RISK PREMIA ON KEY ASSET CLASSES: A SOUTH AFRICAN PERSPECTIVE

byB Hu

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ABSTRACT

The estimation of long-term expected returns on key asset classes is an important aspect of actuarial work, encountered by actuaries working in diverse fields, whether in the determination of optimal long-term investment strategies, setting of capital requirements or the valuation of liabilities.

Key to setting a reasonable long-term expected return is having a view on the appropriate "premium" on risky asset classes relative to the risk-free asset. This extra return required by investors upfront can in turn be decomposed into various risk premium components, such as asset class-specific, term and inflation.

This paper aims to provide a perspective on arriving at reasonable risk premia by considering key South African asset classes such as equities, property, nominal bonds, inflation-linked bonds and cash.

KEYWORDS
South African asset classes; risk premia

1. INTRODUCTION

1.1 In their areas of work, actuaries are often faced with the task of having to determine expected long-term returns from different asset classes, for various uses ranging from setting long-term investment strategies to setting aside capital. The key asset classes considered are usually equities, bonds, property and cash.

1.2 This paper proposes a framework for setting the long-term expected returns from the asset classes mentioned above in the South African context. The following risk premia are discussed in the process:

- Equity risk premium (relative to nominal bonds);

- Property risk premium (relative to nominal bonds);
- Term risk premium (between short- and long-dated government-issued fixed-interest instruments); and
- Inflation risk premium (between break-even inflation and actual inflation).

1.3. This paper will provide a historical estimate of the four risk premia above based on historical data. It will then propose a framework for estimating the equity risk premium on a prospective basis.

1.4 The paper first considers existing literature and research relevant to this topic.

2. LITERATURE REVIEW

2.1 THEUNISSEN (2001)

In his paper, the author provided great detail on the construction and composition of the equity index used, and a history of results on key statistics such as dividend and earnings yield and others. His research found empirical historical evidence of an inverse relationship between valuation level and subsequent returns across different holding periods, for both the JSE All Share and S&P Composite indices. Historical real geometric average returns on the All Share index had been about 7.2%, compared to about 3% for long-dated bonds.

2.2 ARNOTT & BERNSTEIN (2002)

In their paper, the authors put forward a framework for estimating the forward-looking US equity risk premium relative to bonds, which they found at the time to be close to zero. Their framework will be alluded to later in this paper.

2.3 FAMA & FRENCH (2002)

The authors, using the discounted dividend model, showed that since 1926, investors have expected an equity risk premium of about 3%.

2.4 CAICEDO-LLANO & DIONYSOPOULOS (2009)

The authors stated the dividend-to-price ratio was considered a better forecast for long-term horizons. They found in the literature a general conclusion stating that longer horizons are more forecastable.

2.5 MCGRATTAN & PRESCOTT (2003)

The authors argued that long-term bonds should be used as the risk-free asset in equity premium calculations, as short-dated bills have a significant liquidity premium embedded within their yields and do not form a significant part of long-term fixed interest holdings.

2.6 SIEGEL (2005)

The author concluded that although there were good reasons why the future equity risk premium should be lower than achieved historically, a projected premium of 2% to 3% over long-term bonds would still provide sufficient reward for investors willing to bear the risk of equities. He cited earlier research by other authors (Poterba & Summers[i], and Cochrane[ii]) of evidence of mean-reversion of long-term equity returns. He argued that risk premiums exist because investors are assumed to have declining marginal utility of consumption. How fast this utility declines measures the extent of risk aversion.

He found anecdotal reasons to suggest that professional money managers tend to have a lower estimate of the equity risk premium than academics.

He also postulated that the reasons for the continued drop in yields from US Treasury inflation-linked bonds could be a fear of declining economic growth, increased risk aversion of an ageing population, an excess of savings over investment opportunities expressed through the demand for US Treasuries from other countries, and an increased demand for fixed-income assets by institutions seeking to better match their liabilities.

2.7 CARHART & WINKELMANN (2003)

The authors found the US corporate bond yield above Treasury bonds to be about 2.25%. Subtracting an expected default loss of 0.75% left them with 1.5% as what they deemed to be the expected US corporate bond risk premium. The authors considered this to be a lower bound to the equity risk premium. As equity volatility is two or three times higher than that of corporate bonds, they tentatively suggested an equity risk premium of 3% or higher.

2.8 CLAUS & JACOB (2001)

Annual estimates of the equity risk premium since 1985 were calculated by subtracting the 10-year risk-free rate from the discount rate equating US stock market valuations with forecasted future cashflows. Results suggested that the equity risk premium was probably no more than 3%, which was supported by evidence from countries such as Canada, France, Germany, Japan and the United Kingdom.

2.9 DIERMEIER ET AL (1984)

The authors argued that the total return from equities should equal the dividend yield plus the growth rate on dividends. The latter cannot in the long run, be more than the rate of economic growth. Otherwise dividends would crowd out all other claims to the economy. In any case, new stock issuances made by the corporate sector are likely to cause the dividend growth rate to be slower than that for GDP growth. The authors thus propose the equity risk premium to equal the dividend yield, plus the GDP growth rate, less new issues net of share repurchases, and less the risk-free rate.

2.10 DIMSON & STAUNTON (2002, 2003, 2006)

The authors examined the extensive history of equity returns across different countries in their 2002 book, and found the geometric mean premium for a 16-country world index to be 3%.

In their 2003 paper, the forward-looking risk premium for the world's major markets was estimated to be around 3% on a geometric mean basis. They stated that using the achieved risk premium to forecast the required risk premium depends on having a long enough period to iron out good and bad luck. Yet, they cautioned that even with 102 years of data, their estimates would be imprecise. The estimated equity risk premium can vary quite easily over time. Stock market outcomes are influenced by many factors, some of which (e.g. significant removal of global trade barriers) may be non-repeatable, implying that projections can deviate from the past.

They also noted that the large risk premia achieved in the second half of the 20th Century are attributable to three main factors. Firstly, there was remarkable growth in productivity and efficiency, accelerating technological change and improvements to management skills and corporate governance. Secondly, stock prices have risen thanks to a fall in the required rate of return, due mainly to reduced business and investment risk, thanks to lessons learnt from various wars, increase in international trade and adoption of modern

portfolio management theory and benefits of global diversification. Lastly, transaction and monitoring costs have become lower, contributing to the upward re-rating of stock prices. They argued that past returns have been helped by the impact of good luck and re-rating, and that when seeking forecasts for the future, historical risk premia should be lowered.

In their 2006 working paper, based on updated data and certain assumptions, the geometric equity premium on the world index was forecasted at 3% to 3.5%.

2.11 GRINOLD & KRONER (2002)

The authors examined the four components of the expected equity risk premium (income, expected real earnings growth, expected inflation and expected re-pricing) and suggested a risk premium of about 2.5%. They argued that neither a view of 5.5% nor 0% can be justified without making extreme or irrational assumptions.

2.12 SONG (2008)

The author provided an extensive summary of various research on the equity risk premium, some of which have been cited above.

2.13 HÖRDAHL (2008)

The author stated that breakeven rates of inflation include risk premium compensating investors for inflation and liquidity risk. He estimated the 10-year inflation risk premium to be about 0.2% in the United States, and close to 0.5% in the Euro area. He also cited research by D'Amico[iii] et al reporting a moderate-sized positive 10-year US inflation premium of around 0.5% on average that was relatively stable. However, their results were sensitive to the date from which inflation-linked bonds data were included.

2.14 GRISHCHENKO & HUANG (2008)

The authors found the value of an inflation risk premium to be time-varying, and estimated the 10-year premium to be range from 0.11% to 0.22%, based on data from 2000 to 2007. The negative premium observed from 2000 to 2003 could be due to either a deflation scare or liquidity problems in the TIPS market (seen via high real yields). Based on data from 2004 to 2007, the 10-year premium was estimated to be 0.29% to 0.48%.

They also cited research by other authors, such as Buraschi and Jiltsov[iv], who estimated the 10-year premium to be roughly 0.7%, and Haubrich et al[v], whose estimate ranged from 0.38% to 0.6%, averaging 0.51%.

3. SETTING LONG-TERM EXPECTED RETURNS ON ASSET CLASSES

3.1 A framework for setting the expected 10-year returns on South African equities, property, nominal bonds, inflation-linked bonds and cash (represented by short-term government paper) is proposed. A 10-year horizon is used so as to be sufficiently long to be more representative of a full market cycle. This is expressed in the form of the equations below.

3.2 $I = Y_N - Y_I - IRP$ where
I = expected 10-year inflation
Y_N = yield on 10-year nominal bond
Y_I = yield on 10-year inflation-linked bond
IRP = inflation risk premium

3.3 $N_R = Y_I + IRP$ where
N_R = expected real return from 10-year nominal bond, if held to maturity and coupons re-invested at the same yield

3.4 $E_R = N_R + ERP$ where
E_R = expected real return from equities over 10-year period
ERP = equity risk premium

3.5 $P_R = N_R + PRP$ where
P_R = expected real return from listed property over 10-year period
PRP = property risk premium

3.6 $C_R = N_R - TRP$ where
C_R = expected real return from cash over 10-year period
TRP = term risk premium

3.7 $X_N = X_R + I$ where
X_N = expected nominal return from asset class X over 10-year period, X = E, P, N, IL (inflation-linked bond), C
X_R = expected real return from asset class X over 10-year period, X = E, P, N, IL (inflation-linked bond), C

3.8 The 4 risk premia: ERP, PRP, TRP and IRP are considered in more detail.

4. HISTORICALAL INDICATORS OF KEY RISK PREMIA

4.1 EQUITY RISK PREMIUM

4.1.1. Historical equity risk premium is defined in this paper as the excess return of South African equities over bonds on an ex-post basis. Monthly data for the total returns on South African equities and bonds were obtained from a database maintained by Alexander Forbes. This spans the period January 1960 to December 2009, totaling 600 months.

4.1.2. From the data, 10-year rolling periods were constructed for returns on equities and bonds. Rolling periods are used to allow a distribution of results and empirical confidence intervals to be considered. For each 10-year rolling period, the annualized geometric return was calculated. Two time periods were considered: January 1960 to December 2009, and July 1995 to December 2009. The reason for choosing July 1995 was because that marked the start of the FTSE/JSE All Share Index. Hence, 481 rolling periods were derived for the first time period, and 55 for the second.

4.1.3. The figures below show the 10-year rolling returns from equities and bonds for different starting months.

Figure 1. Historical performance of equities to bonds: Jan 1960 to Dec 2009

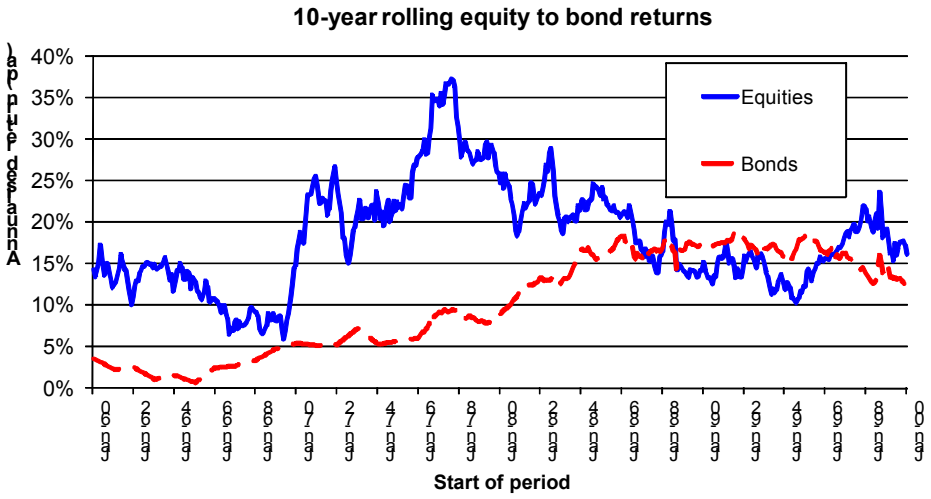
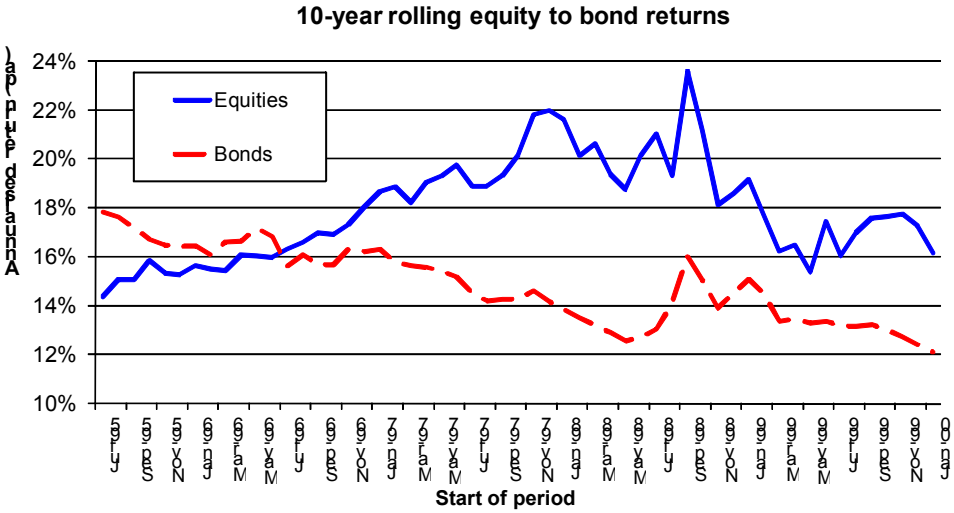


Figure 2. Historical performance of equities to bonds: July 1995 to Dec 2009



4.1.4. The tables below show the statistics comparing the 10-year rolling returns on the two asset classes over the two time periods.

Table 1. Historical performance of equities to bonds: Jan 1960 to Dec 2009

Jan 1960 to Dec 2009	
Outperformance of equities over bonds	
Upper quartile	**13.7%**
Median	**7.5%**
Lower quartile	**1.9%**
Average	**8.0%**

Equities outperformed bonds in 79% of the rolling periods considered.

Table 2. Historical performance of equities to bonds: July 1995 to Dec 2009

July 1995 to Dec 2009	
Outperformance of equities over bonds	
Upper quartile	**5.0%**
Median	**3.8%**
Lower quartile	**0.9%**
Average	**3.1%**

Equities outperformed bonds in 78% of the rolling periods considered.

4.1.5. From Table 1, it can be seen that in 75% of the observations, the excess return of equities over bonds is less than 13.7%. Only 25% of the observations experienced an excess return less than 1.9%. Empirically, there is a 50% confidence interval in which the historical equity premium varied from 1.9% to 13.7%. The median observation was 7.5%, compared to the 8.0% average. This suggested that return over the period was slightly skewed to the right – with the best returns being more than the worst returns in magnitude.

4.1.6. From Table 2, it can be seen that in 75% of the observations, the excess return of equities over bonds is less than 5.0%. Only 25% of the observations experienced an excess return less than 0.9%. Empirically, there is a 50% confidence interval in which the historical equity premium varied from 0.9% to 5.0%. The median observation was 3.8%, compared to the 3.1% average. This suggested that premium over the period was slightly skewed to the left – with the best returns being less than the worst returns in magnitude.

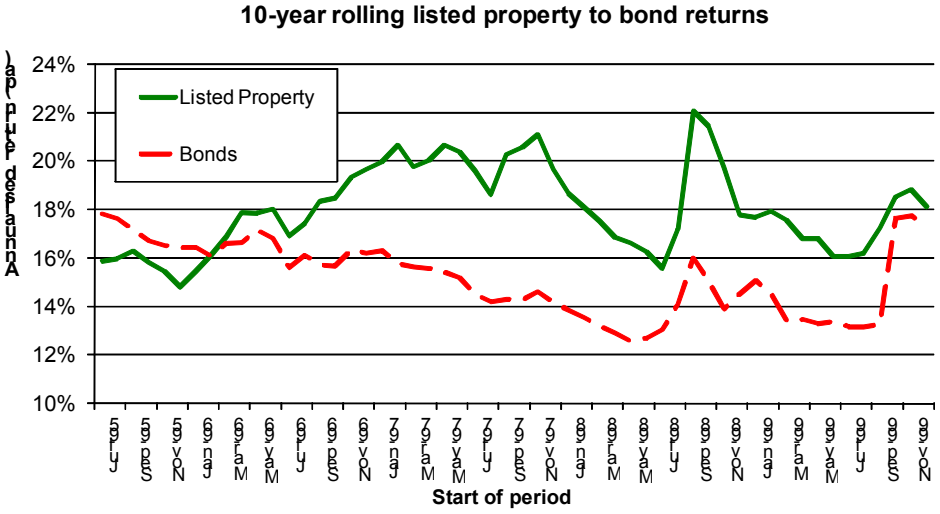
4.2 PROPERTY RISK PREMIUM

4.2.1 Historical property risk premium is defined in this paper as the excess return of South African listed property over bonds on an ex-post basis. Monthly data for the returns on South African listed property and bonds were obtained from INet, based on the FTSE/JSE Real Estate Index and BESA All Bond Index, spanning July 1995 to November 2009, totaling 173 months. Listed property is considered instead of direct property, due to the availability of more reliable data, better liquidity and transparency. However, a fair amount of correlation with the equity market is expected, as these are essentially investments in property companies listed on the securities exchange.

4.2.2 From the data, 10-year rolling periods were constructed for listed property and bonds, resulting in 54 such rolling periods. For each rolling period, the annualized geometric return was calculated.

4.2.3. The figure below shows the 10-year rolling returns from listed property and bonds for different starting months.

Figure 3. Historical performance of listed property to bonds: July 1995 to November 2009



4.2.4. The table below shows the statistics comparing the 10-year rolling returns on the two asset classes over the period.

Table 3. Historical performance of listed property to bonds: July 1995 to Nov 2009

July 1995 to Nov 2009	
Outperformance of property over bonds	
Upper quartile	**4.8%**
Median	**3.5%**
Lower quartile	**1.6%**
Average	**3.1%**

Over the period, listed property outperformed bonds in 87% of the rolling periods considered.

4.2.5. From Table 3, it can be seen that in 75% of the observations, the excess return of listed property over bonds is less than 4.8%. Only 25% of the observations experienced an excess return less than 1.6%. Empirically, there is a 50% confidence interval in which the historical property risk premium varied from 1.6% to 4.8%. This band is narrower that for the historical equity risk premium. The median of historical 10-year listed property premium was 3.5%, whilst the average was 3.1%. This suggested that premium over the period was slightly skewed to the left – with the best returns being less than the worst returns in magnitude.

4.3. TERM RISK PREMIUM

4.3.1 Historical term risk premium is defined in this paper as the excess return of long-dated over short-dated government-issued fixed-interest instruments in the South African market. This is net of the effects of different theories on long-term yields, including liquidity preference, market segmentation and expectations. Consistent with the rest of the paper, 10 years is chosen as being long dated. For short-dated, 3-month, 6-month and 1-year are used. Data for the perfect-fit bond yield curves as at each month-end from July 2000 to December 2009 were obtained from the Bond Exchange of South Africa. Two periods were considered: July 2000 to Deember 2009, and January 2005 to December 2009 (for a five-year history). The periods selected made 114 and 60 yield curves available to conduct the analysis.

4.3.2 The yields along the curve were converted into effective annual rates. Thereafter, the difference in rates between the 3-month and 10-year, 6-month and 10-year, and 1-year and 10-year were calculated for each month. The results are shown below:

Figure 4. Excess return of long-dated over short-dated government-issued fixed-interest instruments for different month-ends

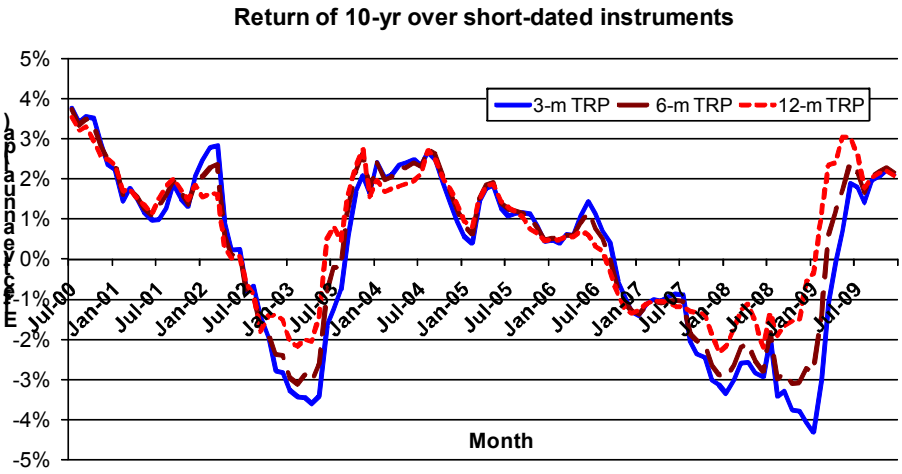


Table 4. Excess return of long-dated over short-dated government-issued fixed-interest instruments

	July 2000 to Dec 2009		
Historical term risk premium	3-m	6-m	1-y
Upper quartile	1.8%	2.0%	1.8%
Median	0.7%	0.8%	0.8%
Lower quartile	-1.4%	-1.4%	-1.2%
Average	0.1%	0.3%	0.6%
	Jan 2005 to Dec 2009		
Historical term risk premium	3-m	6-m	1-y
Upper quartile	1.1%	1.2%	1.4%
Median	-0.3%	0.2%	0.3%
Lower quartile	-2.5%	-2.1%	-1.3%
Average	-0.6%	-0.3%	0.1%

4.3.3 From Table 4, keeping the same interpretation of the quartiles and confidence intervals, it can be seen that the term risk premium has generally been higher from the period since July 2000 than that since January 2005. In the latter period, the premium tended to be more negative than in the initial period. It is suspected that this could be due to the stronger demand (hence lower yields) for longer-dated instruments from financial institutions seeking to achieve a better match with their long-term liabilities, particularly over the period 2007 to 2009. Since then, a significant positive term risk premium has emerged, largely due to a series of interest rate cuts at the short-dated end of the yield curve by the South African Reserve Bank.

4.3.4 As a reference, as at end of December 2009, the 3-month and 1-year term premia were estimated at 2.1%. The 6-month premium was 2.2%.

4.4 INFLATION RISK PREMIUM

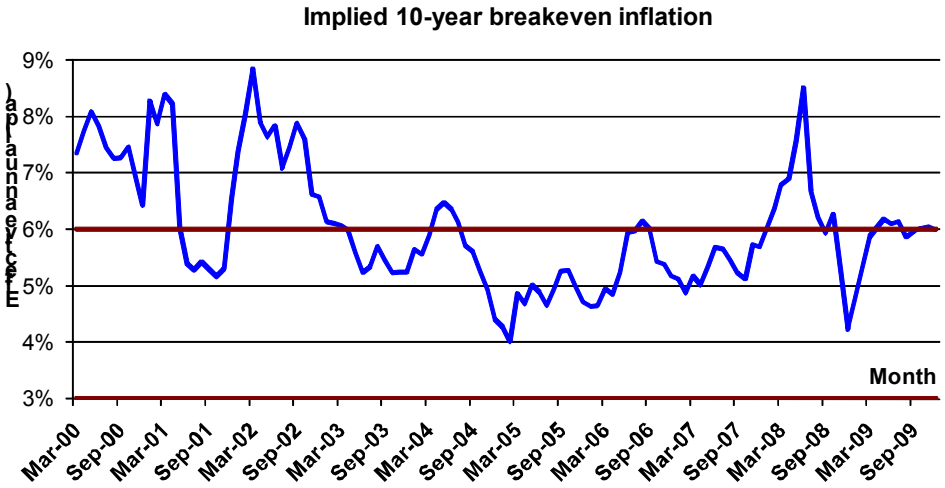
4.4.1 It is possible to deduce the financial market's estimate of long-term inflation, based on the difference in yields between similar-dated nominal and inflation-linked bonds. This is known as 'breakeven inflation'. The historical inflation risk premium is defined in this paper as the difference between breakeven and actual inflation over the same period. The inflation risk premium can be regarded as the additional return required by investors in nominal bond instruments to compensate them for the risk of inflation going out of control, which would erode their return in inflation-adjusted terms.

4.4.2 Monthly data of the 10-year points along South African Bond Best Decency Par Yield Curve from June 1976 were sourced from INet (code SAGB10). INet also provided monthly yields on the R189 and R197 South African Government-issued inflation-linked bonds since March 2000 (issuance date of the R189, the first government-issued inflation-linked bond in South Africa). Monthly data of year-on-year rates of inflation (measured by the Consumer Price Index published by Statistics South Africa) over the same period were also obtained, based on a database maintained by Alexander Forbes.

4.4.3 In theory, the yield on a hypothetical inflation-linked bond with a constant 10-year duration can be constructed by taking a duration-weighted average of the yields on the R189 and R197, which mature in March 2013 and December 2023 respectively. The weightings across the two would naturally change over time due to the time-varying nature of duration. To arrive at the yields on the hypothetical bond, the weightings to the bonds were adjusted each year taking account of changing duration.

4.4.4 The yield on the 10-year duration inflation-linked bond is compared with the10 -year point along the nominal bond yield curve for that month to arrive at the market's estimate of breakeven inflation for that month. The estimated breakeven inflation levels since March 2000 (118 months) are shown below, relative to the 3% to 6% band currently targeted by the South African Reserve Bank.

Figure 5. Implied break-even inflation rates



Key statistics pertaining to these results are shown below.

Table 5. Statistics on historical break-even inflation rates

Mar 00 – Dec 09	**Breakeven inflation**
Upper quartile	**6.6%**
Median	**5.9%**
Lower quartile	**5.2%**
Average	**6.0%**
May 01 - Dec 09	**Breakeven inflation**
Upper quartile	**6.1%**
Median	**5.7%**
Lower quartile	**5.2%**
Average	**5.8%**
Sep 04 - Dec 09	**Breakeven inflation**
Upper quartile	**6.0%**
Median	**5.4%**
Lower quartile	**4.9%**
Average	**5.5%**

4.4.5 It can be seen that the estimated level of breakeven inflation (and its associated empirical confidence level) has declined in more recent years. This could largely be due to the market's increasing confidence in the commitment of the South African Reserve Bank to maintain price stability. The rising issuance of government inflation-linked bonds, on which the payout by National Treasury to investors is linked to actual inflation, could have been seen as further evidence of that commitment. Interestingly, for all three periods, the average has been slightly greater than the median, implying that the upside inflationary risks priced in have been greater in magnitude than the downside ones.

4.4.6 As the South African government only started to issue inflation-linked bonds from March 2000, there is insufficient data to work out the actual inflation rate over the subsequent 10-year period. However, a crude approximation is made by taking the Consumer Price Index from March 2000 to Deember 2009 (a period of 9.8 years) and extrapolating it until February 2010 (assuming same inflation over the remaining two months as the average over the last 118). The resulting crude estimate is 6.1% pa. Comparing this to the 10-year breakeven inflation rate of 7.4% on March 2000 gave a long-term implied inflation risk premium of 1.3% at that month.

4.4.7 Compared to overseas research on the inflation risk premium (mentioned in sections 2.12 and 2.13 above), an inflation risk premium of 1.3% (as at March 2000) would be high. However, this could partly be due to initial uncertainty over the commitment by a developing economy with a volatile currency towards inflation-targeting, and consequently over the inflation outlook. More time and inflation data would be required to obtain better and more useful estimates of the historical inflation risk premium. This aspect warrants further research.

5. FRAMEWORK FOR ESTIMATING PROSPECTIVE EQUITY RISK PREMIUM

5.1 In this section, suggestions at deriving a prospective estimate of the equity risk premium (ERP) are put forward. Several results and scenarios will also be presented. In essence, the ERP will be determined by the difference between the ex-ante equity return, and the ex-ante nominal bond return, as long as both returns are either nominal or real simultaneously.

5.2 Grinold & Kroner (2002) proposed the following model for estimating the prospective return on equities (although the notations are different):

$E_N = I + DY + G + CPE – CSI$ where

E_N = Nominal return on equity
I = Expected inflation
DY = Dividend Yield
G = Real rate of growth on dividends
CPE = Re-rating due to change in valuation level (measured by the Price/Earnings ratio)
CSI = Dilution of return due to increase in share issuance

If Y is defined as the long-term yield on a bond, then assuming it is held to maturity, that coupons are reinvested at the same yield and that no interim valuations and transactions take place until maturity, Y can be taken as the prospective bond return.

Hence, the expected prospective ERP can be estimated as follows:

ERP = Expected ex-ante equity return – Expected ex-ante bond return
$= I + DY + G + CPE – CSI – Y$
$= DY + G + CPE – CSI – (Y – I)$

As these are expected values, random errors would not feature because their expected values would be zero.

5.3 In comparison, Arnott & Bernstain (2002) proposed the following approach to estimating the expected ERP (shown with different notation):

$ERP = DY + [RGDP_{PC} – RG_U] – (Y – I)$ where

$RGDP_{PC}$ = Real growth in per-capita GDP
RG_U = Real growth attributable to unlisted entities

Again, as these are expected values, random errors would not feature because their expected values would be zero.

It can be seen that this is very similar to the model in 5.2, except for the following:

- G (the real growth in dividends) is estimated as $RGDP_{PC} – RG_U$, namely the real per capita GDP growth, less the contribution from entities not listed on the securities exchange;

- CPE (re-rating due to change in P/E valuation level) taken as zero, as it was assumed that the market would be fairly valued at any stage, hence any price appreciation/depreciation due to re-ratings would be random, and the expected value of a random element was taken as zero
- CSI (dilution due to increased share issuance) not taken into account explicitly

5.4 This paper proposes to estimate the expected 10-year ERP by combining the two models above as follows:

ERP = DY + RGDP + CPE – (Y – I) where

RGDP = Real GDP growth
Y = Nominal yield on 10-year zero bond
I = Implied 10-year inflation

It is important to note the following:

- No active management and possible alpha net of fees is considered
- Fees and expenses associated with investing in the passive index and transacting thereon are ignored
- Taxes are ignored

The following modifications to the models shown in 5.2 and 5.3 are proposed in this model, and justified in greater detail.

- Real GDP growth is used instead of Real Per Capita GDP growth
- Real growth due to unlisted entities and other entrepreneurial activities is ignored
- Dilution due to share issuance is ignored due to absence of reliable data

5.4.1 Arnott & Bernstein obtained data series on real GDP growth, real per capita GDP growth and real equity returns from 1802 to 2001 for the United States. They found the cumulative growth on real per capita GDP to track cumulative real equity returns much more closely. In the South African context, unfortunately the data set was much more limited and the author was only able to obtain annualised GDP growth data released from June 1993 by Statistics South Africa.

5.4.2 Over the period March 1993 to June 2009, the cumulative real GDP growth was found to be about 170%, compared to the cumulative real equity return ofaround 28 0%. The cumulative per capita GDP growth would be less than 170% as South Africa experienced positive cumulative population growth over the period. Hence, despite the theoretical soundness of using per capita growth, empirical evidence in South Africa suggests that this may understate real long-term return from equities. Hence, a deviation is taken from the approach of Arnott & Bernstein by not using per capita GDP growth rates.

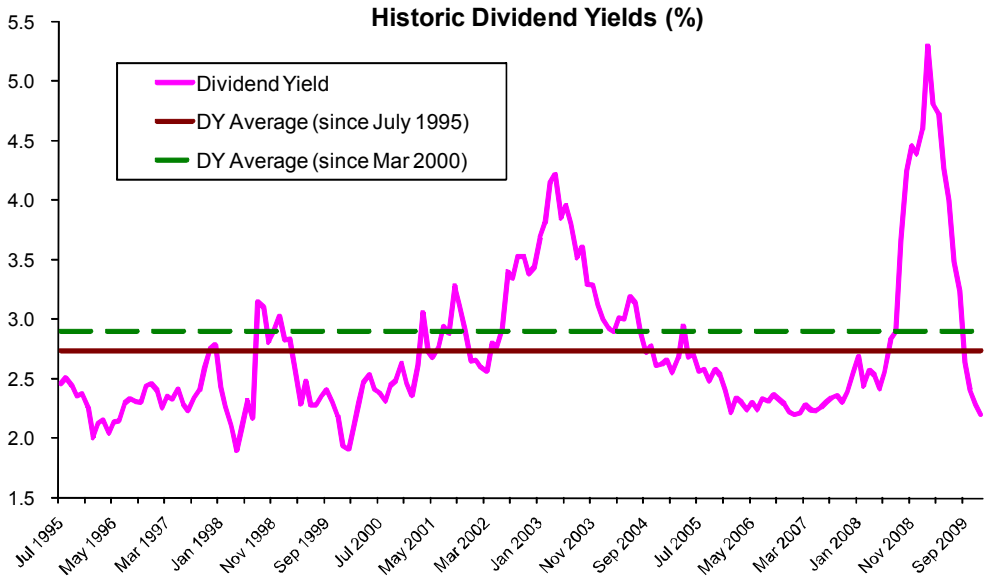
5.4.3 The author further assumes that the South African capital market takes relative contribution to the economy into account in its valuation of shares. If this holds, then the significant out-performance of real equity return over real GDP growth from 1993 to 2009 may suggest that contribution to the economy is overwhelmed by listed companies. In fact, one may even argue controversially that unlisted companies do not make a meaningful contribution to economic growth, actual economic growth is higher than published, or other factors are driving market valuation levels. Although logically it is difficult to explain this

conundrum, for the purposes of this paper, a simplistic theoretical assumption that contribution to the economy is fully accounted for by listed companies is made. This renders the RG_U term (contribution by unlisted companies) mentioned in 5.2 zero.

5.5 Re-examining the components of the model proposed above in greater detail:
ERP = Expected real equity return – Expected real bond return
= DY + RGDP + CPE – (Y – I)

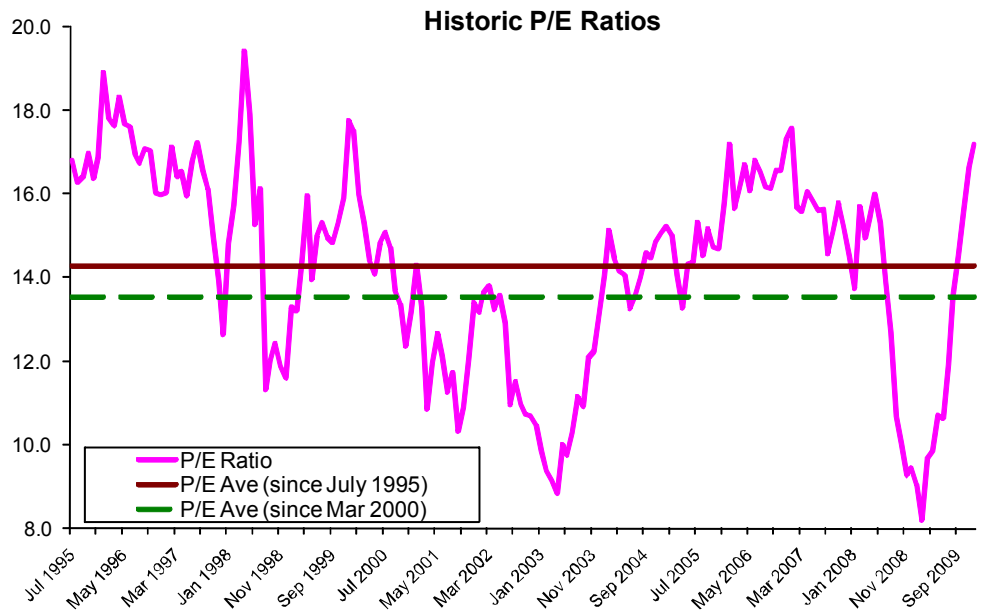
Based on monthly data available on the All Share Capital Index from INet since July 1995, historical values of the dividend yield and price/earnings ratio are shown below:

Figure 6. Historical dividend yield



Since July 1995, the average dividend yield has been 2.7%. If only the period since March 2000 is used (the issuance of the first inflation-linked bond and availability of market-implied breakeven inflation), then it is 2.9%. As the difference between the two was not much, to maintain consistency with the rest of the paper, the average since March 2000 (issuance of the R189 and availability of implied breakeven inflation) is used.

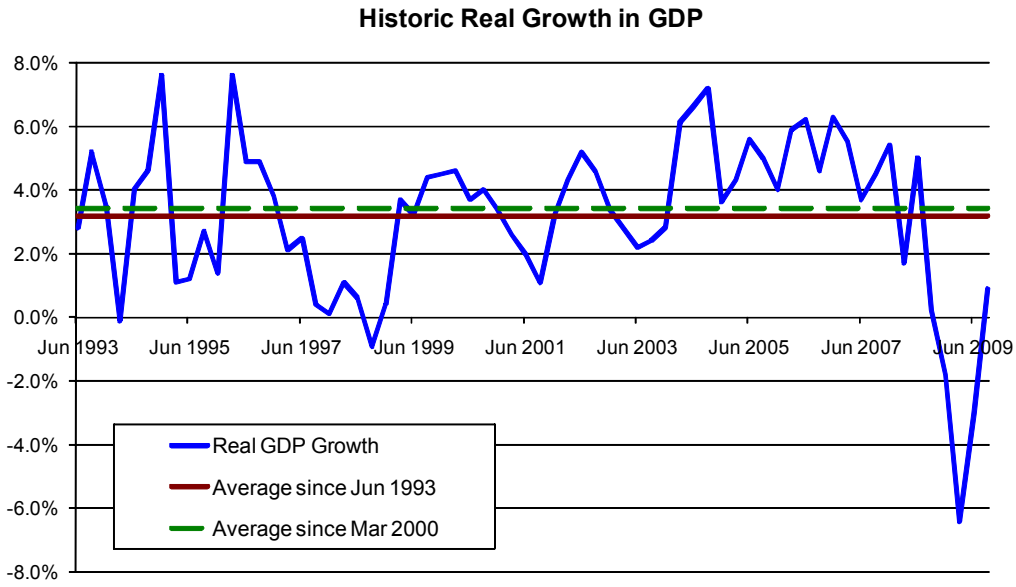
Figure 7. Historical P/E Ratios



Since July 1995, the average P/E ratio has been 14.3. If only the period since March 2000 is used (the issuance of the first inflation-linked bond and availability of market-implied breakeven inflation), then it is 13.5. As the difference between the two was not too much, to maintain consistency with the rest of the paper, the average since March 2000 is used.

Based on quarterly data of South African real annualised GDP growth from Statistics South Africa since June 1993, historical values of the quarter-on-quarter GDP growth rates are shown below:

Figure 8. Historical real GDP growth



Since June 1993, the average real GDP growth has been 3.2%. If only the period since March 2000 is used (the issuance of the first inflation-linked bond and availability of market-implied breakeven inflation), then it was 3.4%. As the difference between the two was not too much, to maintain consistency with the rest of the paper, the average since March 2000 will be used. If the negative growths from Dec 2008 to June 2009 are excluded, the average would be 3.5%. As most economies tend to experience recessions at some points along their development phase, it was felt that the 3.4% would be a more realistic estimate of real economic growth based on historical data.

5.6 Returning to the model for ERP:

ERP = Expected real equity return – Expected real bond return
= DY + RGDP + CPE – (Y – I)

Arnott & Berstein (2002) remarked that "unlike expected real stock returns, no powerful tendency for reversion to the mean is at work in real bond yields". Although there are many debates as to whether equity returns are mean-reverting or not, for the purposes of this paper, the real equity return will be estimated by the average dividend yield of 2.9% and real GDP growth of 3.4%, giving an expected real return of 6.3%.

It is assumed (at least in this default central scenario) that no future re-ratings are due. Arnott & Berstein (op cit) also assumed the market to be fairly valued at any stage, and hence did not allow for return enhancements due to re-ratings.

On the real bond return, the 10-year bond yield and implied break-even inflation as at December 2009 will be used. These were 9.1% and 6.0% respectively, implying an estimated 10-year real bond return of 3.1%. This paper regards the bond component as requiring more dynamic adjustments. The implication is that depending on the date of calculation, bond yields available and the latest estimates of average dividend yield and GDP growth, the estimated ERP should vary each time a calculation is done.

Importantly, the break-even inflation above made no allowance for an inflation risk premium (IRP) parameter. Had there been one, the inflation parameter would have been less than 6.0%, resulting in an expected real bond return greater than 3.1%.

In summary, assuming no future re-ratings and no embedded IRP, then based on the assumptions underlying the proposed model, the ERP would be estimated as at December 2009 as:

ERP = 2.9% + 3.4% - (9.1% - 6.0%)
= 6.3% - 3.1%
= 3.2%

5.7 By its very nature, estimating the ERP is an uncertain process. Hence, scenario tests are done to give a feel of how this number could vary. The following parameters are considered:

- P/E re-rating of x% takes place over 10 years, on average x%/10 each year to be simplistic. For example, should the P/E rating decrease from the Deember 2009 value of 17.2 to say 13.5 (the historical average since 1995), a -22% re rating

effect would be achieved over 10 years, or -2.2% pa on average. The more positive this assumption, the greater the ERP.

- An inflation risk premium is embedded within the calculated break-even inflation. The greater this assumption, the greater the expected real bond return and the smaller the ERP.

The table below presents the results under the different scenarios as at Deember 2009 :

Table 1. Scenario testing on expected ERP (Dec 2009)

	Re-rating effect over 10 years						
IRP	**-7.5%**	**-5.0%**	**-2.5%**	**0.0%**	**2.5%**	**5.0%**	**7.5%**
0.0%	2.5%	2.7%	3.0%	3.2%	3.5%	3.7%	4.0%
0.1%	2.4%	2.6%	2.9%	3.1%	3.4%	3.6%	3.9%
0.2%	2.3%	2.5%	2.8%	3.0%	3.3%	3.5%	3.8%
0.3%	2.2%	2.4%	2.7%	2.9%	3.2%	3.4%	3.7%
0.4%	2.1%	2.3%	2.6%	2.8%	3.1%	3.3%	3.6%
0.5%	2.0%	2.2%	2.5%	2.7%	3.0%	3.2%	3.5%
0.6%	1.9%	2.1%	2.4%	2.6%	2.9%	3.1%	3.4%
0.7%	1.8%	2.0%	2.3%	2.5%	2.8%	3.0%	3.3%
0.8%	1.7%	1.9%	2.2%	2.4%	2.7%	2.9%	3.2%
0.9%	1.6%	1.8%	2.1%	2.3%	2.6%	2.8%	3.1%
1.0%	1.5%	1.7%	2.0%	2.2%	2.5%	2.7%	3.0%

The table above aims to provide the reader with an idea of the extent to which the estimated ERP can vary, although the different scenarios considered are not exhaustive. As an example, assuming no future re-rating and an IRP of 0.5%, the estimated 10-year ERP as at December 2009 would be 2.7%.

5.8 The model presented sets out a framework for setting prospective estimates of the equity risk premium. The results under various scenarios (at least the less extreme ones) are in line with the findings of the literature surveyed in Section 2, and fall within the empirical historical confidence interval presented in 4.1.4. While historical figures should not be seen as predictive of future performance, they may provide some sense of the reasonability of prospective estimates.

6. FURTHER RESEARCH

6.1 Internationally, much has been researched about various methods of estimating the equity risk premium. This has also included modeling the ERP as a percentage of, rather than as an additive component to, the 10-year Treasury yield[vi]. The author of this paper recognises thatthe amount of data available has not been as extensive as those used internationally. For this reason, an intuitive and more fundamental framework for estimating the premia has been adopted, rather than a mathematical modeling approach, as a longer data set would have been needed to achieve statistical credibility. Nevertheless, despite its limitations, the author hopes that this research would encourage interest to look into this topic in greater detail, and for other authors to propose alternative solutions to answering this important question. By no means is the framework proposed here the definitive one, but it could be a fair starting point.

7. CONCLUSION

7.1 This paper has proposed a framework for estimating expected 10-year returns from various South African asset classes. It has looked at historical risk premia and proposed a framework for estimating the prospective equity risk premium. By construction, that estimate is likely to change each time it is calculated.

7.2 The results of this paper are academic and theoretical in nature. It is not intended to form a basis of any decision by a party to do, or to omit to do, anything. It does not constitute, and should not be construed, as advice or recommendation in any way. The author and his employer accept no responsibility for any direct or indirect consequences arising from anyone relying on or usingthese materials or the opinions expressed in this paper. Actual experience may very well deviate from long-term expectations. The ultimate setting of long-term expected returns rests with the reader of this paper. The results shown are dependent on the assumptions of the model and the parameters used in the process. Although certain information has been obtained from sources believed to be reliable, its accuracy, completeness or fairness is not guaranteed. The author has relied upon and assumed without independent verification, the accuracy and completeness of all information available from data sources.

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