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PORTFOLIO RETURNS ON BONDS AND STOCKS IN THE KENYAN MARKET

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ABSTRACT

This paper sought to investigate portfolio real returns on stocks and bonds in the Kenyan market. Empirical evidence suggests that long-run real return on stocks is higher than long-run real return on bonds. In this paper we examine returns on bonds and stocks at the NSE for the period 1999 to 2006. To be able to compute real returns we incorporated inflation for the same period of time. Further we performed correlation between the real returns on stocks and bonds and regressed real returns on stocks against real returns on bonds, and inflation and real returns on bonds. This gave a regression model relating the given variables. A t-test of means was performed at a significance level at 95%. General findings indicate negative correlation between returns on stocks and bonds. Moreover it was realized that in the long run stocks outperformed bond on returns.

KEY WORDS: portfolio diversification, real returns, stocks, bonds, and inflation

LIST OF ABBREVIATIONS

No.	FULL NAME	SHORT NAME
1	Nairobi Stock exchange	NSE
2	Central Bank of Kenya	CBK
3	Kenya National Bureau of statistics	KNBS
4	Stock Returns	stockr
5	Bond Returns	Bondr
6	Standard Deviation	Stdev
7	Consumer Price Index	CPI
8	r	Correlation
9	R^2	Coefficient of Determination

Background Information

The most important uncertainty that investors face is the rate of return that they can expect over the long run (Peter L. Bernstein). Investors are interested in earning good returns from the investments they make hence they are faced with two decisions to make: firstly portfolio mix and secondly long run investments. Investors would in reality buy those securities that would preserve the capital invested or those that could lead to capital appreciation (Reilly et al 2006).

Investors who lend their assets can expect, in theory, to receive a payment to compensate them for the loss of purchasing power in their cash while it is lent, plus some premium for actually giving someone else the use of the money, A.J.FROST and D.P.HAGER (1990). Markowitz (1952) asserts that investors seek both maximum expected returns for a given level of risk and minimum risk for a given level of expected return. This paper sought to investigate the returns on bonds and stocks at the Nairobi Stock Exchange (NSE) in the medium term period 1996-2006.
From period 2002 – 2007 the main NSE index rose by 817% in dollar terms according to Standards and poor's, a leading investment research firm, making it be among the world's best performing markets.

Africa Research Bulletin (2008) explains that Kenyan investors were stocks frenzy such that they would even sell their cattle to buy the shares. In this paper we tend to analyze returns on bonds and stocks over the same period. Treasury bonds and stocks are competing assets particularly when their prices are not at equilibrium. A wise investor chooses one or both assets not only according to his/her goals and the amount of capital available but also according to his own

tolerance for risk. Correct choice ensures that investors are able to reduce their risk and enhance their returns by taking into account the market forces and taking rightful decisions.

The crowding out effect is an economic theory explaining an increase in interest rates due to rising government borrowing in the money market, Girmens and Guillard (2002). The problem occurs when government debt 'crowds out' in private companies and individuals from the lending market. The government issues T-bills at high interest rates so as to make them attractive and competitive to potential investors, Ahmed and Miller (1999)

Statement of the Problem

Research findings due to Ibbotson et al 1990 and Peter L. Bernstein in the developed markets, especially United States (U.S), Britain and Japan, suggest that in the long run stocks are fundamentally less risky than bonds. Shiller and Beltratti, (1992) using annual data from the U.S during the period 1948-1989 showed small positive co-movement between stocks and bond returns. Stock and bond returns tend to move in opposite directions when expected future inflation varies (Campbell and Ammer, 1993).

Raul Ibarra-Ramirez 2011 while studying the stock, bonds and the investment Horizon using a spatial dominance approach, using the daily data for the US from 1965 to 2008, found that bonds returns dominate stock returns over short term horizon of one to two years. However for Horizons of nine years or over, it was found that stock returns dominate bond returns.

In Kenya many studies have been conducted on the stock market touching on various aspects. Among them is Regina (2006) who analyzed the effect of treasury bills on stock market returns. Also Nyamute (1998) analyzed the movement and /or changes in four of the major economic indicators (interest rates, money supply, inflation rate and exchange rates). However Nyamute (1998) and Regina (2006) did not compute real returns on stocks and bonds, and hence did not compute long run returns. To date there has not been any study on long run returns on stocks and bonds in the Kenyan market.

The main purpose of this paper was to examine and compare returns between stocks and bonds at the Nairobi Stock Exchange (NSE) for the period 1996 to 2006, and determine whether the real returns on stocks are higher than real returns on bonds.

Objective of the study

The objective was to investigate the medium term returns on stocks and bonds in the Kenyan market.

Hypothesis Testing

The following hypothesis was tested:

H_0 : The mean real medium term returns on stocks is the same as the mean real medium term
      returns on bonds

H_1 : The mean real medium term returns on stocks and bonds are not the same.

Population and Sampling Design

The study used all the fifty-five (55) companies listed in the Nairobi Stock Exchange by then and all the treasury and corporate bonds. Inflation for the period year 1996 to year 2006 was also considered to enable compute real returns per annum on equities and stocks. This period was considered adequate enough for securities performance and hence returns differential if it existed between stocks and treasury bonds. For clear analysis of the impact of inflation on long term equity returns and long term bond returns, we divided the securities into various categories thus the companies that make up the NSE-20 share index, and the companies that make up the various market segments namely: Finance and Investment, Agricultural, Commercial and Services, and Industrial and Allied.

We captured stock prices for the companies from the NSE with attention/emphasis to the firms that make up the NSE-20 index. We assumed the information given on the NSE-20 index was accurate and representative. The sample was further broken down into various market segments in order to get a clear understanding of the impact of inflation.

Data Collection

Secondary data from NSE included share prices (adjusted for rights issues, stock splits and stock dividends if any) and bond prices. For securities selected, weekly opening and closing share prices and dividend (interim &final) information was collected and used to compute weekly and monthly returns.

For bonds, yield data was collected from Central Bank of Kenya (CBK) database available on their website where as data on inflation was to be sourced from Kenya National Bureau of Statistics (KNBS). The monetizing power of CBK makes government bonds practically free from default. The assets under consideration are long term equities and long term treasury bonds. We need to compile their real returns per annum (%) and standard deviation.

Return on Equities and 91 (or 182) day Treasury bill

In order to compute yearly average return on stocks we used the following formula: The Annual return R_{it} of asset is given by the formula

$$R_{it} = \frac{P_{it_1} - P_{it_0} + D_{it}}{P_{it_0}} \ldots\ldots\ldots\ldots\ldots\ldots i = 1, 2, 3, \ldots n$$

Where

R_{it} = Return of stock at period t

P_{it_1} = Price of stock at period t

P_{it_0} = Price of stock at period t-1

D_{it} = Dividend paid using the period on stock

Treasury bill was issued on a discount basis. All are issued in entry form i.e. the buyer receives a receipt at the time of the purchase and treasury bills face value at the time of maturity. The return denoted r_{tb} on treasury bills is calculated from the following equation.

$$PP_{tb} = \frac{MV}{(1 + r_{tb})^n}$$

Where

PP_{tb}= Purchase price of the treasury bills

MV= Maturity value or face value of treasury bills

r_{tb}= the return on treasury bills

n= the period to maturity

Inflation per annum (%) was obtained from data on yearly Economics Reviews from the Ministry of Planning and national development at the Kenya National Bureau of Statistics library.

Data analysis

Table in Appendix. 1 shows the monthly equity premium for the period 1999 to 2006. The results show relatively many negative values for the earlier period of 1999 to third quarter of 2002 indicating that bond returns were higher than stock returns within the period. However from the last quarter of 2002 to 2006 there are relatively many positive values of equity premium largely due to the fact that stock returns are higher than bond returns. The findings agree with that of Nicholas Barberis, 2000.

By compounding the monthly returns and incorporating inflation it results into the table in appendix.2 showing the annual equity premium. It appears that the equity premium for the earlier period is negative giving an indication that real return on bonds was higher than real returns on stocks. In 2003, for example there was highest equity premium of 88.7478% due to investor confidence in the stock market after the successful 2002 presidential election. The 2001 equity premium was lowest due to fear by market participants about the uncertainty of expected presidential election slated for 2002. The equity premium increases significantly between 2004 and 2006 an indication of shift in investors from bond market to stock market. This explains the fact that Kenyan investors are rigid since they tend to move in one direction as to whether they invest in bonds or stocks.

The average real returns on stocks and bonds is as shown in appendix.3. The results show that annual real returns on stocks are higher than annual real returns on bonds in the long run. From graph in appendix.3 it appears the stocks and bonds real returns are moving in opposite direction thus when real returns on bonds is high the real returns on stocks is low. In the second half of the period real returns on stocks appear to be much higher than real return on bonds explaining Markowitz's fact that real returns on stocks is usually higher than real returns on bonds in the long due to high risk involved in investing in stocks. This is in agreement with findings by Thomas C. Chiag, Jiandong Li and Sheng-Yung Yang, 2014 who concluded that stock-bond correlations are negatively correlated with stock market uncertainty.

Table in appendix.4 gives the stocks and bonds standard deviation for 96 month period. It is found that the correlation between real return for stocks and bonds is -0.328 showing that it is significant at 0.01 levels. The standard deviation of stocks real returns is higher than that of bonds for each consecutive period indicating that inflation impacts positively on stocks returns much higher than bonds returns. The equity premium increases significantly between 2004 and 2006 an indication of shift in investors from bond market to stock market.

The correlation between stock returns and average bond returns in 1999 was found to be -0.282 with a coefficient of determination r^2 of 0.0, signifying that only 8% of stock returns was explained by movements in average bond returns. In other words the stock movements could not be explained by bond returns in that year.

A paired t-test carried out gave findings shown in table under appendix.5. For the period 1999 to 2002 it appears that bond returns were higher than stock returns. The difference between the two was significant at 95% confidence Interval especially for the 1999 – 2000 periods. The opposite is experienced for the 2003 – 2006 where stock returns were higher than bond returns. There was a significant difference of 0.018 at 95% C.I for the 2005 -2006 period.

The analysis above indicates that there is negative co-movement between stock returns and bond returns. It can be noticed that that there is little association between real returns on stocks and bonds on short term basis. However, in the long run period of 96 months the correlation is -0.328 indicating insignificant relationship. This is largely explained by the fact that bond returns are more largely affected by inflation than returns on stocks.

Regression Analysis

The regression equation to be employed is

$$r_s = \alpha + \beta_1 I_s + \beta_2 \operatorname{Re}al\operatorname{Re}turn + \beta_3 r_b$$

Where r_s = real return on stocks

I_s = Inflation index

r_b = return on bonds.

The equation above with appropriate values of α, β_1, β_2 and β_3 may be used to *predict* the values of the stock returns given values of inflation, real return and inflation. From results in appendix. 6 and appendix.7 we came up with the following regression equation.

$$\hat{r} = 7.91(\pm 3.06) - 8.15(\pm 2.63)CPI - 8.35(\pm 2.61)R.RBonds,$$

Where R.R Bonds denotes real return on bonds. Thus the return on stocks can be explained by CPI real return on bonds.

Summary of Findings and Conclusions

Stocks and bonds are the two main investment vehicles at the NSE and that is why a lot of research has to be carried out about them. The movement of the real returns for the two is important to investors so that they can be able to make fair judgment about investment plan to execute. The relationship of the two also enhances investor's predictability. The study is about the correlation between real returns on stocks and bonds for the period 1999 to march 2007.

In the study the use of Karl Pearson's correlation and a student's t-Test for the two samples assuming unequal variance are employed. It is concluded that there is significant difference between the real return on stocks and real return on bonds. It appears like returns on bonds are higher than returns on stocks in the short run. However the reverse is true for a longer period of time. This conforms to other studies as reviewed in the literature review. The coefficient of determination explains the movement in one variable and can be explained by movements in the other in percentage terms.

The period of study is not sufficient enough to be able to make outstanding conclusions about a long term scenario. The trading of bonds in the secondary market started way back in 1996 and data on it is not readily available. Thus I had to rely on a few bond results that were available. At 2-tailed significance level the overall correlation between bonds return and stocks return is -0.328 indicating a high degree of association between the two. This only explains the fact that stocks and bonds trade in the opposite direction, a fact explained by rigidity due to Kenyan investors who tend to move together in one direction.

Recommendations

There is need for either the Capital Markets Authority and/or the Nairobi Stock Exchange to keep and provide data on bonds trading to researchers with ease. There is need for investors to access information easily about what trades at the NSE. The purpose of this paper was to establish a relationship between real stock returns and real bond returns. It appears like there is a significant relationship between the two, hence real returns in one can explain the other and conversely.

REFERENCES

Ahmed and Miller (1999).   "Crowding-out and Crowding-In Effects of the components of Government Expenditure." *Working Paper 1999-2002, University of Connecticut.*

Africa Research Bulletin: Economic Financial and Technical Series 44(2) 17298C-17299a.doi:10.1111/j.1467-634 (2008).

Campbell, J.Y, and Ammer. J, (1993). "What moves the Stock and Bond Markets? A variance decomposition for long term Asset Returns". Journal of Finance 48, pp.3-37

Central Bank of Kenya (2006). Statistical Bulletin, June

Guillaume Girmens and Michel Guillard (2002). "Privatization and Investment: Crowding-out Effect vs. Financial Diversification" Working paper, EPEE, Universite d'Evry-Val d'Essonne, France.

Ibbotson Associates: stocks, Bonds, Bills, and inflation: 1991 yearbook. Chicago

Markowitz (1952). "Portfolio Selection." Journal of Finance. 7:1, pp.77-99.

Nicholas Barberis: Investing for the long-run when returns are predictable. The journal of Finance, Vol. LV, No.1 February 2000.

Nyamute M N (1998), The relationship between the NSE Index and major macroeconomic variables: Inflation rate, Money supply, Treasury bill rate and exchange rate, MBA Thesis University of Nairobi.

Peter L. Bernstein : What Rate of Return Can You Reasonably Expect… Or What Can the Long Run Tell Us about the Short Run?

Raul Ibarra-Ramirez: Stock, Bonds and the Investment Horizon; A spatial dominance approach, 2011. Branco de Mexico Working papers N 2011-03

Regina K.M: Analysing the effect of Treasury bill rates on stock market returns using GARCH, 2006.
Reilly F.K and K.C.Brown (2003): "Investment Analysis and Portfolio Management". The Dryden Press Fifth Edition.

Shiller, R., and A. Beltratti, (1992), 'Stock prices and Bond Yields: Can Their Co-Movements Be Explained In Terms Of Present Value Models"? Journal of Monetary Economics 30, pp25-46

Stocks, Bonds, Bills, and Inflation: 1991 Yearbook. Chicago: Ibbotson Associates, 1991.

Thomas C. Chiang, Jiandong Li and Sheng-Yung Yang: Dynamic Stock-bond return correlations and financial market uncertainty, July 2014. Review of Quantitative Finance and Accounting

Appendix.1: Monthly Equity Premium

Year	month	stockr	bondr	premium	stock_stdev	CPI	bonds_stdev
1999	1	-1.511701356	0.859765	-2.37147	1.124146296	-0.4	0.048879
1999	2	3.24621456	0.862176	2.384038	0.648381368	1.5	0.050654
1999	3	-6.659101541	0.856353	-7.51545	0.716403917	3.0	0.052085
1999	4	0.513660725	0.862647	-0.34899	0.703545018	3.8	0.049115
1999	5	-1.981862386	0.865824	-2.84769	0.715845106	5.7	0.054828
1999	6	0.66243939	0.867	-0.20456	0.463066391	5.0	0.048571
1999	7	-0.74936859	1.300706	-2.05007	0.299077393	5.2	0.045948
1999	8	-12.43667717	1.287053	-13.7237	1.308154805	6.6	0.045616
1999	9	-1.943948075	1.324368	-3.26832	0.910225399	8.4	0.155915
1999	10	-1.907766672	1.284789	-3.19256	4.763401798	9.5	0.05107
1999	11	-3.527908179	1.312	-4.83991	0.450148553	10.7	0.069461
1999	12	0.886009586	1.304263	-0.41825	0.554278289	10.5	0.068905
2000	1	0.835059271	1.497967	-0.66291	0.299485587	9.6	0.195021
2000	2	-2.606636441	1.497967	-4.1046	1.235274079	7.5	0.195988
2000	3	-4.158883849	1.497967	-5.65685	1.275657966	5.9	0.197477
2000	4	-4.136413779	1.497967	-5.63438	0.389702947	7.2	0.256627
2000	5	-7.333856272	1.497967	-8.83182	0.801355274	8.6	0.188239
2000	6	-1.401637052	1.497967	-2.8996	0.369665793	11.2	0.199141
2000	7	-0.117994949	1.497967	-1.61596	0.708666029	11.5	0.084245
2000	8	-1.13745842	1.497967	-2.63543	0.588642711	11.3	0.083239
2000	9	2.287512309	1.497967	0.789545	0.613758094	11.6	0.080397
2000	10	5.41620205	1.497967	3.918235	0.703441472	11.3	0.07951
2000	11	-0.599237361	1.497967	-2.0972	0.726222462	11.6	0.079068
2000	12	-2.640947875	1.497967	-4.13892	0.671185309	11.8	0.078272
2001	1	-0.82487624	1.286121	-2.111	0.4216941	12.0	0.020805
2001	2	2.343619646	1.285	1.05862	0.78202264	10.2	0.032705
2001	3	-6.040053896	1.286394	-7.32645	0.650656533	9.5	0.036437
2001	4	-3.629441842	1.296439	-4.92588	0.65214623	9.1	0.030721

2001	5	-2.616254893	1.283388	-3.89964	0.656168971	6.9	0.038331
2001	6	1.139127406	1.268394	-0.12927	0.488226971	4.6	0.145712
2001	7	-1.986373569	1.09991	-3.08628	0.925905772	4.3	0.025309
2001	8	-7.660791849	1.10406	-8.76485	0.422597357	4.0	0.040652
2001	9	-6.426844356	1.108776	-7.53562	1.314597951	3.1	0.041856
2001	10	3.229018224	1.104269	2.12475	0.8191744	3.2	0.042176
2001	11	-4.308405377	1.098731	-5.40714	1.051817539	2.1	0.040989
2001	12	-7.673264388	1.103636	-8.7769	1.717903854	1.6	0.036158
2002	1	-3.616327	1.03461	-4.65094	0.589606987	0.5	0.176313
2002	2	-0.66752194	1.048555	-1.71608	0.339844069	1.2	0.176041
2002	3	-5.302821599	1.039561	-6.34238	1.292605141	2.0	0.18068
2002	4	-4.537717732	1.044727	-5.58244	0.478742711	0.9	0.182965
2002	5	-1.202818911	1.032152	-2.23497	0.489387711	1.7	0.174922
2002	6	0.976005435	1.047936	-0.07193	0.348834501	2.8	0.192891
2002	7	2.737443134	0.937727	1.799716	0.584845703	2.1	0.195862
2002	8	-7.109575745	0.741964	-7.85154	0.903638031	1.8	0.639928
2002	9	-2.658497163	0.941847	-3.60034	0.717296836	1.8	0.198227
2002	10	7.305303124	0.937504	6.3678	1.067849524	1.9	0.202171
2002	11	11.11092078	0.941932	10.16899	1.329387946	2.6	0.197181
2002	12	35.05545602	0.936684	34.11877	15.34098596	4.2	0.198961
2003	1	17.63982076	0.8563	16.78352	2.272445801	2.0	0.213224
2003	2	1.647953602	0.863345	0.784609	0.585485008	7.4	0.213834
2003	3	5.706610147	0.864827	4.841783	0.855911475	10.1	0.221968
2003	4	16.52265762	0.86075	15.66191	0.888213102	11.6	0.213484
2003	5	11.9922727	0.963747	11.02853	2.334682202	14.9	1.050994
2003	6	-3.750217539	0.860451	-4.61067	3.103409826	13.7	0.21616
2003	7	5.648297683	0.585494	5.062804	0.535957095	10.9	0.456857
2003	8	13.1272968	0.596445	12.53085	1.441228277	8.3	0.457344
2003	9	11.83104186	0.947143	10.8839	0.55113825	7.9	3.701183
2003	10	2.220191359	0.59211	1.628081	0.535023924	9.1	0.454864
2003	11	15.311221	0.638192	14.67303	1.524076149	9.0	0.685615
2003	12	1.912250507	0.624249	1.288002	1.069177786	8.3	0.444005
2004	1	13.96891704	0.90824	13.06068	1.081957784	9.1	0.282419
2004	2	3.921372457	0.90824	3.013132	0.814359176	9.9	0.282419
2004	3	-18.79574488	0.90824	-19.704	0.665917441	8.3	0.282419
2004	4	-1.191780337	0.90824	-2.10002	2.050895608	7.6	0.282419
2004	5	-4.864140119	0.90824	-5.77238	0.838783389	4.7	0.282419

2004	6	-1.12825919	0.90824	-2.0365	0.52099373	5.9	0.282419
2004	7	3.113867931	0.90824	2.205628	0.606255848	8.5	0.282419
2004	8	-2.374430087	0.90824	-3.28267	0.430359095	15.8	0.282419
2004	9	0.854112612	0.90824	-0.05413	0.478060209	19.0	0.282419
2004	10	3.013644258	0.90824	2.105404	0.473793301	18.3	0.282419
2004	11	5.052878286	0.90824	4.144638	0.549295899	16.6	0.282419
2004	12	-2.401426322	0.90824	-3.30967	0.597055932	16.3	0.282419
2005	1	5.52612127	0.770267	4.755855	0.621465157	14.9	0.326019
2005	2	4.50417716	0.770267	3.73391	0.488091575	13.9	0.326019
2005	3	-1.863985058	0.7709	-2.63489	0.720657787	14.1	0.326305
2005	4	1.633235478	0.770267	0.862969	0.331593777	16.0	0.326019
2005	5	7.758397958	0.770267	6.988131	0.590479888	14.8	0.326019
2005	6	10.57962968	0.770267	9.809363	0.554249676	11.9	0.326019
2005	7	-0.081238536	0.770508	-0.85175	0.926916012	11.8	0.325163
2005	8	-1.266336905	0.770808	-2.03715	0.433137148	6.9	0.325272
2005	9	-0.807435184	0.770808	-1.57824	0.462280062	4.3	0.325272
2005	10	2.432225678	0.770808	1.661417	0.491873685	3.7	0.325272
2005	11	-0.322882476	0.771042	-1.09392	1.391614922	6.0	0.325368
2005	12	-4.065433411	0.770808	-4.83624	1.073993217	7.6	0.325272
2006	1	6.622284313	0.788972	5.833312	0.934052804	15.4	0.315449
2006	2	-1.86794951	0.788972	-2.65692	0.214129201	18.9	0.315449
2006	3	5.706561815	0.788972	4.91759	5.258593528	19.1	0.315449
2006	4	0.284555593	0.788972	-0.50442	4.34997565	14.9	0.315449
2006	5	8.61463142	0.788972	7.825659	0.874084149	13.1	0.315449
2006	6	-0.823065136	0.788972	-1.61204	0.671667065	10.9	0.315449
2006	7	-0.353887262	0.788972	-1.14286	0.34422253	10.1	0.315449
2006	8	7.680682943	0.788972	6.891711	2.831013258	11.5	0.315449
2006	9	6.685632049	0.788972	5.89666	1.196831383	13.8	0.315449
2006	10	7.17832167	0.788972	6.389349	0.836210599	15.7	0.315449
2006	11	6.402804079	0.788972	5.613832	1.4270006	14.6	0.315449
2006	12	0.570090755	0.788972	-0.21888	1.010068937	15.6	0.315449

Appendix.2: Annual Equity Premium

year	CPI	Real Returns stocks	Real Returns Bonds	Equity premium	Annual stock returns	Stock Stdev	Annual Bonds returns	Bonds Stdev
1999	5.8	-18.751	7.2344	-25.9854	-7.20	4.8483	12.986944	0.229969
2000	10.0	-33.599	8.0205	-41.6195	-13.64	2.0041	17.975607	0.303329
2001	5.8	-44.829	8.5679	-53.3969	-33.27	2.6720	14.325119	0.094782
2002	6.4	-1.458	5.3134	-6.7714	11.31	5.6107	11.685197	0.089098
2003	9.8	88.185	-0.5628	88.7478	107.80	10.8688	9.253052	0.149210
2004	11.6	-6.325	-0.7249	-5.6001	16.90	5.3664	10.898880	0.001884
2005	10.3	5.818	-1.0644	6.8824	26.43	5.2180	9.247017	0.000304
2006	14.5	21.774	-4.9877	26.7617	50.73	6.0541	9.467667	0.000538
2007	8.92	23.483	-8.9228	32.4058	41.33	8.4280		

Appendix.3 Annual real returns on stocks and bonds
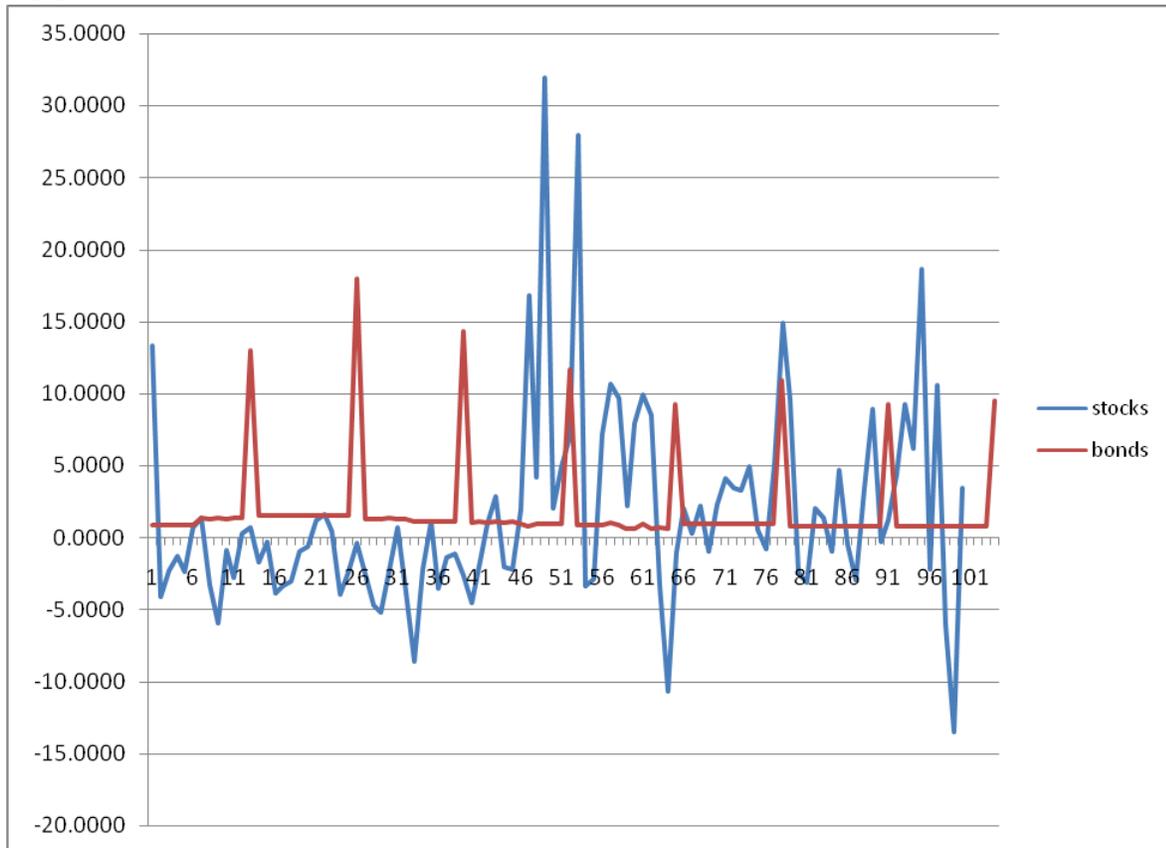
Appendix.4: Overall correlations between stock returns and bond returns

Correlations

		STOCKR	BONDR
STOCKR	Pearson Correlation	1.000	-.328
	Sig. (2-tailed)	.	.001
	N	96	96
BONDR	Pearson Correlation	-.328	1.000
	Sig. (2-tailed)	.001	.
	N	96	96

** Correlation is significant at the 0.01 level (2-tailed).

Appendix.5: Paired Sampled Test Statistic

Period	d = stock return – bond return	Standard error	95% C.I (Confidence Interval)	p-value
1999 - 2000	-3.00	0.75	-4.55 to -1.44	0.001
2001 - 2002	-1.18	1.81	-4.92 to -2.56	0.52
2003 - 2004	3.28	1.71	-0.25 to -6.82	0.067
2005 - 2006	2.17	0.85	0.41 to 3.92	0.018

Appendix.6: Regression

Model Terms	Adjusted R^2	R^2
CPI	0.022	0.032
Bond Returns	0.098	0.107
Real Returns on Bonds	0.027	0.038
Real Returns on Stocks	0.602	0.606
CPI + Real Return of Stocks	1	1
CPI + Real Return of Bonds	0.109	0.128

Appendix.7 : Regression Coefficients

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	7.914	3.061		2.585	.011
	CPI	.200	.136	.143	1.468	.145
	BONDR	-8.354	2.614	-.311	-3.195	.002

a Dependent Variable: STOCKR