APPRAISAL OF THE FINANCIAL PERFORMANCE OF SSNIT INVESTMENT PORTFOLIO (1995 - 2004)

By

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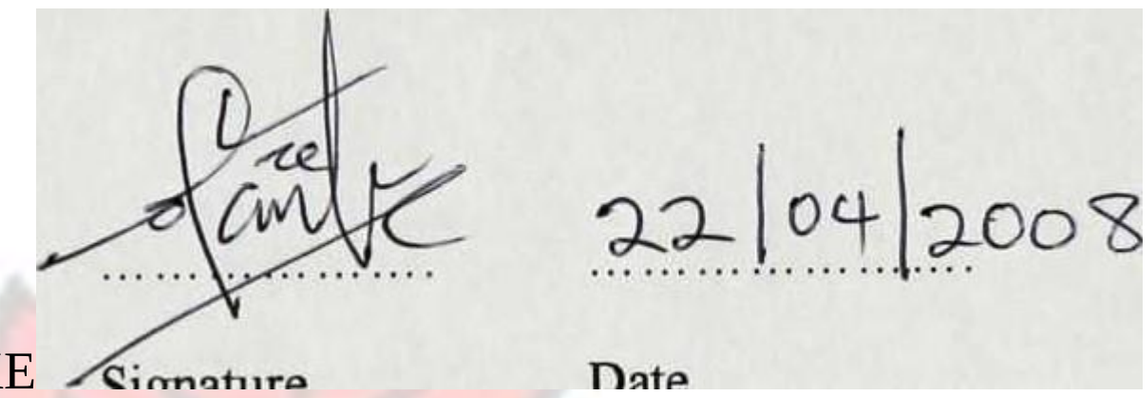
CERTIFICATION

I hereby declare that this submission is my own work towards the MBA and to the best of my knowledge, it contains neither material previously publicised by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.



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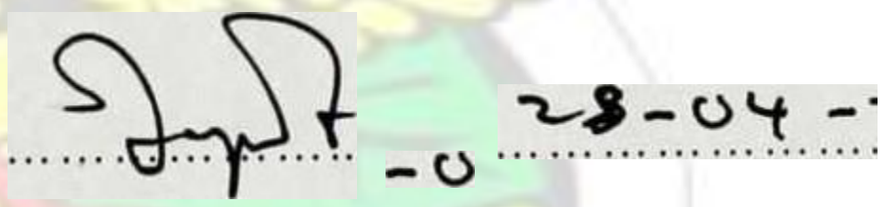

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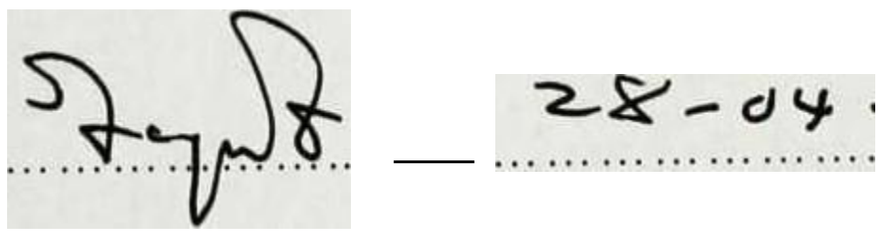

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DEDICATION

This work is dedicated to my Father Emmanuel Q. Dake-Bansa and my Mother Cecilia A. Mienuvor Dake-Bansa for their prayers and support in my education.

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I thank the Lord for having made it possible for me to complete this thesis successfully. To my supervisor Mr. Joseph M. Frimpong, I express my profound thanks for his invaluable comments and guidance at every stage leading to the successful completion of this study. I am also thankful to the former Dean of KNUST Business School, Professor Seth N. Buatsi and all other lecturers of the KNUST Business School for their support in the work.

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Elikem and Aseye, brothers and sisters for their support, concern and prayers.

In all, while the above take all the credit, any shortcomings and inadequacies of this study are my sole responsibility.

ABSTRACT

This study is an appraisal of SSNIT Investment Portfolio performance, focusing on establishing and analysing the relationship between 1) the portfolio returns and investment asset allocation policy, asset selection strategy and asset timing strategy; and 2) the portfolio returns and selected macroeconomic variables. The analysis uses finance, statistical and econometric techniques on quarterly time series data on SSNIT Investment Portfolio and selected macroeconomic variables over the past decade (1995-2004). The evidence from the analysis reveals that on the average, SSNIT investment portfolio earned positive real returns on its investment portfolio over the past decade (1995 -2004), exceeding its benchmark. Also, the portfolio's value was enhanced annually through active portfolio management, which involves strategic asset selection and timing. SSNIT would have lost value if the investment portfolio was managed passively. The study further revealed asset timing and asset selection significantly influenced the portfolio returns. The portfolio returns were more sensitive to strategic asset timing than they were to policy allocation and strategic asset selection. Finally, it was observed that variations in macroeconomic variables had significant instant and lagged effects on the SSNIT Investment Portfolio performance. The study recommends that SSNIT fund managers should endeavour to maintain superior asset selection strategy and pay critical attention to asset timing. SSNIT should also consider a review of its asset allocation policy in line with current trends@capital market expectation. Finally, in order to enable the SSNIT investment

portfolio to take I advantage of various investment opportunities in the economy, government must of necessity and as a matter of urgency follow sustained prudent macroeconomic policies.

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CHAPTER ONE

INTRODUCTION

1.1 Background

The Social Security and National Insurance Trust (SSNIT or the Trust) was established in 1965 by the Social Security Act (Act 279). The basic reason for the creation of SSNIT is to provide income replacement schemes for Ghanaian workers

and their dependants in the event of stoppage or loss of income resulting from certain life's contingencies. Upon establishment, SSNIT provided lumpsum benefit payments to its qualifying members under a Provident Fund Scheme. In 1992, SSNIT was mandated to provide pension payments under the Social Security Law (PNDCL 247). This law gave birth to the Social Security Pension Scheme, which provides for three contingencies: old-age, death/survivors and invalidity. SSNIT thus plays an important role in the socio-economic development of Ghana. There is therefore the need to assess the variables that influence the long-term viability of the SSNIT Pension Scheme. Key among these variables is the prudent investment of surplus funds.

SSNIT holds an investment portfolio that span the financial, manufacturing, services and real estate sectors of the Ghanaian economy. The investment portfolio is classified into five main composites, namely: Domestic Equity, International Equity, Fixed Income, Real Estate and Economically Targeted Investment portfolios. The— total value of-SSÑIranvestment Portfolio assets have grown from 080.0 billion in 1995 to billion in 2004. The substantial growth in the assets requires the fund managers to make prudent investment decisions for optimal real portfolio returns to ensure that the fund's obligations are met. There, however appears to be some disquiet from some pensioners and contributors to the Scheme regarding the performance of SSNIT's investments. Available figures from SSNIT Investment Department put the average annual real rate of return on SSNIT investment portfolio between 1995 and 2004 at negative 2.1%. This compares unfavourably with SSNIT's actuarially determined targeted minimum required real return of positive 2% on SSNIT Investment Portfolio.

It is against this background that this study attempts to provide an appraisal of SSNIT Investment Portfolio performance. The study also seeks to establish and analyse the relationship between investment policy, investment strategy and macroeconomic variables on SSNIT investment portfolio returns.

1.2 Statement of Problem

(Ilkiw, 2003) and (Justino, 2003) argue that, to stem the possible conditions of poverty, deprivation, and to reduce or eliminate destitution, nations the world over needed effective and efficient social security schemes. They stressed that such schemes must emphasize prudent investment of surplus funds to ensure their longterm viability and sustainability. It was in line with similar arguments that the SSNIT Pension Scheme of Ghana was established to provide income replacement schemes for Ghanaian workers and their dependants in the event of income loss occasioned by old age, death or invalidity. (P.N.D.C. Law 247).

The membership of SSNIT has increased significantly over the last 10 years, witythe numberofúÑ6VGtributors rising by 129% from about 466,000 in 1995 to about by the end of 2004. (Source: SSNIT Research Department). As the proportion of the Ghanaian labour force that participate in the SSNIT scheme continue to grow, the increasing challenge of adequately providing for their security, and the security of their dependants, in the event of income loss resulting from oldage, invalidity or death must be met. This requires the long-term viability and sustainability of the SSNIT Pension Scheme. Key among the variables that is believed to influence the viability and sustainability of SSNIT Pension Scheme is the prudent investment of surplus funds. Time and again, the performance of SSNIT's investments become

topical issue in the Ghanaian media The investments are perceived to be performing abysmally. Available information from SSNIT Investment Department put the ten year (1995 — 2004) geometric mean return on SSNIT Investment Portfolio at negative 2.1 per cent.

The seeming or perceived abysmal performance of SSNIT's investment portfolio may be attributed to (1) the unfavourable economic environment that prevailed during the greater part of the period under review; (2) improper asset allocation decisions; and (3) the impression that SSNIT funds are part of the public purse and can be used as such, under the banner of meeting the social and economic utility principle of investing pension funds.

This study is interested in identifying what the actual performance of SSNIT's investment portfolio has been over the period 1995 to 2004. Also, the study seeks to establish and analyse the relationship between (1) the SSNIT's investment portfolio returns and investment policy and asset selection and asset timing; and (2) the SSNIT's investment portfolio returns and selected macroeconomic variables.

1.3 Objectives of the Study

Broadly, the study intends to evaluate and analyse the financial performance of SSNIT investment portfolio. The specific objectives include, to:

a) Identify the annual returns on each of SSNIT's investment assets between 1995 and 2004.

b) Identify the overall annual returns on SSNIT's investment portfolio over the past decade (1995-2004).

c) Identify the annualized (geometric) mean return on SSNIT's investment portfolio from 1995 to 2004.

d) Establish and malyse the relationship between SSNIT Investment portfolio returns and its asset allocation, asset selection and asset timing.

e) Establish and analyse the relationship between SSNIT Investment portfolio returns and inflation rates, treasury bill rates, exchange rates, lending rates and Ghana Stock Exchange performance.

f) Make appropriate recommendations to enhance the performance of SSNIT investment portfolio.

1.4 Relevance of the Study

——ThiÅ study-<ÇÕÜÚTÓ appraise the financial performance of the SSNIT investment portfolio over the period 1995 to 2004. The general information in the public domain regarding the performance of SSNIT's investments is nothing to wñte home about Analysts and stakeholders are apparently anxious to find

answers to the perceived abysmal returns on SSNIT investments. This study is expected to provide them the relevant answers. Also, the study would serve as precedence for future research and also close some of the loopholes identified in earlier studies. It is the belief of the researcher that all data and information gathered

during the study would serve as a means of useful information to academicians and researchers in general.

Of much more importance are the implications of findings of the study regarding the long-term viability and sustainability of the SSNIT pension scheme. While policy makers would be advised to keep a close eye on macroeconomic variables to mitigate their harmful effects on the investment climate, SSNIT's fund managers would be advised to put in place and comply with prudent investment policies and strategies for optimum portfolio returns. SSNIT is carrying out a restructuring exercise in its Investment Department with the view to strengthening it to enhance the performance of its investment portfolio. As part of the restructuring exercise, the department has metamorphosed into five departments, namely: Equities Department, Fixed Income Department, Economically Targeted Investments Department, Realty Department and Portfolio Performance Measurement and Monitoring Department. The researcher is one of the current three-member-staff of the Portfolio Performance Measurement and Monitoring Department. This gives relevance of the study to the researcher in particular and to SSNIT in general.

1.5 Hypotheses

This study attempts to test the relevance of previous studies and models to the SSNIT investment portfolio. As a background guide therefore, this study builds on the results of prior studies to form the following hypotheses:

a) Asset allocation policy does not significantly influence the performance of SSNIT's Investment Portfolio.

b) Asset selection does not significantly influence the performance of SSNIT's Investment Portfolio. c) Asset timing does not significantly influence the performance of SSNIT's Investment Portfolio.

d) The levels of inflation does not significantly influence the performance of SSNIT's Investment Portfolio.

e) The levels of Deposit Money Bank lending rates does not significantly influence the performance of SSNIT's Investment Portfolio.

f) Increasing depreciation rate of local currency to foreign currency (the US dollar) does not significantly influence the performance of SSNIT's Investment Portfolio.

g) Increasing Treasury bill rate does not significantly influence the performance of SSNIT's Investment Portfolio.

h) Increasing Ghana Stock Exchange All-Share Index does not significantly influence the performance of SSNIT's Investment Portfolio.

1.6 Scope and Limitations of the Study

Being the only mandatory public pension fund in Ghana, the study would be focused entirely on SSNIT and would cover its investment portfolio between 1995 and 2004. Since SSNIT's investments span a number of sectors in the Ghanaian economy, we would also use data and information from bodies like Statistical

Services, Bank of Ghana, Ghana Stock Exchange, and Institution of Statistical Social and Economic Research and the International Social Security Association

As stated in the methodology of this study, quarterly data of all the variables would be used. This is to ensure the fair capture of likely changes and trends in the variable and for that matter more accurate and representative computations. Data collected would be analysed using the Sharpe Composite Investment Performance Evaluation Measure, Brinson et al's Performance Attribution Matrix and Multiple Linear Regression models.

The study period is 1995 to 2004, which is chosen mainly due to the inception date of SSNIT Investment Department and data constraints. Data availability constraints are anticipated, particularly on the valuation figures for SSNIT-held unlisted equity and realty investments. This necessitated the use of book values for equities and inflation adjustment for real estates.

1.7 Organization of the Study

This study would be organized in five chapters. Chapter one is an introductory chapter, which would cover a background analysis of the major components of the study. This chapter would also include the research problem, relevance, objectives, hypotheses, and how the study is organised. The chapter would also discuss the scope and limitations of the study.

A review of the relevant literature would be made to serve as the basis of this study in chapter two. This chapter will also cover the conceptual framework of the study. In chapter three we present the profile of SSNIT and the methodology ofthe study to reflect its scope, data sources, data requirements, definition of key variables and analytical techniques used to be in chapter four.

Chapter four presents estimations using models and analytical techniques outlined in the methodology. We also present a discussion of the results and findings of the research in this chapter. The concluding chapter, five, would provide a summary of the study. The conclusions of the study and relevant recommendations based on the findings of the study would then be presented. The references would accompany the appendices to conclude the chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 The Concept of Social Security.

(ILO Convention 102, 1952) defines social Security as a series of public measures taken with the aim of providing members of society with protection against economic and social distress that would otherwise result from the stoppage or substantial reduction of earnings (resulting from sickness, maternity, employment injury, unemployment, invalidity, old age and death), the provision of medical care and the provision of subsidies for families with children.

(lyer, 1993) dates the concept of protecting the elderly back a millennia, where active members of an extended family support their elderly relatives, with the

expectations that, when they are old, the younger members of the family will support them in turn. According to (Dei, 2001), in Ghana, this informal intra-family system of social protection has been widely used during the pre and post independence eras, particularly in the rural farming areas. He asserts however that, with the advent of industrialization, the rapid growth of the urban labour force rendered this informal family support system ineffective as a mechanism for social protection in many countries. This prompted the development of the more formal social protection or social security pension schemes in various countries, including Ghana.

2.2 A Review of Selected Pension Schemes and their Investment Performance

2.2.1 The Latin Americas

(Palacios, 2003) dates the origins of old-age security schemes in Latin America back to the first decades of this century. He points out that in the 1980s, grave economic crisis adversely affected public pension reserves. Thus, in many countries within the region, the real values of pension benefits were almost completely eroded by inflation, with some pension funds defaulting on their pension liabilities. These factors and conditions led to pension reforms in the region.

(Muller, 1999) held that Chile was the first Latin American country to enact a radical departure from the Bismarckian paradigm by privatizing its pension system. In 1981, Chile replaced its public Pay As You Go (PAYG) scheme with a compulsory Individually Full-Funded (IFF) scheme administered by private pension funds. The Chilean switch involved a multi-pillar scheme in which the lion's share of old-age security falls to private, IFF pension funds. A publicly run first pillar pays out tax-financed social assistance pensions to a limited number of elderly persons In need, who

have not contributed at all or contributed for less than 20 years to the pension insurance. The second pillar consists of funded private pension funds (Administradoras de Fondos de Pensiones, or AFP).

The AFPs are expected to invest the accumulated funds profitably, following specific investment rules set by the state supervisory agency, Superintendencia de Administradoras de—FõñFde Pensiones (SAFP). The SAFP impose rigorous requirements about reporting, disclosure, and financial solvency among others. The amount of future pensions depends on the rate ofreturn to pension assets and on the lifetime earning profile of the insured (defined contribution plan). The Chilean experience is widely regarded as a success. Real rates of return on the Chilean pension fund investment portfolio have been impressive, averaging 10.5% since inception (Muller, 1999). And since Chile returned to democracy in 1990, no party or interest group has challenged their basic social security model.

According to (Becker, 1996) Argentina, inspired by the Chilean example, introduced a fundamental reform of its pension system in 1994, which aroused considerable interest. (Hujo, 1999) observed that the new Argentine pension system combines a sweeping reform of the public PAYG system with mainly privately managed pension funds (Administradoras de Fondos de Jubilaciones y Pensiones, or AFJPs). The insured can decide to redirect part of their pension contributions to one of the AFJPs, thereby choosing the mixed pension path and participating in two mandatory earnings-related schemes simultaneously. Alternatively, the insured can opt to remain in the public PAYG system, thus choosing the public pension path:

Palacios (2003) noted that other countries in the Latin Americas have emulated the pioneer, Chile, and posted impressive since-inception real returns on their investments, These include Bolivia: 16.2%, Colombia: 11.8%, Mexico: 10.6%,

Uruguay: 9.5% and El-Salvador: 11.3%.

22.2 The US Public Pension System

(Buck Consultants, 2000) contend that although some US public pension plans date to the late 19th century, most (mainly defined benefit) were established between ~~een the 1920's and the 1940's.~~ the They hold that US public sector plans have grown to comprise a substantial segment of national pension assets and membership. Participants include more than 14 million workers — ten percent of the national workforce — and six million retirees as well as other annuitants; all are members of more than 2,000 retirement systems sponsored by a state or local government (U.S. Census, 2002). These systems have combined assets of more than $2 trillion and have distributed over $110 billion in pension and other benefits (Board of Governors, 2004; U.S. census, 2002); this volume exceeded the entire economic output of 22 states and the District of Columbia (U.S. dept. of Commerce, 2003). A study prepared for the Nebraska Public Employee Retirement System (PERS) found that from 1983-99 that Defined Benefit plans in the U.S. generated an average real return of I I percent annually, higher than returns on Defined Contribution plans - 6 percent (Buck Consultants, 2000).

2.3 International Social Security Association's Guidelines on Investing Social Security Funds

At its international conference on the investment on social security funds, held in Merida, Mexico in September 2005, the International Social Security Association (ISSA) of the International Labour Organisation, provided the following guidelines for the investment of social security funds:

(i) The maintenance of a sound governance structure, which require the clear identification of responsibilities, establishment of a governing body that should be

subject to the least political interference or influence, the creation of an investment committee and an investing institution. The investment committee appointed by the investing institution should be responsible for developing the investment policy and the investment strategy, recommending them to the governing body, overseeing their implementation, and evaluating their effectiveness.

(ii) The two pnmary obJectives for investment of social finds are (l) secunty — the investnEnts should the soctal security scheme to meet its commitments in a cost-effective way; and (2) profitability — the investments should Ehieve optimum returns The social and economic utility of investments may also be taken into account Such however, should be subsidiary to the primary objectives of security and profitability.

(iii) Periodic analysis of each asset class and the portfolio as a whole should be carried out to determine normal, risk-adjusted, and inflation-adjusted rates of return. The analysis should include comparisons with targd rates return, and with appropriate benchmarks, to allow the governing body of the social security scheme to assess investment performance, to update the asset allocation strategy, and to make adjustments (as may be required) to the investment policy and strategy. The analysis of investment portfolio performance should be publicised.

2.4 The Concept of Performance Appraisal

(Mullins, 2002) notes that the history of performance appraisal dates to Taylor's pioneering Time and Motion studies in the early 20th century, and defines

performance appraisal as a method of reviewing the performance and potential of employees that is usually undertaken formally and systematically at regular intervals.

(Dulewicz, 1989) observes that there is a basic human tendency to make judgments about those one is working with, as well about oneself To Dulewicz, performance appraisal is both inevitable and universal. He argued that in the absence

of a carefully structured system of appraisal, people will tend to judge the work performance of others, including subordinates, naturally, informally and arbitrarily.

(Business Affairs, 2003) defines performance appraisal as a process that provides a periodic review and evaluation of an individual's job performance. (Howe, 2003), concerned about employee productivity, presents performance appraisal as a way of identifying employee training and development needs. The

U.S. General Accounting Office (GAO/GCD-98-26) provides a general definition of performance appraisal, defining it as the ongoing evaluation and reporting of programme accomplishments, particularly, the progress towards pre-established goals. It contends that performance measurement or appraisal is typically conducted by programme or agency management. Performance measures may address the type or level of programme activities conducted (process), the direct products and services delivered by a programme (outputs), and/or the results of those products and services (outcomes).

(Artley et al., 2001) indicates that performance measures quantitatively tell us something important about our product(s), service(s), and the process(es) that produce them. Arguing that they are a tool to help us understand, manage, and improve what our organizations do, Artley et al. pointed out that effective performance measures can let us know how well we are doing, whether we are meeting our goals, whether our customers are satisfied, our processes are in statistical control, and where improvements are necessary. In a summary, they provideus with inferrffãfiõTÕcessary to make intelligent decisions about improving what we do.

This definition captures the essence of a typical business' or institution's performance appraisal, which may cover any or all of the following aspects of the business or institution: legal, operations, marketing, human resources and finance; in respect of its strategic goals and objectives.

For the appraisal of the financial performance of an institution, White et al. presents financial ratio analysis as a useful tool in evaluating a company's profitability, efficiency, liquidity, leverage and solvency. (Bringham and Houston,

1998; Brealey and Myers, 2000; Ross et al., 1998; Reilly and Brown, 2000 and White et al., 1997) agree with White et al. as they espouse the use of financial ratios to evaluate business' performance in several important areas, including profitability, efficiency, liquidity, leverage and solvency.

Having noted in brief various views on performance appraisal, we wish to mention that this study limits itself to the financial performance of a pension fund's investment portfolio. (Sharpe and Alexander, 1990) defines Portfolio Performance Appraisal as a component of the investment process involving the periodic analysis of how a portfolio performed in terms of returns earned and risks incurred. (Sharpe, 1994; Blake, 1990; and Reilly and Brown, 2000), also pointed out that portfolio performance appraisal involves measuring the ex-post portfolio returns, examining the associated risks and benchmarks for comparison. They argued that ex-post portfolio returns can be measured as time-weighted rates of return (geometric mean) or money-weighted (or value weighted or internal rate of return) rates of return. They indicated that the simplest method is money-weighted rate of return, but the most preferred is the time-weighted rate of return, since it controls for cash inflows and-outflows. Next we present a review of empirical works on the performance of

pension funds investment portfolios in the light of investment policy and strategy, governance and macroeconomic environment.

2.5 Investment Policy, Strategy and Performance of Public Pension Funds

A UK study into over 2000 segregated pension funds by (Thomas and Tonks, 2000) during the period 1983-1997 found that most of the funds are "close trackers" of the FT-AII Share Index and that their average outperformance was significantly different from zero, around one half of a percentage point per year. The average selectivity alpha and the average timing parameters were both negative. This meant that active portfolio management, which involved strategic asset selection and timing, did hurt the investment portfolios. (Blake et al., 1999) also

found that the contribution of stock selection and average market timing to the returns on UK pension funds investment portfolio very negative.

(Ippolito and Turner, 1987) studied over 1500 US ERISA-based pension funds during the period of 1977-1983, and (Lakonishok et al., 1992) examined 769 US defined benefit funds in 1983-1989. Both studies conclude that, on average, the pension managers significantly under performed the passive management style (represented by S&P index). A study by (Coggin et al., 1993) on a random sample of 71 US equity pension funds during 1983-1990 found a significant positive selectivity and negative timing alphas. (Christopherson et al., 1998), using conditional performance evaluation framework, evaluated 261 portfolios over the period 19801996 comparing them to the Russell 3000 benchmark and found that the average manager outperformed the Russell by 0.72% per annum.

(Mitchell and Hsin, 1997) reported a negative link between investment direeted in-state to-SocTåiíð Economically Targeted investments and one-year investment returns. (Munnell and Sunden, 2001) however argue that such policies do not hurt investment performance. (Coronado et al., 2003), found evidence that instate investment directed at social and economic development and country/industry

restrictions have a negative influence on public sector plan investment performance, although these results were relatively weak (Yang and Mitchell, 2005) also hypothesized that the higher fraction of plan assets, which are directed in-state to social and economically targeted investments, the lower will be the plan's investment returns.

In examining public pension plan investment strategies, (Useem and Mitchell, 2000) explored four quantifiable measures: (l) tactical investment; (2) equity investment (the fraction of pension assets placed in stocks); (3) outside

investment management (whether asset management is contracted to outside investment firms); and (4) international investment (whether the plan invests outside the U.S.). They concentrated on these four measures because they were among the key investment policy decisions that pension managers make and because data available to them contains good information about each. The primary data-set used was an extensive survey of 291 state and local retirement plans conducted in 1993 for the Public Pension Coordinating Council (Zorn, 1994).

(Useem and Mitchell, 2000) revealed that the extent of pension plan tactical investing strategv depended on whether asset allocation is 'tactical (i.e., changed often with varying economic conditions)" or "long-term (i.e., not changed often with varying economic conditions)." Among the plans studied, 28 percent used tactical approach. Tactical investing may raise returns on assets during the year ahead. This is because adapting portfolio holdings to changing economic circumstances is the esseneex)f active in»estfiîãfiñånagernent, and should produce better returns during the year ahead, if done effectively.

The next investment strategy variable they studied captured the extent to which a public pension plan's portfolio was devoted to stocks, real-estate equities,

and other forms of equity. These are investment policy asset allocation decisions, and (Brinson et al., 1986; Brinson et al., 1991; Ambachtsheer, 1994) indicated that investment asset allocation decisions are more significant drivers of investment performance than investment strategy decisions, which involve market timing and/or the selection of specific securities. Useem and Mitchell found that state and local pension systems on the average, held 42 percent of their investment assets in equities and 50 percent in fixed-income assets; the remainder was primarily cash. These asset

allocations are similar to those reported in other surveys. (Salisbury et al., 1994), for example, found public pensions allocating 47 percent to equity and 47 percent to bonds. This allocation stood in sharp contrast to the prevalent pattern just a decade earlier. In 1980, state and local funds placed just 22 percent of their assets in equities, with 70 percent going to bonds (Silverman et al., 1995; Brancato et al., 1995).

Other research show that over the last decades U.S. equities have outperformed government bonds, and foreign stocks have out-performed domestic equities (Siegel, 1994; Ibbotson Associates, 1996; Engebretson, 1995). Useem and Mitchell held that retirement systems that followed a policy of placing more of their assets in U.S. equities, and in international holdings, should be expected to have achieved higher returns on assets at higher risks.

Another indicator of investment strategy was whether the pension fund managers outsourced management of their assets to extemal investment firms. A comparison of intemaHy-ñäñííed pension funds with mutual funds by (Berkowitz et al., 1988) during the late 1970s and early 1980s revealed lower risk-adjusted returns among the former, suggesting that external management has yielded superior results in the past. Useem and Mitchell expected outsourcing of asset management to improve investment returns since outside investment managers are likely to bring superior professional experience and skill to the pension plan investment decisions.

Moreover, contracting-out allows a retirement system to change its investment managers more readily in response to poor performance. As a public agency, the pension fund is likely to find it more difficult to oust inside managers for weak results than to dismiss an outside firm for comparable shortcomings. Finally, outside managers are likely to be better shielded against political pressures to pick state and local companies for investment. They found that a majority of the public pension plans — 77 percent — placed all of their funds under external management.

The final indicator studied by Useem and Mitchell in respect of retirement plan investment strategy is whether the fund had placed some of its assets in international investments. International investments are expected to have low correlation with

domestic investments. This allows for a reduction in volatility and assists in improving portfolio diversification. According to (Solnik and McLeavey, 2004), because markets do not move up or down together an expert investor can adjust the policy asset allocation of his/her portfolio towards superior risk adjusted portfolio returns. Most public pension systems in the U.S. hold relatively little money in non-US stocks and bonds. Only 35 percent held any international stock, and none placed more than a fifth of its assets in such holdings. Only 22 percent held any international bonds, and none allocated more than a tenth of its assets to such instruments, (Useem and Mitchell, 2000).

—(Brinson et--a<T9S6Ýexamined the effects of investment policy and investment strategy, represented by market timing and security (or manager) selection, on total portfolio returns. Their goal was to determine, from historical investment data on 91 U.S. corporate pension plans, which investment decisions had

the geatest trnpEts on the magnitude of total return on the vanabtlity of that return They developed a framework which defined Policy Return (PR) as x RF)•, Policy and Timing Return (PTR) as E(W.i x Rei), Policy and Security Selection Return (PSR) E(Wpi x R.i) and Actual Portfolio Return (APR) as E(W.i x R.i). Where Wpi is policy (passive) weight for asset i; Wai is the actual weight for asset class i; Rpi is ptssive balchrnark return for asset class i and R.i is the active return for asset class i.

(Brinson et al., 1986) further defined active returns due to: l) Timing as (PTR-PR), which they expected to be positive; 2) Selection as (PSR—PR), which also they expected to be positive; 3) Other as (APR-PSR-PTR+PR) and the total active return as (APR-PR), also expected to be positive. They concluded that the average pension plan lost 66 basis points per year in market timing, lost another 36 basis points per year from security selection and 110 basis points from active management

They also observed that the effect of market timing on the compound annual return of individual plans ranged from +0.25 to -2.68 percent per year over the period The effect of security selection ranged from +3.60 to -2.90 percent per year. On average, total active management cost the average plan 1.10 per cent per year.

Its effects on individual plans varied, however, from a low of -4.17 percent per year to a high of +3.69 per cent per year — a range of 7.86 per cent.

To identify the ability of investment policy to dictate actual plan return, (Brinson et al., 1986) regressed each plan's actual total return (APR) against, in turn, its calculated common-stotWbÓnds/cash equivalents investment policy returns (PR), policy and timing return (PTR) and policy and selection return (PSR). The value in each quadrant thus has 91 regression equations behinds it

The results were striking. Naturally, the total plan performance explained 100 per cent of itself (APR). But the investment policy returns (PR) explained on average fully 93.6 per cent of the total variation in actual plan return; in particular plans it explained no less than 75.5 per cent and up to 98.6 per cent of total return variation. Returns due to policy and timing (PTR) added modestly to the explained variation of 95.3 per cent, as did policy and security selection (PSR), 97.8per cent. They argued that total return to a plan is dominated by investment policy decisions. Investment strategy, which is active management and involves asset timing and asset or security selection, while important, describes far less of a plan's returns than investment policy, which sets the asset allocations.

(Drobetz and Kohler, 2002), in their study on The Contribution of Asset Allocation (investment policy decision) to Portfolio Performance, addressed the question about the portion of the performance explained by asset allocation decisions from three different perspectives, namely: variability of returns over time attributable to policy; variation in among funds explained by policy differences; and portion of the return level explained by policy returns. Furthermore, they split the (historical) return for each fund into two parts: (i) policy returns and (ii) active return They followed the model of (Ibbotson and Kaplan, 2000), which was as follows:

$$Rit = (1+PR_{it})(1 +ARit) -1 -$$

(2.1) where, Rit, PRit and ARit are the total return, the policy return, and the active return of fund-'i' In period&rešÞëCtÑely. The policy return is the part of the

total return attributable to the asset allocation policy. It is calculated as the sum product of asset class weights and associated returns:

$$PRit = bit\ Rit + bi2\ R2t + ... + bin\ Rat, \quad (2.2)$$

where Rnt denotes the return on asset class n in period t. Given the total fund returns and the estimated policy returns, we can then solve for the active returns, which mirror the capability of the fund manager to select specific assets and/or to time the market:

$$ARit = \frac{(1+Rit)}{(1+PRit)} - 1 \quad (2.3)$$

To determine variability across time attributable to policy, Drobetz and Kohler run a time-series regression of monthly fund returns on monthly policy returns for each fund. The distribution of R^2s quantify what proportion of the variability of the average fund is explained by its policy. Drobetz and Kohler pointed out that the time-series R^2 measures how closely the asset managers adhered to his or her policy target. Using panel data of six-year monthly returns on 51 Swiss and German mutual funds they found that on the average 82.9% of the variability in total fund return is explained by policy return. This confirmed the result of similar studies by (Brinson et al., 1986, 1991) and (Ibbotson and Kaplan, 2000) where on the average, 93.6%, 91.5% and 88% of variability in total fund returns was explained by

policy returns.

To determine the portion of the total return level explained by policy returns, (Drobetz and Kohler, 2002), followed (Ibbotson and Kaplan, 2000), and calculated the ratio of average annual policy returns, PR, divided by average annual fund returns, R. This ratio (which they called Return Level Ratio) of compound returns is

a simple performance measure. (Surz et al., 1999) argue that a high time-series R^2

merely indicates that a fund adhered very closely to its policy target and used broad diversification within asset classes. However, perse, it tells nothing about the importance of asset allocation. If the fund managers have exactly followed their passive strategies, the Return Level ratio will be equal to one. In contrast, when the average fund return is above (below) the average benchmark return, then the value will be lower (higher) than one. Therefore, the value of this ratio allows a judgment about the quality of active management strategies, i.e., whether they have added value. In their study, Drobetz and Kohler concluded that active management not only failed to add value above the policy benchmarks but destroyed a significant portion of investors' value. A mean ratio of 134% implies that active management destroyed roughly 34% of the performance that would have been achieved, on the average by following a passive strategy.

(Stanko, 2003) applied composite portfolio performance evaluation models used in previous studies done by (Treynor, 1965; Sharpe, 1994; and Jensen, 1969), to evaluate the performance ofthe Polish Public Pension Funds. Stanko used Treynor's model, which measures the risk premium return per unit of systematic risk, given as T = (Ri — RFR)/Pi and Sharpe's model, which measures risk premium per unit of total risk, given as S = (Ri — RFR)/ to measure the efficiency of the funds' investments. In these models, Ri is the average rate of return for portfolio i during a specified time period; RFR is the average rate of return on a risk-free investment during the same time period; is the total risk/volatility (systematic and unsystematic) of the funds' investments; Pi is the measure of systematic risk and is given as Cov(Ri , Rm)/0^2m with 0^2m being the risk or volatility of a market portfolio. In his stydy, Stanko concluded that the investments in most of the Polish Public Pension Funds werúÃ7íïthat, they were well diversified, since their Sharpe and Treynor ratios were equal.

To identify whether active management added value to the pension fund, (Stanko, 2003) used the basic (Jensen, 1965) regression model as single-index

market model: $\overline{r_{it} - r_{ft} = \alpha_i}$+ Pim rft)+ -- _____ (2.4) Where rit is the return on the i[th] fund at the period t; rt't is the risk free rate at the period t; oti is the constant term measuring the additional portfolio return due to active management; rmt is the return on a benchmark market portfolio; is the fund's beta, that is systematic risk; and is the random variable.

Since investment assets in the polish pension fund portfolios were held mainly in stock and bonds, (Stanko, 2003) further developed a two-index market model as follows:

rit — rft = ai + Pim (rmt — rft) + im (rbt — rft) + Eit ;

_____- (2.5) Where all terms remain as defined in (2.4) above with 9 im being the beta for bond investments and rbt is the return on the benchmark bond portfolio.

(Blake et al., 2001) used the multiple-index Jensen regression to determine the sensitivity of market returns to the returns on UK pension funds, having argued in (Blake et al., 1998) that such approach is more appropriate for the aggregate portfolio compared to earlier two-index models used. They defined an aggregate portfolio as a portfolio that consist of more than two composites asset classes. (Blake and Timmermann, 2001) held that in portfolio management, strategic asset allocation is a risk decision, of the anticipated liability cash flows. However, one may use the strategic asset allocation benchmark to judge the stock selection and market timing (i.e. tactical asset location) decisions. On account of this, (Stanko, 2003) believed that a comparison of empirical alphas derived from asset allocation portfolio gives some insights for portfolio attribution, hence the model:

$= \alpha_i + \beta_i (\overline{A_t} - r_{ft}) + \overline{\varepsilon_{it}}$; ---------- (2.6)

where all the terms are as defined in (2.4) and At is the investment return from a strategic asset allocation portfolio at time t, employed by a pension fund.

To (Cesari and Panetta. , 2000), if a fund's performance is based not only on the security-specific information possessed by an investment manger also on his or

her timing strategy, then the alpha estimates from time series undervalue this timing ability. (Stanko, 2003) explained that this is so because the composition and therefore the risk of the portfolio, changes as the managers adjust their exposure to risk in reaction to the market trends. The performance measurement must therefore recognize the manager's micro-forecasting ability (security selection) and macroforecasting ability (market timing). To adequately reflect these, (Stanko, 2003) uses (Treynor-Mazuy, 1966) test, which assumes a non-linear relationship between the

risk and return. That is: rit— = CG + (rmt — rft) + TMi — rft) ^{2} +— ; (2.7)

Where all terms remained as defined in (2.4) above and TM is additional amount of return resulting from timing. He concluded that the intercept alpha estimate measures the security selection ability, while the squared term represents the additional amount of return as a product of the timing ability. Thus, when the TM parameter is positive, this ability is superior, while negative value show that the fund is losing the shareholders' money by engaging in speculative activity. To derive the equation above, one needs to start with the standard Jensen model and then assume that changes of beta are only due to the market timing activity. Stanko concluded that significant positive alphas were achieved due to asset allocation and market timing—With respect-tÇðFGRance attribution, asset allocation played a dominant role, Security selection produced significant negative results.

2.6 Governance and the Performance of Public Pension Funds

(Mitchell and Hsin, 1997) employed cross-sectional data to link both funding and investment performance outcomes to governance variables. They found that having in-house actuaries and requiring Board members to carry liability insurance enhanced investment performance and funding. They also found that funding was lower when states experienced fiscal stress, and when employees were represented on the pension

system Board. (Lakonishok et al., 1992) relates the average underperformance of 1.3% annually to the agency problems ("window-dressinS').

(Coronado et al., 2003) explored whether conflicts of interests inherent in public pension plans hurt plan investment performance. Employing cross-section PENDAT 2000 data, they found some evidence that Economically Targeted Investments (ETI) and country/industry restrictions were associated with lower investment returns, and that public plans earned a significantly lower rate of return than did private plans.

(Yang and Mitchell, 2005) employed a newly constructed longitudinal dataset on United States of America to appraise funding, governance and performance of the U.S. public pension fund. Examining the links between plan funding and governance structure, taking into account investment performance, they posit that:

StockFundt = cto + RORt + (12 Flowfundt-l +Œ3Compositiont + ct4Managementt + Œ5Reportingt + ct6Xt + el . -------- .---- .

Flowfundt+l = β_0+ PI StockFundt + 132 RORt + Compositiont + Managementt + Reportingt + P6Xt + e2 ---------(2.9)

RORt = yo + StockFundt-1 + Compositiont + Managementt + Y4Reportingt + Y51nvestmentt + A(6Xt + e3 (2.10) Where StockFundt, Flowfundt+l and RORt are the dependent variables representing, respectively, the plan stock funding ratio, flow funding ratio and investment performance.

They hypothesised that investment returns (RORt) have a positive effect on stock funding (StockFundt), and that, in turn, stock funding affects flow funding (Flowfundt+l). They further hypothesized that three types of factors influence the dependent variables, namely: lagged dependent variables, factors representing plan governance, and indicators of plan investment practices. Yang and Mitchell defined stock-funding ratio as the ratio of plan assets to liabilities and held that the flowfunding

ratio reflects how well a plan meets its annual contribution requirements as determined by plan actuaries.

The plan's investment performance (RORt) was measured as the rates of return reported on pension investments. They expected past funding behaviours to affect a pension plan's investment strategy. To them, well-funded pension plan may be more able to bear investment risk than a poorly funded plan, since the stronger plan has more of a buffer to withstand a bear market, for instance. Thus they envisaged a positive link between the plan's lagged funding ratio and its current investment return. On the other hand, an underfunded pension might invest in riskier portfolios, in the hope of improving its asset base. In this latter case, we would expect-lagged stock fundingTbðinversely related to current investment returns.

(Carmichael and Palacios, 2003) defines governance as the systems and processes by which a company or government manages its affairs with the objective of maximizing the welfare of and resolving the conflicts of interest among its stakeholders. In practice, most retirement systems are run by a retirement Board that has authority over investments, actuarial valuations, system operations and often plan benefits as well. (Yang and Mitchell, 2005) measured plan governance along three dimensions: Board composition, management practices, and reporting practices. They measured Board compositions by the percentage of employees (contributors) on public pension Boards. Increasing percentages of employees on pension Boards may reduce stock funding and investment performance (Mitchell and Hsin, 1997), as they may be conservative and risk averse. (Mitchell, 1988) suggests that Board members who are not finance experts may find it difficult to monitor plan performance. This is likely to adversely affect the plan investment performance. Previous studies have however found mixed results on this point: no statistically significant impact discerned in cross sectional data studied by (Useem and Mitchell, 2000), but a negative impact of retiree Board members on investment returns was observed by (Mitchell and Hsin, 1997). Yang and Mitchell hypothesized that having more participants on the Board may lead to lower returns due to more conservative approach to investments.

To evaluate plan management practices in public pensions, Yang and Mitchell controlled on expense ratios, defined as the sum of administrative and investment cost over total plan assets; these would be expected to have a negative impact on stock funding.

(Yang and Mitchell, 2005) evaluated plan reporting practices by considering the number of plan_peFformatiCë related reports publicised. (Hess and Impavido, 2003) were concerned that trustees might act in their own self-interest, by simply shirking their duties or seeking to use fund assets to further the social or political goals of the party in power. It is therefore critical to effectively and efficiently

monitor plan Trustees. This is likely to be facilitated if annual reports are provided containing financial, actuarial, statistical, and investment information. Previous empirical literature has provided little hard evidence supporting the supposition: (Mitchell and Hsin, 1997), as well as (Useem and Mitchell, 2000) did not find a link between performance reviews and pension plan investment returns.

In their study, (Yang and Mitchell, 2005) indicated that, holding all other factors constant at their mean values, Governance changes have an important effect:

for example adding one more active plan member to a Board would lower plan stock funding ratio by 0.7 percentage points. Adding a retired member would decrease the stock funding ratio by 1.7 percentage points, drop flow funding by 2.3 percentage points and cut annual investment returns by 0.4 percentage points. Finally holding all else constant, issuing an annual report with financial, actuarial, statistical, and investment information would boost a plan's annual investment returns by 2.1 percentage points.

(Useem and Mitchell, 2000) used information drawn from two surveys of U.S. state and local pension systems to explore the links between governance policies, investment strategies, and Investment performance. They defined governance as the structure of a pension plan board, along with the complex of rules and practices that guide its oversight of fund assets. They expected investor governance polices to have a

direct effect on investment strategies; these included investment decisions whether long-term or short-term, whether to manage the money in-house-ornot, and-issues-regarding portfolio mix These they anticipated to have an important bearing on pension fund financial performance.

(Useem and Mitchell, 2000) focused on six areas of pension plan governance where they believe the impact on investment strategies may be greatest and where survey information was available. These areas included: (l) investment restrictions; (2)independent performance evaluation; (3) board responsibility for asset allocations; (4) board direct responsibility for investment decisions; (5) board size; and (6) board composition.

They undertook a two-step multivariate empirical analysis. They first explored the effects of governance policies on investment strategies to determine whether there was any linkage between the two. Second, they regressed investment performance, defined here as the return on assets a year later, on governance policy and investment strategy to assess the impact of the two sets of factors on the performance outcome. Useem and Mitchell found that retirement plans with constitutional restrictions on investments, placed less money in equities and more in fixed income investment, tended not manage their assets tactically and did not maintain globally diversified portfolios. Retirement Systems with annual independent performance evaluations put more money in equities and international holdings, but invested less tactically. Plans whose boards were charged with setting allocation policies were less likely to invest tactically; those with larger boards were more likely to tilt toward equity and international investments, and toward inside management of the investments. On the other hand, board composition, measured as the fraction of members who are plan participants, had little measurable bearing on these investment strategies.

The impact of investor governance on investment strategies was substantial: the vector ofgovernance-efiãïãðferistics accounts for over 22 percent of the crossplan variance in the fraction of funds held in equities. The retirement plans

placed 42 percent of their investment funds in equities on average. Their results suggest that expanding the pension board size by three trustees (a nearly two-fifths increase from

the mean of 8 trustees) would be associated with having 2 percentage points more in equities. Independent performance appraisals increase the equity fraction by 14 percentage points and constitutional investment restrictions reduced equity holdings by 7 percentage points. In other words, governance structures have a potent effect on investment patterns.

2.7 Macroeconomic Variables and Performance of Public Pension Funds The researcher did not find any prior research work providing empirical evidence on the impact of macroeconomic variables on the financial performance of pension fund investment portfolio. This study expects to fill this gap. (Hsin and Mitchell, 1994) however used cross-sectional data to evaluate the determinants of US public pension funding including stress and governance variable their paper concluded that actuarial assumptions (specifically, assumptions about interest rates wage growth rates and amortisation periods) appeared to be set strategically to meet changing fiscal situations.

In addition, a number of studies, applying the multifactor Arbitrage Pricing Theory (APT), document that a relationship exists between macroeconomic variables and equity market returns. For example, in their study on selecting macroeconomic variables as explanatory factors of emerging market returns, (Bilson et al., 2000) used the following model:

Rit = (Ii + ßiRwt+ + (DiGPit+ YiRAit+ kiERit + Cit. — (2.11)

Where-Rit is the return for the i'th country at time 't', Rwt is the value weighted market index at time 't', MSit is the percentage change in the money supply for country 'i' at time 't', GPit is the percentage change in goods price for country 'i' at time 't', RAit is the percentage change in real activity for country 'i' at time 't', and ERit is the percentage change in exchange rate for country 'i' at time 't'. Bilson et al.

concluded among other things that money supply, inflation, industrial production and exchange rates are significantly associated with emerging equity returns.

In testing the impact of financial liberalization (reforms) in Nigeria on the efficiency of the Nigeria Stock Market, (Omole and Falokun, 1996) used interest and exchange rates as policy variables. They employed an Ordinary Least Square model specified as follows:

SPI xao, Xb1,Xb0) ; $ASP = f(X_{a1}$,xo, X_{b1}, $X_{b0})$ ----- (2.12) With SPI and ASP being stock price indices and average stock prices respectively, and Xa and Xb being exchange rates and interest rates respectively. Omole and Falokun concluded that exchange rates exerted more influence on the stock prices as a unit change in current exchange rates changes the average stock prices by 0.43%, while a unit change in interest rate changes average stock prices by 0.39%. Tested individually, exchange rates exert a 74% influence on stock prices and interest rates having an 84% influence on stock prices. The results of Omole and Falokun's study confirmed the theoretical postulates that financial reforms are linked to the stock market through the improvement in the financial intermediation process.

In his study on the impact of macroeconomic variables on the Ghana Stock Exchange performance, (Amoto, 2000) modified the original (Omole and Falokun, 1996) model to become:

Log DSI = + ßlLog1NF + ß2LogEX + ß3LogLR + ß4LogTB + ß5LogAGC

—H-VT ---------- (2.13)

Where ß's are the coefficients of regression; DSI is the Databank Stock Index; INF is the rate of inflation, EX is the exchange rate; LR is the lending rate; TB is the Treasury bill rate; AGC is the dummy representing the impact ofthe listing of AGC; and VT is the error term Amoto concluded that macroeconomic instability influences stock market performance represented by movements in the Databank Stock Index. While the rate of inflation and the lending rate drag performance with a lag, the Treasury bill rate and the exchange rate improve the stock index and thus market performance significantly.

This study adapts such literature by considering the relationships in (Bilson et al., 2000; Omole and Falokun, 1996; and Amoto, 2000) in pension fund investment portfolio context.

2.8 Ghanaian Literature on SSMT Pension Fund Investment Portfolio Performance

So far, accessible literature does not provide any prior research into SSNIT Pension Scheme focusing on the use of finance theory and error correction models to appraise and analyse the performance of its Investment Portfolio. Numerous studies have been made on SSNIT Pension Scheme and the Investment of its pension funds, though. These include a World Bank study by (Hess and Impavido, 2003). They held that SSNIT's investment in social and developmental projects (housing finance, student loans and industrial estates) has become a burden for the SSNIT. (Dei, 2001) corroborated this when he observed that students' loans are provided to students at a subsidized interest rate. While pointing out that the number of students has increased considerably, hence the increased size of the SSNIT students' loan portfolio, he noted4hat graduate unerrTþ1õýiíðnt has also increased. The increase in graduate unemployment means low repayment rate of the loans. This, together with government's delays in the payment of its portion of interest on the loans to the SSNIT, significantly burdens the Trust.

In his study on Mobilizing Domestic Resources for Economic developiñei1Y The Role of Pension Funds in Ghana, (Damnyag, 2000) observed that, on one hand, the SSNIT Pension fund contributes to financial deepening in Ghana, and in particular enhance the total productivity factor, private savings and capital formation in Ghana. On the other hand, he discovered that, compared to earnings on interest bearing accounts, participants of the SSNIT scheme derive relatively lower benefits from their savings with SSNIT. He argued that this resulted from the combined effect of low interest paid by SSNIT on

members account, high inflationary environment and depreciation of the cedi to its major foreign trading currencies over the years.

In a related investigation, (Gockel, 1996) used descriptive statistics to access the performance of SSNIT pension scheme in Ghana In terms of how it generates savings for workers pensions. In his analysis, he considered the effects of inflation, exchange rates and real interest rate on SSNIT members' savings between the periods 1965 to 1990. He found that, contributors to the fund were losing large amounts of their savings through inflation. According to him the loss was as high as 52% in 1980, in 1981 and in 1990.

On the provision of income replacement schemes to workers (Da-Roacha, 1999) argues that the benefits enjoyed by SSNIT contributors under the SSNIT Pension Scheme are inadequate; particularly where sickness and unemployment benefit are not catered for. Considering the importance of protecting workers in Ghana,-Đa-Roacha fur:thãTëWáEd that it is not prudent to put the lifetime savings of most wage earners in Ghana into a single scheme like SSNIT. For this reason, he suggests that other pension funds managers be allowed to join SSNIT. However, without the proper and effective regulatory framework, this may not be the best,

because privatized schemes all over the world are not devoid of dishonesty on the part of the funds managers.

(Prempeh, 2002) infers the adverse impact of politics in corporate governance on Ghanaian public sector institutions including SSNIT, when he quotes the revelations in a World Bank report which said, "SSNIT had no investment policy guidelines, no stated underwriting criteria and no central investment committee. The report continued that SSNIT held considerable unlisted equity investments, real estate and corporate

loans, many of them producing no cash flow. Furthermore, SSNIT's 1999 financial statements showed a real return of only 2.3%, while provision for bad debts amounted to 20% of assets and administrative costs represented 22% of collected contributions.

Examining the Investment ofPension Funds as it applies to SSNIT from 1991 to 1995, (Atabugum, 1997) discovered that the SSNIT fund was quite substantial. With the average fund ratio at 9, she asserted that scheme appear to be sustainable. She attributed this to the demographics of the population, whereby the contributing members to the scheme far outnumber the scheme's beneficiaries (i.e. pensioners) by a ratio of 40: I ; with a change of demographics, however, in the not too distant future, there could be a problem of non-sustainability of the scheme. To her, SSNIT needed to make prudent investments to reap positive real returns for the sustainability of the Scheme. She noted that average returns being made by the fund's investment portfolio of 25% was not encouraging at all.

To improve the-fúñdš-auVn on investments, she recommended among things that, the pension ftlnd management must be allocated to a number of private Trustees. The total fund should be divided among several Trustees with funds periodically re-allocated among the Trustees according to their past performance.

She envisaged that private management ofthe fund will produce the best allocation of capital and the best returns on savings; holding that most publicly managed pension funds earn less than privately managed ones because they are required to invest in government securities or make loans to failing state enterprises at very concessionary nominal Interest rates. These investments yield negative real returns .In addition publicly managed funds run the risk of encouraging deficit financing and wasteful spending by governments, who see the fund as a hidden and exclusive source of funds. Governments tend to use the funds to meet their parochial political objectives rather than national economic objectives. She contended that a privately managed fund that is run competitively will not only earn positive real investment returns, but also contribute to the growth of the financial markets on and promote private sector development.

2.9 Conceptual Framework of the Study

Stemming from the overriding need to provide income replacement to a country's citizenry in the event of income loss or stoppage, to avoid destitution in societies with its attendant vices, it is perhaps needless to reiterate the paramount importance for nations the world over to implement social security schemes and to ensure long-term financial viability and sustenance of such schemes. Key miong the measures required for the maintenance of continued long-term financial viability of social security schemes is the prudent and proper investment of investible social security-funds. The investnTëñÝOfthese funds, which can make critical contribution to the growth of financial markets and national economies are not without risk; and careless or reckless investments of social security funds can yield negative real rates of return, or result in the disappearance of funds altogether. It is in this regard that it is important and appropriate to assess and analyse the performance of the SSNIT investment portfolio thereby providing SSNIT management, contributors, policy makers and other stakeholders, an indication of the financial viability and sustainability of the SSNIT Pension Scheme.

The current state of knowledge presents the financial performance of pension plan investment portfolio as the return on the investment assets and associated risk. The return on pension investment assets is a function, broadly of the portfolio plan investment policy, investment strategy and governance. (See Figure 2.1 , page 40)

As an example, a study to appraise funding, governance and performance of the U.S. public pension fund stipulated the model below was used.

StockFundt + RORt + ct2 Flowfundt-l +ct3Compositiont

+ Œ4Managementt + (15Reportingt + ct6Xt + el ---------—-(2.14)

Flowfundt+l po + 131 StockFundt + RORt + Compositiont

+ Managementt + Reporting + 136Xt + e2 (2.15)

$$ROR_t = yo + StockFund_{t-1} + Composition_t + Y3\,Management_t + Y4Reporting_t + Y51nvestment_t + Y6X_t + e_3 \quad (2.16)$$

Where StockFundt, Flowfundt+l and RORt are the dependent variables representing, respectivgly, the plan's stock funding ratio, flow funding ratio, and investment performance.

Investment returns (RORt) was hypothesised have a positive effect on stock funding (StockFundt), and that, in turn, stock funding affects flow funding (Flowfundt+l). The study further hypothesized that three types of factors influence the dependent variables, namely: lagged dependent variables, factors representing plan governance (Board Composition, Management and Reporting Practices), and indicators of plan investment practices.

In other studies aimed at determining the contribution of investment policy and strategy decisions to portfolio performance, monthly fund returns were regressed on monthly policy returns for each fund, using the model:

$$PRit = biO + bi1Rit + bi2R2t + bi3R3t + \ldots + binRnt + e1t \quad (2.17)$$

Where PRit is the policy return on asset 'i' in period 't', Rnt is the return on asset class 'n' in period 't' and eit is the error term.

The distribution of R^2s quantify what proportion of the variability of the average fund was explained by it policy. For the portion of the return explained by the policy, the Return Level ratio being the ratio of the average annual policy returns for the portfolio (PRp) to the average annual return for the portfolio (Rp) would be calculated; where:

$$(PRp) = [\prod(1+\overline{PR_t})]^{1/n} - 1 \; ; \quad \overline{(R_p)} \quad (Rp) = [\prod(1+\overline{R_{pt}})]^{1/n} - 1 \quad (2.18)$$

This ratio is believed to equal one if a fund follow its policy mix and invested passively. A fund that outperformed (underperformed) its passive policy benchmark will have a ratio less (more) than one.

From the review of accessible literature, there appear to be no prior study providing empirical evidence on the impact of macroeconomic variables on the performance of a pension fund investment portfolio. A number of studies however document that a relatic<ïñékfsts between macroeconomic variables and equity market returns. For example, a study on selecting macroeconomic variables as explanatory factors of emerging market returns used model:

Rit + ßiRwt+ ôiMSit + OiGPit+ YiRAit+ kiERit + Eit ----------(2.19)

Where Rit is the return for the i'th country at time 't', R.t is the value sseighted market index at time 't', MSa is the percentage change in the money supply for country 'i' at time 't', GPit is the percentage change in goods price for country 'i' at time 't', RAit is the percentage change in real activity for country 'i' at time 't', and ERit is the percentage change in exchange rate for country 'i' at time 't'. This study adapts such literature by considering this relationship in pension fund investment portfolio context.

Available information on SSNIT's investment returns apparently gives many stakeholders cause to worry in respect of the scheme's long-term viability. The annualised real return on SSNIT investments over the past ten years is believed to be negative. The perceived unattractive performance of SSNIT's investment portfolio have been attributed (l) partly to the general unstable and unfavourable macro economic environment, within which SSNIT's portfolio companies operated during the period; (2) to improper investment assets allocation resulting from the nonavailability of sound investment policies, procedures and guidelines and perhaps the non-compliance with existing policies procedures and guidelines; and (3) to the Impression that SSNIT funds are part of the public purse and can be used as such under the banner of meeting the social and economic utility principle in pension fund investing.

This study adopts models used by (Sharpe, 1990; Brinson et al., 1986; Drobetz and Kohler, 2002; and Bilson et al., 2000) in their previous studies to evaluate-and analyse4he-fiúCíáLperformance of SSNIT's Investment Portfolio. In line with this we would establish (l) the influence of investment activities (asset

allocation, asset selection and timing) on SSNIT investment portfolio returns; and (2) the influence of inflation, treasury bill rates, exchange rates (cedi to dollar) and lending rates on the return portfolio assets classes as well as on the SSNIT investment overall portfolio.

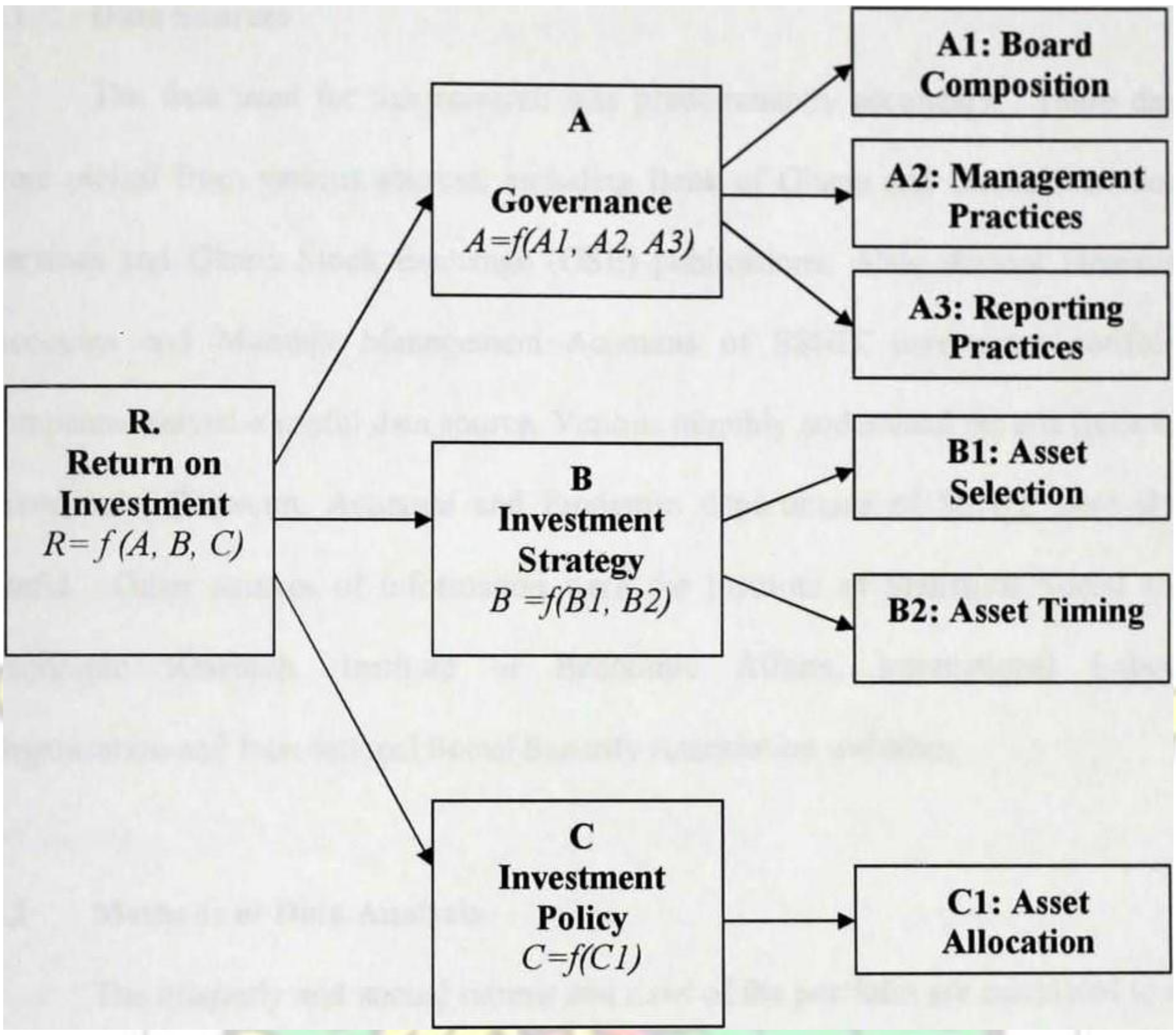

Fig. 2.1 Schematic Conceptual Framework

CRAFTER THREE

METHODOLOGY a PROFILE

3.1 Data Sources The data used for this reexch wu predottmuuly secondary. These daa were ptck«i from vanous sourc•, trxludmg Bmk of (hma ınd Ghana Statsocal Services ard (ñma Stock Exchange (GSE) Biblicauorw Also, Annual FttWXial Accounts md Monthly Mmaganent Accoums of SSNIT investment portfobo compuues served a useful source VUIous monthly md amual 'eports from the Investment. Research, Actuanal and Properties departments of SSMT were aso useful Other sources of information Institute of Statistical Soaal and Econonuc Institute of Ecomrmc AfTarrs, International Labour Orgamsatton and International Soctal Secunty Assoctauon websites

3.2 Methods of Data Analysis

The quarterly md ınnual returnsmd risks of the portfolio are calculated to as the ›asic measuresof the portfolio's performUEe (see secuon 3.3) FurtiEr malyse Ue made ustng Sharpe composite performmce evaluation measure Sturpe performance (S) is gival as:

$$S = \frac{R_p - R_f}{} \quad \text{----------} \quad (3.1)$$

Where R_p is ts the portfolie return, R' ts average nsk rate. o, ts tbe total portfolio nsk We also use the CoefTtoetg of Vanauon (CV). *hjch ts nsk (a) per urut of return to compare the rtsks portfobo.

$$\text{cv-oyR,} \quad \text{——————————} \quad (32)$$

Models from previous by (Brirbon et al., 1986; Ibbotson md Kaplm. 2000; and Drobetz and Kohler, 2002) would be to perform performance

attribution and to run a multiple linear regresston of quarterly portfolio returt8 on quarterly policy, selection and timing returns as:

$$OPRt = + \quad + \quad + \beta_3 PTR_t + e_t \text{ ---------- (3.3)}$$

Where the ßs are the regression coefficients, OPRt is the actual overall portfolio return at period 't' and is defined as E(W.i x R.i), PRt given by E(Wpi x Rpi), md it is the passive policy return at period 't', PSRt is the policy return at orne 't' defined by E(Wpi x Rai), PTRt also defined as E(Wai x Rpi) is the policy trnung return at time 't' and et is the error term Also, Wpi is policy (passive) weight for asset class i; Wai is the actual weight for asset class i; Rpi is passive return for asset i and

Rai is the active return for asset class i. We would apply the (Engle and Granger, 1987) Error Correction Model (ECM) to determine the short and long run effects of investment policy and strategy on the portfolio returns.

We would also use the Return Level model by (Drobetz and Kohler, 2000) to determine how the SSNIT Investment portfolio performance compared to its passive policy benchmarks. To do this we will compute the ratio of average annual policy returns (PRp) to the average annual portfolio or portfolio asset return (Rp); where

$$\overline{(PR_p)} = [\Pi (1+\overline{PR_t})]^{1/n} - 1; \quad \overline{(R_p)} = [\Pi (1+\overline{R_{pt}})]^{1/n} - 1 \text{ ---------- (3.4)}$$

PR is portfolio policy return in year 't' and Rpt is portfolio return in year 't'. (See below for more on Rpt). According to Drobetz and Kohler, this ratio will be one (l) if a fun&manager foilesçs--îß-þðlicy mix and invests passively. A fund that outperforms (underperforms) its passive portfolio belchmarks will have a ratioless (more) than one.

To establish and analyse the relationship portfolio returt8 and selected macroeconomic variables we adapt models of (Amoto, 2000 Bllson et al., 2000) follows:

OPR, = + ßlGSF4 + ß21NFt + + ß4LR,+ + ---------- (3 6) Where the ßs are the regression coefficients, is the return on the portfolio at time 't', GSEt is the

change in GSE All-Share Index at time 't', INFt is the rate of inflation at time 't', EX is the cedi to the US dollar exchange rate at Orne 't', IR is the deposit money banks' lending rate at time 't', TBRt is the 91-day Treasury bill interest rate at time 't', and is the error term Again, we would use the (Grmger and Engle, 1987) Error Correction Model (ECM) to identify the short md long run effects of the selected macroeconomic vanables on the investment portfolio returns.

3.3 Data Requirements and Definition of Key Variables

The macroeconomic variables selected for this study are the Interest rates on treasury bills, interbank exchange rates, rates of inflation, lending rates and GSE AllShare index (more on these soon). The data on these variables would be quarterly longitudinal data from 1995 to 2004. The quarterly values of each of the SSNIT-held Investment assets and the cash distribution paid on the investment would also be required for determination of the return and risks on the asset and the portfolio.

Return on an investment asset

The return on asset 'i' in quarter 'j' (Rij) is defined by the relation:

$$RiJ \qquad \frac{VI - Vo + DI}{} \qquad \text{- (3.6)}$$

Where Vo is the begnmng period value of the asset; VI is the end period value of the asset; DI the cash distribution paid on the investment during the period (that is dividend for equities and interest for debts).

Time weighted Rate ofReturn

It is an annual return measure that averages rates of return on an asset over a time period, accounting for additions and withdrawals of funds over the period. It is given as:

$$R_{ti} = [\prod(1+R_{ij})] - 1 \quad \text{----------} \quad (3.7)$$

Where Rti is the (annual) time weighted return on asset 'i' in year 't' and Rij is the return on an asset 'i' in quarter 'j' and i = 1, 2, 3, . .. n.

The annualized 'n'-year time weighted return (Rai) on asset 'i' is given as:

$$Rai = \prod(1+R_{ti})^{1/n} - 1 \quad \text{----------} \quad (3.8)$$

Where Rti is the annual (time-weighted) return on asset 'i'.

Portfolio Return

The return on a portfolio of say 'n' investment assets in quarter 'j' (Rpj) is given as:

$$Rpj = EWijRij \text{----------} (3.9)$$

Where 1 , = 1, 2, 3, …, n; and J —1,2,3,4.

The annual portfolio return in year't' (Rpt) is given as: KUMåS1-6HAåJ

$$Rpt = [Il(1+Rpj)] - 1; \text{----------} (3.10)$$

Where Rpj is the quarterly return on the portfolio.

The n-year time weighted return on the portfolio is given as:

$$Rap = \prod(1+R_{pt})^{1/n} - 1; \text{----------} (3.11)$$

Where Rap is the annualized time weighted portfolio return over the 'n' years and Rpt is the annual portfolio return, t = l, 2, 3 ... n

Risk ofan Investment Asset

This is the likelihood that the actual return on an asset or portfolio will deviate from its expected return It is usually measured as the standard deviation of the returns on the asset or the portfolio. The standard deviation is the positive square root of the variance. The variance of an asset 'i' in quarter 'j' (5^2ij) is given as:

$$\sigma^2_{ij} = \sum[R_{ij} - \overline{(R_{ij})}]^2 ; \text{----------} (3.12)$$

and the Standard Deviation of asset 'i' in quarter 'j' (q) is given as:

$$\sigma_{ij} = \{E[RiJ - (Rij)]^2\}^{1/2} \quad (3.13)$$

Where Rij is the return on asset 'i' in quarter 'j'; and Rij is the mean return on asset 'i' in quarter 'j'.

Portfolio Risk

The risk on a portfolio of 'n' investment assets is defined as:

$$\sigma_p = \{E\ [W\ i\ wj\ COV\ (Ri\ ,Rj)]\}^{1/2}\ ; \quad (3.14)$$

Where i l, 2, 3, n. Cov (Ri ,Rj) is the covariance between the return of asset 'i' and asset 'j', which is the measure of the degree to which Ri and R j move ——-together over time relative to their respective means.

The Ghana Stock Exchange All-Share Index: The study uses the GSE AllShare Index as a key macroeconomic variable for the regression analysis because it is a measure of the performance of the Ghana Stock Exchange, which provides and indication of how well the economy is doing. Also, since it is market value weighted index of all companies (in terms of capitalization), it mirrors a real portfolio. The GSE All-Share Index is a weighted average of the values of all the equities on various trading sessions; this is better than the Databank Stock Average (DSA), which ignores the basic fact that some equities have more weight than others in terms of their size and capitalization. The closest alternative to the GSE All Share Index is the Databank Stock Index (DSI). We stick to the GSE All Share Index mainly because it is the normal yardstick by which the average investor measures the return on the stock market. It thus fits the purpose and scope of the study. The stock index is used in this study as a summary indicator of performance and actually captures the general trend in the other stock market development indicators viz: Liquidity, Size, Concentration and Volatility.

Other variables required for this empirical analysis include Treasury bill rates, lending rates, inflation and exchange rates. These are but a few of the variables used in assessing the state of an economy at any point in time. The choice of only these variables however is predicated on the reason that, together interest rates, inflation and exchange rates form the three fundamental prices in the Ghanaian economy. These prices are driven by one variable - money supply. They thus move

together-and are expeeted—ffiñfluence private sector activity together hence the performance of SSNIT portfolio companies.

Inflation: Macroeconomic instability in Ghana is first reflected in inflation rates. As the rate of inflation goes up, consumer incomes are eroded, they thus must reorganize their portfolio. This variable was chosen because of its impact on investment Inflation erodes investment returns. The coefficient of the tnflatlon term In the model is thus expected to be negative.

Exchange Rate (cedi:dollar): Another facet of macroeconomic instability is the persistent depreciation of the Cedi against the major international currencies. Bank of Ghana has used both monetary and exchange rate policy as well as other interventions to prop up the value of the Cedi. Until recently (2004/2005), all attempts to stabilize the exchange rate have not been successful. In our study, we use depreciation of the interbank end of period Cedi/Dollar exchange rate in our regression analysis. The exchange rate is chosen for the analysis of the impact of the macroeconomy on investment returns because together with Interest rates, they exert the most important influence on the financing decisions and strategies of both investors and firms; thus affecting SSNIT-held investments in such firms.

Deposit Money Banks ' Lending Rate: The Lending rates used in our model is the average lending rate on all loans granted by various Deposit Money Banks (DMBs), to all sectors of the economy. These sectors range from agriculture through manufacturing to the services. These rates were generated from Bank of Ghana figures obtained from the various sectors. The choice of the lending rate a variable in the model is based on the fact that lending rates affect firms' financing strategies. Rates on money borrowed from Deposit Money Banks and other merchant banks determine firms' leverage mix and thus their decision whether to sourceÆunds from the-eqtfiÝiîiåFket or not. The supply of shares is thus strongly dependent on such

rates. The coefficient of the lending rate variable in the regression model is expected to be negative

Treasury Bill Rate: The Treasury bill rate used in this study is the rate earned on 91-day Treasury bill holdings of investors. According to the Chicago Federal Reserve Bank News Letter Nod, December 1987, vThen investors are scared, they look for safety. They adjust their portfolios to include safer and fewer risky assets; this kind of movement is usually referred to as "flight to quality" and it causes Government bond prices go up, stock prices fall. The Treasury bill rate competes with returns on equities as investors choose between short-term and long-term instruments. Treasury bills are the most riskless capital market instruments in the Ghanaian economy. The basis of this substitution behaviour of investors is the need to hedge against risk while considering return on such investments. We expect a positive regression coefficient for the Treasury bill variable.

Asset Allocation: Asset allocation is the process of deciding how to distribute an investor's wealth among different countries and/or asset classes for investment purposes. It entails the selection of broad asset classes, strategic or policy allocations and the determination of asset class benchmark returns to achieve optimal portfolio returns. The asset allocation decision is expected to account for close to 90% of the variation in portfolio returns, while asset selection and timing account for the remaining 10%.

Security Selection: This is that part of investment strategy, which involves the active selection of investments within an asset class. Superior (inferior) selection should positively (negatively) influence portfolio returns.

Asset Timing: _Asset—timiÎVis the strategic under or over weighting of an asset class relative to its normal policy weight, for the purposes of enhancing returns and/or reducing risk. Timing is undertaken to achieve incremental returns relative to

passive policy returns. We expect the timing variable to assume a positive regressing coefficient.

3.4 Profile of Social Security and National Insurance Trust

3.4.1 The Establishment of SSNIT

The SSNIT was established in 1965 by the Social Security Act (Act 279), which set up a Social Security Fund and provided for lump-sum payments. In 1972, SSNIT operated Provident Fund Scheme under the Social Security Decree of 1972 (NRCD 127). Under the Provident Fund Scheme, SSNIT invested it funds solely in government money market instruments. The Provident Fund Scheme was converted to Social Security Pension Scheme in 1991, under the Social Security Law (PNDCL 247).

3.4.2 The SSMT Vision and Mission

SSNIT's Vision: The vision of SSNIT is to develop itself into a world class financial institution dedicated to the promotion of economic security of the Ghanaian worker.

SSNIT's Mission: SSNIT is committed to the provision of cutting edge Income replacement schemes to Ghanaian workers and their dependants in the event of old age, permanent disability, or death through a motivated staff and diligent leadership.

3.4.3 Provisions of the SSNIT Pension Scheme

Coverage: Both Act 279 of 1965 and NRCD 127 of 1972 provided for compulsory coverage for workers in establishments employing five or more workers.

However, under the PNDCL 247, once there is an employer-employee relationship, it is mandatory for all employees to join the SSNIT Pension Scheme. The law also provides for voluntary membership for the self-employed. The members of the Ghana Armed Forces, Police Force, Prisons and Fire Services are exempted from the scheme by law. However, individuals employed by these establishments may opt to join the state pension scheme as voluntary contributors. Membership of the scheme has grown from 466,332 in 1995 to 1,068,546 in 2004 (See Figure 3.1)

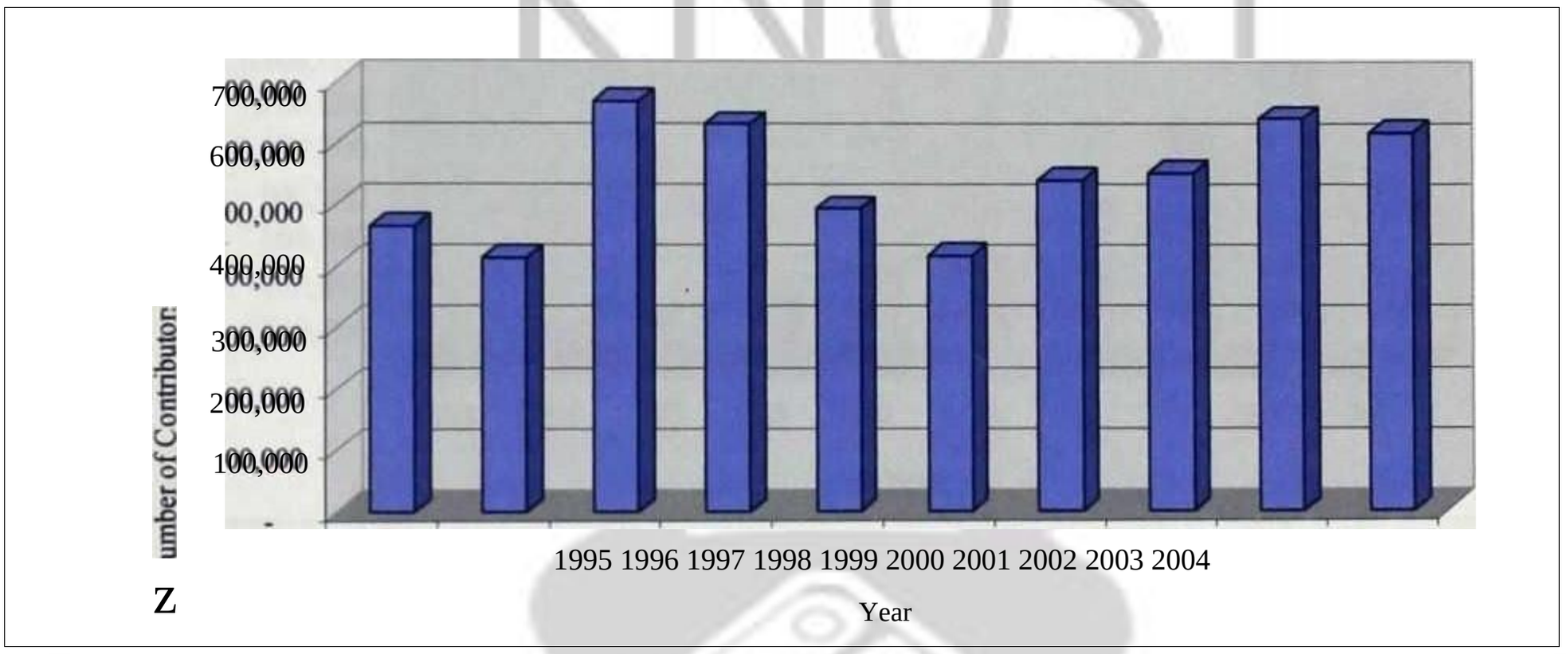

Fig. 3.1 Trend in Annual Membership of the SSNIT Scheme (1995 — 2005)

Source: SSNIT Research Department

Contribution Rates and Collections: The contribution rates were initially fixed at 7.5% and 15% of the worker's basic salary to be contributed monthly by the worker and his employer respectively. Following the realization that the initial rates were too hi@h for many workers and employers to afford, the rates were reduced to "-and 12.5% of the worker's basic salary to be contributed monthly by the worker and his employer respectively. These later rates have been in force since. To facilitate the collection and payment of contributions, the law provided among other things for: The deduction at source by an employer of the worker's portion of the contribution and pay this together with his (the employer's 12.5%) portion monthly into the fund. This is to be paid to the scheme by the 14th of the ensuing month to avoid penalty charges on delayed payments. Over the past decade, contribution to the scheme has

grown significantly from #115,644.58 million in 1995 to ,530.00million in 2004. Figure 3.2 below shows the trend in annual contribution over the period under review (1995 — 2004).

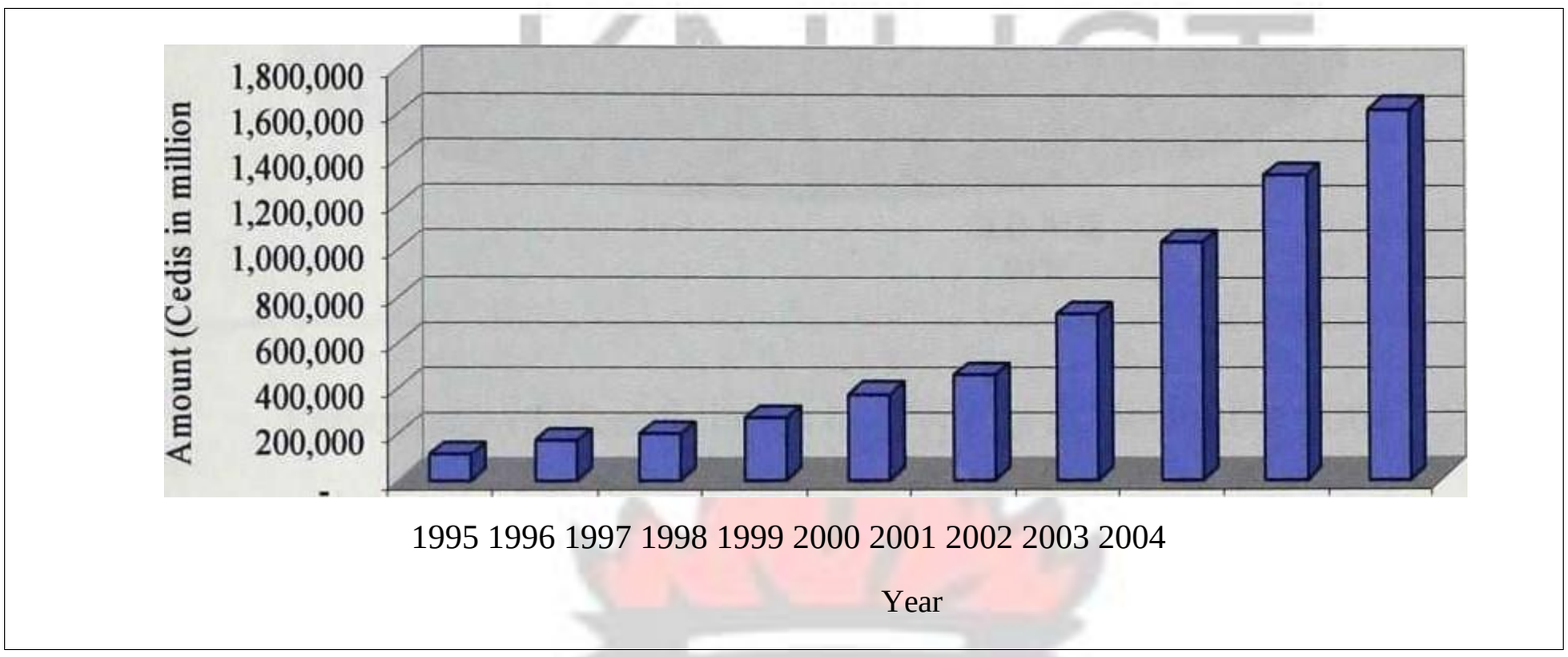

Fig. 3.2Trend in Annual Contribution (1995 — 2004)

Source: SSNIT Research Department

Benefits: Under the Provident Fund Scheme, six benefits were established to cater for the following contingencies: Superannuation, Sickness, Invalidity, Death/Survivors, Emigration and Unemployment. With the conversion of the Provident Fynd Scheme into a Pension Scheme in 1991 by PNDC Law 247, the benefits were reduced to three: Old-Age Pension, Invalidity Pension and Death/Survivor's benefit. The number of beneficiaries of the scheme has increased from 24,707 in 1995 to 74,309 in 2004. While invalidity beneficiaries increased from 115 in 1995 to 733 in 2004, death/survivors beneficiaries grew from 2,659 in 1995 to 4,859 in 2004. Old age beneficiaries grew from 21,933 in 1995 to 68,717 in 2004. Figure 3.3 below shows the percentage of beneficiaries of the scheme as at December 2004.

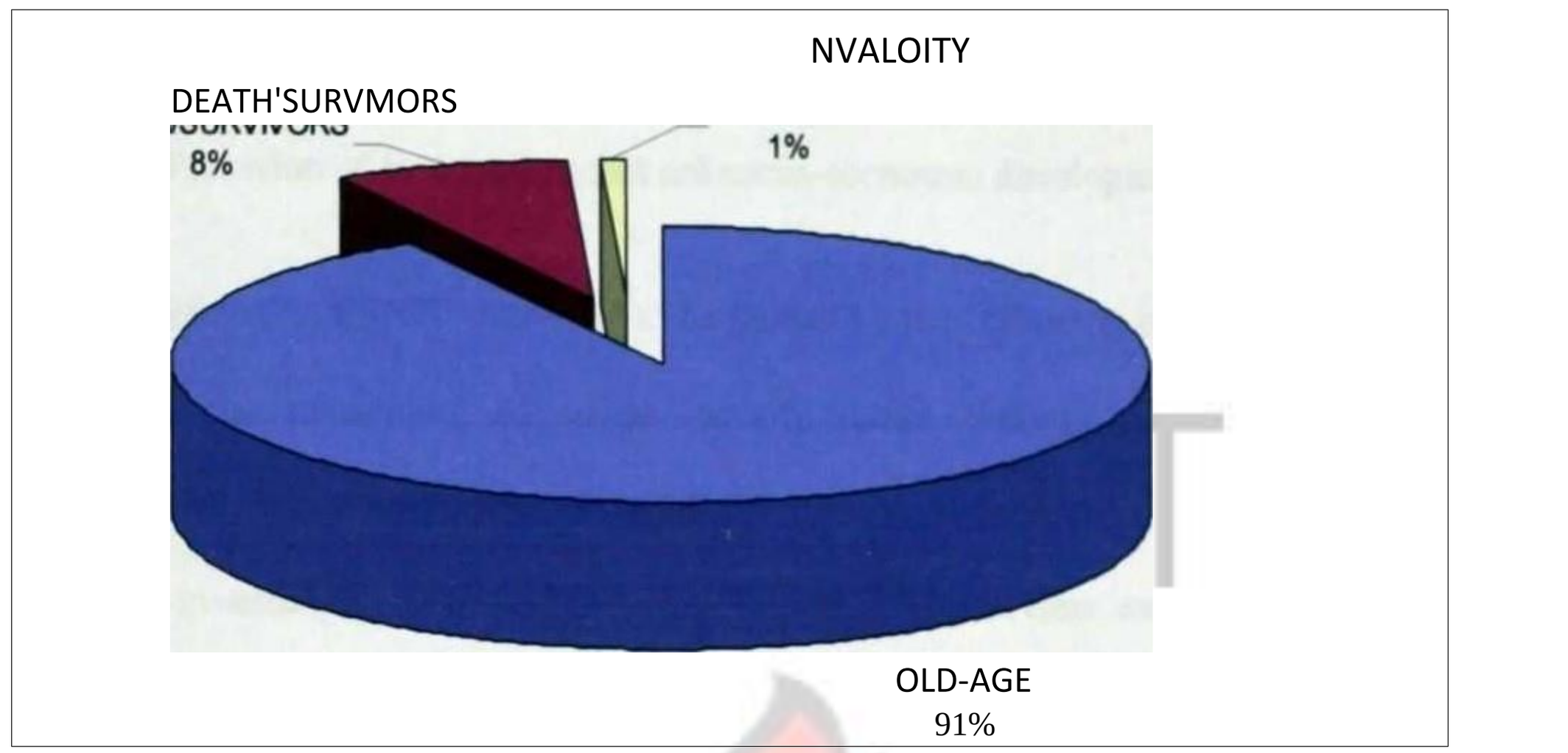

Fig. 3.3 Percentage of Beneficiaries by Type as at December 2004

Source: SSNIT Research Department

The total value of benefits claimed rose from <6.30 billion in 1995 to <465.50 billion in 2004, with 91% for old age benefits, 8% for death/survivors benefits and 1% for invalidity benefits.

3.4.4 SSNIT Investment Policy

In 1994, SSNIT prepared and investment policy, outlining the criteria for choosing a portfolio mix and expected portfolio return annually. Based on the return, risk, liquidity, actuarial characteristics and social and economic development roles of ú-Trust, the investment policy was fashioned to guide the investments towards achieving the following goals:

i. Maintenance of a long term Optimum Fund Ratio as may be determined from time to time by the scheme's actuary;

ii. To protect the corpus of the assets in the scheme; iii. To protect the value of those assets; iv. To assist the scheme meet its obligations to members througl improvement in investment returns on a long-term and sustainable basis;

v. Provision of investments that are socio-economic development ormted.

Additionally, SSNIT continued to be guided by the follosaing basic principles that govern the investment of social security funds: Safety, yield, liquidity, diversification, social and economic utility.

The investment policy was reviewed in 2001. This review was approved by the SSNIT Board of Directors in 2004. The review was carried out with the view to improving and updating the policy to conform to current trends in the management of pension funds. Key among the issues involved in the review was the determination of an annual actuarial minimum real rate of return of the SSNIT Investment Portfolio. In addition the assets were re-categorized as Domestic Equity (DE), International Equity (IE), Fixed Income Securities (FI), Real Estate Investments (RE) and Economically Targeted Investments (ETD. The table below shows the strategic asset allocation and benchmark returns.

TABLE 3.1 STRATEGIC/POLICY ASSET ALLOCATIONS AND BENCHMARK RETURNS

Asset Class	Target Allocation	Rebalancing Range	Benchmark Return

Domestic Equities	29%	+1-80/0	150-200 b.p. over GSE
Listed Equity Unlisted	25%	100/0	20% — 25% Return on
Equity	4%	+/_30/0	Equity
Fixed Income		+1—40/0	
G.o.G Bonds	1%	+/_10/0	5% Real Return
Third Party Lending	4%	+1—20/0	BOG Prime Rate + 100 b.p.
Corporate Loans	2%	+/-20/0	Av. Com. Bank Base Rate — 400 b.p.
Short-Term Debts	32%	+/_50/0	91 -Day Treasury Bill
Students' Loans		+/_50/0	1 -Year Note
Real Estates	150/0	+1-70/0	I-Year Note + 100 b.p.
Econ. Targeted Investments	5%	+1-00/0	Cost Recovery
Total	1000/0		

Note: b.p-refers to basis-pornT700 basis point equals 1%

3.4.5 Structure of SSNIT's Investment Division and the Investment Process

As part of the investrrmt policy review, SSNIT Board of Directors approved a new structure for the Investment Division, which is bang trnplemalted. The thrust of the new structure is investment management by instruments. Four (4) portfolios have been created to be headed by portfolio rnmagers of the of Heads of Department The portfolios are: Equity Investments, Economically Targeted Investments, Fixed Income Investments md Realty. In addiuorv a Portfolio Performance Monitoring and Measurement outfit has also been created (see figure

3.4 below).

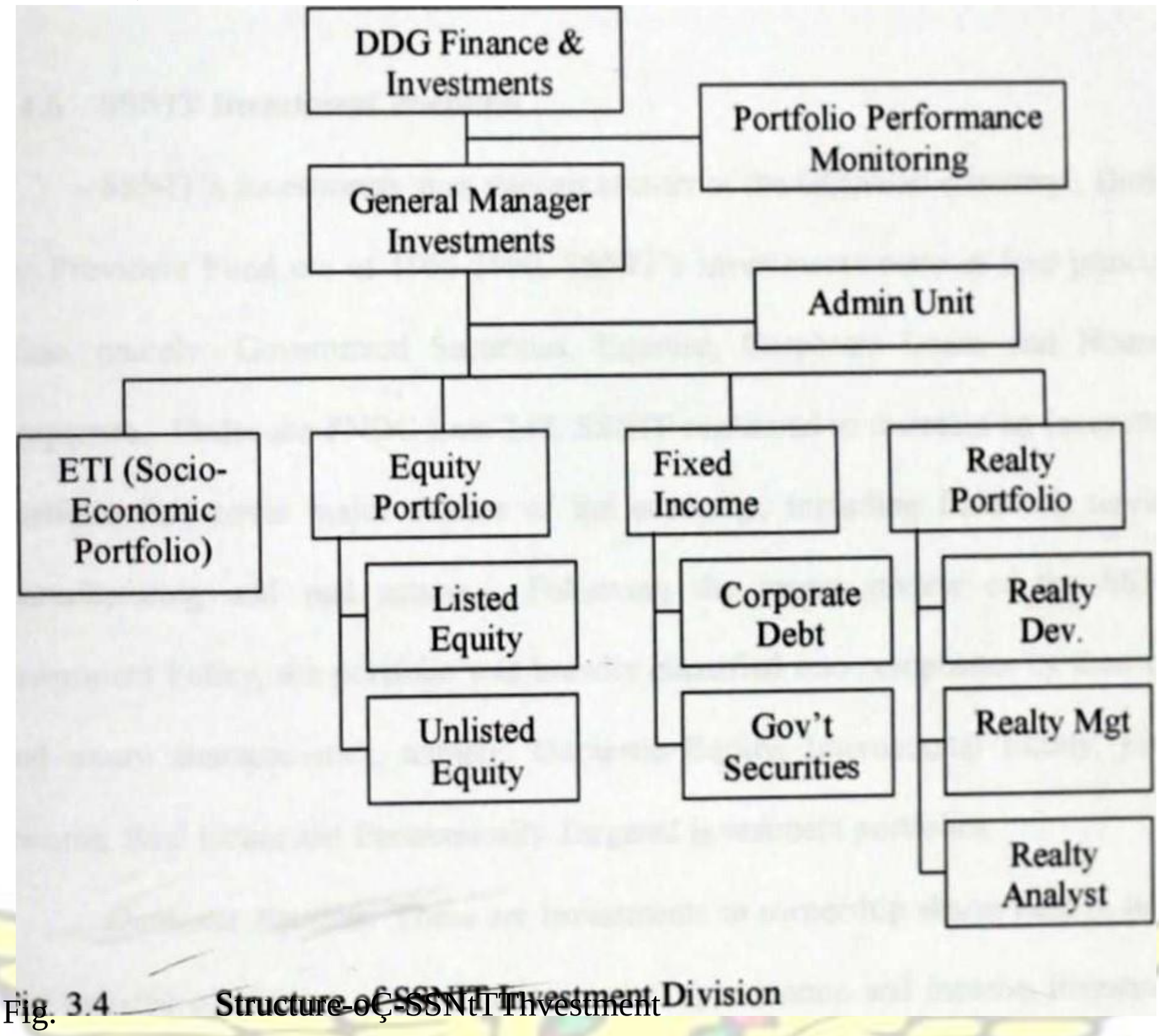

Fig. 3.4 **Structure of SSNIT Investment Division**

Source: SNITInvestment Policy 2Œ)4

The investment division identifies and assesses investment opportunities and submits investment proposals to management for review and re-direction to the Board for consideration. There is a Board sub-committee on Finance and Investments, which critically reviews Investment proposals submitted to the Board and make appropriate recommendations thereof to the Board. Investment decisions made by the Board are implemented by SSNIT Management through the Deputy Director General. The Deputy Director General reports to the Director General who also reports to the Board of Directors, which is responsible for all investment decisions and policy issues.

3.4.6 SSNIT Investment Portfolio

SSNIT's investments span various sectors of the Ghanaian economy. During the Provident Fund era of 1965-1990, SSNIT's investments were in four principal areas,

namely: Government Securities, Equities, Corporate Loans and Housing Properties. Under the PNDC Law 247, SSNIT continued to maintain an investment portfolio that cover major sectors of the economy, including financial, services manufacturing and real estates. Following the recent review of the SSNIT Investment Policy, the portfolio was broadly classified into composites by their risk and return characteristics, namely: Domestic Equity, International Equity, Fixed Income, Real Estate and Economically Targeted Investment portfolios.

Domestic Equities: These are investments in ownership shares held in listed and unlisted companies—By-providing capital appreciation and income, investment in shares has the long-term goal of covering the portion of the fund's liability attributable to continued service of active members. Equity investments are expected to, tn the long-term, provide a hedge against Domeuc •e categorized further into Listed md Unlisted.

SSNIT-held listed equity investments are ownership shares held by SSMT tn cornpames listed on the Ghana Stock (GSE). As of Decanber 2004. SSNIT held shares in 20 equtues out of the 30 equities on the Ghana Stock Exchange. The market value of SSNIT-held listed equity portfolio at the close of 2004 stood at €2,719.7 billiorv constituting about 31.0% of the total SSNIT investment portfolio (See Appendix 4) and 2.79% of the total G.S.E market capitalization of ₵97,614.45 billion The policy allocation for listed equity is 25% with rebalancing range of +/-10% and a balchmark return of between 150 md 200 basis points above the G.S.E. All-Share Index

SSNIT-held unlisted equity inwstments are ownership shares held by SSNIT in companies not listed on the G.S.E. As at the end of 2004, the Trust held shares in 46 unlisted (privately owned) companies. The value of SSNIT-held unlisted equity investment at the end of 2004 totalled ©410.35 billion, constituting 4.9% of the total investment portfolio. These investments span the services (18 compani

manufacturing (12 Companies), real estate (2 companies), and financial (14 companies) sectors of the Ghanaian economy (See Appaldix 3). The Trust's investment policy provides a target allocation of 4%, a rebalmcing range of +1-3% and a benchmark return of between 20% and 25% return on equity

International Equities Portfolio: Investments in this category of assets include _xúTshore and dor»esttc--mvestments that earn returns in foragi currency.

International equity investments are expected to contnbute to diversificauon md a reduction in portfolio risk due to the low correlation betweel dortEsuc foragi

Though the policy is to set a targa allocation for this of assets, SSNIT holds international equity investrrmts in two nunely Ghatu companies,

International Bank Limited and Ecobank The of Transnational Incorporated

this class at the close of 2004 was $5.2 cor8t1tuung about of the total portfolio.

Fixed Income Portfolio: This class of is expected to provide general income to meet Interest cost on accrued pension liability. The fixed income securities are held to provide liquidity, portfolio diversification, md managed with the view to reducing the sensitivity of the overall portfolio to interest rate volatility. Included in this class of assets are Government of Ghana Bonds (including inflation indexed bonds), Corporate Debts, Short-Term Debts (i.e. treasuries), md Studalt Loans. At the end of 2004, the value to the fixed income portfolio stood at ¢3,554.8 billion, representing 51.9% of the total portfolio. The benchmark allocation by the SSNIT investment policy is 51 %

Real Estate Portfolio: This class of assets is to provide stability and diversification through investments, which tend to preserve and expand capital during periods of high unanticipated inflation. As at December 2004, the value of the real estate portfolio, which stood at 003.8 billion, represented 10% of the total portfolio. The benchmark allocation by the SSNIT investment policy is 15%

Economically Targeted Investment Portfolio: These are investments made in line with the social and economic utility principle of pension fund investments. Whiles ETI investments are not expected to yield superior economic profits they must notmake losses. _The--aHocatron to ETI is caped at 5% of the total Investible funds. Some of the projects/investments under ETI are Ghana Hostels Limited, Abattoirs, Ghana Industrial & Commercial Estates Lintitd, Exim Guarantee Company Limited, Expon Finance Company, Mdro Mass Transit.

3.4.7 Growth in Investment Assets

The value of the Trust's investment assets has grown substantially by 2,209.5% over the past 10 years from <380.0 billion in 1995 to billion in 2004.

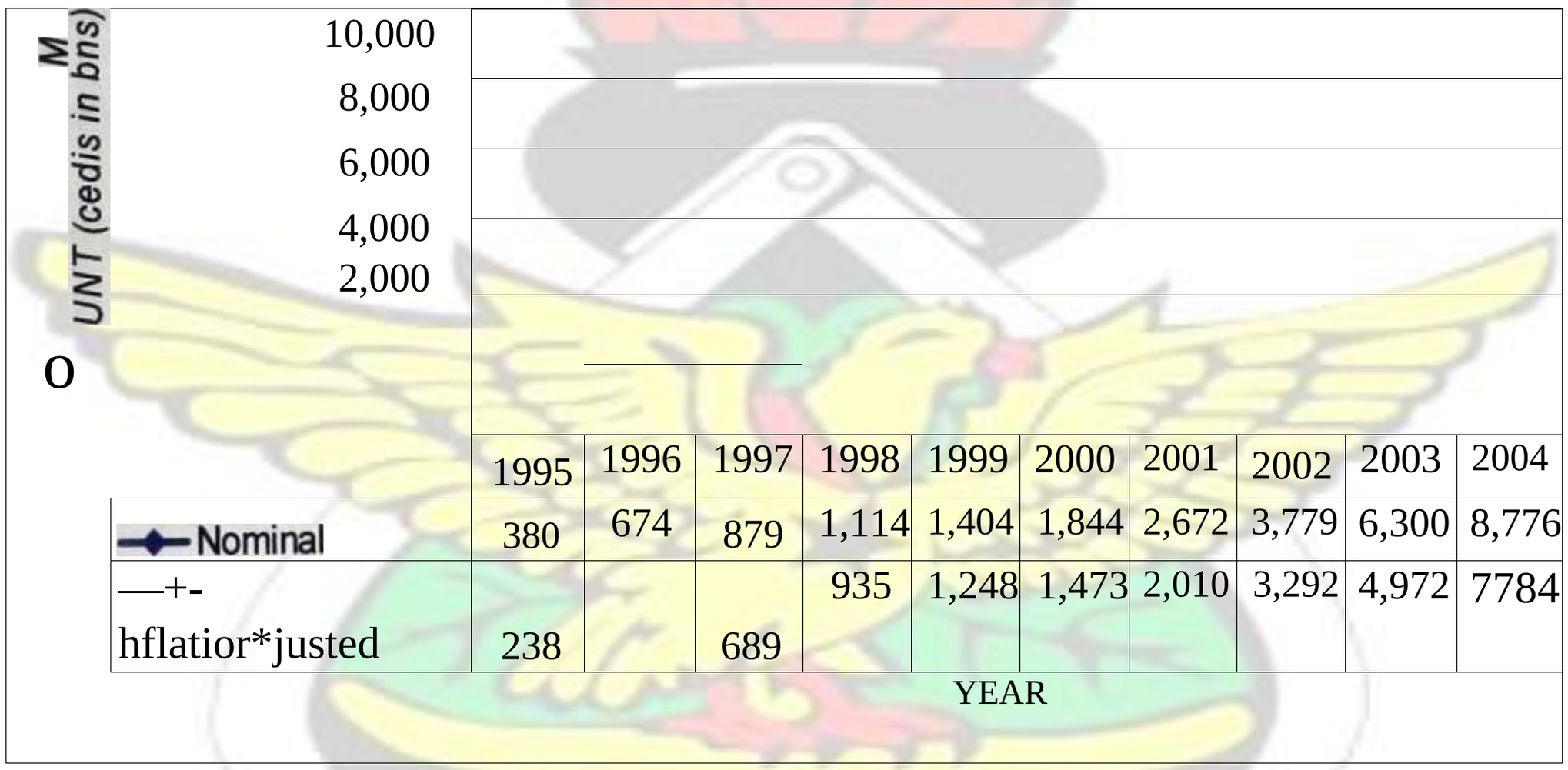

Fig. 3.5 Trend in Total SSNIT Investment Assets (Nominal and Inflation Adjusted, 1995 - 2004) Source: SSNIT Annual Accounts and Investment Department

DATA ANALYSES, FINDINGS AND DISCUSSION

4.1 SSNIT Investment Portfolio Performance

To analyse the investment portfolio performance, we present the total portfolio returns and risks, followed by coefficient of variation and Sharpe Composite Performance measure. The annual returns on each portfolio assets compared to their benchmarks are presented in appendix 5.

4.1.1 Portfolio Return and Risk Analysis

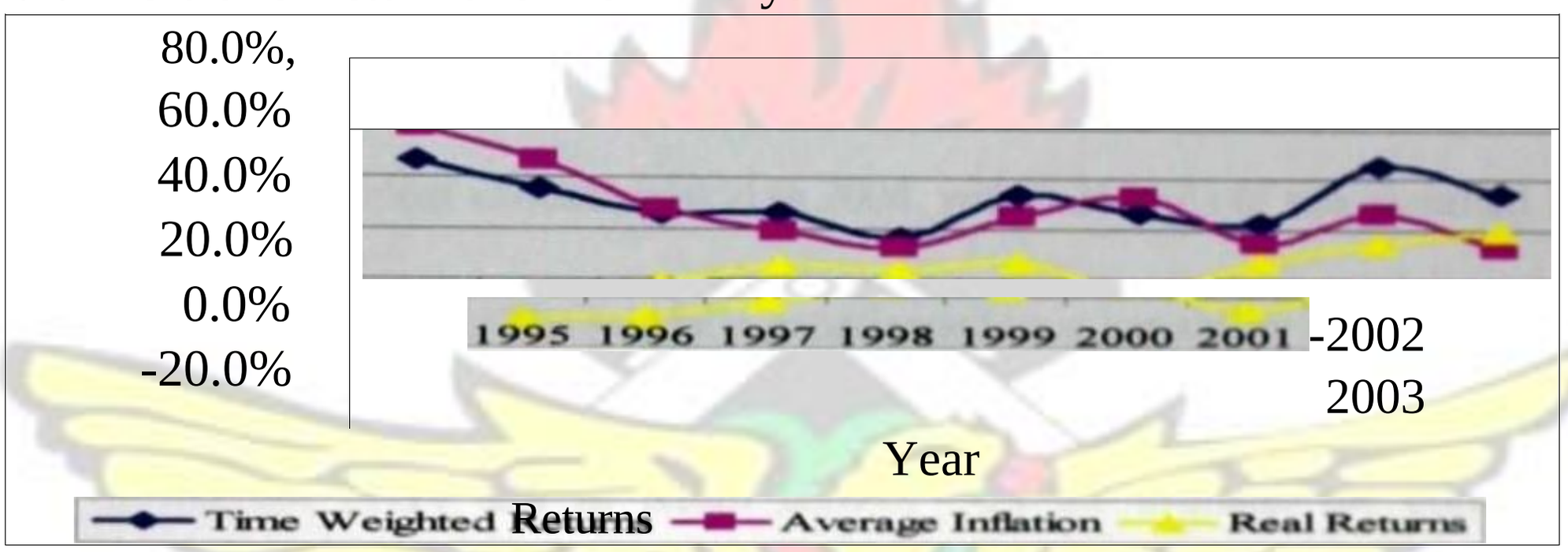

Fig. 4.1 Annual SSNIT Investment Portfolio Returns and Risks

The nominal mean return on the portfolio over the period 1995 to 2004 was 30.9% with a risk level of 9.55%. The nominal return ranged from a minimum of 16.4% in 1999 to a maximum of 45.2% in 2004. The portfolio risk ranged from a minimum 1.0% in 2002 to a maximum of 8.8% in 2004. After adjusting for inflation, thgÆ)ortfolio ten>L4L995-2004) real return was +3.10%. This compares favourably with the overall benchmark portfolio return of +2%, exceeding it by 1.10%. The portfolio's nominal returns were completely eroded by inflation in four out of the ten years under study. These years and their respective portfolio real returns are 1995: -8.1%, 1996:-7.7%, 1997: -1.6%. and 2001: -S.W.. Generally, the portfolio real return showed continuous improvement over the period under review, except for the year 2001. The portfolio progressively earned positive real returns of

3.6%, 6.6%, 6.9%, 14.6% and 19.3% in 1999, 2000, 2002, 2003 and 2004 respectively. In all these years the portfolio exceeded its benchmark in real terms.

4.1.2 Portfolio Coefficient of Variation

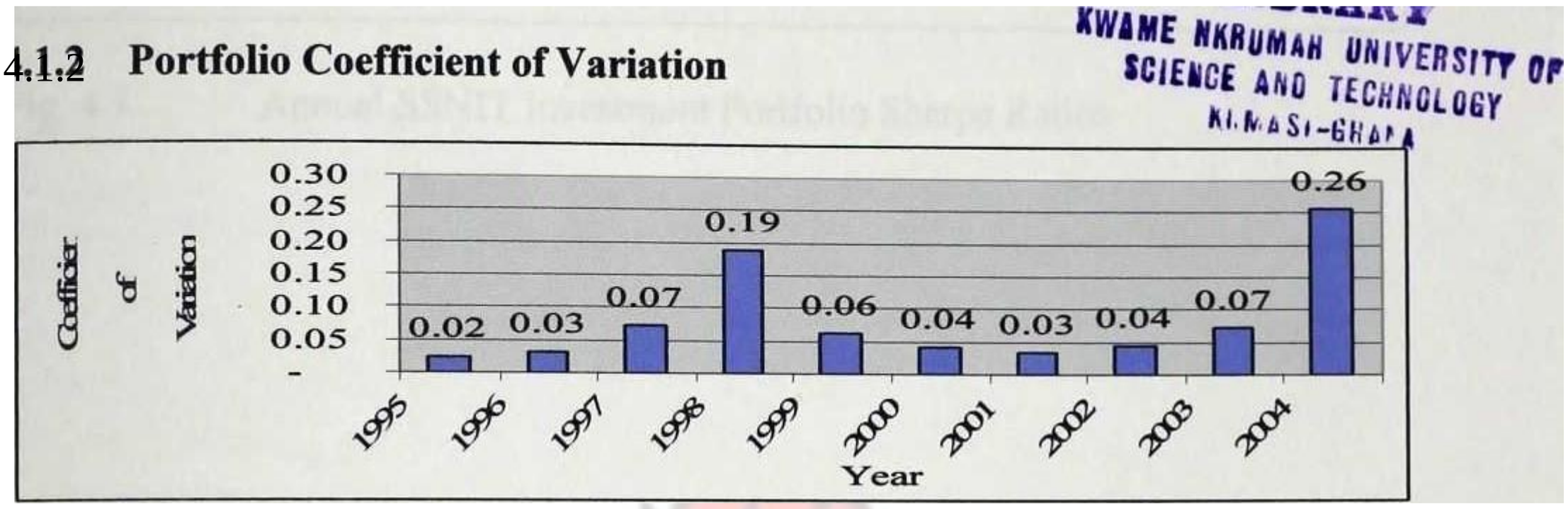

Fig. 4.2 Annual SSNIT Investment Portfolio Coefficient of Variations

In terms of risk, the annual portfolio coefficient of variation show the portfolio was the most variable (risky) in 2004, with 0.26 units of risk assumed for 1 unit return earned. The portfolio experienced least variability in 1995, assuming 0.02 unit of risk for every unit of return earned. On the average, the portfolio's Coefficient of Variation on the average stood at 0.31.

4.1.3 Portfolio Sharpe Composite Performance Measure

The portfolio risk premiums earned per unit of total risk measured by the Sharpe Ratios were unimpressive between 1996 and 2002. They were negative. In 1995, 2003 and 2004 however, the portfolio earned impressive positive Sharpe ratios.

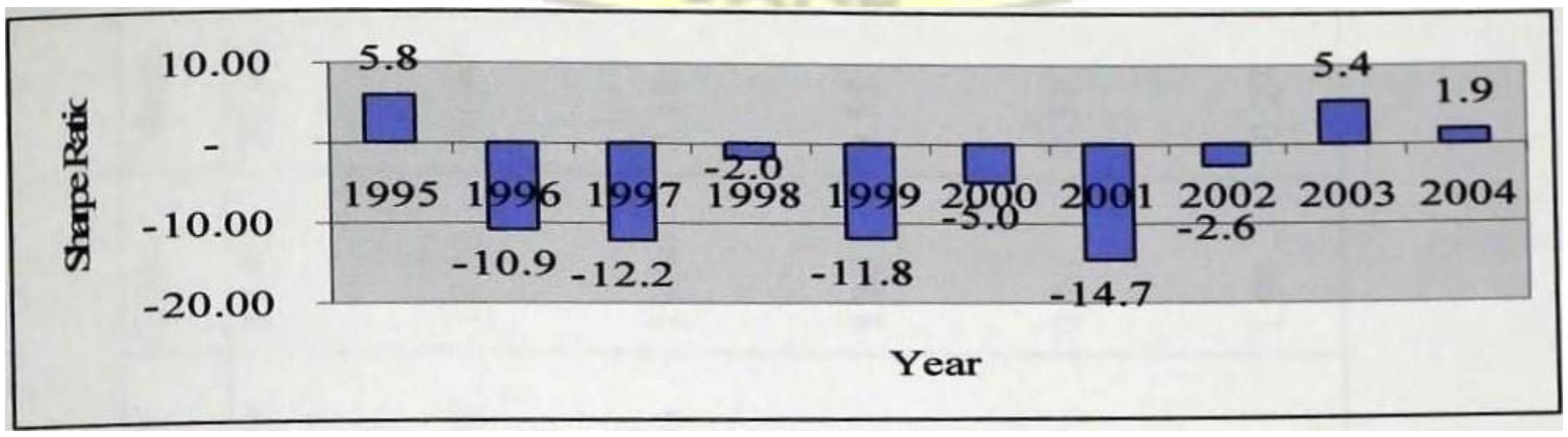

Fig. 4.3 Annual SSNIT Investment Portfolio Sharpe Ratios

Table 4.1 Annual SSNIT Investment Portfolio Returns (1995 – 2004)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Mean
Time Weighted Return (%)	46.60	35.30	25.50	26.10	16.40	33.50	26.20	22.70	45.20	34.40	30.90
Inflation (%) (Geo. Mean)	59.50	46.60	27.60	19.20	12.40	25.20	32.90	14.80	26.70	12.70	26.90
Real Return (%)	-8.10	-7.70	-1.60	5.80	3.60	6.60	-5.00	6.90	14.60	19.30	3.10
Standard Deviation (%)	1.14	1.06	1.82	4.94	1.02	1.38	0.89	1.00	3.23	8.80	9.55
Coefficient of Variation	0.02	0.03	0.07	0.19	0.06	0.04	0.03	0.04	0.07	0.26	0.31
Sharpe Ratio	5.80	-10.90	-12.30	-2.00	-11.80	-4.90	-14.70	-2.60	5.4	1.90	-0.27

Real Return = [(1+Nominal Return)/(1+ Inflation)] – 1; Nominal Return refers to the Time Weighted Returns

4.2 Investment Portfolio Return Attribution Analysis

Adopting the (Brinson et. al., 1986, 1991) framework for return attribution, we present in the Table 4.2 below, the mean annualized returns on SSNIT Investment Portfolio by activity from 1995 to 2004. In the Table, the first quadrant (I) is the passive policy return, the second quadrant (Il) is the policy timing return, the third quadrant (Ill) is the policy selection return and the fourth quadrant (IV) is the actual overall portfolio return

Table 4.2 Mean Annualized Returns by Activity on SSNIT Investment Portfolio by Activity (1995-2004)

Selection		
Active	Passive	
(IV) 30.90%	(11) 15.34%	i m i n
(111) 28.14%	(1) 16.78%	

Active Returns due to:

Timing - 1.41% Security Selection 11.36%

Other 4.20%

Total Active Return 14.15%

The mean annualized total return over the 10-year period IV) was 30.90%. On the average the portfolio lost 145 basis points per year in market timing but gained 1,135 basis points per year from secunty selection The mean annualized total return from for the normal policy (passive index returns and average weighting) was

16.78% (Quadrant I). Overall, the portfolio gained 1,409 points per year resulting from active management.

Table 4.3 provides more details on various effects active management and investment policy at work. The effect of market timing on the compound annual return of individual plans ranged from +6.78 to -8.06 percent per year over the period. The effect of security selection ranged from +28.51 to -24.99 percent per year. On average, total active management earned 10.28 per cent per year on the portfolio. Its annual effect varied however, from a low of -13.32 percent per year to a high of +22.04 per cent per year — a range of 35.36 per cent.

Table 4.3 Annualized returns on SSNIT Investment Portfolio by Activity (1995-2004)

Total Returns	Mean Returns	Maximum Return	Minimum Return	Standard Deviation
Portfolio returns				
Policy	16.78%	37.64%	2.83%	10.58%
Policy and Timing	15.34%	35.20%	6.99%	9.48%
Policy and Selection	28.14%	58.01%	1.16%	15.24%

Actual Portfolio	30.90%	45.20%	16.40%	9.66%
Active Returns				
Timing only	-1.45%	6.78%	-8.06%	4.78%
Selection	11.35%	30.27%	-24.52%	14.4%
Other	4.18%	31.07%	-7.70%	12.24%
Total active	14.09%	37.60%*	0.42%*	11.26%*

*NotAdditive

Adopting (Drobetz and Kohler, 2000) model, the retum level ratio is 0.54; less than one. This means that active management of the portfolio yielded returns above what passive portfolio management could have yielded.

4.3 Relationship between SSNIT Investment Portfolio Return and its InveStment PolieyúTSíFhiegy

4.3.1 Models Specifications and Testing

The original Brinson et al. (1986 and 1991) model is modified to become:

OPR = + + $\beta_1 PR + \beta_2 PSR$ ß3PTR + V

t ----------(4.1)

Where the ßs are the coefficients of regression

OPR is the overall investment portfolio return

PR is the policy (passive) return on the portfolio

PSR is the policy and selection return on the portfolio

PTR is the policy and timing return on the portfolio

Vt is the error term

Equation (4.8) is actually an adoption of the (Brinson et al., 1986, 1991) original model, which in its original form is specified as:

OPR = f(PSR)•, OPR = f(PSR); OPR = f(PTR)_____ (4.2)

Equation (4.2) was used to test the ability of investment policy to dictate pension funds investment portfolio returns. We adopted this model with some modification because as in (Brinson et al., 1986, 1991), our study looks at the general Impact of investment policy and strategy on the SSNIT pension fund investment portfolio.

Variables in equation (4.1) are normalized so we may conduct a partial elasticity analysis. Taking the logs to do this normalization thus enables us to assess the impact of a change in Timing for instance on the overall portfolio return (APR), holding all other factors constant. Equation (4.1) in its log form thus appears as:

$$\text{Log OPR}=ß0+ \beta_1\text{LogPR} + \beta_2\text{LogPSR} + \beta_3\text{LogPTR} + V_t \text{ ---------- (4.3)}$$

In this log-linear form each partial slope coefficient measures the partial elasticity of the dependent variable yith-fespectto the independent variable in question, holding all other factors constant. For instance, measures the partial impact of a percentage change in Policy Returns on overall portfolio performance.

4.3.2 Time Series Characteristics of Regression Variables

Before we proceed to test equation (4.3), we conduct unit root tests on the chosen variables to ascertain their time series characteristics. This helps us to avoid spurious results that emanate from the use of non-stationary variables in regression analyses. Various methods available for the unit root tests range from the DickeyFuller (DF), Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) to the Sarghan Bhargava Durbin Watson (SBDW). The full DF equation is specified as:

$$Yt=Ct + \gamma Y_{t-1} + U_t \text{ ----------} \quad (4.4)$$

Where Yt, is any series and Ut $(0,0^2)$; Yo = 0

The DF however suffers from a defect of relying on the assumption of AR (1) i.e. the whole data generating process (DGP) is first order autoregressive. We therefore adopt the ADF using:

$$A \quad Yt=po+ \rho_1 Y_{t-1}+ \Sigma\alpha_i \Delta Y_{t-j} + E_t \text{ ----------} \quad (4.5)$$

Where Y, is any series and Et, is the error term.

The unit root test process is a test on the coefficient p. The null hypothesis here is Ho: p = 0 (using the traditional t — test); and the alternative is

$H_a: \rho < 1$

The test for the existence of unit root produces the following results:

Table 4.4 Results of the Unit Root Test on Regression Variables (I)

Variable	Lagged Difference	t-statistic	Prob.
DLOPR	1	-5.574627*	0.0002
DLPSR	1	-8.538790*	0.0000
DLPTR	2	-6.052614*	0.0001
DLPR	1	-6.746298*	0.0001

* Means variable is stationary at I % significance level.

These results are supported by the graphical analyses that are used for the same test in Appendix 1B

These results, as reported in Table 4.4 reveal that the variables are not stationary at their levels. At 1% significance level, their first differences on the other hand are stationary. They are in fact integrated of order one (l) i.e. Yt I (l). We continue by examining the possibility of the existence of cointegration. The validation of the existence of cointegration would afford us the opportunity to develop an Error

Correction Model (ECM) to take advantage of all the attributes discussed in an ECM by the Granger Representation Theorem. This theorem states that if two series are cointegrated then they will be most efficiently represented by an error correction specification and furthermore, if the series are cointegrated, this dynamic specification will encompass any other specification, including the partial adjustment_Ødam, 1992).

423.3 Test for Cointegration

This process begins with a test of the long run relationship between the dependent and explanatory variables as stated in equation (4.6) below.

$$LOPR = -1.734 - 0.993LPR + 0.623LPSR + 1.805LPTR + E_t \text{ ----------} (4.6)$$

We conduct a unit root test on the residuals (Et) to evaluate its time series characteristics. An Et I (0) (i.e. a zero order of integration of this variable) implies the presence of cointegration between the variables used in equation (4.6). As it turns out, the results confirm that the variables are cointegrated. Results of this test are presented in a graphical form below.

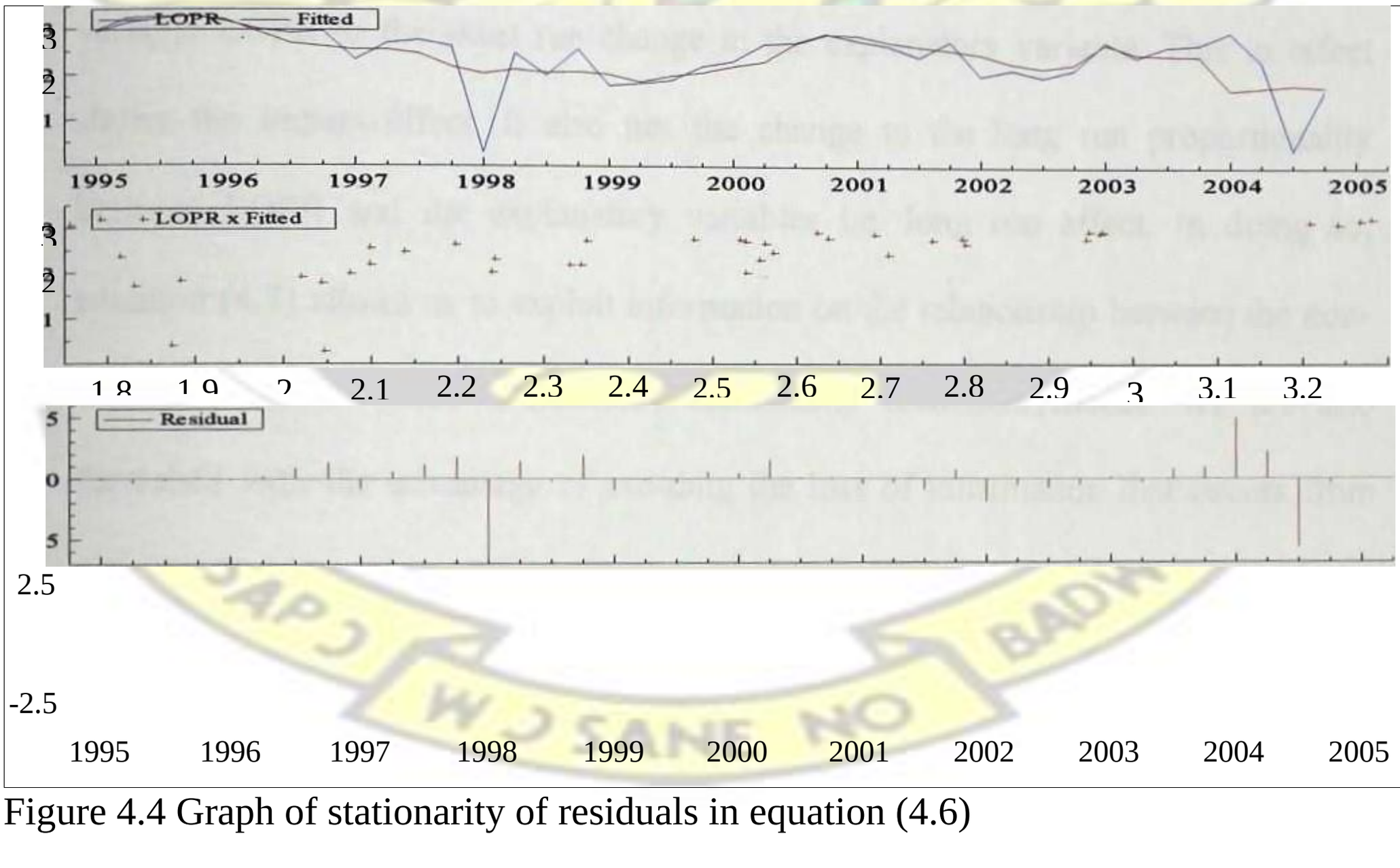

Figure 4.4 Graph of stationarity of residuals in equation (4.6)

We can therefore proceed to develop an error correction model to test both the short and long run impact of investment policy and strategy on the performance ofthe SSNIT investment portfolio.

4.3.4 Developing a Parsimonious Error Correction Model

Having been offered the opportunity to use an error correction model, we proceed by using Hendry's general to specific approach to develop a parsimonious model (Adam, 1992). We do this by regressing the difference (with their lags) of the investment policy and strategy variables on the difference of the overall portfolio returns (OPR). Details of the first step in this process are presented in appendix ID.

In our bid to arrive at the final parsimonious ECM two main factors are considered. First, we are mindful of the significance of each variable, and second, we consider the finance theory behind any relationship we establish. After dropping insignificant variables we specify the final parsimonious error correction model as:

DLOPR + þlDLPSR + ß2DLPTR - þ3DLPR - þ4DLPSR 4 + þ5DLPTR_5+ þ6DLPR 5 + Et — (4.7)

In this form, equation (4.7) relates the short run change in the dependent variable LOPR to the short run change in the explanatory variable. This in effect shows the impact effect. It also ties the change to the long run proportionality between LOPR and the explanatory variables i.e. long run effect. In doing so, equation (4.7) allows us to exploit information on the relationship between the nonstationary series within a stationary statistically consistent model. We are also furnished with the advantage of avoiding the loss of information that occurs from attempts to address non-stationarity through differencing. We test this model with the quarterly data discussed already. This test produces the following results:

Table 4.5: Results of Test of Equation (4.7)

EQ (7) Modeliing DLOPR by OLS (using Data 1)

The present sample is: 1996 (3) to 2004 (4)

Variable	Coefficient	Standard Emn•	t-value	t-prob
Constant	-0.00027734	0.0017541	-0.158	0.8755
DLPSR	0.50780	0.025703	19.756	0.0000
DLPTR	0.91452	0.13279	6.887	0.0000
DLPR	-0.36787	0.11414	-3.223	0.0033
DLPSR 4	-0.069855	0.026643	-2.622	0.0142
DLPTR 5	1.3274	0.55722	2.382	0.0245
DLPR 5	-0.69333	0.31659	-2.190	0.0373

RA2 = 0.961321 F (6.27) = 111.84[0.0000]\sigma= 0.0101567

DW = 2.20 RSS — -0.002785 for 7 variables and 34 observations.

4.3.4 Diagnostic Tests

None of the model diagnostic tests (See Appendix IE) are significant even at the 5% significance level. The AR test for auto-correlated residuals confirms the absence of serial or residual correlation. The ARCH test for heteroscedastic errors rejected the presence of heteroscedasticity; the Jarque-Bera normality test for the distribution of the residual indicate that the residual terms are white noise; and finally

the RESETtest for the regression specification was also not significant, which indicates that the fitted regressions are good.

4.4 Relationship between SSNIT Investment Portfolio Returns and Selected Macroeconomic Variables

4.4.1 Models Specification and Testing

In the search for an appropriate model to represent the stated relationship, Hendry's general to specific approach is used. The original (Omole and Falokun, 1996) model is modified to become:

$$OPR = + ßlGSE + ß21NF + ß3LR + ß4EX + ß5TBR + Vt \text{ ---------- } (4.8)$$

Where the ßs are the coefficients of regression

OPR is the overall investment portfolio return

GSE is the Ghana Stock Exchange All-Share Index

INF is the rate of inflation

EX is the cedi/dollar exchange rate

LR is the Deposit Money Banks' lending rate

TB is the 91 -day Treasury bill rate

Vt is the error term

Equation (4.8) is actually a considerable modification of the Omole and Falokun's original model, which in its original form is specified as:

$$SPI = f(Xal, xao, Xbl, Xb0) \text{ ---------- } (4.9)$$

Equation (4.9) was used to test the impact of trade liberalization on the Nigerian Stock Market (NSE). In equation (4.9), SPI represent stock price index, Xa and Xb represent interest-race-and-exchange rate respectively. This modification is because our study looks at the general impact of macroeconomic instability as opposed to Omole and Falokun's study, which limits itself to trade liberalization and thus required only the exchange rate and the interest rate. Omole and Falokun in fact describe these two variables as the bedrock oftrade liberalization.

Variables in equation (4.8) are normalized to enable us conduct a partial elasticity analysis. Taking the logs to do this normalization thus enables us to assess

the impact of a change in lending rates for instance on the portfolio return holding all other factors constant. Equation (4.1) in its log form thus appears as:

$$\text{LogOPR} = ßo + ßI\text{LogGSE} + ß2\text{Log1NF} + ß3\text{LogLR} + ß4\text{LogEX} + ß5\text{LogTBR} + Vt \quad (4.10)$$

In this log-linear form, each partial slope coefficient measures the partial elasticity of the dependent variable with respect to the independent variable in question, holding all other factors constant. and ß2 for instance measure the partial impact of a percentage change in Ghana Stock Exchange returns and inflation rate respectively on portfolio performance,

4.4.2 Time Series Characteristics of Regression Variables

Before we proceed to test equation 4.3, we conduct unit root tests on the chosen variables to ascertain their time series characteristics. This helps us to avoid spurious results that emanate from the use of non-stationery variables in regression analyses. Various methods available for the unit root tests range from the DickeyFuller (DF), Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) to the Sarghan Bhargava Durbin Watson (SBDW). The full DF equation is specified as:

$$Y\text{-e-æff-ËYYW+Ut} \quad (4.11)$$

Where Yt is any series and Ut $(0, 6^2)$; Yo = 0

The DF however suffers from a defect of relying on the assumption of AR (1) i.e. the whole data generating process (DGP) is first order autoregressive (ARI). We therefore adopt the ADF using:

$$AYt = po + PIM\text{-}I + EctiAYt\text{-}j + Et \quad (4.12)$$

Where Yt is any series and E.t is the error term.

The unit root test process is a test on the coefficient p. The null hypothesis here is

Ho: p = 0 using the traditional 't' test; and the alternative is Ha: p < I

The test for the existence of unit root (P < l) produces the following results:

Table 4.6 results of the Unit Root Test on Regression Variables (Il)

Variable	Lagged Difference	t-statistic	Prob
DLOPR	1	-5.574627*	0.0000
DLGSE	1	-3.274939*	0.0024
DLTBR	2	-3.474109*	0.0015
DLINF	2	-3.182300*	0.0032
DLLR	1	-3.881790*	0.0005
DLEX	2	-3.171433*	0.0033

*Means variable is stationary at 1% significance level

These results are supported by the graphical analyses that are used for the same test in appendix 2B.

These results, as reported in Table 4.6 reveal that the variables are not stationary at their levels. At 1% significance level however, their first differences on the other hand are stationary:- They are in fact integrated of order one (1) i.e. Yt I (l). We continue by examining the possibility of the existence of cointegration. The validation of the existence of cointegration would afford us the opportunity to develop an Error Correction Model (ECM) to take advantage of all the attributes discussed in ECMs by the Granger Representation Theorem. This theorem states that if two series are cointegrated then they will be most efficiently represented by an error correction specification and furthermore, if the series are cointegrated, this dynamic specification will encompass any other specification, including the partial adjustment (Adam, 1992).

4.4.3 Test for Cointegration

This process begins with a test of the long run relationship between the dependent and explanatory variables as stated in equation (4.6) below:

$$LOPR\ 2.256 - 0.356 - 0.557LTBR + 0.802LINF - 0.165LLR + 0.318LEX + Et \quad (4.13)$$

We conduct a unit root test on the residuals (Et) to evaluate its time series characteristics. An Et—l (0) (i.e. a zero order of integration of this variable) implies the presence of cointegration between the variables used in equation (4.13). As it turns out, the results confirm that the variables are cointegrated. Results of this test are presented in a graphical form below.

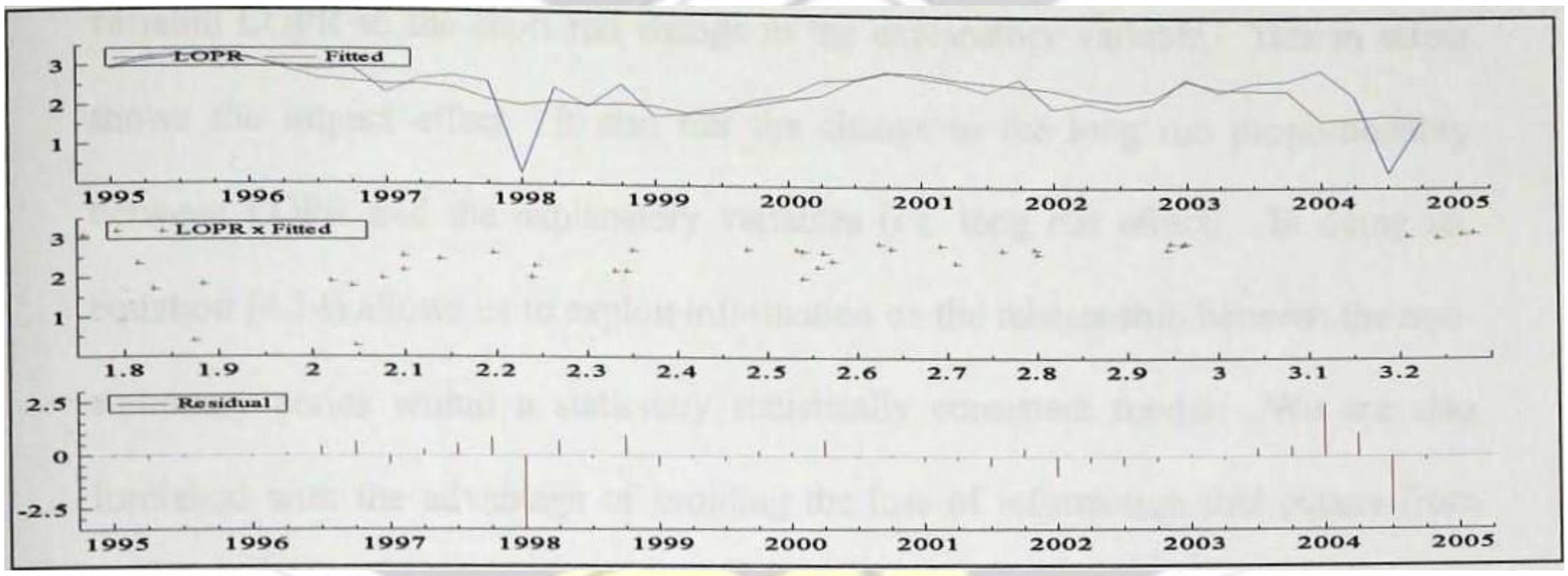

Figure 4.5 Graph of stationarity of residuals in equation (4.13)

We can therefore proceed to develop an error correction model to test both the short and long run impact of macroeconomic environment on the performance of the SSNIT investment portfolio return.

4.4.4 Developing a Parsimonious Error Correction Model

Having been offered the opportunity to use an error correction model, we proceed by using Hendry's general to specific approach to develop a parsimonious

model (Adam, 1992). We do this by regressing the difference of the overall portfolio returns (APR) on the difference (with their lags) of the macroeconomic variables. Details of the first step in this process are presented in appendix 21). In our bid to arrive at the final parsimonious ECM two main factors are considered. First, we are mindful of the significance of each variable. We also consider the economic theory behind any relationship we establish. After dropping insignificant variables, we specify the final parsimonious error correction model as:

DLOPR + ßlDLGSE 3 + ß2DLTBR - ß3DLINF3 - ß4DLLR- 2

(4.14) ß5DLEX 5 + Et

In this form, equation (414) relates the short rtm chmge tn dQadmt variable LOPR to the short rtm change in nus tn effect

the explanatory variable

shows the impact effect It also ties the change to the long run proportomllty between LOPR and the explanatory variables (i• long run effect). In dotng so. equation (4.14) allows us to exploit information on the relationship betueat the nonstationary series within a stationary statistically model. We are also furnished with the advantage of avoiding the loss of information that occurs from attempts to address non-stationarity through diffemctng We test this model suth the quarterly data discussed already. This test produces the followtng results.

Table 4.7: Results of Test of Equation (4.14)

Dependent Variable: DLOPR

Method: Ordinary Least Squarvs

Date: 04/11/06 Time: 09:56

Sample (adjusted): 1996:3 to 2004:4

Included observations: 34 after adjusting endpoints

Variable	Coefficient	Standard Ermr	t-value	t-prob

Constant	-1.3932	OR7969	-3669	00019
DLGSE 3	3.6899	1 Ä235	2788	00076
DLTBR	3.5725	1.1460	3 117	00013
DLINF 3	-1.0960	0.59317	-1.848	00081
DLLR 2—	-9.8274_————————	27307	-3591	00022
DLEX 5	-27345	2.9360	-0.931	0 0432

R-Squared 0.848918 Adjusted R-Squared 0.815344

F

3.03 [0.0118] \sigma = 0.546056 DW=2.26

RSS = 5.069005854 for 5 variables and 34 observations

4.4.5 Diagnostic Tests

None of the model tests are significant even at 5% significance level. The AR test for auto-correlated residuals confirms the absence of serial or residual correlation. The ARCH test for heteroscedastic errors rejected the presence of heteroscedasticity; the Jarque-Bera normality test for the distribution of the residual indicate that the residual terms are white noise and finally the RESET test for the regression specification was also not significant, which indicates that the fitted regressions are good.

4.5 Discussion and Analysis of Results

We began this section trying to provide an empirical support for all the descriptive analysis done in the previous sections of the study. In doing so, as stated already, the finance and economic theory behind the stated relationships remained very important in all considerations. The objectives and hypotheses formulated in the first

chapter of this study thus formed the basis of this exercise. The various parametric tools have been meticulously applied in this exercise. This exercise produced the results represented by tables 4.1 and 4.2 as well as equations (4.7) and (4.14). Aiest on the data admissibility and applicability of this test also produced the results presented in Tables 4.5 and 4.7. These results are interpreted and analysed in this section.

4.5.1 SSNIT Portfolio Performance Analysis

The mean nominal return on the investments for the period (1995-2004) was approximately 30.9%. The portfolio nominal return ranged from 16.4% in 1999 to 45.2% in 2003. The mean real return on the portfolio over the ten year period under study was +3.1%. This is 1.10% (110 basis points) in excess of the SSNIT actuarially determined targeted real return of +2.0%. The portfolio performed abysmally in the years 1995, 1996, 1997, and 2001 posting negative real of returns. However, from 1999 to 2004 (except for 2001) the portfolio performance improved year on year, posting significant positive real returns of 3.6%, 6.6%, 6.9%, 14.6% and 19.3% in 1999, 2000, 2002, 2003 and 2004 respectively Thus in real terms the portfolio's performance ranged from -8.1% in 1995 to 19.3% in 2004.

In terms of risk, the portfolio returns show the most variability in 2004, with 0.26 units of risk assumed for I unit return earned. The portfolio experienced least variability in 1995, assuming 0.02 unit of risk for every unit of return earned. Using the Coefficient of Variation, we would conclude that the portfolio performed best in the years 1995. Its worst performance was in 2004. On the average, the portfolio's Coefficient of Variation on the average stood at 0.31. This means over the period under study, on the average, for every unit of return the portfolio earns it assumes a risk of 0.31 units.

The portfolio posted positive Sharpe ratio of 5.8, 5.4 and 1.9 in 1993, 2003 and 2004 respectively. This means that the portfolio earned a premium (over the risk free rate»of 514 units ~~and 1.9 units~~ for every unit of total portfolio risk assumed. However, the portfolio's Sharpe ratios were unimpressive from 1996 to 2002. They were negative. There could however be two (2) interpretations of these results:

(a) The Abnormal Capital Market Line

The Sharpe ratio uses a benchmark (Risk free rate) based on the 'ex post' capital market line. The theoretical CML is upward sloping with the Risk free (Rf) rate of return as its intercept on the ordinal. According to theory, the riskier an asset, the higher its expected return. However, in Ghana particularly from 1995 to 2002, the capital market line seems to have been downward sloping with the risk-free rate being relatively higher than the rate of return on most assets on the financial market (See Bank of Ghana Quarterly Review). This could be the reason for SSNIT's investments registering negative Sharpe's. In 2003 and 2004, the rates appeared to have been in line with theory and the Sharpe ratios relatively better results.

(b) Prudence in Investment Management

The second argument is that of improper asset selection and timing. In spite of the fact that the capital market line was abnormal in Ghana, the fund managers are expected to dosuperior asset selection and so prudently allocate the funds to ensure that assets that yield higher (lower) risk-adjusted returns have higher (lower) weights in the portfolio. Thus SSNIT has no excuse for its low risk-adjusted returns from 1995 to 2002.

In simple terms, whatever direction our capital market line slope, the managers of the fund should invest in ventures which would yield returns which match the Treasury Bill Rate or exceed it. That would be prudent management, given the prevailing macro-economic situation.

4.5.2 Relationship between SSMT Investment Portfolio Returns and its Investment Policy and Strategy

Over the ten year period under review, active portfolio management was found to have added value to the portfolio annually. Though the portfolio on the average lost 141 basis points per year in market timing it gained 1,136 basis points per year from security selection. Overall, the portfolio gained 1,415 basis points per year from active management.

The variables used in studying the impact of investment policy and strategy on the return of the SSNIT investment portfolio were significant event at 1%. The constant term is however significant at 5%. Also the variables have instant impact on the portfolio performance.

Investment policy variable is the policy return (PR). Holding all the other variables constant, a 1% increase in policy asset allocations results in a 0.38% decrease in portfolio return immediately and after one year (5 quarters) decrease portfolio return further by 0.69%. This is contrary to theory which holds that a 1% change should change portfolio return by between 0.80% and 0.9% of the variation in investment portfolio returns is attributable to investment policy. It is likely that the Trust's investment policy falls short of current trends in capital market expected returns. SSNIT might find it very useful to review its benchmark returns and strategic asset allocation Should the fund managers follow passive portfolio management (allocating the investible funds exactly in line with strategic asset allocation), the portfoÞ-per$ormance would not be spectacular.

Investment strategy is captured by the policy selection (PSR) and policy timing returns (PTR) variables. Finance theory expects that investment strategy (asset selection and timing) to contribute between 5% and 10% to the variation in

portfolio returns. The policy selection returns variable carries an immediate effect positive co-efficient of 0.51 and a one year lagged effect of minus 0.07. means holding all other variables, an asset selection decision that increases the policy selection return by 1% results in an immediate increase of 0.51% in the portfolio return. All other variables held constant, this asset selection decision dragged the portfolio performance by 0.07% in four quarters. This is reflective of the considerable pains that SSNIT's management takes to select securities that will add value to the portfolio.

The policy timing variables also takes opposite signs depending on time. Holding all other variables constant, a 1% increase in timing (that is variations in assets allocations by additions or reductions to the portfolio assets) instantly increases the portfolio's performance by 0.91%. And in 5 quarters, this investment strategy decision results in a further 1.32% improvement in portfolio performance. The performance of the portfolio is more sensitive to timing decisions than to security selection than to passive policy allocation decision.

The overall goodness of fit value of 96.1% represented by the R-Squared In Table 4.5 shows the power of investment policy and strategy in explaining the performance of the SSNIT investment portfolio performance. It implies over 96% of the variation in the portfolio returns is explained by changes in policy selection returns policy timing returns and the passive policy (asset allocation) returns.

4.5.3 Relationship between SSNIT Investment Portfolio Returns and Selected Macroeconomic Variables

For the impact of macroeconomic variables on investment returns, majority of the chosen variables are significant at 1%. Notable amongst these are the constant term, the rate of inflation, the exchange rate and the lending rate. Results produced in Table 4.7 are interesting and very much in tune with our expectations far as our hypotheses are concerned. Significantly, the rate of inflation, which actually portrays all shades of macroeconomic instability, assumed the expected negative sign of 1.09. It is also

significant at 1%. The negative coefficient indicates the partial impact of a percentage increase in inflation on the performance of the investment portfolio, and tells us that a 1% increase in the rate of inflation drags portfolio performance by

1.09% holding all the other factors constant. As expected however, the portfolios' response to general price instability is not instant. It takes a lag of almost three quarters for a change in inflation to affect the portfolio performance. The lag of the inflation term also conforms to economic theory. Finance and investment decisions, in response to changes in the economic fundamentals are actually not instantaneous; an Increase in the cost of production will not lead to decisions in favour of increased product prices. Sales and profit may be relatively poor. SSNIT's portfolio companies are thus adversely affected and hence the portfolio performance.

The lending rate also assumes the expected negative coefficient. The hypothesis that increasing lending rates (increase the cost of production of portfolio companies, shrink their margms and) adversely affects portfolio performance has therefore been supported. Obviously, many public and private businesses in Ghana (listed ones included) do not look attractive enough to warrant huge investments. High lending rates prompted by increasing government borrowing have in fact not helped the private sect>n-generdand the SSNIT investment portfolio companies in particular. The response of SSNIT's investment portfolio performance to increasing lending rates, (Table 4.7) though lags two quarters, is however quicker than inflation effects. The coefficient of 9.83 is extremely high and tells us that high cost of borrowing in Ghana is actually killing businesses and negatively affecting the nation's pension fund investment portfolio. Holding all other factors constant, when Deposit Money Banks raise their interests rates by 1% SSNIT's investment portfolio performance deteriorates by 9.83%.

In line with our belief that SSNIT's portfolio companies might suffer from exchange losses and result in abysmal portfolio returns; the exchange rate variable adopted in equation (4.14) assumes a negative coefficient. This is actually not too surprising since relatively very little investments is made into businesses that do not

actually suffer from this phenomenon, namely Anglogold Ashanti Limited (AGA), Aluworks Limited (ALW), Ghana International Bank Limited (GIB) and Ecobank Transnational Incorporated (ETI). These businesses gain a lot from persistent depreciations in the value of the cedi; in fact they benefit from government objective of making Ghanaian exports more attractive through exchange rate depreciations. It is true that AGA and ALW rely on imported inputs whose prices rise with the falling value of local currency. They are however saved from these exchange losses because a bulk of their products find their way onto the international markets where proceeds from sales are received in foreign currency. These gains are however eroded by the huge exchange losses the rest of the portfolio companies incur. From Table 4.7, holding all the other factors constant; a 1% increase in cedi to dollar exchange rates results in a 2.73% decline In the portfolio return. The effect however lags over a year (5 quarters).

_The Treasury þJLrate-B-also significant even at 1% a-level. It obtained the expected positive coefficient. The result corroborates our claim that, portfolio return is directly related to the treasury bill rates. Its coefficient of 3.57 tells us that, holding all other variables constant, 1% increase in treasury bill rates increases the

portfolio returns be 3.57%. The model shows that changes in treasury bill rates influences the portfolio returns instantly. It is important to note that treasury investments constitute a significant 33% of the SSNIT investment portfolio as at December 2004. Indeed, the SSNIT investment policy provides that 32% of the investment assets be held in treasury investments.

The GSE variable also assumes the expected positive coefficient. Holding all other variable constant, a 1% increase in the GSE All-Share Index would result in a 3.69% increase in the portfolio performance. The portfolio's performance is not immediately sensitive to the changes in the GSE All-Share Index; it takes the portfolio three months to respond to changes that occur in the stock exchange performance.

The overall goodness of fit value of 84.9% represented by the R-Squared in

Table 4.7 shows the extent to which the chosen macroeconomic variables explain the SSNIT investment portfolio performance. It actually means that 84.9% of the movement in SSNIT's investment portfolio performance is explained by the variations in the selected macroeconomic fundamentals represented by the GSE AllShare Index, inflation rates, lending rates, treasury bill rates and the cedi to dollar exchange rates.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary and Conclusions

5.1.1 Relationship between SSNIT Investment Portfolio Returns and its Investment Policy and Strategy

The annualized real return on the portfolio over the period under study was +3.1%. This compares favourably to the target actuarially determined +2% real rate of return, exceeding it by 1.10%. High levels of inflation completely eroded the returns in four (1995, 1996, 1997, and 2001) out of the ten years under study. More prudent portfolio timing during these years could have averted these negative real rates of return. However, in 1998, 1999, 2000, 2002, 2003, and 2004 the portfolio posted impressive real rates of return, haven ridden on impressive stock market performance and relatively low levels ofinflation.

The fund managers were relatively risk averse in the years 1995, 1996, 2001 and 2004, when the coefficients of variation on the portfolio were 0.02, 0.03 and 0.03 respectively The portfolio was exposed to relatively higher levels of risk in the remaining years with the highest level of risk exposure occurring in 2004 at 0.26 units per 1 of return. The portfolio recorded negative Sharpe ratios from 1996 to 2002; showing that during these years the portfolio underperformed the average riskfree

return. In 1995, 2003 and 2004, the portfolio posted positive Sharpe ratios; it thus out performed the average risk free in these years.

Active portfo •o management which includes security selection and asset timing contributed significantly to the portfolio performance. While individual security selection added value to the portfolio, asset timing hurt the portfolio.

Portfolio theory holds that active management though important usually adds relatively very small to portfolio performance and that, a significant portion of portfolio performance comes from asset allocation policy. For SSNIT, maintaining a passive policy mix would have added relatively lesser value to portfolio. Indeed, the Return Level ratio shed more lights on these, by showing that following passive asset allocation policy adds relatively very little to the portfolio return compared to active management Involving prudent security selection and timing. Both investment policy and strategy (selection and timing) variables have instantaneous and lagged impact on portfolio returns, with the portfolio performance being the most sensitive to strategic timing decisions. These results suggest that SSNIT's investment policy allocations and benchmark returns have fallen out of line with current trends in investment and economic climate.

5.1.2 Relationship between SSNIT Investment Portfolio Returns and Selected Macroeconomic Variables

The results of the effects of macroeconomic variable on the SSNIT Investment Portfolio performance as discussed in chapter four are not surprising, in the sense that they confirm finance and economic theory by reason ofthe signs of the coefficients. With the exception of Treasury bill rates, the lags in the independent variables' effect on the portfolio performance are relatively long to allow arbitrage for a fund manager who is shrewd. This perhaps is a reflection of some level of information inefficiency in the financial markets in Ghana.

High lending rates have the worst impact on the state of the portfolio

performance as it is killing private sector initiative. Also depreciation of the cedi and intractable inflation hurt the portfolio companies and hence portfolio performance. Prudent policies aimed at reducing these to the projected lower digits are much warranted. Though the high treasury rates seem to improve SSNIT's investment portfolio performance, it is not an interesting development that must be alcouraged to continue ifthe stock market is expected to grow.

5.2 Recommendations

An analysis of the financial performance of SSNIT's investment portfolio has been made. The study no doubt has made very important findings, which have been outlined and discussed. It is clear from the above that the following policy reforms and recommendations are very much warranted:

5.2.1 Relationship between SSMT Investment Portfolio Returns and its Investment Policy and Strategy

The results of the attribution and regression analyses suggest that is necessary for SSNIT to review its investment policy in line with current trends in capital market expectations. While the asset timing strategy hurt the portfolio, asset selection strategy added value to the portfolio. For improved portfolio performance, the fund managers should not only endeavour to maintain superior asset selection strategy but also pay critical attention to asset timing. More so, because of the relatively higher level of portfolio performance sensitivity to asset timing.

The essence of efficient asset timing is to tactically decrease (increase) the weight of relatively worse (better) performing assets in the portfolio periodically with the viewto enhagging-peftfolio performance. In line with this, we recommend:

a) Quarterly review of the financial market performance to identify the returns on available financial instruments or assets and their associated risks.

b) Quarterly portfolio performance review aimed at achieving optimal risk adjusted returns.

c) Appropriate variations in asset weights that will ensure targeted annual real returns are met.

d) Avoid undue delays and shorten procedures in investment decision making and implementation.

As part of efforts aimed at ensuring improved asset selection SSNIT should:

a) Maintain list potential investments that meet its investment policy and guidelines. The list should be screened as a first step in selecting potential investments for review and analyses.

b) Conduct thorough legal, managements, technical and financial due diligence on the potential investments with the view to evaluating the suitability of the investment in meeting the objectives of trust.

c) Structure its investment deals such that while it seeks to align the interest of all parties, it also aims at protecting its rights, earning positive real returns, provides downside risk protection and facilitate exit from poorly performing investments.

d) Maintain an adequately resourced investment outfit, with the view to ensuring that important milestones set at the beginning of the investment are met and appropriate measures are taken to mitigate any adverse changes in»umpuensthat could affect the investment's performance.

In addition, SSNIT should periodically engage independent professionals to re-value its realty and unlisted equity investment assets to determine and recognize any hidden gains or losses in such assets.

5.2.2 Relationship between SSNIT Investment Portfolio Returns and Selected Macroeconomic Variables

In order to enable the SSNIT investment portfolio to take full advantage of various investment opportunities in the economy, government must of necessity and as a matter of urgency follow sustained prudent macroeconomic policies. This should be aimed at strengthening the cedi, reducing lending and inflation rates that have persisted aver the years. These three fundamental prices in the economy product prices as reflected in inflation, interest and exchange rate - are all largely driven by money supply. Consequently, it is just prudent that Bank of Ghana should concentrate on managing the money supply so that the various prices would be market determined.

Government borrowing from the short-term securities market exerts heavy pressure on shorter-term treasury bill yield curves. This has a tendency to crowd out small and medium sized enterprises from the credit market. Synchronization of government long-term projects with long-term sources of financing through issuing medium to long-term bonds will stabilize short-term interest rates and encourage the private sector in general and SSNIT portfolio . companies in particulĐĐ_paruc1pate in the capital market. In periods of increasing treasury rates, SSNIT fund managers should not be quick in holding excessively high amounts in treasury assets so as to post impressive portfolio returns. The fund managers should maintain an asset allocation that would generate returns sufficient to match its short, medium and long-term liabilities.

The GSE has not only served as a means for raising relatively cheaper capital for most companies but also provided additional investment avenue needed for economic growth. There is therefore the need to create an enabling environment to encourage the enlistment of additional companies onto the GSE. This together with some form of financial engineering to introduce financial derivatives onto the GSE

would increase the depth of the market and enable investors diversify their portfolio to optimize their investment returns. In addition, much more needs to be done on education. The securities market is a recent development in the Ghanaian financial system The current radio and television programmes aimed at sensitising the public on the merits of stock market investment should be extended to the hinterland to mobilise the huge untapped resources out there.

Finally, we also recommend the complete computerization and e-trading on the GSE. We expect this to shorten transaction time and enhance activity on the market. Most modem business transactions especially stock market trading take place on the internet. The massive popularity enjoyed by markets like the NASDAQ and the NYSE could partly be attributed to this phenomenon. Getting hooked to the internet will go a long way to make things easier for non-resident Ghanaians and Foreigners who continue to play the important role in the demand for equities on the market. We expect these to increase investor confidence in the stock market, enhancg_the value of stocks and bonds and invariably improve SSNIT investment portfolio performance.

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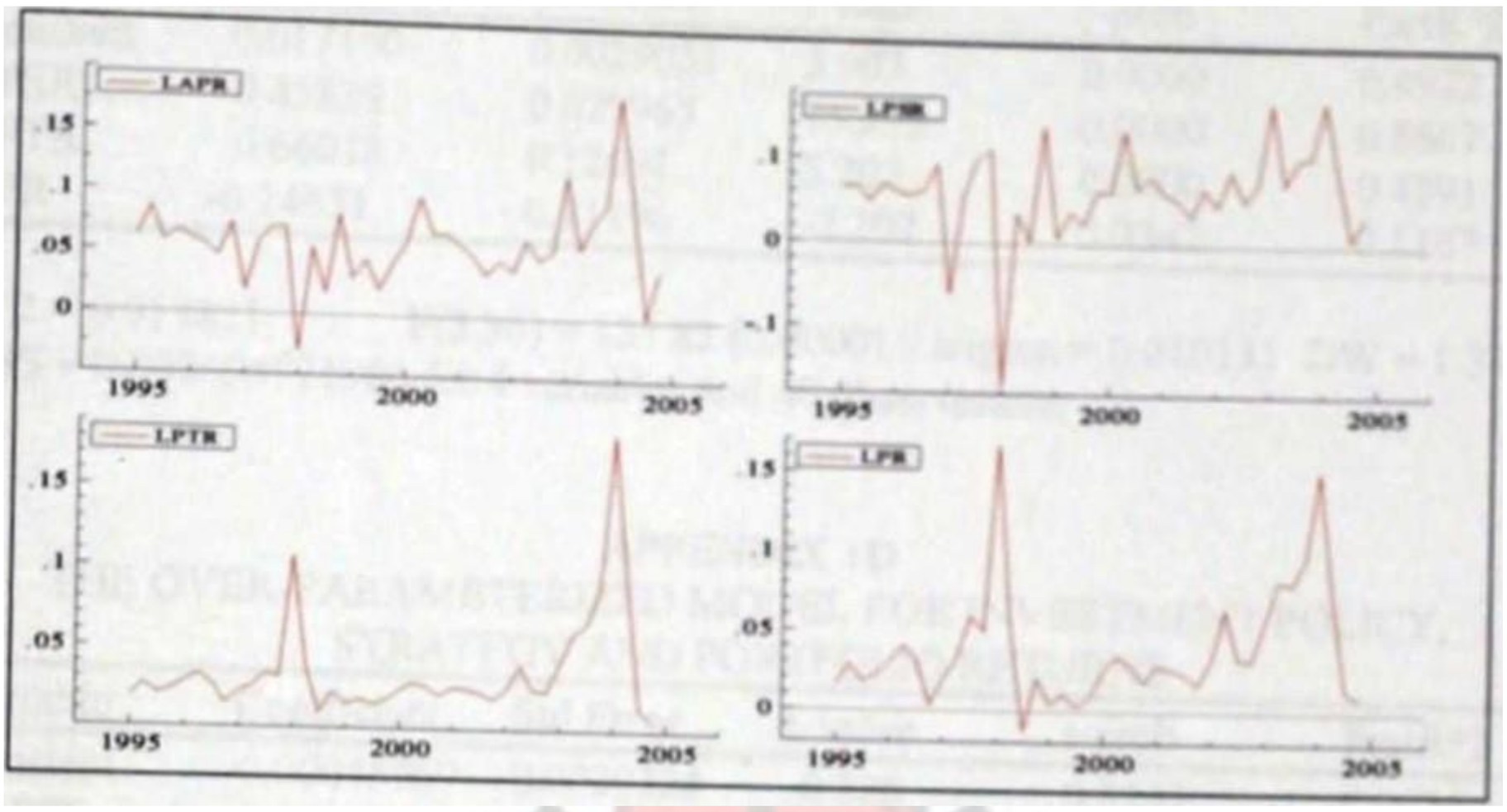
APPENDIX IA

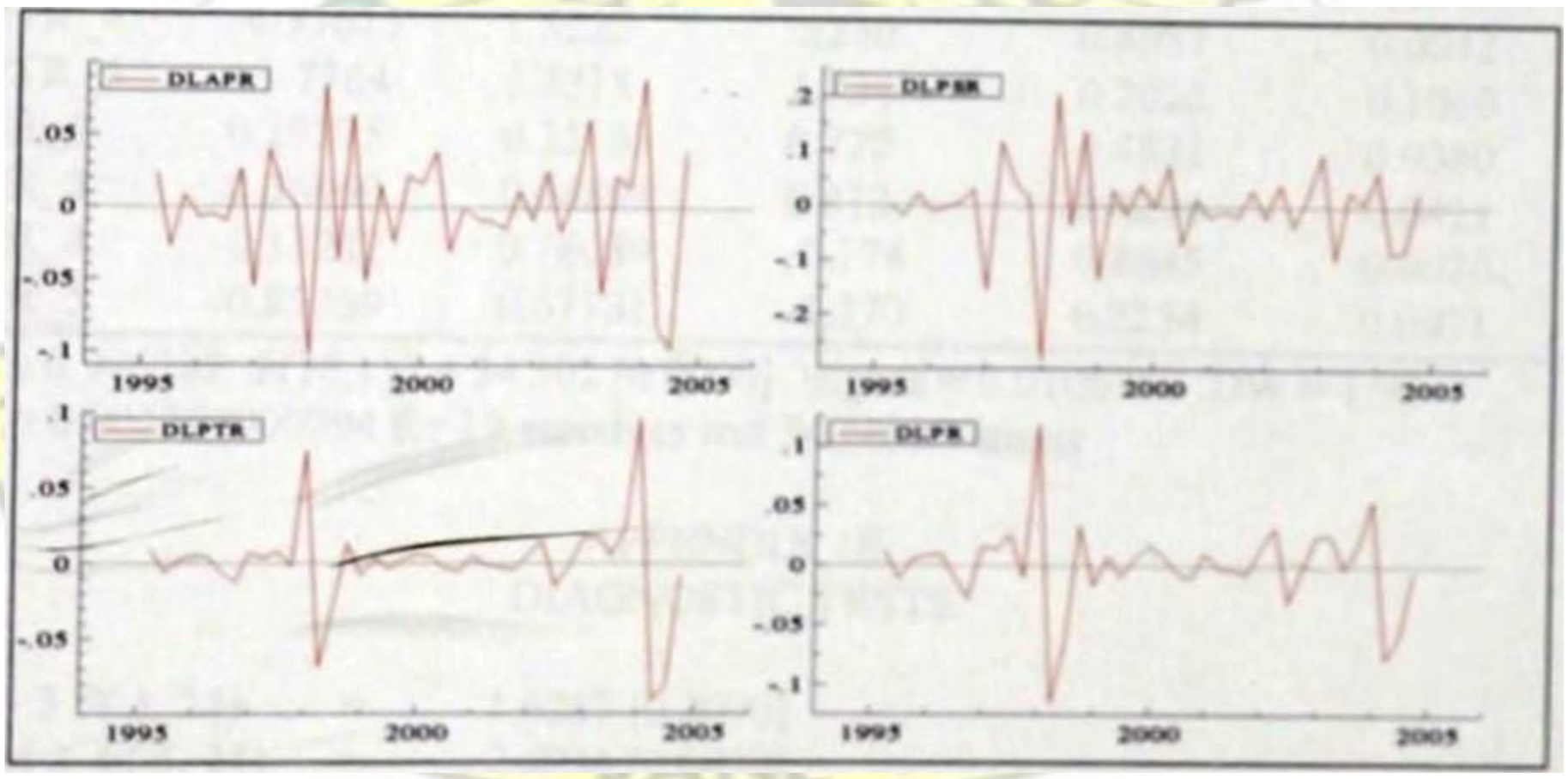
GRAPH OF ESTIMATION VARIABLES FOR INVESTMENT STRATEGY AND PORITOLIO RETURNS AT THEIR LEVELS



LAPR is the log value of the overall portfolio return
LPSR is the log value of the Policy Selection Return
LPTR is the log value of the Policy Timing Return
I-PR is the log value of the Policy (Passive) Return

APPENDIX 1B

GRAPH OF FIRST DIFFERENCE OF ESTIMATION VARIABLES FOR INVESTMENT STRATEGY AND PORTFOLIO RETURNS



DI-APR is the log value of the first difference of the overall return
DLPSR is the log value of the first difference of the Policy Selection Return
DLPTR is the log value of the first difference of Policy Timing Return DI-PR is the log value of the first difference of the Policy Return

APPENDLX 1 C

DETAILED RESULTS OF THE LONG RUN MODEL FOR INVESTMENT POLICY, STRATEGY AND PORTFOLİO RETURNS

Variable	Coefficient	Std.Error	t-value	t- rob	PartRA2

Constant	0017160	00029051	5.907	00000	04922
LPSR	0.45839	0029963	15.299	00000	08667
LPTR	0.66018	o. 12691	5.202	o.oooo	0.4291
LPR	-0.24651	0.11196	-2.202	00342	01 187

RA2 - 0.918821 F(3,36) = 135.82[0.00001 kigma-O.010131 DW- 1 24

RSS — 0003694971986 for 4 variables and 40 observations

APPENDIX ID

THE OVER-PARAMETERIZED MODEL FOR INVESTMENT POLICY, STRATEGY AND PORTFOLİO RETURNS

Constant	-0.00045969	0.0020324	-0226	0.8241	00034
DLPSR	0.47199	0.044494	10.608	0.0000	0.8824
DLPSR 1	00086941	0053166	0.164	0.8723	00018
DLPTR	0.84814	0.22360	3.793	00018	0,4896
DLPTR 1	-0,065154	o. 19994	-0.326	O. 7490	00070
DLPR	-0.37257	0,20477	-1.819	00889	o. 1808
DLPR 1	0,061675	o. 17550	0.351	0.7302	o.0082
DLPSR 2	-0.0046484	0072867	-0.064	0.9500	o. 0003
DLPSR 3	0.013960	0.070130	0.199	0.8449	o.0026
DLPSR 4	-0036337	0.078637	-0.462	0.6507	00140
DLPSR 5	-0,0020562	0,057899	-0.036	0.9721	o.oooi
DLPTR 2	-0.38591	0.30306	-1.273	0.2223	00975
DLPTR 3	-0.33926	0.66775	-0.508	0.6188	0.0169
DLPTR 4	0.37615	1.5023	0.250	0.8057	00042
DLPTR 5	1.7764	1.3318	1.334	0.2022	o. 1060
DLPR 2	0.19375	0.25153	0.770	0.4531	00380
DLPR 3	0.36460	0.44894	0.812	0.4294	0.0421
DLPR 4	-0.13212	0.76089	-0.174	0.8645	00020
DLPR 5	-0.85269	0.67131	-1.270	0.2234	00971

R^ 2- 0.976282 -34.302[0.0000] İsigmazO.0106705 Dw- 1 95

2 F(18,15) = 34.302 [0.0000] \sigma = 0.0106705 DW = 1.95

Variable Coefficient Std. Error t-value t-prob PartRA2

RSS — 0 001707900794 for 19 variables and 34 observations

APPENDIX I E

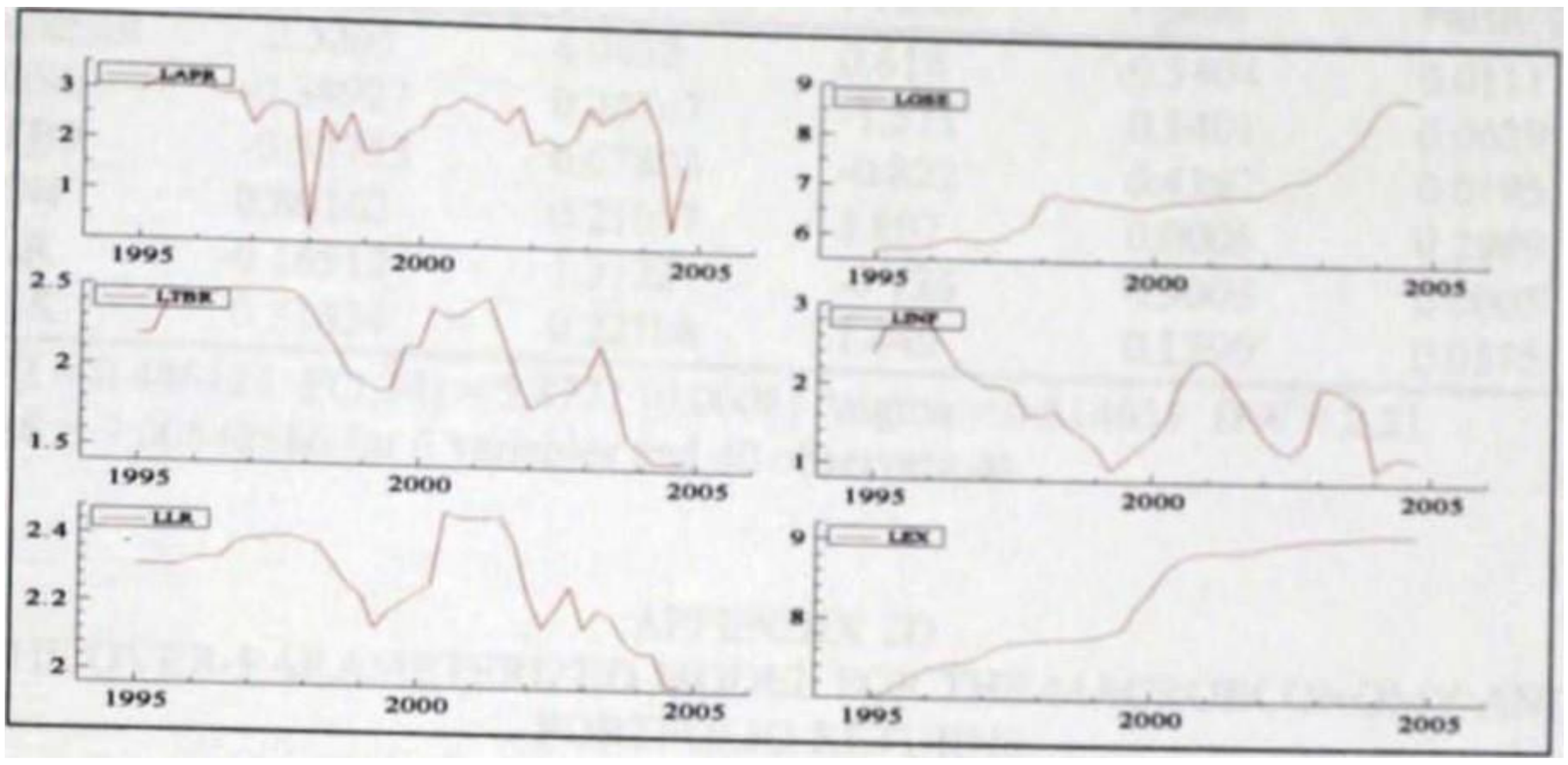
DIAGNOSTIC TESTS

——-AR 1- 3 3, 24)	=	1.6287 [0.20901
ARCH3 3, 2	=	2.4934 [0.08791
Normality ChiA2(2)	=	1.258 [0.53311
XiA2 F(12, 14)	=	0.853 [0.60461
RESET 1, 26)	=	0081374 [0.77771

APPENDIX 2A

GRAPH OF ESTIMATION VARIABLES FOR PORTFOLIO RETURNS AND

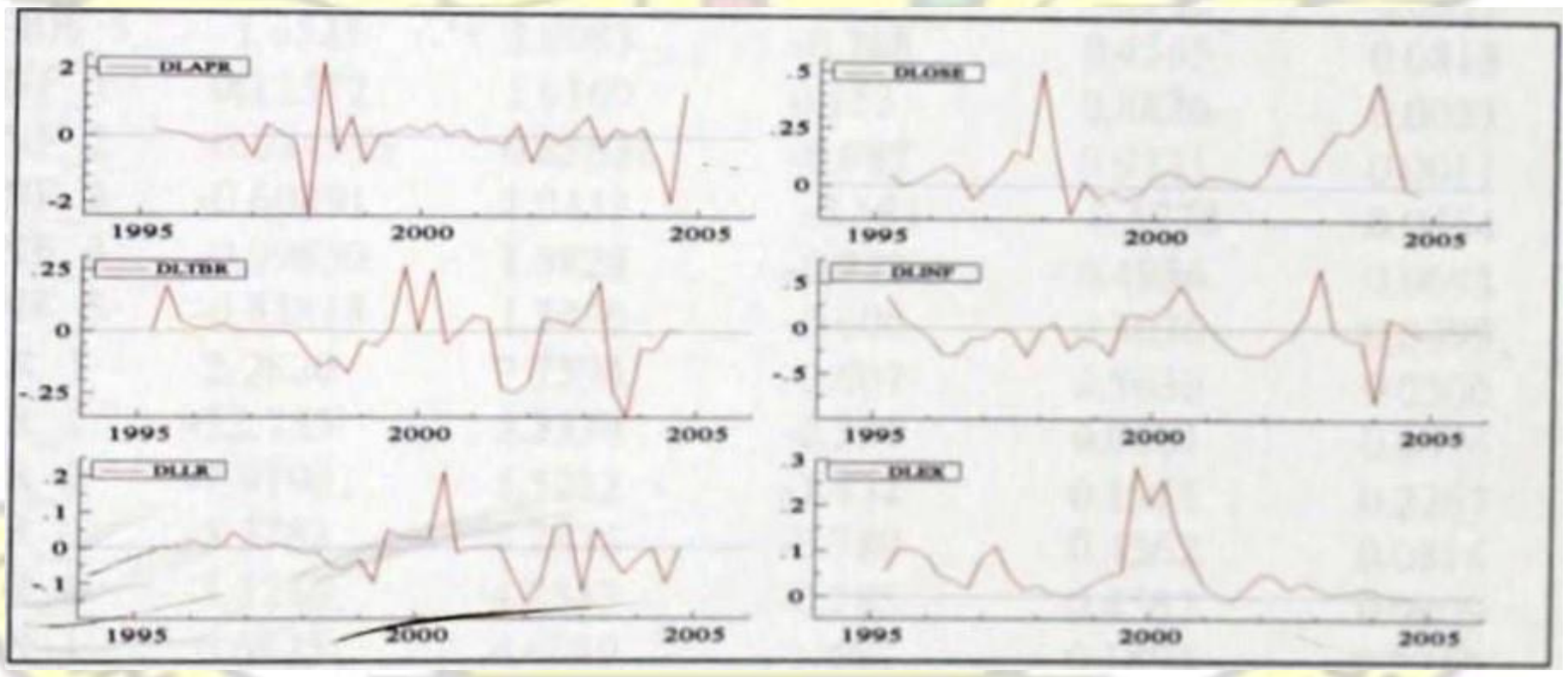
THE MACROECONOMY AT THEIR LEVELS



LOPR is the log value of the overall portfolio return
LGSE is the log value of the return on the Ghana Stock Exchange
LTBR is the log value of the 91-day treasury bill rate
LINF is the log value of the inflation rate
LEX is the log value of the cedi/dollar exchange rate
LLR is the log value of the lending rates of Deposit Money Banks (DMBs)

APPENDIX 2B

GRAPH OF FIRST DIFFERENCE OF ESTIMATION VARIABLES FOR THE MACROECONOMY AND PORTFOLIO RETURNS



DLAPR is the log value of the first difference of the overall portfolio return
DLGSE is the log value of the first difference of the Ghana Stock Exchange

DLTBR is the log value of the first difference ofthe 91 -Day treasury bill rate
DI-INF is the log value of the first difference of the rate of inflation
DI-EX is the log value of the first difference of the exchange rate
DLLR is the log value of the first difference of the lending rates of Deposit Money Banks (DMBs)

APPENDIX 2C DETAILED RESULTS OF THE LONG RUN MODEL FOR THE MACROECONOMY AND PORTFOLİO RETURNS

Variable	Coefficient	Std.Error	t-value	t-prob	PartRA2
Constant	2.5265	40852	0,618	0.5404	0.0111
LGSE	-0.38927	0.25767	-1.511	0.1401	0.0629
LTBR	-0.55753	0.67805	-o. 822	0.4167	00195
LINF	0.80162	0.21057	3.807	0.0006	0.2989
LLR	-0.16512	1.3122	-0.126	0.9006	0.0005
LEX	0.31834	0.22108	1.440	o. 1590	00575

RA2- 0.446123 [00008] kigma-O.514651 DW -2.21
RSS z 9.00542886 for 6 variables and 40 observations

APPENDIX 21)
THE OVER-PARAMETERIZED MODEL FOR THE MACROECONOMY AND PORTFOLİO RETURNS

Constant	-1.9521	0.76638	-2.547	00383	0.4810
DLOPR 1	-0.39853	0.35007	-1.138	0.2924	0.1562
DLGSE 1	2.1673	1.7512	1.238	0.2558	o. 1795
DLGSE 2	-1.9152	2.2182	-0.863	0.4165	0.0962
DLGSE 3	3,2381	1.9374	1,671	0.1386	0.2852
DLGSE 4	-1.4297	20492	-0.698	0.5079	0.0650
DLGSE 5	2.6269	20846	1.260	0.2480	o. 1849
DLTBR 1	-2.9986	32977	-0.909	0.3934	0.1056
DLTBR 2	1.7897	3.1445	0.569	0.5871	O.0442
DLTBR 3	42291	3.1235	1.354	0.2178	0.2075
DLTBR 4	1.9947	3.1834	.627	0,5508	00531
DLTBR 5	-1.6535	2.0983	-0.788	0.4565	00815
DLINF 1	o. 15572	1,0169	o. 153	0.8826	0.0033
DLINF 2	-0.074525	0.85631	-0087	0.9331	o.oo1 1
DLINF 3	-0.60891	1.0433	-0.584	0.5778	00464
DLINF 4	-0.99850	1.3828	-0.722	0.4936	0.0693
DLINF 5	-0.83813	1.3830	-0.606	0.5636	o.0499
DLLR 1	-2.2820	3.7594	-0.607	0.5630	00500
DLLR 2	-12.755	5.3338	-2.391	00481	0.4496
DLLR 3	-7.9190	5.5282	-1.432	0.1951	0.2267
DLLR 4	-3.3783	4.2836	-0.789	0.4562	00816
DLLR 5	—3,3236	4.2343 4.6039	-0,785	0.4582	0.0809
DLEX 1	6.6925	4.6039	1.454	o. 1894	0.2319
DLEX 2	2.2914	6.8327	0.335	0.7472	00158
DLEX_3	-2.7598	7.2923	-0.378	0.7163	00201 00333
DLEX 4	3.6066	7.3417	0.491	0.6383	
DLEX 5	13.466	6.1569	2.187	00649	0.4060

Variable	Coefficient	Std. Error	t-value	t-prob	PartRA2

RA2 - 0.834159 F(26,7) =1.3542 [03582] kigma-O.691591 DW -2.26

RSS 3.348091139 for 27 variables and 34 observations

APPENDIX 2E

DIAGNOSTIC TESTS

AR 1- 1 1, 17)	=	0.35918 [0.5569]
ARCH 1 F(l, 16)	=	0.052461 [0.8217]
Normality ChiA2(2)	=	2.4331 [0.2962]
RESET 1, 17)	=	0.63825 [0.4354]

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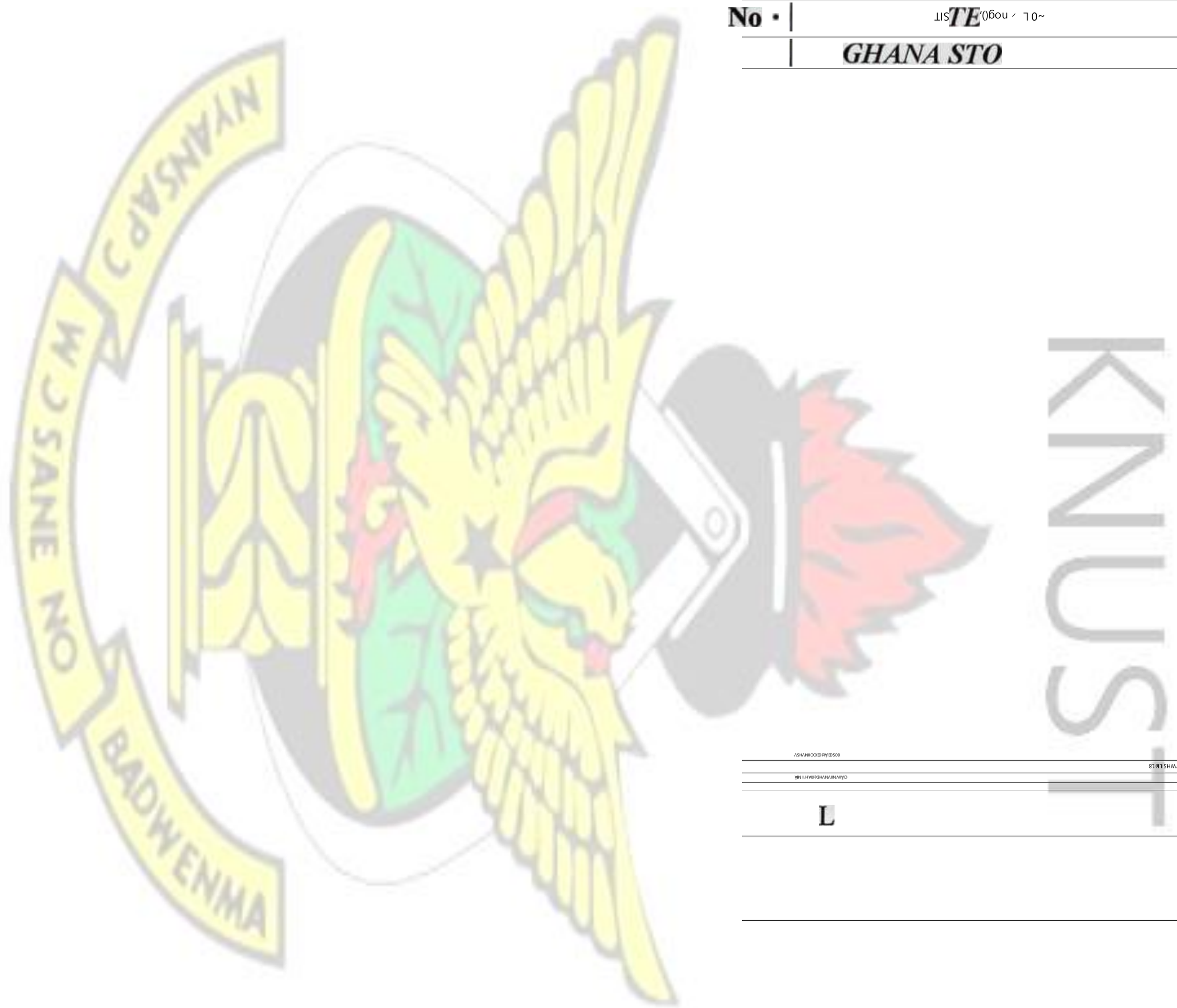
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Active Public Equity Unlisted		
International Equity Unlisted non-Ghanaian Hard Currency		
Third Party Lending Corporate Debt		

APPENDIX 5

Γ ASSETS (1995-2004): ACTUAL VERSUS (BENCHMARK)

RETURNS

ASSET/YEAR									
									2004
Active Public Equity	26.9%		-78.1%				66.3%	272.2%	105.1%
	(13.6%)	(22.1%)	(80.6%)	(-8.9%)	(24.6%)	(19.2%)	(55.5%)	(169.1%)	(103.2)%
Unlisted Equity									
	(22.5%)	(22.5%)	(22.5%)	(22.5%)	(22.5%)	(22.5%)	(22.5%)	(22.5%)	(22.5%)
International Equity	7.0%								
	(22.0%)	(22.0%)	(22.0%)	(22.0%)	(22.0%)	(22.0%)	(22.0%)	(22.0%)	(22.0%)
f Ghana nds	8.5%								
	(68.6)	(51.4%)		(17.9%)	(31.8%)	(37.8%)	(20.1%)	(33.7%)	(17.3%)
					23.7%				
	(28.3%)		(29.4%)	(23.7%)	(30.3%)	(34.2%)	(24.4%)	(22.5%)	(18.2%)
Short-Term Debts									
	(39.8%)	(46.9%)	(35.7%)	(28.3%)	(40.2%)		(25.3%)	(27.3%)	(17.3%)
Students Loans									
	(37.5%)	(37.5%)		(37.5%)	(37.5%)	(37.5%)	(37.5%)	(37.5%)	(37.5%)
Real Estates	64.1%								
	(14.7%)	(14.7%)	(14.7%)	(14.7%)	(14.7%)	(14.7%)	(14.7%)	(14.7%)	(14.7%)