A comparative analysis of returns of various financial asset classes in South Africa: a triumph of bonds?

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A B S T R A C T

There is a popular view that equities always outperform other financial asset classes; especially bonds. This study investigates the performance of three common asset classes to determine whether or not this view is validated in South Africa. Conceptually, the popular view is irrational. If one class consistently and materially outperforms other asset classes, in the absence of other reasons, the other asset classes would disappear. Accordingly, rationally, in the long run and on a risk-adjusted basis, returns on all asset classes should conceptually more or less converge. The results from this study, which concentrates on equities, bonds and cash, show that in South Africa, even before adjusting for risk, there was no material difference between the returns of equities over long bonds over the 27-year period covered by this study (1986–2013). This is equally true for other shorter fixed periods with the end-date (28 February 2013) being the focal point. It is even more evident that bonds outperform equities when a system of rolling periods is used. On a nominal basis (before adjusting for risk), over any randomly selected rolling period, bonds outperform equities in six of the seven categories. This study does not take tax into consideration. After adjusting for risk using the Sharpe ratio or other risk measures, bonds outperformed equities.

Key words: equities, bonds, cash, performance, asset classes, risk-adjusted basis, outperformance

Introduction

A popular view that is also prevalent in South Africa is that equities, although risky, outperform other asset classes, but this view is irrational. Investors are presumed to

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be rational, even if only bounded rational, and if any class outperforms other classes, there is little reason for investors to invest in underperforming assets. Rational investors would invest only in equities, and other classes of assets would disappear unless there are other reasons for the existence of that asset class, as in the case of money. Since various asset classes do exist, it is logical to believe that over the long run all asset classes, especially once adjusted for risk, perform roughly the same, which is empirically validated in this article. This comparative study of total returns examines the relative performance of three South African asset classes. This is achieved by providing a history of the returns of the three major investment classes over an extended period and highlighting the differing levels of risk associated with each asset class. Once this has been done, a comparative analysis is carried out.

Some investment managers such as Bridgewater Associates, an American investment management firm with US$120 billion assets under management serving institutional clients, have been very successful in adopting the concept of risk-parity as their investment mantra. Bridgewater Associates began as an institutional investment advisory service, graduated to institutional investing and pioneered the risk-parity investment approach in 1996.[1]

Literature review

Considerable research has been done on the relative performance of various asset classes, especially equities versus bonds (Barsky 1986; Grauer & Hakonsson 1987; Leibowitz & Krasker 1988; Fama & French 1989; Fama & French 1993; Lucas 1994; Benartzi & Thaler 1995; Asness 2000; Ilmanen 2003). The findings were that no single asset class continuously outperforms other classes in all economic environments. This suggests that a dual strategy for investments is called for – firstly diversification, and secondly changing the balance of an investment portfolio (i.e. asset allocation). This can reduce risk while at the same time improving returns. Correct asset allocation is critical for portfolio performance, and diversification for the control of risk. Assets perform differently over varying time periods, and these differences may well reflect structural changes in the economy. In South Africa, for example, there was a structural decline in inflation that began in the mid-1990s and coincided with the prolonged outperformance of bonds relative to equities that lasted until 2009 (see Figure 1). Although historical performance is not a guarantee of future performance, it serves as a useful input for investors when making asset allocation decisions.

Arnott (2011), citing the Ibbotson 2011 Classic Yearbook, notes that in the USA over the 84-year period from January 1926 to December 2010, the Standard & Poor's

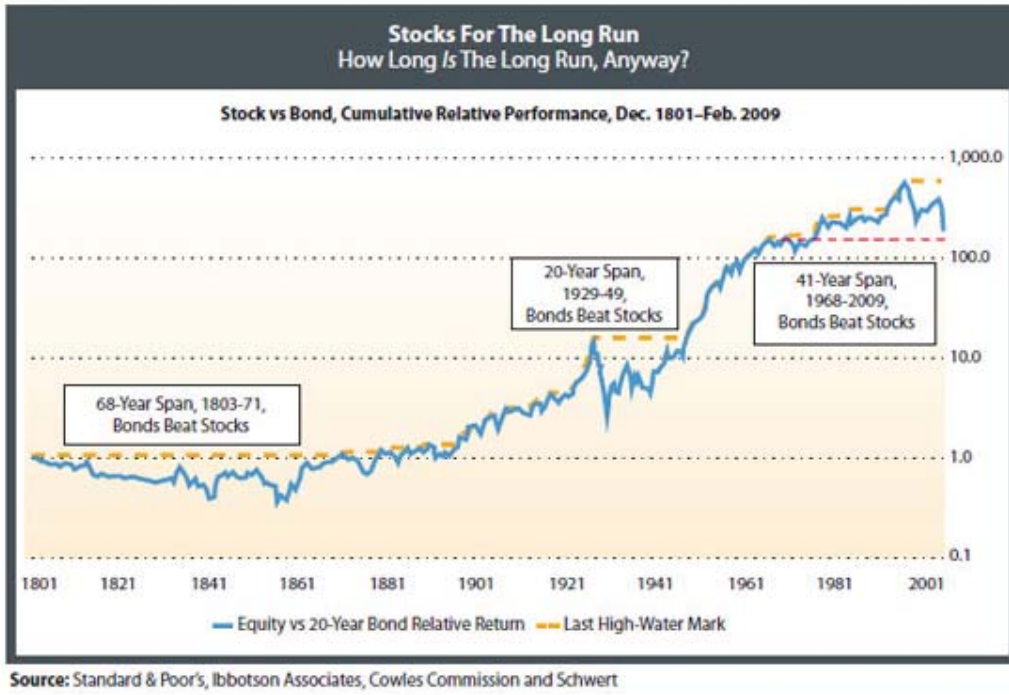
500 (S&P 500) index generated a compound return of 9.9% p.a. compared with 5.5% p.a. for long-term government bonds, an excess of 4.4%. A quick calculation shows that through the power of compound interest, US$1 000 invested in equities in January 1926 would have grown to US$2.778 million in December 2010 compared with a mere US$89 778 for bonds, an outperformance of 31 times. On this basis, equities should be preferred over bonds as an investment class over the long run. This appears to provide overwhelming evidence that investors should prefer equities to bonds as an asset class. According to Kopcke and Muldoon (2009), the relatively high long-term return on equities makes investments in equities seem both an attractive and suitable means of accumulating wealth. The authors warn, however, that the 50% drop in the S&P 500 from May 2008 to March 2009 is a reminder that equities pose considerable risk for investors, especially over the short term.

Arnott (2011), however, continues by pointing out that equities should produce higher returns than bonds in order for the capital markets to work. Otherwise, stockholders, as the equity investors, would not be paid for the additional risk they take for being lower down the capital structure, namely the capital default risk. This is thus even before market risk is taken into consideration. Kopcke and Muldoon (2009) show that in the USA, the average annual real rate of return on equities was 7.2% between 1949 and 2008. The standard deviation of annual returns was 18.2 percentage points. The authors state that stockholders expect adequate compensation for bearing this higher market risk. Accordingly, the gap between the annual return on equities and bonds has averaged 3.8 percentage points since 1872, and 5 percentage points since 1949. In an article entitled 'Bonds: why bother?', Arnott (2009) says that bond sceptics generally point out that equities have beaten bonds by 5 percentage points a year for many decades, and that stock returns mean-revert, so that the true long-term investor enjoys that higher return with little additional risk in 20-year and longer annualised returns. The author says that most investors use bonds not to generate higher returns but rather to provide asset class diversification and thus to reduce portfolio risk. Most investors expect their stock holdings to outpace their bonds holdings over any reasonably long span of time.

Similar views are found in South Africa. Firer and McLeod (1999) compared the performance of equities, bonds and cash in South African markets between 1925 and 1998 and concluded that over this period, equities far outperformed the other two asset classes. Similar results for South Africa were also found by Winston Floquet (1998), senior partner of Fleming Martin Securities Ltd., a leading stockbroking firm in South Africa that was subsequently taken over by JP Morgan Chase & Co.

Despite these findings, other views are found, namely that bonds can outperform equities over substantial periods. Arnott (2009) challenges two core beliefs of modern

investing, namely the reliability of equities as the higher-return asset class and the efficacy of bonds in portfolio diversification and in risk reduction.



Source: Arnott (2009)

Figure 1: Stocks compared with bonds: cumulative relative performance in the USA, December 1801–February 2009

Arnott (2009) shows in Figure 1 that in the USA, bonds outperformed equities for a 68-year span from 1803–1871, for a 20-year span from 1929–1949, and again for a 41-year span from 1968–2009. The author also points out that it is a fact that equities produced negative returns for just over a decade. Real returns for the S&P 500 index were negative over any time span starting in 1997 or later, which the author calls the lost decade for equities. The author shows that starting any time from 1979 until 2008, the investor in 20-year Treasury bonds would have beaten the S&P 500 investor. He found, in fact, that from the end of February 1969 until February 2009, bonds outperformed stocks by a small margin.

A study by Bloomberg (2011) entitled 'Bonds: the better investment' points out that the generations-long beliefs, firstly that equities outperformed bonds in the past and will continue to do so in the future, and secondly that equities, because

of mean reversion that damps out short-run fluctuations, are not risky if held for ten years or more, are myths. The study continues by saying that in the 'holy name of diversification', investors are told to maintain a balance on the bulk of their investment portfolio between equities and bonds, which, the authors maintain, is a mistake. For individual investors, the study takes the position that bonds are a better investment than equities. That is because after paying taxes, fees, expenses and factoring in the risk, the return on equities is not likely to exceed the return on bonds. These risks are clearly demonstrated as a result of the two stock market crashes that occurred between 2000 and 2009. The study found that over the previous 20 years, the performance between equities and bonds had been about the same. For the previous 25 and 30 years, it was found that equities had nominally outperformed bonds. However, when risk expressed as volatility is taken into account, it is clear that bonds outperformed equities for the previous 25 and 30 years as well.

The study makes the important point that 30 years is as long as most of us invest. It is clear from their analysis that over the previous 25 to 30 years, investors were not rewarded for taking substantial risks in the stock market when compared to Treasury bonds. Equities are risky; the study points out that over certain periods of time, stock markets declined and even crashed. The crash of 1929, for example, is infamous. On 19 October 1987, the Dow Jones Industrial Average declined 508 points in one day, a 22.6% loss. More recently there was the dot-com crash of 2000–2002, when the Nasdaq lost 77.9% of its value. The next crash occurred in 2008 when equities lost 37%.

Returning to South Africa, Hassan and Van Biljon (2010) conducted a detailed empirical examination of the South African equity premium over a 105-year period. The authors concluded that over the long run, the South African equity market produced average returns six to eight percentage points above bonds and cash. Furthermore, they found that looking at a 20-year horizon, an investor would not have experienced a single negative realised equity premium over the entire 105-year period. The results presented in this article, however, do not confirm the findings of Hassan and Van Biljon (2010).

It is also important to realise that South Africa is an emerging economy and ranks fifth on the list of emerging financial markets that international investors focus on. As such it is anticipated worldwide that many pension funds and other institutional investors invest in the South African equities to track the worldwide emerging market index. This study analyses the performance of equities compared with bonds and cash in the South African financial markets as a proxy for emerging markets over various fixed and rolling periods, both on a nominal and a risk-adjusted basis. In a previous study on historical performance in South Africa, Firer and McLeod

(1999) looked at a 74-year period from 1925 to 1998, using the same methodology as the Ibbotson and Sinquefield (1989) study, making their results comparable to those of the US study. The results of Firer and McLeod's study indicated that, in South Africa, on a nominal basis equities outperformed bonds and cash over the 74-year period 1925 to 1998 by a considerable margin.

This study examined the performance of three common asset classes in South Africa, namely equities, bonds and cash, using monthly total return data for the period April 1986 to February 2013. Over this period of the study, bonds outperformed equities on a risk-adjusted basis. Even looking at nominal returns, bonds fare well against equities over the medium to long term (three years or more). This study utilises total monthly return data covering the period April 1986 to February 2013 and reaches different conclusions from those of Firer and McLeod (1999). The performance of equities and bonds is generally comparable on a nominal basis. Figure 1 illustrates the value to which one South African Rand (ZAR) invested in April 1986 would appreciate up to February 2013 in the three asset classes. In nominal terms, ignoring tax and transaction costs, one Rand would appreciate to R68.32 if invested in equities, R55.03 if invested in bonds and R22.50 if invested in cash in South Africa. For comparative purposes, as a matter of interest, one dollar invested in the S&P 500 index over the same period would be worth US$11 today. One Rand invested in the S&P 500 index in April 1986 would be worth R51.61 today (28 February 2013) after taking exchange rate movements into account.

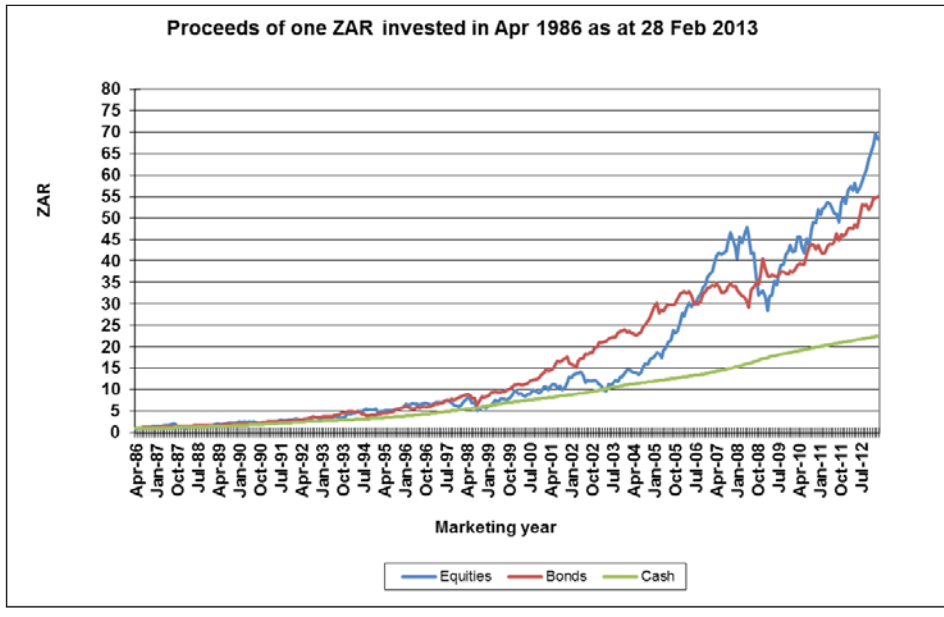


Figure 2: Value of one Rand invested in equities, bonds and cash in South Africa in April 1986

It is clear from Figure 2 that between 1996 and 2006, bonds outperformed equities on a nominal basis and then again from October 2008 onwards for a few months. Since then, equities have been the better-performing asset class on a nominal basis. Once adjusted for risk, bonds consistently outperformed equities over the 27-year period in South Africa.

Data

Data for the three asset classes

Equities

It is common cause that the South African financial stock market history commenced in 1960 (Firer & McLeod 1999: 7). Attempts have been made to reconstruct financial data before this date, but since this study starts in 1986, this reconstruction is of no further interest for the purposes of this study. The Johannesburg Stock Exchange (JSE) is South Africa's only stock exchange. The different sectorial indices were reconstructed in March 1995 when a new and more-inclusive method of determining the constituents of the indices was established (Firer & McLeod 1999: 8).

Bonds

The date of 1986 was chosen for this study because in that year, for the first time, the All Bond index consisting of bond maturities classified as short (1–3 years), medium (7–12 years) and long (12 years+) was created and published by actuaries on a monthly basis.

Cash

The monthly return on cash is calculated from the Alexander Forbes money market index. This is an index created and published by consulting actuaries since July 1985 on a monthly basis.

Since this study uses monthly total return data, April 1986 is the starting point. The total return data used in this study have been verified by consulting actuaries and are consistent over the entire period. The data series ends with the latest data available when this study was prepared, namely the end of February 2013. The data thus consist of three series of 323 monthly total return data-points, one for each asset class. The period thus spans almost 27 years.

The source of the data used in this study is I-Net Bridge, a leading South African data provider.

Distributions of the data

We applied the Augmented Dickey-Fuller test statistic to all data to determine whether or not the data are stationary. The tests show that all data except the return data on cash are stationary. We began by examining the return distribution of the monthly total returns (capital plus dividends) of equities in the USA using the S&P 500 index and comparing that with the South African stock returns using the JSE All Share index for the period April 1986 to February 2013.

In a study comparing the Sharpe ratio with 12 other performance measures, Eling and Schuhmacher (2007) found significant deviations from a normal distribution of the 2 763 hedge fund returns tested. Despite this, their comparison of the Sharpe ratio with the other performance measures resulted in virtually identical rank ordering across hedge funds. In a follow-up study, Eling (2008) tested the hypothesis that investment funds with a non-normal return distribution cannot be adequately evaluated by using the classic Sharpe ratio. The author analysed a dataset of 38 954 mutual funds investing in seven asset classes over the period 1996–2005 and found that the previous result is true not only for hedge funds but also for mutual funds investing in stocks, bonds, real estate, funds of hedge funds, commodity trading advisers and commodity pool operators. In short, choosing a performance measure is not critical to fund evaluation, and the Sharpe ratio is generally adequate.

In this article, we analyse both nominal and risk-adjusted monthly returns of three asset classes over a 27-year period (323 monthly returns). This study uses several measures to adjust for risk, namely variance, standard deviation, coefficient of variance and the Sharpe ratio. The specific measure of risk adjustment does not make any material change to the conclusions of the article.

Figure 3 depicts the monthly return distribution of the S&P 500 index over the past 27 years.

For the US market, the monthly mean is 0.869% with a standard deviation of 4.50. The coefficient of variation is 5.18. Although the data in Figure 3 appear to be fairly normally distributed, the Jarque-Bera normality test makes it clear that statistically the data are not normally distributed. The annual compound (geometric) rate of return is 9.59%. Thus one dollar invested in the S&P 500 index in April 1986 would be worth US$11.76 on 28 February 2013. The maximum monthly return of +11.47% occurred in January 1987, and the minimum of -1.47% in October 1987 (the stock market crash). There were 206 (64%) monthly positive returns and 117 (36%) negative returns over the 27-year period.

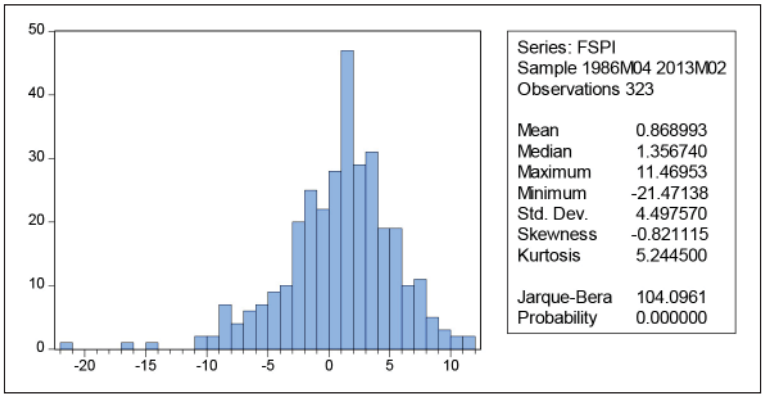


Figure 3: Distribution of monthly total returns: S&P 500 index

Figure 4 depicts the monthly return distribution of the JSE All Share index over the past 27 years.

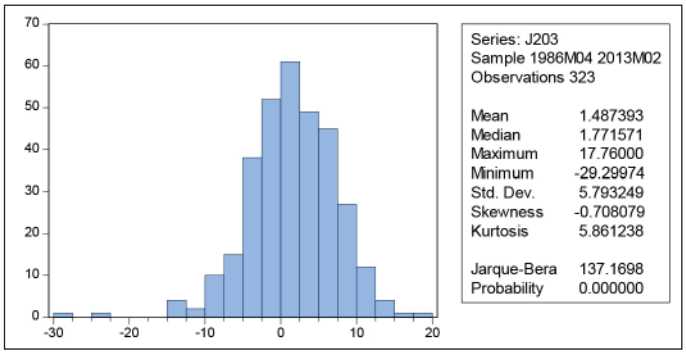


Figure 4: Distribution of monthly total returns: JSE All Share index

For the South African equity market, the monthly mean is 1.487% with a standard deviation of 5.79. The coefficient of variation is 3.90. Although the data from Figure 4 appear to be fairly normally distributed, the Jarque-Bera normality test makes it clear that statistically the data are not normally distributed. The annual compound (geometric) rate of return is 16.99%, which means that one Rand invested in the JSE All Share index in April 1986 would be worth R68.32 on 28 February 2013. The maximum monthly return of +17.76% occurred in December 1993, and the minimum of -29.30% in August 1998 as a result of the Asian crisis, which impacted heavily on emerging markets. There were 200 (62%) monthly positive returns and 123 (38%) negative returns over the 27-year period.

Figure 5 depicts the monthly return distribution of the SA Long Bond index over the past 27 years.

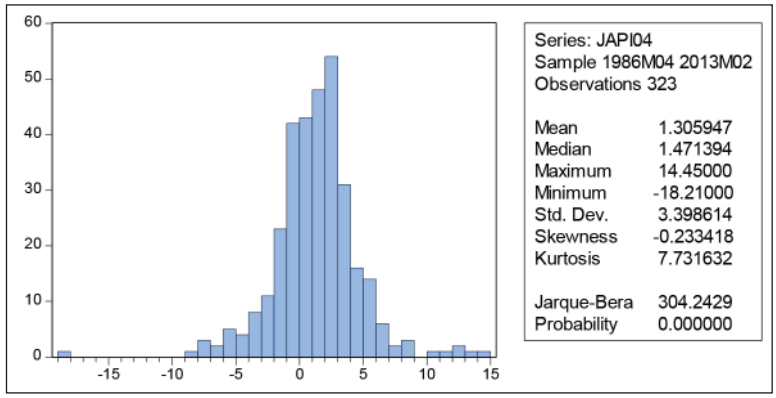


Figure 5: Distribution of monthly total returns: SA Long Bond index

For the South African bond market, the monthly mean is 1.306% with a standard deviation of 3.40. The coefficient of variation (CV) is 2.60. Although the data from Figure 5 appear to be fairly normally distributed, the Jarque-Bera normality test makes it clear that statistically the data are not normally distributed. The annual compound (geometric) rate is 16.06%, which means that one Rand invested in the SA Long Bond index in April 1986 would be worth R55.03 today (28 February 2013). The maximum monthly return of +14.45% occurred in September 1998, which followed on the preceding month's minimum of -18.21% as a result of the Asian crisis that impacted heavily on emerging markets. There were 223 (69%) monthly positive returns and 100 (31%) negative returns over the 27-year period.

Figure 6 depicts the monthly return distribution of the South African cash market over the past 27 years.

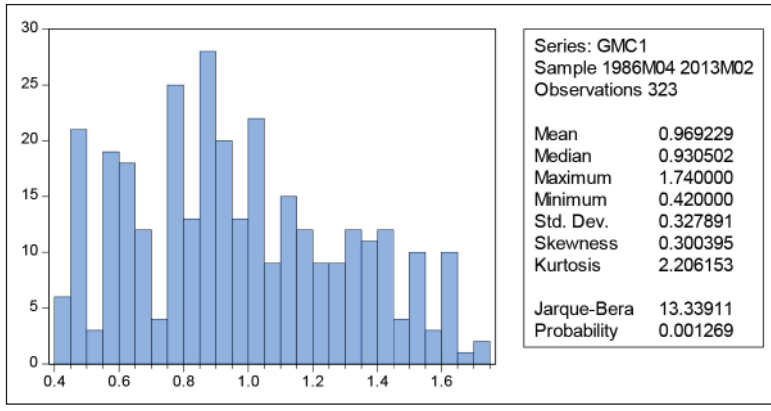


Figure 6: Distribution of monthly total returns: SA cash market

Since the time of Aristotle, money represented by cash has served as a unit of account, a medium of exchange and a store of wealth. For the South African cash market, the monthly mean is 0.969% with a standard deviation of 0.33. The coefficient of variation is 0.338. The Jarque-Bera normality test shown in Figure 6 makes it clear that statistically the return data for the South African cash market are not normally distributed. The annual compound (geometric) rate is 12.26%, which means that one Rand invested in the South African cash market in April 1986 would be worth R22.50 today (28 February 2013). The maximum monthly return of +1.7% occurred in November 1998 and the minimum of 0.42% in December 2012. There were 323 (100%) monthly positive returns and 0 (0%) negative returns over the 27-year period.

Methodology

Effective compound (or geometric) rate of return

The total rate of return $(P_1 - P_0 + I_1)/P_0$, capital appreciation plus income, is expressed as a ratio of the opening value (P_0), where P_0 is the opening price at the beginning of the month and P_1 is the closing price at the end of the month. I_1 is the income received during the month. The value at the end of month 1 is then $V_1 = P_0(1+r_1)$, where r_1 is the total return for the month. This exercise is then repeated for each month, and in that way a geometric series of monthly returns is determined.

Value after N months

Knowing the monthly total returns, it is possible to determine the value after N months, V_N. If P_0 is the opening price, then the final value after N months (V_N) of the series would be:

$$V_N = P0\ (1+r1)(1+r2)(\ldots)(1+rN) \quad \ldots (E1)$$

or

$$V_N = P_0 \prod_{j=1}^{j=N}(1 + r_j) \quad \ldots (E2)$$

Using the methodology suggested by E2, it is possible to plot the value after any month in the series. The results are indicated in Figure 2. The value of each series can thus be determined after any period. In Figure 2, the opening price is set at one Rand and the value during the 27-year period for each series can be depicted.

Compound (or geometric) rate of return

The compound (geometric) rate of returns can be determined from equation E2. If the effective compound return rate is r, then r can be determined from E2.

$$r = \sqrt[N]{\prod_{j=1}^{j=N}(1 + r_j)} - 1 \quad \ldots \text{(E3)}$$

The effective compound rate of return for each series can be determined by applying formula E3 (or its equivalent), permitting a comparison for each asset class over the entire period or sub-periods. The results are indicated in Tables 2 and 3.

Measures of dispersion: standard deviation and others

It has long been accepted that any single measure such as the mean of a series, at any point, is not an adequate indication that can be used to predict an outcome. The mean has to be augmented by a measure of dispersion, which needs to be taken into consideration as well. In investment theory, it is accepted that the mean should be placed within a mean-variance framework. In addition to the mean, a measure of dispersion is thus also needed. The measure could be the variance, standard deviation, Sharpe ratio and so on. From the series of monthly total returns discussed, it is possible to determine the arithmetic mean, variance, standard deviation for each series and also the distribution.

Monthly means of the various asset classes

$$\textit{Monthly mean of total returns} = \frac{1}{N}\sum_{j=1}^{j=N} r_j \quad \ldots \text{(E4)}$$

The mean and measures of dispersion for South African equities, bonds and cash over the past 27 years were calculated and are indicated in Figures 4, 5 and 6 as well as in Tables 2 and 3.

Fixed- and rolling-period returns

An examination of any series is exposed to the problem of bias determined by the start and end points. To overcome this problem, two different return-calculation systems are adopted. Firstly, seven different fixed-period returns are adopted, namely one, three, five, seven, ten, 20 and 25 years from the end date. Secondly, a system of rolling periods is adopted, namely one, three, five, seven, ten, 20 and 25 years, rolling forward from April 1986 to February 2013.

There is a logical explanation why April 1986 was selected as the start date for this study, as discussed, but to overcome this problem a system of fixed and rolling returns is used. The system of fixed period returns is indicated in Table 3 and the system of rolling period returns in Tables 4 and 5.

Results

Asset allocation and market timing

Table 1 shows the nominal value of a single sum investment of R1 000 invested over 26 calendar years, starting on 1 January 1987 and ending on 31 December 2012. The equity investor would accrue R49 226, the bond investor R42 348 and the cash investor R21 506. The benefit of market timing in asset allocation is clearly illustrated by the Best column. If an investor had the foresight of the best-performing of the three asset classes on 1 January each year, the R1 000 invested on 1 January 1987 would have accrued to R660 493 by 31 December 2012.

Table 1: Asset allocation: value of R1 000 invested on 1 January 1987 as at 31 December 2012

	All Share (%)	**Long Bond (%)**	**Cash (%)**	**Best (%)**
Gross return	4 822.56	4 134.82	2 050.61	65 949.28
Return p.a.	16.08	15.39	12.32	28.36
Std dev p.a.	23.19	13.36	4.34	14.70
Sharpe	18.01	26.12	9.68	112.00
Coefficient of variation	144.26	86.83	35.20	51.82
R1 000.00 Invested on 1 January 1987				
	R49 226	**R42 348**	**R21 506**	**R660 493**

Correlation matrix

Interestingly, there is a 50% correlation between monthly returns on the US and South African equity markets. The correlation between South African equities and bonds is relatively low, and the correlation between South African equities and cash is actually negative. This results in diversification opportunities for fund managers in the South African financial markets. The medium-term changes in relative performance from the various asset classes highlight the importance of diversification in portfolios. Clearly, historical performance is an essential (but by no means the only) input into the planning of an appropriate asset allocation strategy.

Table 2: Correlation matrix of monthly returns

	S&P 500	JSE All Share	Long Bonds	Cash
S&P 500	1	0.503	0.200	0.064
JSE All Share	0.503	1	0.265	-0.037
Long Bonds	0.200	0.265	1	0.118
Cash	0.064	-0.037	0.118	1

Fixed period returns

Table 3 indicates the comparative analysis for various fixed periods to the end point of February 2013. The first set of results covers the entire 27-year period. The periods are thereafter reduced to 25, 20, 10, seven, five, three and one year respectively.

Over the fixed 27-year period the *monthly returns* of equities, bonds and cash are 1.487%, 1.306% and 0.969% respectively on a non-risk-adjusted monthly basis, which illustrates that equities marginally outperform bonds over this period. Thus, over this period, on a nominal basis the performances of equities and bonds is comparable, as one would expect. This finding, that on a nominal basis equities and bonds perform comparably, is contrary to the previous South African study by Firer and McLeod (1999) (covering a different period) and to the popular view that equities vastly outperform other classes, especially bonds.

Based on monthly means, clearly cash underperforms both equities and bonds as might be expected. Cash as an asset class exists, obviously, because cash has an important role to play as the medium of exchange, over and above being an asset class.

Table 3: Fixed-period returns

	27 years to 28 Feb 2013			25 years to 28 Feb 2013			20 years to 28 Feb 2013			10 years to 28 Feb 2013		
	Equities	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**
Monthly Std Dev	5.793	3.399	0.328	5.550	3.323	0.337	5.642	3.594	0.291	4.927	2.972	0.189
Monthly Mean	1.487	1.306	0.969	1.465	1.190	0.883	1.465	1.190	0.883	1.665	0.851	0.678
Coeff of Var	3.895	2.602	0.338	3.788	2.792	0.382	3.851	3.019	0.330	2.958	3.492	0.279
Sharpe ratio	0.097	0.113	0.141	0.108	0.103	0.133	0.110	0.096	0.132	0.210	0.074	0.244
Geom return p.a.	16.99%	16.06%	12.26%	17.87%	15.67%	12.40%	16.81%	14.38%	11.11%	20.21%	10.14%	8.44%
Arith return p.a.	19.38%	16.85%	12.27%	20.06%	16.43%	12.40%	19.07%	15.26%	11.12%	21.92%	10.70%	8.44%
ERP	4.73%			5.47%			5.70%			11.77%		
Equities - Bonds p.a.	0.94%			2.20%			2.43%			10.08%		

7 years to 28 Feb 2013			5 years to 28 Feb 2013			3 years to 28 Feb 2013			1 year to 28 Feb 2013		
Equities	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**
4.809	3.171	0.189	5.057	3.327	0.202	3.763	2.376	0.046	2.435	2.437	0.021
1.225	0.665	0.655	0.800	0.932	0.618	1.410	1.053	0.483	1.510	1.239	0.448
3.926	4.766	0.289	6.318	3.571	0.328	2.668	2.257	0.096	1.612	1.966	0.046
0.126	0.015	0.195	0.044	0.106	0.192	0.251	0.248	0.400	0.442	0.331	0.731
14.17%	7.66%	8.15%	8.39%	11.07%	7.67%	17.36%	13.03%	5.96%	19.32%	15.56%	5.51%
15.73%	8.28%	8.15%	10.04%	11.77%	7.67%	18.30%	13.40%	5.96%	19.70%	15.93%	5.51%
6.02%			0.73%			11.40%			13.81%		
6.51%			-2.68%			4.33%			3.76%		

Adjusting for risk

If *standard deviation* is taken as a proxy for risk, equities, bonds and cash show a standard deviation over the 27-year period of 5.791, 3.400 and 0.328 respectively, from which it is clear that if the nominal values are adjusted for risk, bonds outperform equities. It should also be noted that the standard deviation of total returns for bonds is much higher than one might have thought. This is explained in the section on the distribution of the data, where bonds demonstrated negative returns over 31% of the entire period, which is much higher than one would have expected. As expected, equities are true to the reputation of being risky. It is clear, however, that once adjusted for risk, bonds outperformed equities if measured over the entire period. This is illustrated by the *coefficient of variation* (CV), which measures the risk per unit of return. The CV of bonds is 2.60, which is less than the 3.90 for equities, thus illustrating better risk-adjusted returns for bonds. Another method of combining mean values and risk, taking the risk-free rate into account, is the *Sharpe ratio*. The Sharpe ratios for the 27-year period are 0.097 for equities and 0.113 for bonds.

Compound annual return over the full 27-year fixed period

Table 3 shows that the compound return per annum is 16.99%, 16.06% and 12.26% for equities, bonds and cash respectively. The gap between equities minus bonds is 0.94%. The equity risk premium (ERP), measuring the excess return of equities over cash (risk-free), is 4.73%.

Compound annual return over the 25-year fixed period

The performance comparison is similar to the full period, except that the return gap between equities and bonds widened to 2.2%. The equity risk premium (ERP), measuring the excess return of equities over cash (risk-free), widened from 4.73% over the full period to 5.47%.

Compound annual return over the 20-year fixed period

The performance comparison is similar to the 25-year period. Equities outperformed bonds by 2.43% and the ERP was 2.43%.

Compound annual return over the ten-, seven-, five-, three- and one-year fixed periods

Over the ten-year period equity performance was superior. Equities outperformed bonds by 10.08% and the ERP was 11.77%. Although the gap narrowed over the seven-year period, equities still performed well, outpacing bonds by 6.51% with an ERP of

6.02%. Interestingly, cash outperformed bonds over the seven-year fixed period. The five-year fixed period showed a different picture. Clearly, equities were not the place to invest during the past five years due to the after-effects of the 2008 financial crisis. Bonds outperformed equities by 2.68%, and the ERP was only 0.73%. The past three and one years were particularly rewarding for equity investors, outperforming bond investors by 4.33% and 3.76% respectively. The ERP was in double digit territory due to the low level of money market rates.

We next expanded the analysis to incorporate rolling-period returns. As far as we are aware, this is the first study to incorporate a performance analysis using rolling monthly returns over various periods. This method eliminates the usual start/end date bias that might skew the results and perhaps give a 'false' impression of comparative returns. We have done rolling-return calculations between all possible start and end months over 25-, 20-, ten-, seven-, five-, three- and one-year periods (i.e. seven different rolling period return categories).

Rolling period returns

Table 4 sets out the results for the seven rolling-period return categories. The salient findings are:

- Over the 25-year rolling periods, *equities outperformed bonds* by 53 basis points p.a. on a nominal basis. The ERP was 3.11%.
- Over the 20-year rolling periods, *equities outperformed bonds* by 60 basis points p.a. on a nominal basis. The ERP was 3.49%.
- Over the ten-year rolling periods, *bonds outperformed equities* by 42 basis points p.a. on a nominal basis. The ERP was 2.79%.
- Over the seven-year rolling periods, *equities outperformed bonds* by 60 basis points p.a. on a nominal basis. The ERP was 3.49%.
- Over the five-year rolling periods, *equities outperformed bonds* by 46 basis points p.a. on a nominal basis. The ERP was 3.03%.
- Over the three-year rolling periods, *equities outperformed bonds* by 72 basis points p.a. on a nominal basis. The ERP was 3.26%.
- Over the one-year rolling periods, *equities outperformed bonds* by 72 basis points p.a. on a nominal basis. The ERP was 3.59%.
- The average of all rolling categories shows that equities outperformed bonds by 46 basis points p.a. on a nominal basis. The average ERP of all rolling categories was 3.25%.

It is therefore a myth that equities outperform bonds *materially* in South Africa. On a risk-adjusted basis, bonds triumphed over equities in South Africa over the past 27-year period.

Table 4: Rolling-period returns

	Rolling 25 years			Rolling 20 years			Rolling 10 years		
	Equities	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**
Monthly Std Dev	0.001	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.002
Monthly Mean	1.013	1.012	1.010	1.013	1.013	1.010	1.013	1.013	1.010
Coeff of Var	0.001	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.002
Sharpe ratio	107.93	356.25	902.10	169.32	212.01	253.15	204.47	180.60	208.71
Arithmetic return p.a.	15.01%	14.48%	11.90%	15.61%	15.01%	12.12%	15.03%	15.44%	12.23%
ERP	3.11%			3.49%			2.79%		
Equities - Bonds p.a.	0.53%			0.60%			-0.42%		

Rolling 7 years			Rolling 5 years			Rolling 3 years			Rolling 1 year		
Equities	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**	**Equities**	**Bonds**	**Cash**
0.003	0.003	0.002	0.004	0.004	0.002	0.008	0.005	0.003	0.017	0.009	0.003
1.013	1.013	1.010	1.013	1.012	1.010	1.013	1.012	1.010	1.013	1.012	1.010
0.003	0.003	0.002	0.004	0.004	0.002	0.007	0.005	0.003	0.017	0.008	0.003
120.593	124.634	188.353	98.877	112.155	187.478	72.149	119.536	201.635	33.603	67.832	184.070
15.61%	15.02%	12.12%	15.20%	14.74%	12.17%	15.32%	14.60%	12.06%	15.35%	14.63%	11.76%
3.49%			3.03%			3.26%			3.59%		
0.60%			0.46%			0.72%			0.72%		

Table 5: Nominal asset class outperformance in terms of percentage and number of times

Percentage of times one asset class outperformed the other				No. of times one asset class outperformed the other			
	Equities-Bonds (%)	Equities-Cash (%)	Bonds-Cash (%)		Equities-Bonds	Equities-Cash	Bonds-Cash
1 year	54	61	61	1 year	168	189	191
	46	39	39		144	123	121
3 year	46	56	73	3 year	132	162	209
	54	44	27		156	126	79
5 year	40	68	75	5 year	105	180	198
	60	32	25		159	84	66
7 year	45	70	86	7 year	107	169	207
	55	30	14		133	71	33
10 year	40	71	99	10 year	81	145	202
	60	29	1		123	59	2
20 year	33	100	100	20 year	28	84	84
	67	0	0		56	0	0
25 year	42	100	100	25 year	10	24	24
	58	0	0		14	0	0

Table 5 shows the nominal asset class outperformance in terms of percentage and number of times that each asset outperformed another *before* adjusting for risk over all measured rolling periods.

The following results were recorded in comparing the number and percentage of times that equity outperformed bonds in nominal terms over a rolling period:

- All one-year rolling periods: Equity outperformed 168x (54%) and bonds 144x (46%).
- All three-year rolling periods: Equity outperformed 132x (46%) and bonds 156x (54%).
- All five-year rolling periods: Equity outperformed 105x (40%) and bonds 159x (60%).
- All seven-year rolling periods: Equity outperformed 107x (45%) and bonds 133x (55%).
- All ten-year rolling periods: Equity outperformed 81x (40%) and bonds 123x (60%).
- All 20-year rolling periods: Equity outperformed 28x (33%) and bonds 56x (67%).
- All 25-year rolling periods: Equity outperformed 10x (42%) and bonds 14x (58%).

On a nominal basis (before adjusting for risk), over any randomly selected rolling period, bonds outperformed equity more often for six of the seven categories of rolling period returns, except for the one-year rolling period. This study did not take tax into consideration.

A detailed study of the equity risk premium (ERP) measuring the excess return of equities over cash (risk-free) falls outside the scope of this article and is left for a subsequent study. However, the preliminary results of this study indicate that the ERP in South Africa is much lower than analysts generally use in pricing and valuation models.

Conclusion

A widely publicised view exists that equities always, over the long run, substantially outperform other asset classes, particularly bonds. This study shows that this view is incorrect. This study compared the total monthly returns of three asset classes, namely equities, bonds and cash, over a 27-year period starting in April 1986 and ending in February 2013. This start date was chosen as it was the first time that consistent data became available. Studies involving investment returns are susceptible to timing issues. To compensate for this, two systems of return calculations were adopted: firstly a system of fixed periods and secondly a system of roiling periods.

The study shows in Table 3 that where a single exit date was selected, in this case 28 February 2013, on a nominal basis equities outperformed bonds over all selected periods except the five-year period. Once adjusted for risk, this outperformance disappeared and the returns converged as the theory predicted.

To further overcome the problem of the entry and exit dates, a system of rolling periods was utilised. The results are shown in Tables 4 and 5. For almost all rolling periods selected, more often than not, bonds outperformed equities on a nominal basis. Once adjusted for risk, it became clear that generally equities did not outperform bonds.

As expected, cash underperformed both equities and bonds, and the continued existence of cash as an asset class demonstrates another important point, namely that it exists for reasons other than to provide a return on investment, namely, as the primary medium of exchange. Clearly, as a store of wealth, cash is the least-effective asset class. For that reason, it is not preferred by investors as a substantial asset class.

Endnote

1. We thank an anonymous reviewer for drawing our attention to the success of Bridgewater Associates, which is attributable to the investment style of risk-parity. This article

does not explore the complexities of the risk-parity style of investment, which is left for future research. The focal point of this article is to empirically demonstrate convergence of the returns of different asset classes, especially on a risk-adjusted basis.

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