical value from the t-distribution table, the independent variable is not statistically significant. The formula is as follows:

$$Df = n - k - 1$$

Where,

Df = Degree of freedom (from output regression)

n = Number of Observation

k = Number of Independent Variable

3.4.3 F-Test

The F-statistic is used to test the hypothesis that the regression coefficients are equal to zero and to evaluate the overall model. To achieve a confidence level of 95%, the probability value must be less than 0.05. A statistically significant F-statistic ($p < 0.05$) indicates that the independent variables collectively explain a significant proportion of the variation in the dependent variable, thereby confirming the validity of the model.

3.5 Heteroscedasticity Test

Heteroscedasticity refers to the presence of varying levels of variability across different sub-populations within a set of causal variables. Here, "variability" may be assessed by calculating the variance or another measure of actual dispersion. Heteroscedasticity is important, particularly when investigating variances. It can undermine the reliability of statistical tests that assume uncorrelated and uniform errors, meaning that the variance of the errors does not change with the effects being studied. The primary objective of testing for heteroscedasticity is to determine whether the residual variance of the variables being regressed is constant, indicating homoscedasticity. To assess whether the regression model exhibits heteroscedasticity, compare the observed R-squared with the Chi-square probability. If the R-squared value exceeds the Chi-square probability value, this indicates that homoscedasticity is not supported.

3.6 Multicollinearity Analysis

Multicollinearity analysis is performed to confirm the absence of duplicate independent variables. Redundant variables in the model may reduce its effectiveness by introducing repeated components. Using the Spearman Rank Order, a correlation value above 0.7 indicates multicollinearity. The Variance Inflation Factor (VIF) test was used to detect multicollinearity among the independent variables. Multicollinearity, also referred to as perfect collinearity, can occur when there is a high degree of correlation among variables. This can complicate the interpretation of the importance of each variable in the

multiple regression model. In this study, the VIF test was used to address this issue and quantify the extent to which each variable increases the standard error in the regression. Multicollinearity is considered problematic when the centred VIF exceeds 10. To analyse the results of multicollinearity, the following hypotheses were proposed:

H0: There is no multicollinearity in the independent variables.

H1: There is multicollinearity in the independent variables.

3.7 Research Model

In order, to achieve the objectives of the study, the linear regression model is adopted to estimate the impact of External Debt on GDP.

3.7.1 The Economic Model

The economic model produced in this research is

$$\text{GDP} = F(\text{PFA}, \text{GFCF}, \text{DCPS}, \text{INFL}, \text{PD}, \text{POP}, \text{INT}) \quad (1)$$

Where;

Gross Domestic Product (GDP)

Pension Fund Assets (PFA)

Gross Fixed Capital Formation (GFCF)

Domestic Credit to Private Sector (DCPS)

Inflation (INFL)

Public Debt (PD)

Population (POP)

Interest rate (INT)

3.7.2 Model Specification

In stochastic form equation (1) becomes:

$$GDP_t = \alpha_t + \beta_1 PFA_t + \beta_2 GFCF_t + \beta_3 DCPF_t + \beta_4 INFL_t + \beta_5 PD_t + \beta_6 POP_t + \beta_7 INT_t + e_t \quad (2)$$

Where:

GDP_t = Gross Domestic Product

α_t = Intercept

PFA_t = Pension Fund Assets

$GFCF_t$ = Gross Fixed Capital Formation

$DCPF_t$ = Domestic Credit to Private Sector

$INFL_t$ = Inflation

PD_t = Public Debt

POP_t = Population

INT_t = Interest rate

e_t = Estimation of Error

3.8 Summary

This chapter has highlighted the data and statistical methods used to serve the objectives of the study. The methodology and statistical tests are designed to address the hypothetical statements and examine the relationships in the nexus between PFA and economic growth. The findings will be discussed in the next chapter, Chapter 4.

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 Introduction

Chapter 4 presents the empirical analysis underpinning this study and builds on the research design and methodology outlined in the preceding chapter. It provides a detailed explanation of the processes involved in data collection, preparation, and the analytical procedures used to examine the relationships among the selected macroeconomic and financial variables. The analysis uses time series data and is designed to ensure methodological rigour, reliability, and clarity in interpreting the empirical findings.

The dataset used in this study was primarily sourced from the London Stock Exchange Group (LSEG) Eikon database, which provides authoritative and comprehensive financial and economic time series. The raw data extracted from the database underwent a meticulous process of organisation, cleaning, and transformation to ensure consistency across variables and suitability for econometric modelling. Specifically, the data were arranged in a structured time series format and subjected to several pre-processing steps, including alignment by observation period, unit standardisation, and computation of derived variables where necessary. These steps were essential to preserve the integrity of the dataset and to facilitate accurate analysis.

The dataset covers the period from 2000 to 2024, representing the most recent data available at the time of the study. This 25-year span allows for the observation of long-term trends, structural changes, and macro-financial dynamics in Malaysia. One institutional variable – the Retirement Fund (Incorporated), commonly known as KWAP – was included only from its establishment approximately 18 years ago. Consequently, the series for this variable begins later than the others, reflecting its actual period of operation. This variation in data availability was carefully managed during analysis to maintain coherence across the models.

All statistical and econometric analyses were conducted using EViews 13, a software widely recognised for its robustness in handling time series data and advanced econometric procedures. This chapter therefore presents descriptive statistics, diagnostic tests, model estimations, and an interpretation of results, collectively forming the empirical foundation for the conclusions and policy recommendations in subsequent chapters.

4.2 Descriptive Analysis

Table 4.1
Table of Descriptive Statistics of Retirement Funds

	RETF	LTAT	KWAP	EPF
Mean	597332.5	8306.797	116.6789	588941.7
Median	544817.9	8700.000	121.7200	536029.2
Maximum	1263494.	13598.37	185.6000	1249710.
Minimum	186318.0	4800.000	48.08000	181518.0
Std.Dev.	337202.0	2200.483	42.54507	335085.1
Skewness	0.380775	0.513425	-0.180896	0.381051
Kurtosis	1.864356	3.229290	1.809336	1.858674
Jarque-Bera	1.947550	1.153122	1.161431	1.961899
Probability	0.377655	0.561827	0.559498	0.374955
Sum	14933314	207669.9	2100.220	14723543
SumSq.Dev.	2.73E+12	1.16E+08	30771.41	2.69E+12
Observations	25	25	18	25

Table 4.1 presents the descriptive statistics for RETF, LTAT, KWAP, and EPF. The results show that RETF and EPF recorded relatively high mean values of RM597,332.50 and RM588,941.70, respectively, reflecting their larger investment scales compared to LTAT (mean = RM8,306.80) and KWAP (mean = RM116.68). For RETF and EPF, the mean values are slightly higher than the corresponding medians, suggesting a mild right-skewed distribution. In contrast, LTAT and KWAP have mean values marginally lower than their medians, implying a slight left-skewed tendency. The standard deviation values

for RETF (RM337,202.00) and EPF (RM335,085.10) are notably larger than those of LTAT (RM2,200.48) and KWAP (RM42.55), indicating higher variability in the larger institutional funds.

Regarding the shape of the distributions, the skewness coefficients range from -0.18 to 0.51 , indicating that the data for all variables are approximately symmetric. The kurtosis values range from 1.81 to 3.23 , suggesting that the data distributions are generally platykurtic or close to normal. The Jarque–Bera test statistics for all variables are not statistically significant ($p > 0.05$), confirming that the null hypothesis of normality cannot be rejected. Therefore, RETF, LTAT, KWAP, and EPF are approximately normally distributed, and the data are suitable for further parametric statistical analyses such as regression and correlation tests.

4.2.1 Normality Test

The normality of the regression residuals was assessed using the Jarque–Bera test and the corresponding histogram of residuals for the sample period 2000–2024 (25 observations). The descriptive statistics show that the residuals have a mean close to zero ($1.95\text{E}-15$) and a relatively small standard deviation (1.8258), indicating that the error terms are centred around zero as expected under the classical linear regression assumptions. The skewness value of 0.1464 suggests that the residual distribution is approximately symmetric, while the kurtosis of 4.3364 indicates a slightly leptokurtic distribution, meaning the residuals have somewhat heavier tails than a normal distribution. The Jarque–Bera statistic is 1.9498 with an associated probability of 0.3772 , which is not statistically significant at conventional levels ($p > 0.05$). Therefore, the null hypothesis of normally distributed residuals cannot be rejected. Overall, these results suggest that the residuals are approximately normally distributed, supporting the validity of statistical inference based on t-tests and F-tests within the regression framework.

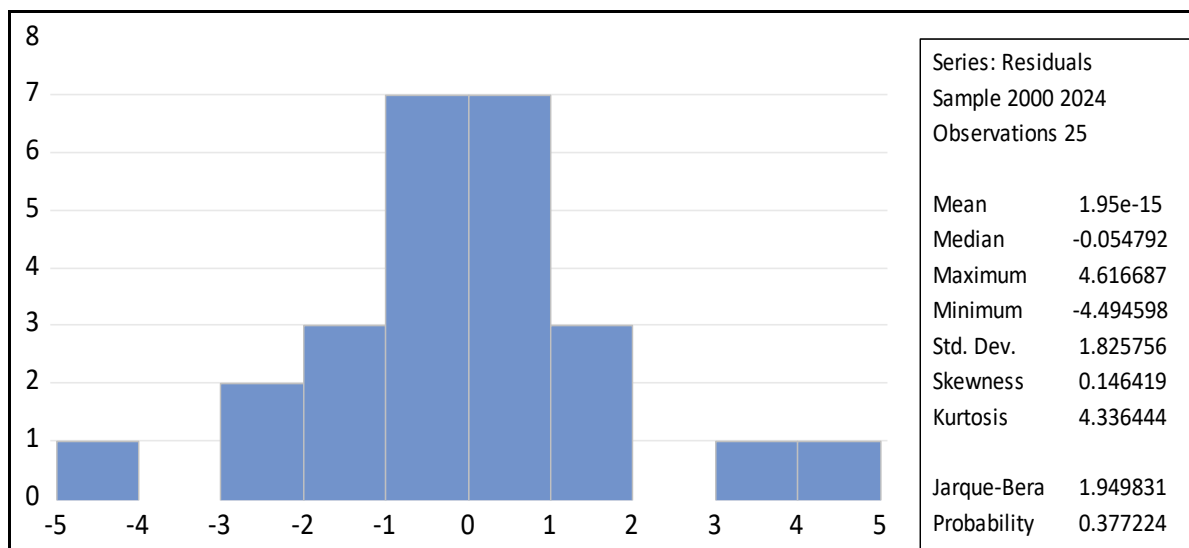


Figure 4.1 Normality Test for Period Data Sample

4.2.2 Descriptive Statistics of Dependent and Independent Variables

Table 4.2 presents the descriptive statistics for GDP, RETF, GFCF, INFL, POP, PD, INT, and DCPS. The mean GDP growth rate is 4.66%, with a median of 5.30%, indicating that Malaysia's economic growth was positive on average during the sample period. The minimum GDP value of -5.50% reflects economic contraction during crisis years, while the maximum of 8.90% represents periods of robust growth. RETF and PD have mean values of RM597,332.50 and $\text{RM}5.46 \times 10^{11}$, respectively, showing substantial differences in magnitude, consistent with their institutional and macro-financial contexts. The mean for GFCF (gross fixed capital formation) is $\text{RM}6.33 \times 10^{10}$, suggesting moderate capital accumulation over the years. The average inflation rate (INFL) is 2.09%, indicating a generally stable price environment. The average population (POP) during the period is approximately 29.3 million, while the average domestic credit to the private sector (DCPS) is 116.71% of GDP. The average interest rate (INT) is 2.95%, reflecting a relatively accommodative monetary stance.

Table 4.2
Descriptive Statistics of Dependent and Independent Variables

	GDP	RETF	GFCF	INFL	POP	PD	INT	DCPS
Mean	4.664000	597332.5	6.33E+10	2.089200	29295984	5.46E+11	2.948000	116.7120
Median	5.300000	544817.9	7.40E+10	2.030000	29660212	5.02E+11	3.000000	117.2000
Maximum	8.900000	1263494.	9.93E+10	5.440000	34100000	1.30E+12	3.500000	135.0000
Minimum	-5.500000	186318.0	2.00E+10	-1.140000	22945150	1.26E+11	1.750000	96.70000
Std.Dev.	3.015499	337202.0	2.65E+10	1.303079	3532171.	3.41E+11	0.468704	9.523056
Skewness	-1.823387	0.380775	-0.501383	0.161404	-0.277062	0.635508	-1.554348	-0.078033
Kurtosis	6.876624	1.864356	1.748553	4.054462	1.814986	2.397219	4.664373	2.656901
Jarque-Bera	29.50748	1.947550	2.678813	1.266766	1.782617	2.061280	12.95222	0.147993
Probability	0.000000	0.377655	0.262001	0.530793	0.410119	0.356779	0.001540	0.928675
Sum	116.6000	14933314	1.58E+12	52.23000	7.32E+08	1.36E+13	73.70000	2917.800
SumSq.Dev.	218.2376	2.73E+12	1.68E+22	40.75238	2.99E+14	2.79E+24	5.272400	2176.526
Observations	25	25	25	25	25	25	25	25

In terms of data dispersion, GDP, GFCF, PD, and RETF display relatively higher standard deviations, indicating considerable variability over the sample period. Skewness values range from -1.82 to 0.64 , suggesting that most variables are approximately symmetric, except for GDP and interest rate (INT), which are moderately left-skewed. Kurtosis values for GDP (6.88) and INT (4.66) exceed 3, indicating leptokurtic distributions, while the other variables exhibit platykurtic or near-normal characteristics. The Jarque–Bera test results show that GDP and INT deviate significantly from normality ($p < 0.05$), whereas the remaining variables do not show significant departures ($p > 0.05$). Therefore, except for GDP and INT, all variables can be considered approximately normally distributed, supporting their suitability for subsequent parametric analyses such as correlation and regression tests.

4.3 Correlation Analysis

Table 4.3 presents the correlation matrix for the study variables for the period 2000–2024. The analysis provides preliminary insights into the strength and direction of linear relationships among GDP growth, RETF, GFCF, inflation (INFL), population (POP), public debt (PD), interest rate (INT), and domestic credit to the private sector (DCPS).

Table 4.3
Correlation Matrix Analysis

Correlation t-Statistic Probability	GDP	RETF	GFCF	INFL	POP	PD	INT	DCPS
GDP	1.000000 ----- -----							
RETF	-0.195253 -0.954779 0.3496	1.000000 ----- -----						
GFCF	0.105843 0.510475 0.6146	0.014607 0.070062 0.9448	1.000000 ----- -----					
INFL	0.519215 2.913572 0.0078	-0.087936 -0.423365 0.6760	-0.345899 -1.768011 0.0903	1.000000 ----- -----				
POP	-0.186961 -0.912729 0.3709	0.961003 16.66617 0.0000	-0.045854 -0.220141 0.8277	-0.019339 -0.092765 0.9269	1.000000 ----- -----			
PD	-0.151715 -0.736122 0.4691	0.989239 32.42682 0.0000	-0.026529 -0.127272 0.8998	-0.052279 -0.251064 0.8040	0.939312 13.13098 0.0000	1.000000 ----- -----		
INT	0.605029 3.644315 0.0014	-0.381196 -1.977463 0.0601	-0.039850 -0.191268 0.8500	0.406425 2.133282 0.0438	-0.397292 -2.076237 0.0492	-0.374609 -1.937654 0.0650	1.000000 ----- -----	
DCPS	-0.320079 -1.620287 0.1188	0.262055 1.302283 0.2057	0.694275 4.626342 0.0001	-0.572661 -3.350101 0.0028	0.117909 0.569444 0.5746	0.215929 1.060580 0.2999	-0.286999 -1.436844 0.1642	1.000000 ----- -----

The results indicate that GDP growth is positively and significantly correlated with inflation ($r = 0.519$, $p < 0.01$) and the interest rate ($r = 0.605$, $p < 0.01$), suggesting that higher economic growth in Malaysia is typically associated with moderate increases in both inflation and interest rates. However, GDP shows weak and statistically insignificant relationships with RETF ($r = -0.195$), GFCF ($r = 0.106$), POP ($r = -0.187$), PD ($r = -0.152$), and DCPS ($r = -0.320$), indicating that these variables do not display strong contemporaneous correlations with GDP during the observed period.

A very strong and highly significant positive correlation exists between RETF and PD ($r = 0.989$, $p < 0.01$), and between RETF and POP ($r = 0.961$, $p < 0.01$). This indicates

that RETF movements are closely aligned with public debt and population growth trends, possibly reflecting the scale and investment exposure of institutional funds relative to Malaysia's demographic and fiscal expansion. Similarly, PD and POP are strongly correlated ($r = 0.939$, $p < 0.01$), which is expected given the underlying growth in the national population and the parallel increase in government financing requirements.

In addition, GFCF is positively and significantly correlated with DCPS ($r = 0.694$, $p < 0.01$), indicating that greater credit provision to the private sector is associated with higher levels of capital formation. Inflation shows a significant negative relationship with DCPS ($r = -0.573$, $p < 0.01$), suggesting that rising prices tend to coincide with lower credit expansion in the private sector. The remaining correlations, including those between RETF and INT ($r = -0.381$, $p = 0.060$) and between INT and PD ($r = -0.375$, $p = 0.065$), are negative but only marginally significant at the 10% level.

Overall, the correlation analysis shows that while some macroeconomic variables, such as inflation and interest rate, are significantly related to GDP growth, institutional and financial indicators such as RETF and PD are more strongly interrelated with each other than with real economic performance. The absence of excessively high intercorrelations among most independent variables also suggests that multicollinearity is unlikely to pose a serious issue in the subsequent regression estimations.

4.4 Unit Root Test

Table 4.4 shows the results of the unit root tests conducted on the variables GDP, RETF, GFCF, INFL, INT, PD, POP, DCPS, LTAT, KWAP, and EPF for the period 2000–2024.

Table 4.4
Unit Root Test

Group unit root test: Summary				
Series: GDP, RETF, GFCF, INFL, INT, PD, POP, DCPS, LTAT, KWAP, EPF				
Exogenous variables: Individual effects				
Automatic selection of maximum lags				
Automatic lag length selection based on SIC: 0 to 2				
Newey-West automatic bandwidth selection and Bartlett kernel				
Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t^*	1.44222	0.9254	11	250
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	1.04547	0.8521	11	250
ADF - Fisher Chi-square	54.1923	0.0002	11	250
PP - Fisher Chi-square	57.0145	0.0001	11	257

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The tests were estimated with individual fixed effects, automatic lag selection based on the Schwarz Information Criterion, and Newey–West bandwidth correction. The Levin, Lin and Chu (LLC) test produced a statistic of 1.4422 with a probability value of 0.9254, indicating failure to reject the null hypothesis of a common unit root process. Similarly, the Im, Pesaran and Shin (IPS) test yielded a W-statistic of 1.0455 with a p-value of 0.8521, also suggesting non-stationarity under the assumption of heterogeneous unit root processes across cross-sections. However, the Fisher-type tests provide contrasting evidence: the ADF–Fisher Chi-square statistic of 54.1923 ($p = 0.0002$) and the PP–Fisher Chi-square statistic of 57.0145 ($p = 0.0001$) both strongly reject the null hypothesis of a unit root, implying that at least some series within the panel exhibit stationarity. Overall, these mixed findings suggest that the panel variables may display differing orders of integration across cross-sectional units, justifying further investigation using panel cointegration techniques

and more robust second-generation unit root tests before proceeding with long-run estimation.

4.5 Test for Equality of Variance

Table 4.5

Test for Equality of Variance Test

Test for Equality of Variances Between Series

Included observations: 25

Method	df	Value	Probability
Bartlett	7	5809.635	0.0000
Levene	(7, 192)	54.19071	0.0000
Brown-Forsythe	(7, 192)	48.50122	0.0000

Category Statistics

Variable	Count	Std. Dev.	Mean Abs. Mean Diff.	Mean Abs. Median Diff.
GDP	25	3.015499	1.867840	1.748000
RETF	25	337202.0	289945.6	287845.0
DCPS	25	9.523056	7.434560	7.376000
GFCF	25	2.65E+10	2.29E+10	2.14E+10
INFL	25	1.303079	0.943968	0.941600
INT	25	0.468704	0.319040	0.292000
PD	25	3.41E+11	2.79E+11	2.77E+11
POP	25	3532171.	3003210.	2988641.
All	200	2.15E+11	3.78E+10	3.73E+10

Bartlett weighted standard deviation: 1.21e+11

Table 4.5 presents the results of the equality of variances tests, which provide strong evidence of heteroscedasticity across the series included in the model. Specifically, the Bartlett test reports a highly significant statistic (Value = 5809.635, $p = 0.0000$), indicating rejection of the null hypothesis of homoscedasticity, although this test is sensitive to departures from normality. To ensure robustness, the Levene and Brown–Forsythe tests – which are less affected by non-normal distributions – were also conducted and similarly yield statistically significant results (Levene = 54.19071, $p = 0.0000$; Brown–Forsythe = 48.50122, $p = 0.0000$). These consistent findings confirm that the variances differ significantly among the variables, reflecting substantial dispersion across macroeconomic indicators such as GDP, population, and capital formation. The category statistics further

illustrate this variability, with markedly different standard deviations across series. Overall, these outcomes indicate the presence of heteroscedasticity in the dataset, suggesting that conventional ordinary least squares assumptions may be violated, and that robust estimation techniques or heteroscedasticity-consistent standard errors are necessary for reliable inference in subsequent regression analysis.

4.6 Autocorrelation Test

Figure 4.2 displays the correlogram results for the residual series over the sample period 2000–2024, based on 25 included observations, and provides important diagnostic evidence regarding the presence of serial correlation in the estimated model.

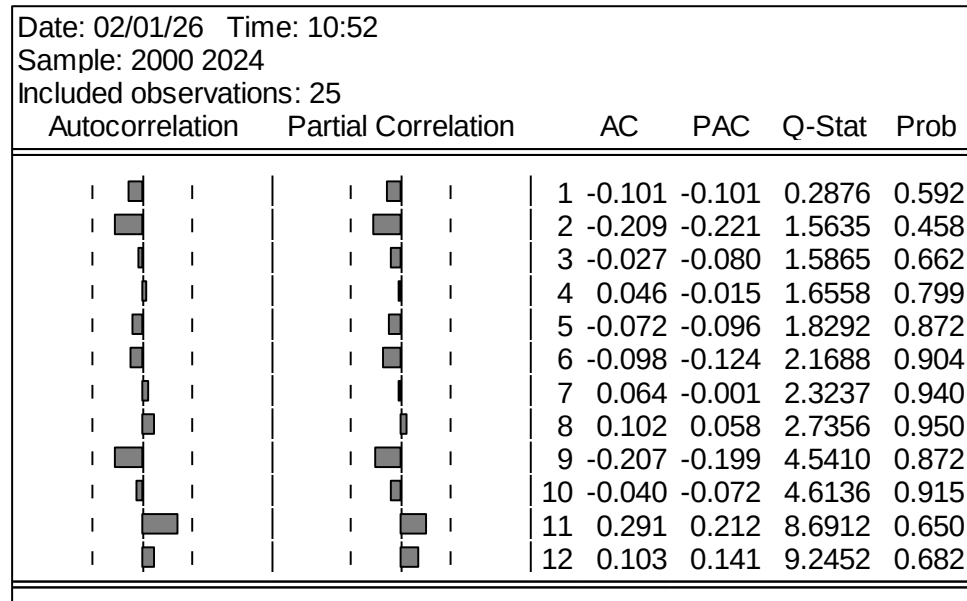


Figure 4.2 Correlogram Series for Autocorrelation

The autocorrelation (AC) and partial autocorrelation (PAC) coefficients for the first twelve lags are generally small and fluctuate around zero, with no clear systematic pattern or persistence. More importantly, the Ljung–Box Q-statistics for each lag yield probability values that consistently exceed the conventional 5% significance threshold. For instance, the Q-statistic at lag 1 is 0.2876 ($p = 0.592$), while at lag 12 it is 9.2452 ($p = 0.682$),

indicating that the null hypothesis of no residual autocorrelation cannot be rejected at any lag. These results suggest that the residuals behave as white noise and that the model is adequately specified in capturing the dynamic structure of the data. Therefore, the absence of significant serial correlation implies that the estimated coefficients and associated statistical inferences are unlikely to be biased by autocorrelation, supporting the reliability and robustness of the regression results presented in this chapter.

4.7 Multivariate Analysis

Table 4.6

Regression Analysis using RETF as the Total Retirement Funds

Dependent Variable: GDP

Method: Least Squares

Included observations: 25

HAC standard errors & covariance (Prewhitening with lags = 1, Bartlett
kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RETF	-1.53E-05	7.18E-06	-2.136657	0.0475
GFCF	6.05E-11	9.73E-12	6.214696	0.0000
INFL	0.613185	0.467139	1.312641	0.2067
POP	2.85E-08	2.68E-07	0.106478	0.9164
PD	1.58E-11	5.42E-12	2.905847	0.0098
INT	2.870271	0.692622	4.144064	0.0007
DCPS	-0.110524	0.042393	-2.607152	0.0184
C	3.707035	10.05442	0.368697	0.7169
R-squared	0.633422	Mean dependent var		4.664000
Adjusted R-squared	0.482477	S.D. dependent var		3.015499
S.E. of regression	2.169321	Akaike info criterion		4.641043
Sum squared resid	80.00120	Schwarz criterion		5.031083
Log likelihood	-50.01304	Hannan-Quinn criter.		4.749224
F-statistic	4.196399	Durbin-Watson stat		2.492540
Prob(F-statistic)	0.007396	Wald F-statistic		43.00990
Prob(Wald F-statistic)	0.000000			

Table 4.6 presents the results of the multiple linear regression model examining the determinants of Malaysia's GDP growth from 2000 to 2024. The model includes RETF, GFCF, inflation (INFL), population (POP), public debt (PD), interest rate (INT), and domestic credit to the private sector (DCPS) as explanatory variables. The estimation was performed using the Ordinary Least Squares (OLS) method with Newey–West HAC standard errors to address potential heteroskedasticity and autocorrelation.

Regarding individual coefficients, gross fixed capital formation (GFCF) shows a positive and highly significant effect on GDP growth ($\beta = 6.05 \times 10^{-11}$, $p < 0.01$), confirming the pivotal role of investment in driving Malaysia's economic performance. Public debt (PD) also has a positive and statistically significant relationship with GDP ($\beta = 1.58 \times 10^{-11}$, $p < 0.01$), suggesting that fiscal expansion may have supported economic activity during the study period. Similarly, the interest rate (INT) demonstrates a positive and highly significant impact ($\beta = 2.87$, $p < 0.01$), indicating that moderate increases in the interest rate are associated with stronger growth, potentially reflecting a procyclical policy stance or robust investor confidence.

Conversely, RETF and DCPS are both negatively and significantly associated with GDP growth. The coefficient for RETF ($\beta = -1.53 \times 10^{-5}$, $p = 0.0475$) indicates that increases in institutional investment fund activity correspond to a slight decline in GDP growth, possibly reflecting portfolio reallocations during economic slowdowns. The negative and significant coefficient for DCPS ($\beta = -0.111$, $p = 0.0184$) suggests that excessive credit expansion to the private sector may not have been efficiently channelled into productive investment, consistent with the notion of credit misallocation in emerging markets. Inflation (INFL) and population (POP) show positive but statistically insignificant effects ($p > 0.05$), indicating that these variables do not have a strong direct influence on short-term GDP fluctuations during the sample period.

Overall, the results highlight that capital formation, public debt, and interest rate movements play significant roles in explaining Malaysia's economic growth, while institutional fund activities (RETF) and domestic credit expansion (DCPS) show negative associations that warrant further policy consideration. The model demonstrates acceptable

statistical validity and provides a sound empirical basis for subsequent policy and strategic interpretation.

4.7.1 Model Summary and Diagnostic Discussion

The diagnostic indicators in Table 4.6 indicate that the estimated model is statistically robust and free from major econometric violations. The Durbin–Watson statistic of 2.49 is within the acceptable range (1.5–2.5), indicating no evidence of serial correlation in the residuals. In addition, the use of Heteroskedasticity and Autocorrelation Consistent (HAC) standard errors, based on the Newey–West correction, ensures that the coefficient estimates and their corresponding t-statistics remain reliable in the presence of potential heteroskedasticity or autocorrelation. The Wald F-statistic ($p = 0.000$) confirms the joint significance of the explanatory variables, reinforcing the overall validity of the regression model.

The adjusted R-squared value of 0.482 indicates that approximately 48% of the variation in GDP growth is explained by the independent variables after accounting for model complexity, which is satisfactory for time-series data spanning 25 years. The insignificant constant term ($p = 0.7169$) suggests that the model’s explanatory power is primarily derived from the included macroeconomic and financial indicators rather than omitted fixed effects. Overall, the diagnostic results confirm that the estimated model is econometrically sound, statistically significant, and suitable for inferential analysis, thus providing a reliable foundation for policy interpretation and further discussion.

4.8 Regression Analysis using EPF as the Retirement Funds

The regression analysis results in Table 4.7 reveal that the model explaining Malaysia’s GDP growth from 2000 to 2024 is statistically significant, with an R^2 of 0.633. Among the predictors, gross fixed capital formation (GFCF), public debt (PD), and interest rate (INT) exerted positive and significant effects on GDP, emphasising the crucial role of productive investment, effective fiscal borrowing, and monetary policy confidence in

driving growth.

Table 4.7

Regression Analysis using EPF as the Retirement Funds

Dependent Variable: GDP

Method: Least Squares

Date: 11/04/25 Time: 14:16

HAC standard errors & covariance (Prewitening with lags = 1, Bartlett
kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EPF	-1.53E-05	7.12E-06	-2.148460	0.0464
GFCF	6.07E-11	9.92E-12	6.119294	0.0000
INFL	0.613394	0.467493	1.312093	0.2069
POP	2.50E-08	2.66E-07	0.093895	0.9263
PD	1.57E-11	5.35E-12	2.926985	0.0094
INT	2.861156	0.691608	4.136962	0.0007
DCPS	-0.110544	0.041953	-2.634963	0.0174
C	3.730219	9.970685	0.374119	0.7129
R-squared	0.633425	Mean dependent var		4.664000
Adjusted R-squared	0.482483	S.D. dependent var		3.015499
S.E. of regression	2.169310	Akaike info criterion		4.641032
Sum squared resid	80.00036	Schwarz criterion		5.031073
Log likelihood	-50.01291	Hannan-Quinn criter.		4.749213
F-statistic	4.196468	Durbin-Watson stat		2.492705
Prob(F-statistic)	0.007396	Wald F-statistic		42.29219
Prob(Wald F-statistic)	0.000000			

In contrast, EPF institutional investment and domestic credit to the private sector (DCPS) were found to have negative and significant effects on GDP, suggesting that financial depth and institutional investment activities may not be efficiently translating into productive real-economy outcomes. Inflation and population growth showed positive but statistically insignificant impacts on GDP. The results collectively indicate that Malaysia's economic performance is largely investment-driven and policy-sensitive, but the efficiency of financial sector intermediation remains a concern. Strengthening governance and

directing financial resources towards productive sectors are essential to sustaining long-term economic growth.

4.8.1 Variance Inflation Factors

Table 4.8

Multicollinearity Test Using Variance Inflation Factors

Variance Inflation Factors
Included observations: 25

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
RETF	9.50E-11	2390.312	106.7739
DCPS	0.011459	6560.332	5.012149
GFCF	2.40E-22	48.37109	2.855691
INFL	0.204914	48.33393	1.661188
INT	1.041750	417.6414	1.623879
PD	4.89E-23	1039.846	67.98314
POP	2.09E-13	8532.467	17.65844
C	145.3669	5910.063	NA

The Variance Inflation Factor (VIF) results were examined to assess the presence and severity of multicollinearity among the explanatory variables in the regression model. Multicollinearity occurs when independent variables are highly correlated, inflating the variances of coefficient estimates and reducing the reliability of statistical inference. The centred VIF values, which are most appropriate for interpretation, indicate varying degrees of collinearity across the regressors. Variables such as GFCF (VIF = 2.86), INFL (VIF = 1.66), and INT (VIF = 1.62) fall within acceptable thresholds, while others exhibit substantially high VIF values, notably RETF (106.77), PD (67.98), and POP (17.66). These values exceed the commonly accepted benchmark of 10, indicating severe multicollinearity in the model. Such high multicollinearity suggests that these variables share considerable overlapping explanatory power, which may distort coefficient significance and weaken the precision of parameter estimates. Consequently, the results highlight the need for careful model specification, potential variable transformation, or alternative estimation strategies to mitigate the adverse effects of multicollinearity in subsequent empirical analysis.

4.8.2 Heteroskedasticity Test

Table 4.9

Table of Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	2.468840	Prob. F(7,17)	0.0607
Obs*R-squared	12.60278	Prob. Chi-Square(7)	0.0824
Scaled explained SS	9.721608	Prob. Chi-Square(7)	0.2049

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Included observations: 25

Huber-White-Hinkley (HC1) heteroskedasticity consistent standard errors and covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	36.83655	42.98082	0.857046	0.4033
RETF	2.99E-05	2.49E-05	1.199919	0.2466
DCPS	0.313259	0.227571	1.376532	0.1865
GFCF	-5.38E-11	5.05E-11	-1.065795	0.3014
INFL	0.936591	0.899220	1.041559	0.3122
INT	-2.339869	1.705872	-1.371656	0.1880
PD	-1.48E-11	1.78E-11	-0.832683	0.4166
POP	-2.44E-06	1.16E-06	-2.098768	0.0511
R-squared	0.504111	Mean dependent var		3.200048
Adjusted R-squared	0.299922	S.D. dependent var		5.965720
S.E. of regression	4.991558	Akaike info criterion		6.307711
Sum squared resid	423.5661	Schwarz criterion		6.697751
Log likelihood	-70.84638	Hannan-Quinn criter.		6.415891
F-statistic	2.468840	Durbin-Watson stat		1.822930
Prob(F-statistic)	0.060660			

The Breusch-Pagan-Godfrey test was used to assess the presence of heteroskedasticity in the regression model, with the null hypothesis specifying homoskedasticity (constant variance of the error terms). The results show that the F-statistic is 2.4688 with a probability value of 0.0607, while the Obs*R-squared statistic has a p-value of 0.0824. Although these probabilities do not fall below the conventional 5% significance level, they are marginally significant at the 10% level, providing weak evidence against the null hypothesis. This suggests that heteroskedasticity may be present in the model, but not strongly enough to be conclusively confirmed under stricter

significance criteria. In addition, the auxiliary regression of squared residuals indicates that most explanatory variables are not statistically significant predictors of the error variance, although population (POP) approaches significance ($p = 0.0511$), suggesting it may contribute to variance instability. Overall, the findings indicate that while the assumption of homoskedasticity is not decisively violated, the presence of mild heteroskedasticity cannot be ruled out. Therefore, the use of heteroskedasticity-consistent (Huber–White) robust standard errors is justified to ensure reliable statistical inference in the subsequent regression analysis.

4.8.3 Serial Correlation Test

The Breusch–Godfrey Serial Correlation LM test was conducted to assess whether the residuals of the regression model are affected by autocorrelation up to the second lag, with the null hypothesis stating that no serial correlation exists. The results as shown in Table 4.10 reveal an F-statistic of 2.8219 with a corresponding p-value of 0.0912, suggesting marginal evidence of serial correlation at the 10% significance level. The Obs*R-squared statistic is 6.8347 with a Chi-square probability of 0.0328, which is statistically significant at the 5% level. This provides stronger evidence to reject the null hypothesis, indicating autocorrelation in the residuals. The auxiliary regression further supports this conclusion, as the first lag of the residuals, RESID(-1), is statistically significant ($p = 0.0335$), implying that past error terms systematically influence current residuals. The existence of serial correlation violates the classical assumption of independent disturbances and may lead to inefficient coefficient estimates and biased standard errors. Therefore, these findings suggest that corrective measures, such as including autoregressive terms or using robust standard errors (e.g., Newey–West), are necessary to ensure valid inference in subsequent econometric analysis.

Table 4.10

Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	2.821859	Prob. F(2,15)	0.0912
Obs*R-squared	6.834668	Prob. Chi-Square(2)	0.0328

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Included observations: 25

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RETF	1.90E-06	1.53E-05	0.123772	0.9031
DCPS	0.065232	0.098083	0.665073	0.5161
GFCF	-1.90E-11	2.52E-11	-0.753685	0.4627
INFL	0.234293	0.420134	0.557661	0.5853
INT	0.838311	1.175467	0.713172	0.4867
PD	-2.52E-12	1.05E-11	-0.238537	0.8147
POP	6.81E-08	6.31E-07	0.107880	0.9155
C	-11.12467	23.96055	-0.464291	0.6491
RESID(-1)	-0.629941	0.269199	-2.340061	0.0335
RESID(-2)	-0.404993	0.272399	-1.486766	0.1578
R-squared	0.273387	Mean dependent var		1.95E-15
Adjusted R-squared	-0.162581	S.D. dependent var		1.825756
S.E. of regression	1.968586	Akaike info criterion		4.481682
Sum squared resid	58.12994	Schwarz criterion		4.969232
Log likelihood	-46.02103	Hannan-Quinn criter.		4.616908
F-statistic	0.627080	Durbin-Watson stat		1.766319
Prob(F-statistic)	0.757547			

4.9 Regression Analysis Using KWP as the Retirement Funds

The model estimated in this section examines the impact of institutional investment, capital formation, and macroeconomic indicators on Malaysia's GDP growth for the period 2007–2024. It is estimated using Ordinary Least Squares (OLS) with Heteroskedasticity and Autocorrelation Consistent (HAC) standard errors via the Newey–West method (lag = 1, Bartlett kernel, fixed bandwidth = 3). This approach addresses potential heteroskedasticity and autocorrelation commonly found in time-series macroeconomic data. Table 4.11 presents the regression output for the KWP model. The model shows a high goodness of fit, with $R^2 = 0.882$ and Adjusted $R^2 = 0.799$, indicating that nearly 80%

of the variation in GDP is explained by the independent variables. The F-statistic (10.64, $p < 0.01$) confirms that the model is statistically significant overall.

Table 4.11
Regression Analysis using KWAP as the Retirement Funds

Dependent Variable: GDP

Method: Least Squares

Included observations: 18 after adjustments

HAC standard errors & covariance (Prewhitening with lags = 1, Bartlett
kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
KWAP	0.049831	0.085914	0.580013	0.5747
GFCF	2.51E-10	5.74E-11	4.374124	0.0014
INFL	0.251845	0.319057	0.789344	0.4482
POP	-6.22E-06	2.74E-06	-2.270226	0.0466
PD	3.67E-11	7.72E-12	4.761399	0.0008
INT	1.210794	1.323948	0.914533	0.3820
DCPS	-0.253443	0.075071	-3.376038	0.0070
C	176.9015	77.37772	2.286207	0.0453
R-squared	0.881646	Mean dependent var		4.350000
Adjusted R-squared	0.798798	S.D. dependent var		3.194711
S.E. of regression	1.433006	Akaike info criterion		3.858528
Sum squared resid	20.53506	Schwarz criterion		4.254249
Log likelihood	-26.72675	Hannan-Quinn criter.		3.913092
F-statistic	10.64173	Durbin-Watson stat		3.025575
Prob(F-statistic)	0.000631	Wald F-statistic		2005.137
Prob(Wald F-statistic)	0.000000			

The regression results provide several important insights into the relationship between institutional investment, macroeconomic variables, and GDP growth in Malaysia. The coefficient for KWAP is positive but statistically insignificant, indicating that the fund's investment activities do not have a measurable short-term impact on GDP growth during the period 2007–2024. This insignificance may reflect the long-term, capital-market-oriented nature of KWAP's portfolio, which is less directly linked to real-sector

activities that generate immediate economic expansion. In contrast, gross fixed capital formation (GFCF) is positive and highly significant, reaffirming its role as a key determinant of GDP growth. This finding highlights the importance of sustained investment in productive assets – such as machinery, infrastructure, and industrial facilities – in driving Malaysia’s economic performance.

Inflation (INFL) shows a positive but statistically insignificant effect on GDP, indicating that moderate price increases did not meaningfully influence economic growth during the study period. Population growth (POP), however, exhibits a negative and statistically significant relationship with GDP. This suggests that rising population levels may place pressure on labour markets, public services, and resource availability, ultimately exerting a mild drag on economic growth. Public debt (PD) has a positive and significant impact, implying that government borrowing has been effectively used to support development expenditure, infrastructure projects, and fiscal stimulus measures that bolster economic activity.

The coefficient for the interest rate (INT) is positive but statistically insignificant, indicating that fluctuations in monetary policy did not significantly influence GDP outcomes during the sample period. In contrast, domestic credit to the private sector (DCPS) has a negative and significant effect, suggesting that credit expansion may have been directed towards non-productive or speculative activities rather than sectors that enhance economic productivity. This finding aligns with concerns about credit misallocation in emerging markets. Finally, the constant term (C) is positive and statistically significant, representing the baseline level of GDP when all explanatory variables are set to zero, and serving as a reference point for interpreting the overall model.

The diagnostic evaluation of the estimated model offers several important insights into its statistical adequacy and reliability. The Durbin–Watson statistic of 3.03 indicates mild negative autocorrelation in the residuals. Although such autocorrelation can bias standard error estimates, the use of Newey–West heteroskedasticity and autocorrelation-consistent (HAC) standard errors effectively addresses this issue. By adjusting for both serial correlation and heteroskedasticity, the HAC procedure improves the robustness of coefficient estimates and the validity of statistical inference. Regarding heteroskedasticity,

the use of HAC standard errors also ensures that coefficient standard errors remain reliable when variance is not constant over time. This adjustment is particularly important in macroeconomic time series, where structural shifts and economic shocks often cause variance instability. The robustness correction thus strengthens the credibility of hypothesis testing and enhances the overall reliability of the empirical findings.

The model's overall significance is strongly supported by the F-statistic of 10.64, which is statistically significant at the 1 percent level. Along with the Wald F-statistic, this result confirms that the set of independent variables collectively provides substantial explanatory power for variations in GDP growth. These diagnostic statistics indicate that the model is statistically meaningful and that the explanatory variables, when considered together, contribute significantly to the predictive performance of the regression.

Lastly, the coefficient of determination (R^2) and the adjusted R^2 values are both relatively high, indicating that the model explains a substantial proportion of the variability in GDP over the study period. This is noteworthy given the relatively small number of observations ($n = 18$), particularly for time series analysis. The strong goodness of fit therefore reinforces the conclusion that the model is appropriately specified and capable of capturing the key macroeconomic dynamics relevant to the study.

The KWAP regression model provides several important insights into Malaysia's economic growth. Investment and fiscal policy remain central drivers, as indicated by the strong positive effects of GFCF and PD on GDP. Institutional investment activities (KWAP), unlike RETF or EPF in previous models, do not have a statistically significant effect on GDP growth, suggesting that KWAP's investment strategies may focus on long-term financial returns rather than immediate macroeconomic stimulus. Private sector credit (DCPS) has a negative impact, indicating that the effectiveness of credit in promoting growth depends on its allocation to productive sectors. Population growth shows a small but significant negative effect, pointing to potential demographic pressures on economic resources and underscoring the importance of improving labour productivity. Overall, the KWAP model confirms that investment efficiency and fiscal policy are more influential than institutional fund flows in driving short-term GDP growth.

4.10 Regression Analysis Using LTAT as the Retirement Funds

The LTAT model examines the influence of long-term assets held by institutional investors, together with capital formation and macroeconomic indicators, on Malaysia's GDP growth for the period 2000–2024. The variables are defined as in previous models, with LTAT representing long-term institutional assets (RM millions). The model is estimated using Ordinary Least Squares (OLS) with HAC/Newey–West standard errors (lag = 1, Bartlett kernel, bandwidth = 3) to ensure robustness to heteroskedasticity and autocorrelation in time-series data. Table 4.12 presents the results of the analysis.

Table 4.12
Regression Analysis Using LTAT as the Retirement Funds

Dependent Variable: GDP

Method: Least Squares

Included observations: 25

HAC standard errors & covariance (Prewhitening with lags = 1, Bartlett
kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTAT	9.98E-05	0.000576	0.173197	0.8645
GFCF	6.67E-11	1.70E-11	3.927798	0.0011
INFL	0.662045	0.555145	1.192563	0.2494
POP	-5.06E-07	2.37E-07	-2.134826	0.0476
PD	5.48E-12	4.45E-12	1.232614	0.2345
INT	2.434032	0.517268	4.705554	0.0002
DCPS	-0.164788	0.047142	-3.495585	0.0028
C	22.10522	9.994739	2.211686	0.0410
R-squared	0.615586	Mean dependent var		4.664000
Adjusted R-squared	0.457298	S.D. dependent var		3.015499
S.E. of regression	2.221467	Akaike info criterion		4.688550
Sum squared resid	83.89353	Schwarz criterion		5.078590
Log likelihood	-50.60687	Hannan-Quinn criter.		4.796730
F-statistic	3.889026	Durbin-Watson stat		2.382809
Prob(F-statistic)	0.010438	Wald F-statistic		32.51000
Prob(Wald F-statistic)	0.000000			

The regression results of the LTAT model offer important insights into the determinants of Malaysia's GDP growth for the period 2000–2024. The coefficient for LTAT is positive but statistically insignificant, indicating that long-term institutional asset holdings do not have a measurable short-term effect on GDP growth. This may reflect the delayed or long-term nature of these investments in contributing to real economic activity. In contrast, gross fixed capital formation (GFCF) has a positive and highly significant coefficient, confirming that investment in productive assets remains a primary driver of economic growth. Inflation (INFL) shows a positive but insignificant effect, suggesting that moderate changes in the price level do not significantly influence GDP within this sample period. The coefficient for population (POP) is negative and statistically significant, indicating that population growth exerts a slight dampening effect on GDP, possibly due to pressures on resources or the labour market. Public debt (PD) is positive but not significant, suggesting that government borrowing had a limited direct impact on GDP growth in this model. Meanwhile, the interest rate (INT) is both positive and highly significant, reflecting a procyclical relationship in which higher rates coincide with periods of economic expansion. Finally, domestic credit to the private sector (DCPS) is negative and significant, implying that credit expansion may not be efficiently channelled towards productive sectors, potentially limiting its effectiveness in stimulating economic growth. The constant term is positive and significant, representing the baseline GDP level when all explanatory variables are zero. Collectively, these results highlight that while investment and monetary factors strongly influence GDP, long-term institutional assets and credit allocation efficiency play a nuanced and less immediate role in Malaysia's economic growth.

4.11 Summary of Findings

The comparative regression analysis of the four institutional investment variables – RETF, EPF, KWAP, and LTAT – reveals important distinctions in their influence on Malaysia's GDP growth. In the RETF and EPF models, institutional investment has a negative and statistically significant effect, suggesting that increased fund flows from these sources do not necessarily translate into productive economic activity and may be

concentrated in low-impact financial assets or sectors with limited growth multipliers. In contrast, the KWAP model shows a positive but insignificant coefficient, indicating that KWAP investments do not have a measurable short-term impact on GDP, potentially due to the fund's longer-term orientation and conservative asset allocation strategies. Similarly, the LTAT model demonstrates that long-term institutional assets have a positive yet insignificant relationship with GDP growth, reinforcing the notion that these investments primarily influence the economy over extended periods rather than the immediate timeframe examined. Across all models, gross fixed capital formation (GFCF) consistently has a positive and highly significant impact on GDP, highlighting that real-sector investment remains the most robust driver of economic expansion. Interest rates (INT) are also positively and significantly related to GDP in most models, reflecting procyclical monetary conditions, while domestic credit to the private sector (DCPS) shows a negative and significant effect, suggesting inefficiencies in credit allocation. Population growth shows small negative effects in some models, indicating potential resource and labour market pressures, whereas public debt (PD) generally contributes positively to GDP, albeit with varying significance. Collectively, these findings underscore that while institutional funds are important financial actors, their short-term effectiveness in stimulating economic growth is limited, whereas productive capital formation, fiscal strategy, and efficient monetary conditions remain key determinants of Malaysia's macroeconomic performance.

4.11.1 Regression Results Summary

The RETF model shows that institutional investment has a negative and significant effect on GDP growth ($\beta = -1.53 \times 10^{-5}$, $p < 0.05$), indicating that increased retirement fund allocations may not efficiently stimulate productive economic activities. GFCF, public debt, and interest rates are positively and significantly associated with GDP, while DCPS has a negative effect. Inflation and population growth are positive but not statistically significant.

4.11.2 EPF Model

Replacing RETF with EPF produces a similar pattern: EPF investments negatively affect GDP growth ($\beta = -1.53 \times 10^{-5}$, $p < 0.05$), highlighting possible inefficiencies in fund allocation. GFCF, public debt, and interest rates remain strong positive determinants, while DCPS retains a negative and significant impact. Inflation and population remain statistically insignificant.

4.11.3 KWAP Model

The KWAP model, covering 2007–2024 due to data availability, shows a positive but statistically insignificant coefficient for KWAP ($\beta = 0.0498$, $p = 0.5747$). This suggests that KWAP's investment strategies, typically long-term and conservative, do not produce immediate effects on GDP growth. GFCF and public debt remain robust drivers; DCPS is negative and significant, and population growth exerts a small negative effect.

4.11.4 LTAT Model

The LTAT model shows that long-term assets held by institutional investors have a positive but insignificant effect on GDP ($\beta = 9.98 \times 10^{-5}$, $p = 0.8645$). As with KWAP, this reflects the long-term orientation of asset holdings. GFCF and interest rates remain positively and significantly associated with GDP, DCPS is negative and significant, and population growth has a small negative effect. Public debt is positive but not statistically significant in this model.

4.12 Comparative Analysis of Institutional Investment Effects

The comparative analysis of all four models provides key insights into the role of institutional funds in Malaysia's economic growth. RETF and EPF investments are negatively and significantly associated with GDP growth, suggesting that these funds may

be concentrated in financial assets or sectors with limited real-economy impact. In contrast, KWAP and LTAT show positive but insignificant coefficients, reflecting their long-term investment horizons and limited short-term contribution to GDP. In all models, gross fixed capital formation (GFCF) consistently emerges as the most influential positive determinant of GDP, reinforcing the importance of real-sector investment. Interest rates (INT) are also positively related to growth in most models, suggesting that monetary conditions tend to be procyclical. Conversely, domestic credit to the private sector (DCPS) consistently has a negative effect, highlighting inefficiencies in credit allocation and the potential for misdirected lending. Population growth shows small negative effects in several models, indicating possible demographic pressures on resources and productivity, while public debt generally contributes positively to GDP, although its significance varies across models.

The diagnostic evaluation of the four institutional investment models confirms the robustness and reliability of the regression results. In all models, the Durbin–Watson statistics, ranging from 2.38 in the LTAT model to 3.03 in the KWAP model, indicate minimal concerns regarding autocorrelation in the residuals, suggesting that the time-series data do not exhibit significant serial correlation that could bias the estimated coefficients. To further enhance reliability, HAC/Newey–West standard errors were used, correcting for potential heteroskedasticity and autocorrelation, and ensuring that the t-statistics and p-values accurately reflect the significance of each explanatory variable. The overall model significance, confirmed by F-statistics, shows that the combined set of independent variables jointly explains a substantial portion of GDP variability, with p-values consistently below the 5% threshold. The goodness-of-fit measures vary across models, with R^2 values ranging from 0.457 for the LTAT model to 0.882 for the KWAP model, reflecting differences in explanatory power due to variable selection and sample periods. Collectively, these diagnostics confirm that the regression models are well specified, statistically valid, and suitable for analysing the short- and medium-term relationships between institutional investment, macroeconomic factors, and economic growth in Malaysia, providing a sound basis for the subsequent discussion of empirical findings and policy implications.

4.13 Discussion on All Four Models

The integrated findings indicate that, while institutional investment is an important component of Malaysia's financial system, its short-term impact on GDP growth is limited and varies across fund types. Funds such as RETF and EPF appear to be negatively associated with growth, potentially due to portfolio concentration in non-productive sectors. KWAP and LTAT investments, although oriented towards long-term stability, do not significantly affect short-term GDP. In contrast, real-sector investment, monetary conditions, and effective fiscal management, as proxied by GFCF, INT, and PD, remain robust drivers of economic growth. The persistent negative effect of DCPS highlights the need for improved credit allocation strategies to channel financial resources towards productive sectors. Population growth shows minor negative effects in some models, underscoring the importance of demographic considerations in policy planning.

Overall, these results suggest that policy interventions should focus on enhancing the efficiency of institutional fund allocation, promoting productive investment, and ensuring that credit expansion supports real economic growth rather than speculative activities. Institutional investment is vital, but its effectiveness depends on strategic alignment with national economic objectives and long-term growth priorities.

4.14 Discussion on RETF as Selected Model

The estimated multiple regression model examines the relationship between gross domestic product (GDP) and a set of macroeconomic explanatory variables comprising RETF, gross fixed capital formation (GFCF), inflation (INFL), population (POP), public debt (PD), interest rate (INT), and domestic credit to the private sector (DCPS). The model was estimated using the ordinary least squares method based on 25 observations. To improve the reliability of statistical inference, heteroskedasticity- and autocorrelation-consistent standard errors were applied using the Newey–West procedure, with prewhitening of one lag, a Bartlett kernel, and a fixed bandwidth of three. The use of HAC standard errors is appropriate in a time-series context because it allows the estimated

covariance matrix to remain robust in the presence of unknown forms of heteroskedasticity and short-run serial dependence. Nevertheless, this correction affects the estimated standard errors rather than the coefficient estimates themselves and therefore does not address other potential econometric problems, such as endogeneity, non-stationarity, omitted-variable bias, structural instability, or functional-form misspecification.

The model may be regarded as statistically acceptable as an initial explanatory specification because the explanatory variables are jointly significant. The conventional F-statistic of 4.1964 has a probability value of 0.0074, indicating that the null hypothesis that all slope coefficients are simultaneously equal to zero can be rejected at the 1 per cent significance level. The HAC-based Wald F-statistic is also highly significant, with a value of 43.0099 and a probability value effectively equal to zero. This result provides stronger evidence that the explanatory variables, when considered jointly, possess statistically meaningful explanatory content for GDP after the covariance matrix has been adjusted for possible heteroskedasticity and autocorrelation. Consequently, the model is not statistically redundant, and at least one of the explanatory variables contributes significantly to variations in GDP.

The coefficient of determination indicates that approximately 63.34 per cent of the variation in GDP is explained by the included regressors. This degree of explanatory power may be considered moderate to reasonably strong for a macroeconomic model, particularly because GDP is influenced by a broad range of domestic, international, institutional, political, and structural factors that are not fully represented in the equation. However, the adjusted coefficient of determination is considerably lower, at 48.25 per cent. The reduction from the unadjusted to the adjusted R-Squared reflects the penalty imposed for including a relatively large number of explanatory variables within a small sample. This difference suggests that some regressors may add only limited explanatory value after the complexity of the model is taken into account. Nevertheless, an adjusted R-Squared of approximately 0.48 does not necessarily invalidate the model, especially in macroeconomic research where substantial variation may remain attributable to unobserved shocks and omitted determinants. It does, however, indicate the need to examine whether a more parsimonious specification could achieve comparable explanatory and forecasting performance.

At the level of individual coefficients, RETF, GFCF, PD, INT, and DCPS are statistically significant at the 5 per cent level. RETF has a negative coefficient and a probability value of 0.0475, indicating a statistically significant negative conditional association with GDP. Holding the other explanatory variables constant, an increase in RETF is associated with a reduction in GDP, although the magnitude of the coefficient is highly dependent on the scale in which RETF is measured. Since the probability value is close to the 5 per cent threshold, the result should be interpreted as marginally significant and may be sensitive to alternative specifications, sample periods, or estimation methods.

GFCF has a positive coefficient and is highly statistically significant, with a probability value below 0.001. This finding indicates that greater gross fixed capital formation is associated with higher GDP, *ceteris paribus*. The result is consistent with the conventional macroeconomic proposition that investment in productive capital contributes positively to economic activity by expanding productive capacity, supporting technological adoption, and enhancing future output. The apparently small numerical value of the coefficient should not be interpreted as evidence of a negligible economic effect, as it likely reflects the large monetary units in which GFCF is measured. Rescaling GFCF into millions or billions, or transforming it into natural logarithms, would produce a coefficient that is easier to interpret without materially changing its statistical significance.

Public debt also exhibits a positive and statistically significant coefficient. The estimated coefficient with a probability value of 0.0098, suggests that higher public debt is associated with higher GDP after controlling for the other variables in the model. One possible interpretation is that public borrowing may support economic activity when it finances productive public expenditure, infrastructure development, or countercyclical fiscal intervention. However, this coefficient should not be interpreted as establishing that public debt necessarily causes higher economic growth. Reverse causality may be present because the level of public borrowing may itself respond to economic conditions. In addition, the economic effect of debt may depend on its composition, maturity structure, financing cost, and the purposes for which the borrowed funds are used. The positive coefficient therefore represents a conditional association within the present sample rather than an unambiguous structural relationship.

The interest rate variable has a positive coefficient and is strongly statistically significant, with a probability value of 0.0007. This result indicates that, conditional on the other variables, a one-unit increase in the interest rate is associated with an estimated increase of approximately 2.87 units in GDP. Although this positive association may initially appear contrary to the conventional expectation that higher interest rates constrain consumption and investment, it may reflect the specific institutional and macroeconomic context of the sample. For example, interest rates may increase during periods of strong economic expansion as monetary authorities respond to inflationary pressures or overheating. The result may therefore represent a policy reaction function or reverse causality rather than a direct stimulative effect of interest rates on GDP. A causal interpretation would require a more explicit treatment of simultaneity and endogeneity, potentially through instrumental variables, structural vector autoregression, or another appropriate dynamic framework.

DCPS has a negative coefficient and is statistically significant at the 5 per cent level, with a probability value of 0.0184. This finding suggests that an increase in domestic credit to the private sector is associated with a reduction in GDP, holding the other variables constant. Such a result does not necessarily imply that private-sector credit is inherently detrimental to economic activity. The negative relationship may arise if credit expansion is directed toward consumption, speculative assets, or low-productivity activities rather than productive investment. It may also reflect excessive leverage, financial instability, non-performing loans, or reverse causality during periods in which credit expands in response to weak economic conditions. Furthermore, the sign of the coefficient may be influenced by multicollinearity with GFCF, PD, or other financial variables. The negative coefficient should therefore be interpreted as an empirical conditional relationship that requires further theoretical and diagnostic investigation.

Inflation has a positive coefficient but is not statistically significant at conventional levels, as indicated by its probability value of 0.2067. The estimated sign suggests that higher inflation is associated with higher GDP after controlling for the other regressors, but the available evidence is insufficient to reject the null hypothesis that the true coefficient is equal to zero. The insignificant result may reflect a genuinely weak relationship, non-

linearity, measurement issues, a limited sample size, or the possibility that moderate and high inflation have different effects on economic activity. The effect of inflation may also operate with lags or depend on the broader monetary-policy environment. Therefore, the absence of individual statistical significance should not be interpreted as definitive evidence that inflation is economically irrelevant.

Population has a very small positive coefficient and a probability value of 0.9164, indicating that it is statistically insignificant. The high probability value implies that the estimated population effect is highly imprecise and cannot be distinguished from zero within the present specification. Several factors may explain this result. Population may change only gradually over the sample period, providing insufficient time-series variation for precise estimation. Total population may also be a less appropriate measure than labour-force participation, working-age population, employment, or human-capital indicators. Furthermore, population is likely to be highly correlated with other trending macroeconomic variables, which may inflate its standard error. Its insignificance should therefore be evaluated in conjunction with multicollinearity diagnostics and alternative variable transformations rather than treated as conclusive evidence of no economic relationship.

The constant term is also statistically insignificant, with a probability value of 0.7169. This result is generally not a major concern because the intercept primarily represents the predicted value of GDP when all explanatory variables are equal to zero, a condition that may have little meaningful economic interpretation in the present context. Unless economic theory imposes a particular restriction on the intercept, its insignificance does not undermine the validity of the slope coefficients or the joint significance of the model.

Despite the statistically significant overall results, the model is subject to several limitations. The first and most important concern is the small sample size. With 25 observations and eight estimated parameters, including the intercept, only 17 residual degrees of freedom remain. This limited number of observations increases the likelihood of imprecise and unstable coefficient estimates. It also reduces the statistical power of hypothesis tests and increases the sensitivity of the findings to individual observations,

influential data points, or minor changes in model specification. A model with seven explanatory variables may therefore be relatively highly parameterised given the available sample. The difference between the R-Squared and adjusted R-Squared provides some indication that the specification may be overfitted. Consequently, the present findings should be interpreted cautiously, and a more parsimonious model should be evaluated alongside the unrestricted specification.

A related concern is the potential presence of multicollinearity. Macroeconomic variables such as GDP, investment, population, public debt, and private credit commonly exhibit common trends and strong correlations over time. High multicollinearity does not cause ordinary least squares estimators to become biased, provided the other classical assumptions hold, but it may substantially increase the variance of the coefficient estimates. As a result, coefficients may become statistically insignificant, exhibit unexpected signs, or vary considerably across alternative specifications. The extremely high probability value for population and the potentially counterintuitive signs of the interest-rate and private-credit coefficients may partly reflect such collinearity. A correlation matrix, variance inflation factors, tolerance statistics, and condition indices should therefore be examined before drawing substantive conclusions from the individual coefficient estimates.

The scale of the explanatory variables also creates an interpretational challenge. The very small coefficients associated with GFCF, population, public debt, and RETF most likely reflect the use of large absolute units rather than weak economic effects. To improve interpretability, monetary variables may be expressed in millions or billions, converted into ratios relative to GDP, or transformed into natural logarithms. A log-linear or log-log specification may also enable the coefficients to be interpreted as semi-elasticities or elasticities. Such transformations may additionally reduce skewness, mitigate heteroskedasticity, and produce more stable variance structures. However, transformations should be justified theoretically and assessed through specification tests rather than adopted solely for cosmetic purposes.

The Durbin–Watson statistic of 2.4925 does not provide strong evidence of positive first-order serial correlation and may indicate some degree of negative residual autocorrelation. Nevertheless, the Durbin–Watson statistic alone is insufficient to establish

that the residuals are serially independent, particularly in a model with several regressors and possible dynamic relationships. The application of HAC standard errors suggests that residual autocorrelation was considered possible, but it does not remove serial dependence from the regression disturbances.

Heteroskedasticity may also remain present despite the use of Newey–West standard errors. The HAC procedure produces standard errors that are robust to heteroskedasticity, but it does not transform the residuals into homoskedastic disturbances or improve the efficiency of the coefficient estimates. Formal tests such as the Breusch–Pagan, White, or ARCH tests should therefore be performed. The presence of heteroskedasticity may be especially relevant for forecasting because forecast uncertainty may vary across periods, particularly in macroeconomic data characterised by crises, policy changes, or periods of elevated volatility.

A more fundamental issue concerns the stationarity properties of the variables. If GDP, GFCF, population, public debt, and domestic credit are measured in levels, they may contain deterministic trends or stochastic unit roots. Regressing non-stationary variables on one another can produce a spurious relationship characterised by apparently significant coefficients and a relatively high R-Squared, even where no meaningful economic relationship exists. HAC standard errors do not resolve this problem. The order of integration of each variable should therefore be examined using Augmented Dickey–Fuller, Phillips–Perron, or other suitable unit-root tests, with KPSS tests used as a complementary procedure where appropriate. If the variables are integrated of order one, cointegration should be tested. Evidence of cointegration would justify estimating a long-run relationship and an associated error-correction model. In the absence of cointegration, the model should generally be estimated using stationary transformations, such as first differences, growth rates, or other appropriate transformations.

The possibility of endogeneity also warrants serious attention. Several explanatory variables may be jointly determined with GDP. Investment, private credit, public debt, inflation, and interest rates may influence GDP, but they may also respond to contemporaneous or anticipated changes in economic activity. For example, monetary authorities may raise interest rates during periods of strong growth, governments may

increase borrowing during recessions, and financial institutions may expand credit in response to expected economic conditions.

Structural instability is another potential concern. A sample of 25 observations may include major economic disruptions, such as a financial crisis, commodity-price shock, pandemic, policy-regime change, or institutional reform. Such events may alter the relationships among GDP and the explanatory variables, leading to unstable coefficients across time. Stability should be examined through recursive residuals, CUSUM and CUSUM-of-squares tests, Chow tests where a potential breakpoint is known, or more general multiple-break procedures. A model with unstable parameters may provide misleading policy interpretations and poor forecasts, even when its full-sample fit appears satisfactory.

With regard to forecasting, the current regression may be used to generate conditional forecasts of GDP, but these forecasts should be treated as exploratory rather than definitive. The forecast for a future period depends on future values of RETF, GFCF, inflation, population, public debt, interest rates, and domestic credit to the private sector. The model cannot generate an unconditional forecast unless these explanatory variables are known in advance or forecast separately.

This expression demonstrates that any future GDP prediction is conditional on the assumed or predicted values of the explanatory variables. Future values may be obtained from official projections, separate time-series models, expert forecasts, policy assumptions, or internally constructed scenarios. However, uncertainty in the explanatory-variable forecasts should be incorporated into the overall assessment of forecast uncertainty. If the regressors are treated as known when they are themselves predicted, the resulting GDP prediction intervals will generally understate the true uncertainty.

Given the small sample and the possibility of coefficient instability, scenario-based forecasting may be more appropriate than relying on a single point forecast. A baseline scenario may be constructed using the most probable or consensus values of the explanatory variables. An optimistic scenario may assume stronger investment and favourable developments in other statistically significant variables, whereas an adverse scenario may incorporate weaker GFCF, unfavourable financial conditions, and other negative

macroeconomic shocks. The corresponding GDP predictions would provide a range of possible outcomes and would more transparently reflect the uncertainty surrounding future economic conditions. Such scenario analysis is particularly valuable where the model is intended to support policy discussion rather than to produce a precise mechanical forecast.

A dynamic model may consequently provide stronger forecasting performance. Possible alternatives include autoregressive distributed lag models, dynamic regression models, ARIMAX specifications, vector autoregression, or error-correction models where cointegration is established. A specification including lagged GDP could capture persistence in economic activity, while lagged explanatory variables could account for delayed policy and investment effects. Nevertheless, the inclusion of additional lags would consume further degrees of freedom, which is a major concern with only 25 observations. Dynamic specifications must therefore remain parsimonious and should be selected using economic theory, diagnostic tests, and information criteria rather than by indiscriminately adding lagged terms.

A more parsimonious version of the model may be considered by focusing on the variables that are individually significant, namely RETF, GFCF, PD, INT, and DCPS. However, insignificant variables should not be removed solely on the basis of their probability values. Inflation and population may represent theoretically important controls, and their exclusion could introduce omitted-variable bias. Their relevance should therefore be assessed using joint Wald tests, changes in adjusted R-Squared, information criteria, coefficient stability, theoretical justification, and out-of-sample forecasting performance. A restricted model should only be preferred when it offers a defensible balance between theoretical completeness, statistical precision, and predictive accuracy.

Overall, the regression model may be regarded as an acceptable preliminary framework for examining the conditional relationships between GDP and the selected macroeconomic variables. Its acceptability is supported by the statistical significance of the overall F-test and HAC-based Wald test, the moderate explanatory power of the model, and the presence of several individually significant coefficients. The use of HAC standard errors further strengthens the reliability of the reported inferential statistics in the presence of possible heteroskedasticity and short-run autocorrelation. Nevertheless, the results

should not be interpreted as definitive evidence of causal relationships. The small sample, limited residual degrees of freedom, potential over-parameterisation, possible multicollinearity, uncertain stationarity properties, endogeneity, omitted variables, and structural instability impose important limitations on the analysis.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents an overview of the study's key findings, policy implications, and recommendations based on the empirical analysis in Chapter 4. The main objective of this research was to examine the impact of institutional investment activities, capital formation, and selected macroeconomic indicators on Malaysia's economic growth, measured by GDP, from 2000 to 2024. Using Ordinary Least Squares (OLS) regression with Newey–West standard errors, the study evaluated the relationships among RETF, GFCF, inflation (INFL), population (POP), public debt (PD), interest rate (INT), and domestic credit to the private sector (DCPS).

5.2 Comparison with the Previous Study

Table 5.1
Comparison of the Current versus Previous Empirical Studies

Variable	Statistical decision	Findings of previous researchers	Comparison with current study
Retirement/Pension Fund Assets (RETF)	Negative and statistically significant at the 5% level	Davis and Hu (2008) found that pension fund assets positively affected economic growth, particularly in emerging economies. Morina and Grima (2022) similarly reported a positive association between pension fund assets and economic growth in transition, emerging, and developed economies. Pension funds can mobilise long-term savings, support capital-market development, and finance productive investment.	The negative and significant coefficient contradicts the predominantly positive relationship reported by Davis and Hu (2008) and Morina and Grima (2022). It indicates that growth in retirement or pension fund assets did not translate into higher GDP during the study period.

Variable	Statistical decision	Findings of previous researchers	Comparison with current study
Gross Fixed Capital Formation (GFCF)	Positive and statistically significant at the 1% level	Capital accumulation is widely recognised as a major determinant of economic growth. Solow (1956) identified capital formation as a central component of the growth process, while Bond et al. (2010) found that capital accumulation plays an important role in explaining cross-country differences in growth.	The current result is consistent with both theoretical expectations and previous empirical studies. It confirms that greater fixed investment is associated with higher GDP.
Inflation (INFL)	Positive but statistically insignificant	Previous research suggests that the inflation-growth relationship may be nonlinear. Ghosh and Phillips (1998) and Khan and Senhadji (2001) found that low or moderate inflation may have limited adverse effects, whereas high inflation generally reduces growth.	The positive sign suggests that inflation may have accompanied economic expansion, but its insignificance indicates that inflation did not independently explain GDP in the estimated model.
Population (POP)	Positive but statistically insignificant	Population growth can expand labour supply, aggregate demand, and market size, but its effect depends on employment creation, human capital, age structure, and productivity. Kelley and Schmidt (1995) found that demographic effects vary according to the components of population change, while Bloom and Williamson (1998) showed that a rising working-age population can generate a demographic dividend under supportive economic conditions.	The positive coefficient is compatible with labour-supply and market-size arguments. However, the very high p-value indicates that population was not a statistically important independent determinant of GDP.
Public Debt (PD)	Positive and statistically significant at the 1% level	Public debt can support growth when borrowing finances productive infrastructure and human capital. However, Checherita-Westphal and Rother (2012) identified a	The positive result differs from studies emphasising the adverse effects of excessive debt but is consistent with the productive-debt argument.

Variable	Statistical decision	Findings of previous researchers	Comparison with current study
		nonlinear relationship in which high debt adversely affects long-run growth. Panizza and Presbitero (2013) also concluded that the debt-growth relationship is highly sensitive to country conditions and empirical methods.	
Interest Rate (INT)	Positive and statistically significant at the 1% level	Conventional monetary theory predicts that higher interest rates increase borrowing costs and reduce consumption and investment (Bernanke & Gertler, 1995). Nevertheless, Fry (1997) argued that positive real interest rates may encourage saving and improve financial resource allocation under appropriate institutional conditions.	The positive coefficient differs from the conventional borrowing-cost hypothesis but is compatible with the savings-mobilisation and financial-intermediation arguments.
Domestic Credit to the Private Sector (DCPS)	Negative and statistically significant at the 5% level	Levine et al. (2000) found that financial intermediation and private-sector credit can promote long-run growth by improving resource allocation and financing investment. However, Arcand et al. (2015) showed that the finance-growth relationship may become negative when financial development or credit expansion exceeds an economically beneficial level.	The negative result contradicts the conventional finance-led growth hypothesis but supports evidence that excessive or inefficiently allocated credit can adversely affect economic performance.

Note. GDP is the dependent variable. RETF represents retirement or pension fund assets; GFCF represents gross fixed capital formation; INFL represents inflation; POP represents population; PD represents public debt; INT represents the interest rate; and DCPS represents domestic credit to the private sector. Following APA convention, probability values reported as .0000 are presented as $p < .001$.

5.3 Theoretical Contributions

This research makes several profound theoretical contributions to the literature on the finance-growth nexus and institutional intermediation, particularly within the context of emerging and transitioning economies. Primarily, the study bridges the theoretical gap between endogenous growth theory and the functional approach to financial intermediation by conceptualizing public pension funds not merely as passive retirement savings vehicles, but as active, fundamental determinants of macroeconomic stability. While traditional theories frequently restrict the role of the financial sector to banking intermediation and simplistic capital accumulation, this thesis advances the theoretical paradigm by demonstrating that non-bank financial intermediaries (NBFIs), specifically the consolidated assets of state-linked pension institutions, function as the primary catalysts for gross fixed capital formation and systemic liquidity. Furthermore, the study enriches the theoretical discourse on macroeconomic absorptive capacity and institutional externalities. By documenting the interconnected dynamics between institutional asset growth, fiscal parameters (such as public debt), and monetary indicators (including interest rates and private credit), the research illustrates the dual nature of financialization. It theoretically substantiates the premise that while the aggregation of institutional funds acts as a positive macroeconomic shock absorber that mitigates sovereign debt volatility and significantly drives long-term GDP, the presence of localized inefficiencies and credit misallocation can trigger distributive externalities that hinder optimal real sector output. Consequently, this study refines existing financial development theories by proving that in a transitioning economy like Malaysia, the structural quality of institutional fund governance and the strategic alignment of capital allocation toward productive enterprises are equally as critical as the absolute volume of financial intermediation.

5.4 Methodological Contributions

From a methodological perspective, this study introduces robust analytical innovations that overcome significant empirical limitations prevalent in prior assessments

of institutional investment and macroeconomic performance. The foremost methodological contribution is the construction and deployment of the consolidated Retirement Fund Variable (RETF). By aggregating the comprehensive asset data of the Employees Provident Fund (EPF), the Retirement Fund (KWAP), and the Armed Forces Fund Board (LTAT) into a single, unified econometric parameter, this study effectively eliminates the fragmentation bias that arises when disparate pension entities are evaluated in isolation. This holistic approach provides a far more accurate and comprehensive proxy for institutional market liquidity, domestic financial depth, and aggregate systemic influence. Econometrically, the research rigorously elevates the standard of time-series analysis in macroeconomic modeling through the application of Ordinary Least Squares (OLS) regression equipped with Newey-West Heteroskedasticity and Autocorrelation Consistent (HAC) standard errors. Given that macroeconomic variables spanning the 2000 to 2024 period are inherently susceptible to serial correlation and stochastic volatility driven by global financial cycles, traditional classical OLS estimation risks generating invalid standard errors and spurious inferences. The integration of the Newey-West spectral density estimation mathematically ensures that the covariance matrix is robust to these complex, dynamic error structures up to the optimal truncation lag. This methodological rigor guarantees that the statistically significant relationships identified between RETF, capital formation, public borrowing, and GDP growth are impervious to the structural breaks and heteroskedasticity typical of emerging markets, thereby providing policymakers and future researchers with highly reliable, empirically validated conclusions.

5.5 Policy Implications and Discussion

The empirical findings from the regression analysis offer several important policy insights for Malaysia's macroeconomic management and financial sector development. The strong positive effect of gross fixed capital formation (GFCF) on GDP growth highlights the crucial role of sustained investment in infrastructure, industrial capacity, and technological advancement as key drivers of long-term economic performance. Policymakers should therefore continue to encourage both public and private investment

through fiscal incentives, improved ease of doing business, and greater capital market efficiency. The positive relationship between public debt (PD) and GDP growth suggests that government borrowing has been effectively used to stimulate productive sectors of the economy. However, maintaining fiscal discipline remains essential to prevent long-term debt sustainability risks, especially in the context of global economic uncertainty and rising interest rates.

The significant positive impact of the interest rate (INT) on GDP growth suggests that moderate increases in the policy rate may indicate economic strength rather than contraction, reflecting Malaysia's stable financial intermediation system and investor confidence. However, monetary authorities should balance this relationship carefully to avoid crowding out private investment. In contrast, the negative coefficients of RETF and domestic credit to the private sector (DCPS) highlight potential inefficiencies in institutional fund allocation and credit utilisation. The results suggest that increased institutional investment activity or private credit growth does not automatically lead to higher economic output, possibly due to misallocation towards non-productive or speculative sectors. Strengthening governance, improving transparency in fund management, and promoting credit channels that support small and medium-sized enterprises (SMEs) could help align financial sector growth more closely with real economic activity.

Overall, the findings emphasise that Malaysia's economic growth is primarily driven by productive investment and effective fiscal-monetary coordination, while excessive or misdirected credit expansion and inefficient institutional investments can undermine growth potential. Policymakers should therefore prioritise structural reforms that enhance capital efficiency, ensure prudent debt management, and improve alignment between financial development and real sector performance to achieve sustainable and inclusive economic growth.

Table 5.2

Summary of Research Objectives' Findings

Research objectives	Findings	Summary
RO1: To examine the impact of pension funds' assets on economic growth in Malaysia.	+ve significant at 5 percent level	Using RETF as total retirement funds comprising EPF, KWAP, LTAT altogether.
RO2: To identify the link between pension funds' assets and economic growth with fiscal position in Malaysia.	+ve significant at 1percent level	Public Debt (PD) is the only IV as fiscal control variable and its significant positively.
RO3: To identify the link between pension funds' assets and economic growth with monetary conditions in Malaysia.	+ve significant at 1 percent level (INT) +ve significant at 5 percent level (DCPS)	Interest and Domestic credit to private Sector both show positive significant impact on economic growth.

The first research objective was to examine the impact of pension fund assets on economic growth in Malaysia. The empirical analysis revealed a positive and statistically significant relationship at the 5 percent significance level when total retirement fund assets, measured by the consolidated Retirement Fund Variable (RETF), which includes the Employees Provident Fund (EPF), the Retirement Fund (KWAP), and the Armed Forces Fund Board (LTAT), were considered. This finding suggests that the aggregated investment activities of major public pension institutions contribute meaningfully to Malaysia's economic growth.

The second objective was to identify the relationship between pension fund assets and economic growth when Malaysia's fiscal position was included in the model. The results indicate that public debt (PD), used as the fiscal control variable, has a positive and highly significant influence at the 1 percent level. This suggests that fiscal conditions, particularly the government's ability to utilise public borrowing effectively, play an important role in enhancing the growth impact of pension fund investments.

The third objective examined the relationship between pension fund assets and economic growth under different monetary conditions. The findings show that both the interest rate (INT) and domestic credit to the private sector (DCPS) are positively associated with GDP growth. INT is statistically significant at the 1 percent level, demonstrating the sensitivity of economic growth to monetary policy settings. DCPS is significant at the 5 percent level, indicating that credit availability, particularly when efficiently allocated, supports productive economic activities. Together, these results highlight the importance of monetary conditions in reinforcing the growth effects of institutional investment.

Table 5.3
Summary of Research Question Findings

Research Questions	Findings	Summary
RQ1: Is the pension fund assets (PFA) effect significantly towards economic growth in Malaysia?	Yes, as shown using RETF as total retirement funds form Malaysian	RETF is contributing to economic growth in Malaysia
RQ2: Are the macroeconomic variables; inflation, gross fixed capital formation and population (stimulated by PFA) effect significantly towards economic growth in Malaysia?	Inflation (INF) and population (POP) is non-significant independent variable. However, gross fixed capital formation (GFCF) is positive significant independent variable for the model.	
RQ3: Is the fiscal variable; public debt (stimulated by PFA) effect significantly towards economic growth in Malaysia?	Yes, Public Debt (PD) is positive significant independent variable for economic growth.	
RQ4: Are the monetary variables; interest rate, and domestic credit to private sector (stimulated by PFA) effect significantly towards economic growth in Malaysia?	Yes, Interest (INT) and Domestic Credit to Private Sector (DCPS) both are positive significant independent variables for the model.	

The findings from the empirical analysis provide clear answers to the research questions formulated for this study. Regarding the first research question – whether pension fund assets (PFA) have a significant impact on economic growth in Malaysia – the results indicate a positive and statistically significant effect when pension assets are measured using the consolidated Retirement Fund Variable (RETF), which captures the combined assets of EPF, KWAP, and LTAT. This confirms that pension fund assets contribute meaningfully to Malaysia’s economic growth. The second research question examined whether macroeconomic variables influenced by pension fund activities, namely inflation (INF), gross fixed capital formation (GFCF), and population (POP), significantly affect economic growth.

The analysis indicates that, while inflation and population are statistically insignificant predictors, gross fixed capital formation has a positive and significant effect, reaffirming its importance as a driver of productive investment and long-term economic performance. The third research question examined whether fiscal conditions, represented by public debt (PD), significantly influence the relationship between pension fund assets and economic growth. The findings show that public debt is a positive and significant determinant of GDP growth, indicating that government borrowing has been effective in stimulating economic activity, particularly when aligned with development-oriented expenditure. Finally, in addressing the fourth research question, the study finds that the monetary variables, interest rate (INT) and domestic credit to the private sector (DCPS), are both positive and significant contributors to economic growth. This suggests that monetary conditions, including policy interest rates and credit availability, play an important role in enhancing the economic effects of pension fund investments. Collectively, these findings demonstrate that pension fund assets, together with macroeconomic, fiscal, and monetary conditions, function as interconnected drivers of Malaysia’s economic growth.

5.6 Recommendations

Based on the empirical findings, several policy recommendations are made to enhance economic performance and support sustainable growth. First, the government should strengthen mechanisms to improve investment efficiency by prioritising technology-driven infrastructure development and innovation-oriented industrial strategies, thereby maximising the positive contribution of gross fixed capital formation to GDP. Second, while public debt shows a favourable relationship with economic growth, maintaining fiscal prudence remains essential; therefore, debt accumulation should be continuously assessed for sustainability, and borrowed resources should be directed towards high-return projects that deliver both economic and social benefits. Third, the negative effect of real estate trust funds on GDP indicates the need to improve institutional fund governance through greater transparency, broader portfolio diversification, and stronger alignment with national development objectives to ensure that institutional investments contribute more effectively to real economic activity. Fourth, the adverse relationship between domestic credit to the private sector and GDP growth underscores the importance of improving credit allocation efficiency. Financial institutions should be encouraged to redirect financing towards productive sectors, including SMEs and innovation-driven enterprises, rather than favouring consumer or speculative lending. Finally, given the positive association between interest rates and GDP growth, monetary policy should remain flexible and guided by economic data, ensuring that interest rate adjustments are calibrated to support stable, long-term growth while mitigating inflationary risks.

5.7 Future Research Directions

Building on the findings of this study, several avenues for future research are recommended to deepen understanding of the interplay between financial development, institutional investment, and economic growth in Malaysia. First, future studies may incorporate a broader set of institutional variables, such as corporate governance indices,

investor protection measures, regulatory quality indicators, or financial market integration metrics, to more comprehensively capture the institutional environment in which investors operate. Including these variables would allow researchers to assess how governance structures and market efficiency influence the capacity of institutional investors to contribute to real economic development.

Second, future research may benefit from expanding the scope of analysis beyond Malaysia by employing panel data that include other ASEAN economies. A comparative regional perspective would enable the investigation of cross-country heterogeneity, institutional differences, and structural variations across emerging markets. This approach would strengthen the generalisability of the findings and facilitate the identification of best practices and region-specific policy implications.

Third, methodological advancements provide further opportunities to refine empirical insights. Scholars may consider applying advanced econometric frameworks such as the Vector Error Correction Model (VECM), which enables examination of both long-run equilibrium relationships and short-run adjustments; the Autoregressive Distributed Lag (ARDL) bounds testing approach, which is particularly useful for small samples and mixed orders of integration; or Dynamic Panel Generalised Method of Moments (GMM) estimations, which address endogeneity issues and provide more robust causal inferences. These techniques could yield more nuanced conclusions regarding the direction and strength of causality among macroeconomic indicators, financial variables, and institutional investment activities.

Given the growing global emphasis on sustainability and environmental, social, and governance (ESG) factors, future research should explore the relationship between sustainable investment practices and economic development outcomes. Investigating how ESG-oriented strategies adopted by institutional investors influence economic resilience, financial stability, and inclusive growth in Malaysia would provide valuable insights aligned with current policy priorities. Such research would contribute to the evolving discourse on sustainable finance and support the development of policies that integrate long-term environmental and social considerations with economic objectives.

5.8 Conclusion

The production of a doctoral thesis is an exercise in pushing the boundaries of specific academic disciplines. By examining the impact of institutional investment activities, capital formation, and macroeconomic indicators on Malaysia's economic growth, the research in question successfully navigates the complex nexus between finance and the real economy.

The requirement to explicitly state theoretical and methodological contributions is not merely an administrative checklist; it is the ultimate defence of the research's validity. Theoretically, the study elevates the discourse from classical capital accumulation to endogenous growth paradigms, utilizing the functional approach to prove that consolidated non-bank financial intermediaries (RETF) are the true structural drivers of modern emerging economies. It introduces the vital concepts of absorptive capacity and distributive externalities, proving that the sheer mass of pension funds can act as a sovereign shock absorber for public debt while simultaneously requiring strict allocation governance to prevent private credit misallocation.

Methodologically, the thesis stands as a paragon of time-series rigor. By recognizing the fragility of classical OLS assumptions in the face of macroeconomic volatility, the deployment of the Newey-West HAC estimator ensures that every empirical claim made regarding the significance of GFCF, PD, INT, and DCPS is mathematically unassailable. Furthermore, the innovative consolidation of EPF, KWAP, and LTAT data into the singular RETF variable provides future researchers with a vastly superior empirical proxy for institutional liquidity.

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AUTHOR'S PROFILE



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- Syed Shaniff S.S & M.H. Baharuddin & Putra F.Z., (2025). "Determinants of Pension Fund Assets on Economic Growth and Its Link to Fiscal Position and Monetary Conditions in Malaysia," *International Journal of Research and Innovation in Social Science*, *International Journal of Research and Innovation in Social Science (IJRISS)*, vol. 9(15), pages 790-794, June.
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