UNIVERSITY of the
WESTERN CAPE

DEPARTMENT OF STATISTICS

A MEASURE OF THE INVESTMENT CLIMATE IN SOUTH AFRICA

TONGAI FOTO

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A project submitted in Partial fulfilment of the requirements for the degree of Master of Science in Computational Finance

November 2009

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Acknowledgements

Sincere thanks to all those who lent their time and support into this work. First and foremost among this group is my Supervisor Prof Chris Visser. Thank you for your guidance, patience and limitless enthusiasm for this project. I will always remember the Thursdays I used to meet you to discuss my project. This project would certainly not have become a reality without your tremendous support. Special thanks go to Prof Renette Blignaut for her kind support. To my family and Friends who are too many to mention by name, thank you very much**.**

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SOUTH AFRICA

Abstract

Investor confidence is a concept many investors are constantly trying to gauge. In practice however these concepts are usually not easy to measure. This study attempts to capture the total sum of investor perception in South Africa by examining market behaviour. Data from the JSE/FTSE (1995-2009) will be used to determine an Equity Risk Premium. Bond Yield Spreads will also be calculated from data provided by I-NET BRIDGE. An amalgamation of these components will produce the proposed Investment Confidence Index. Similar indices currently on the South African Market are based on subjective surveys and might therefore be biased. The proposed index which is a first in SA will prove invaluable to practitioners in the financial sector.

1 Introduction

This study seeks to determine an index that accurately measures investor confidence in the South African Market.

Confidence in the economy and the capital markets is a critical driver of economic and financial fluctuations of the business cycle. Increased confidence means consumers and investors want to buy consumer goods, durables and invest at prevailing prices. When confidence decreases, spending and risk-taking tend to fall.

The Johannesburg Stock Exchange, JSE is the 14th largest exchange in the world by market capitalization standing at 4.514 Trillion Rand (JSE Annual Report 2008). The South African Exchange is only marginally smaller than Stockholm and larger than no fewer than nine exchanges classified as "developed". Last year saw 334 million shares being traded on the JSE. The JSE limited gives companies the opportunity to raise capital in the comfort of a highly regarded and sophisticated regulatory environment with no financial impediments to access by foreign investors. The Rand has a unified free-floating exchange rate backed by a liquid and deep sovereign bond market which has a turnover of 10 times the GDP. A choice of four markets is currently available on the JSE, the JSE Equities Market, the Yield X which is the JSE interest rate market, the JSE active financial derivatives market and the JSE agricultural products derivatives market. For the purposes of our study we will make use of variables from the JSE Equities Market which will be used to calculate our Equity Risk Premium.

The JSE is the worlds largest single stock futures exchange by contracts traded and through its client centricity together with advanced technological ability, it provides its clients and approximately 1600 listed securities with first world services in an emerging market environment.

The proposed index is a first in South Africa in that it employs a wholly quantitative technique to describe the investment climate. No persons opinion is sought in coming up with this index. The market is presumed to be the culmination of all market players' opinions and therefore represent the broadest opinion possible. The figures will provide the only tools for

analysis. A number of surveys have emerged in the past to gauge investor opinion, however these are usually handicapped by issues of timelines, reporting accuracy and the inevitable margins of error encountered when extrapolating broad opinion from a narrowly-delivered survey.

For our proposed index the main components in compiling the index are the Equity Risk Premium (ERP) and Bond Yield Spreads.

Risk appetite is a fundamental building block for any portfolio and the ERP is the single most fundamental motivation for investing in the stock market. In brief, the ERP is defined as the excess reward that investors require to accept the uncertain outcomes associated with owning equity securities. It is important in setting up portfolio returns expectations and determining asset allocation. It's under this backdrop that the ERP has been used as the main component in the proposed Index. Bond Yields have also been used because of the importance that Bonds have in any advanced market. Here in South Africa local asset allocation is primarily split between bond and equities with equities taking around 55% to 75% and the remainder being allocated to bonds and money market investments.

To keep the study simple and relevant these are the only components which were used in coming up with the index. More components could have been added such as premiums from the property markets, commodity markets and currency markets etc but it would essentially have come to the same inference.

2 Literature Review

To the best of our knowledge, the approach being used to come up with the proposed index has never been used here in South Africa. There are however some publications that might approximate to what we are trying to achieve. Perhaps the best known Investment Confidence Index is the State Street Investor Confidence Index, SSICI. This index provides an objective; quantitative measure of global risk tolerance of the world's sophisticated investors. Regional components measure separately the risk appetites of international investors in North America, Europe and the Asia-Pacific region.

State Street's approach measures confidence directly and quantitatively by assessing the changes in investor holdings of risk assets and implementing a research model developed by Froot and O'Conell (2003). The basic idea is that, the more of portfolios that sophisticated investors are willing to devote to riskier as opposed to safer investments, the greater the risk appetite or confidence. When risk appetite increases, investors move to increase, in the same proportion, their holdings of risky investment. This process may occur when there is good news and prices are up, but could also happen over a period of bad news and falling prices. As a result, the risk appetite of investors is a separate and distinct measure from the behaviour of prices.

The index shows the risk appetite of these sophisticated investors by aggregating the common buying patterns of risk investments, and how their allocations evolve over time.
The SSICI is similar to the proposed index in that it captures whether investors are bullish or bearish on risk for any given set of fundamentals whether positive or negative.

Another Confidence Index Currently on the market is the Sanlam Investment Management (SIM) Confidence Index. The Institute of Behavioural finance conducts the research for the Index among 80 to 120 anonymous dependent and Independent Fund Managers and Financial Intermediaries. The index is based on the Yale School of Management Stock Market Confidence Index. Fund Managers are asked the following four questions.

1. *One-Year-Confidence Index*: How much of a change in percentage terms do you expect in the JSE/FTSE ALLSI during the following periods: one month, next three months, next six months and the next year?

2. *Crash confidence Index*: What do you think is the possibility of a catastrophic market crash (like 28 Oct 1928) occurring during the next six months?

3. *Buy-On-Dips*: How would the JSE/FTSE ALLSI do the day after tomorrow if it were to drop by three percent tomorrow?

4. *Valuation-Confidence-Index*: Stock prices in South Africa, when compared with measures of true fundamental value; are they too low, too high or just right?

From these sets of questions an index is then drawn up to gauge the investment confidence in South Africa. Whilst SIMICI might serve its purpose it still comes short in avoiding biasness since it's highly opinionated. Who would have answered yes to a high probability on question 2 just before the subprime crisis in America hit? Chances are no one.

3 Equity Risk Premium

The Equity risk premium (ERP) is defined as a reward that investors require to accept the uncertain outcomes associated with owning equity securities. Simply put, it is the extra return that equity holders expect to achieve over risk free returns. The equity premium is important in setting up portfolio return expectations and determining asset allocation policy. A higher premium implies that equities are more attractive that you would invest a greater share of your portfolio into equities if your risk appetite remained the same.

Generally there are four ways in which to estimate the equity risk premium. These were summarised by Ibbotson and Chen (2002). The ERP's that are obtained are for the USA.

1. *Take a survey.* An estimate of the ERP is obtained by surveying financial professionals or academics e.g. Welch (2000). The outcome of the ERP is usually from 4% to 7%.

2. *Historical method*. Subtract risk-free bond returns from actual historical stock returns. e.g. Dimon, Marsh and Staunton (2002). The outcome of the ERP is from 3.5% (over 200 years) to 5%+ (more recently).

3. *Demand –side model*. This uses a macroeconomic model to calculate the expected equity return by considering payoff demanded by investors, for bearing the risk of equity investments. e.g. Mehra and Prescott (1985) the outcome of the ERP is usually 0.5% to 2%

4. *Supply-side model*. This uses fundamental information such as dividends, earnings or overall economic productivity. e.g Arnott and Bernstein(2002) the outcome of the ERP is from 0% to 2-3%

The above methods all give surprisingly different results with surveys giving the biggest outcome. It's for this reason this paper uses a wholly quantitative approach. Surveys are highly subjective and seldom give accurate results. For this paper the supply side model will be employed to assess the equity risk premium.

Essentially what the Supply Side model does is to

-estimate the expected total return on stocks

-estimate the expected risk-free return (Treasury bond)

-the difference of the two (expected total returns-risk free return) gives the required equity risk premium.

The choice of the risk free rate is a very important component of the ERP. The risk free rate chosen has to be consistent with the risk free rate used to compute expected returns. If the treasury bill (TB) rate is used as the risk free rate, the premium has to be estimated relative to that rate. If a treasury bill is used as the risk free rate (rfr), the premium has to be the premium earned by stocks over that rate. A long-term default free government bond rate is the most commonly used risk-free rate applied in corporate valuations and finance. This paper uses a one month TB rate. This has been used because it is the shortest TB available and is therefore the least risky, it is also consistent with using one month returns of the equity market.
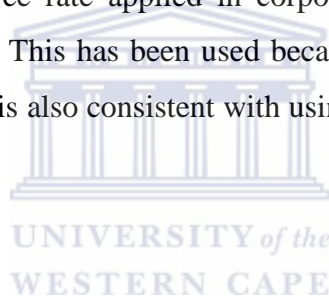
3.1 Data

The Equity data used has been taken from the JSE. In particular we will make use of the JSE-FTSE ALL share index (ALSI), the dividend yield, one month TB rate and the 'All items' Consumer Price Index. The data dates back from June 1995 to the present year, 2009. 1995 has been used as the start year because that is when the equity market became more accessible and integrated with major developed equity markets. This came about as a result of reintegration of the South African financial system after financial sanctions were lifted following the first fully democratic elections in South Africa.

Figure one below shows the movement of the All Share Index and the dividend yield over the past 14 years.
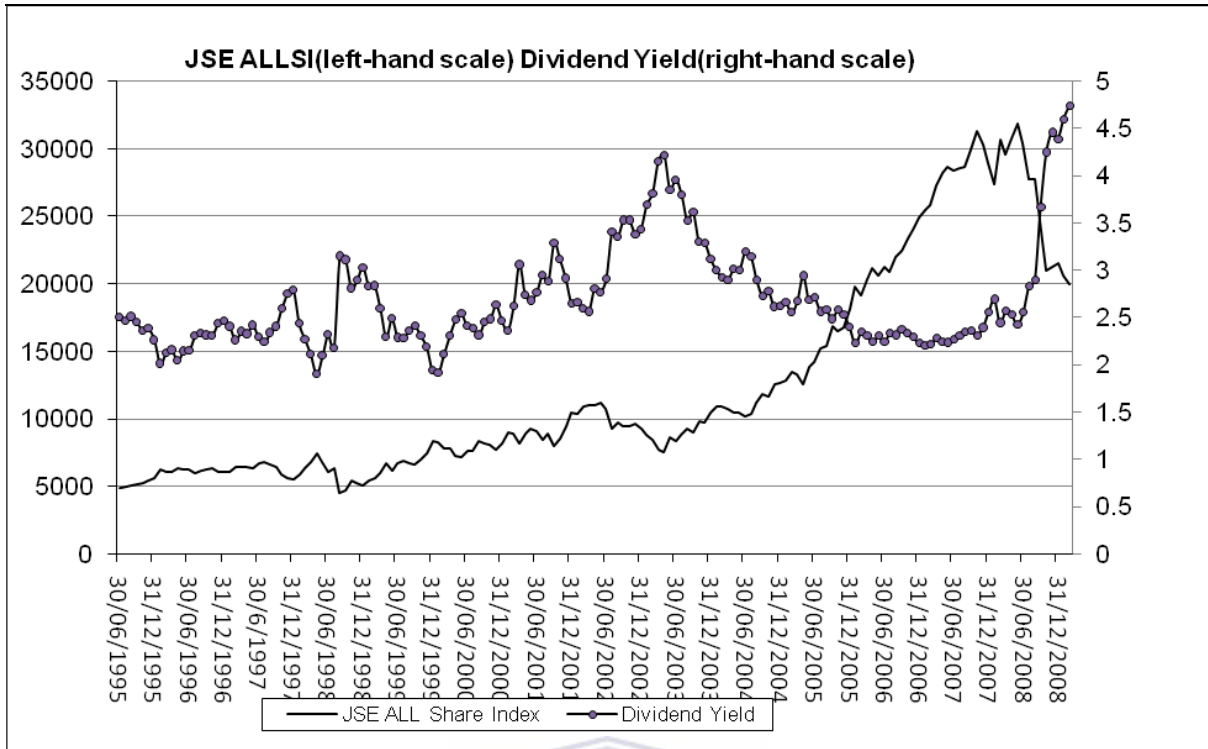
Figure 1:

From Fig 1 the ALSI has been rising steadily over the years and reached an all time high of 31841.27 on the 22nd of May 2008. The dividend yield has been fluctuating over the years and reached a high of 4.22% in April of 2003. South African consumer inflation rate has averaged 6.4% over the past 14 years. Below is a series of the consumer inflation rate over the past 14 years.

All Items Consumer Price Index

Figure 2:

3.2 Methodology and Results

There are two leading supply-side model approaches which can be used. The dividends or earnings approach. In this paper the dividend approach is used. What it essentially says is that returns are a function of dividends and their future growth.(In other words, the dividend yield (%) +expected growth in dividends (%) =expected total return (%)).

This approach is from the Gordon's Growth Model (Gordon 1959) which says that the fair price of a stock (P) is a function of the dividend per share (D), growth in the dividend (G) and the required rate of return (K). The Gordon's Growth Model has been used because of its simplicity and clarity, and it is useful in estimating expected rate of return.

Below is an illustration of the equation of the Gordon's growth model

$$p = \frac{D}{k-g} \qquad\qquad 1.1$$

Where p=Stock price (JSE ALLSI), D=dividend dollars, k=required return and g=growth rate

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If this equation is re arranged we get the following equation

$$k = \frac{D}{p} + g \qquad\qquad 1.2$$

Which is, dividend yield + dividend growth

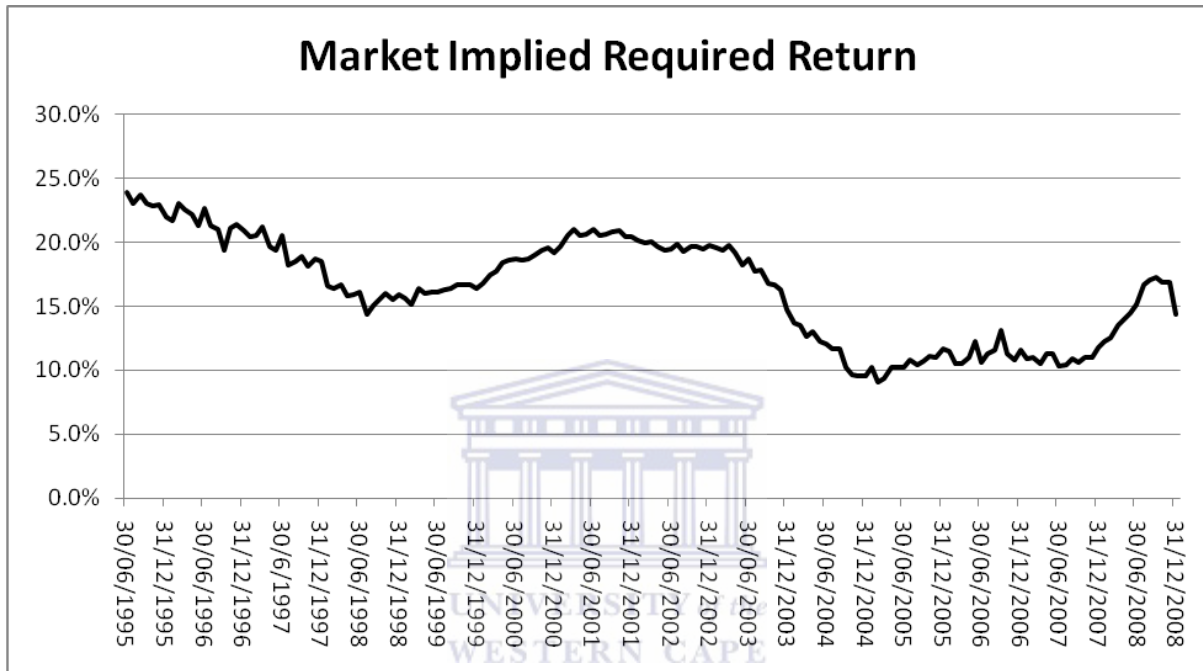Fig 3 below shows a graph of the required return

Figure 3:

The dividend growth rate used in the above equation was a 10-year rolling average (to smooth out short term fluctuations and highlight longer term trends or cycles), which was calculated using the following equation:

$$g = \left(\frac{D_1}{D_0}\right)^{\frac{1}{10}} - 1 \qquad\qquad 1.3$$

Where D_1-dividend at present and D_0- dividend 10 years ago

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After the expected return had been found the next step was to estimate the expected risk-free rate. For this paper a one month TB rate was used. The graph below shows the movement of the TB rate over the past 14 years
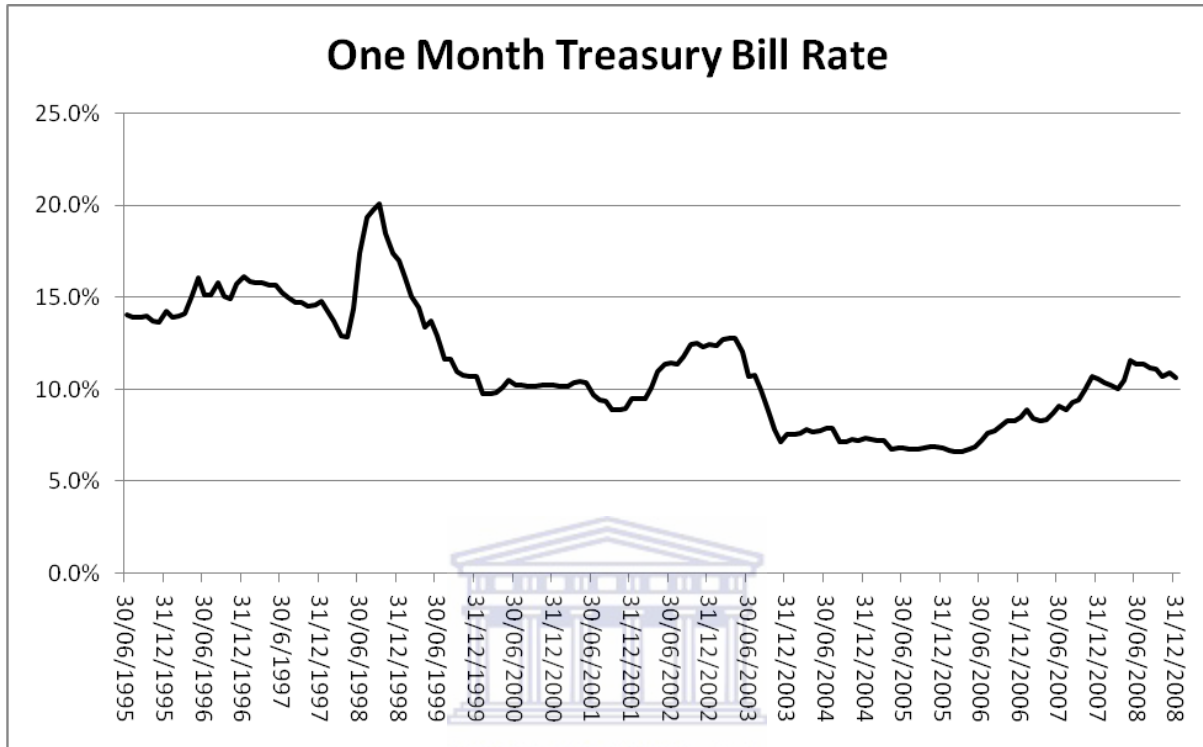

Figure 4:

Finally what is left now is to calculate the equity risk premium itself which can be calculated using the following equation

$$erp = \frac{1+k}{1+rfr} - 1 \qquad\qquad 1.4$$

Where k is the market implied required return and rfr is the one month TB rate used as a proxy for the risk free rate .The result is shown in figure five below
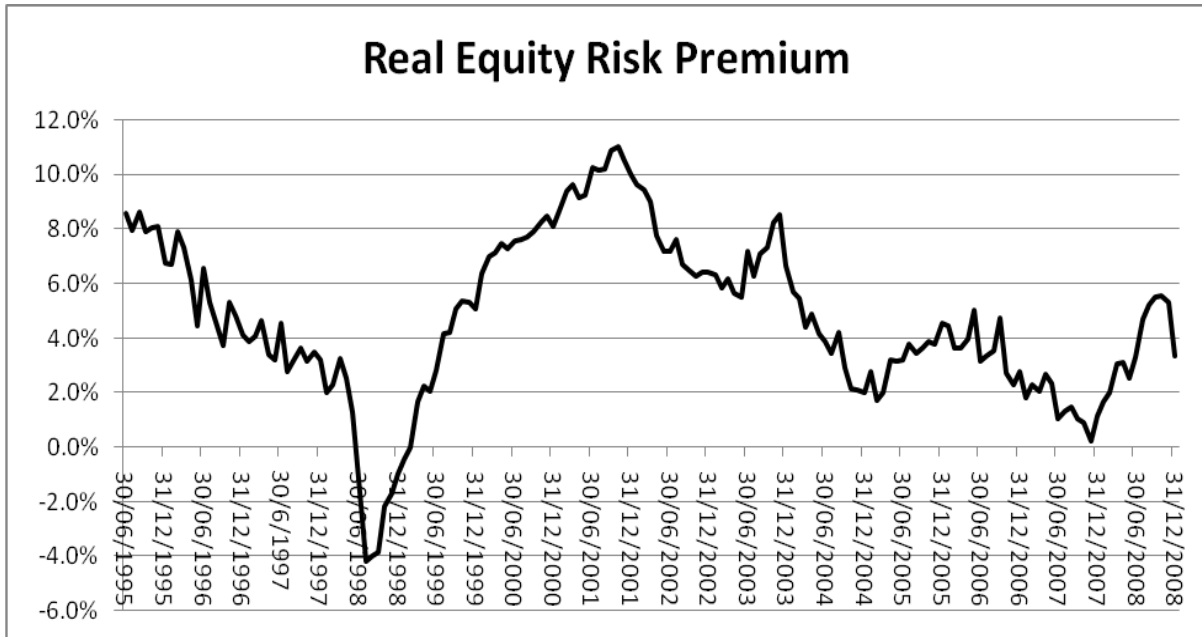
Figure 5:

The above graph shows a period of negative risk premium from June 1998 to January 1999. To correct this, instead of using the real risk premium which deducts inflation we used the nominal rate to get a more representative and meaningful equity risk premium. The equation used was the following

$$nominal\ erp = (1 + e)(1 + i) - 1 \qquad\qquad 1.5$$

Where e is the ERP and i is the all items CPI

The graph below gives the nominal rate of the equity risk premium for the last 14 years.

Figure 6:

3.2.1 Discussion of Results
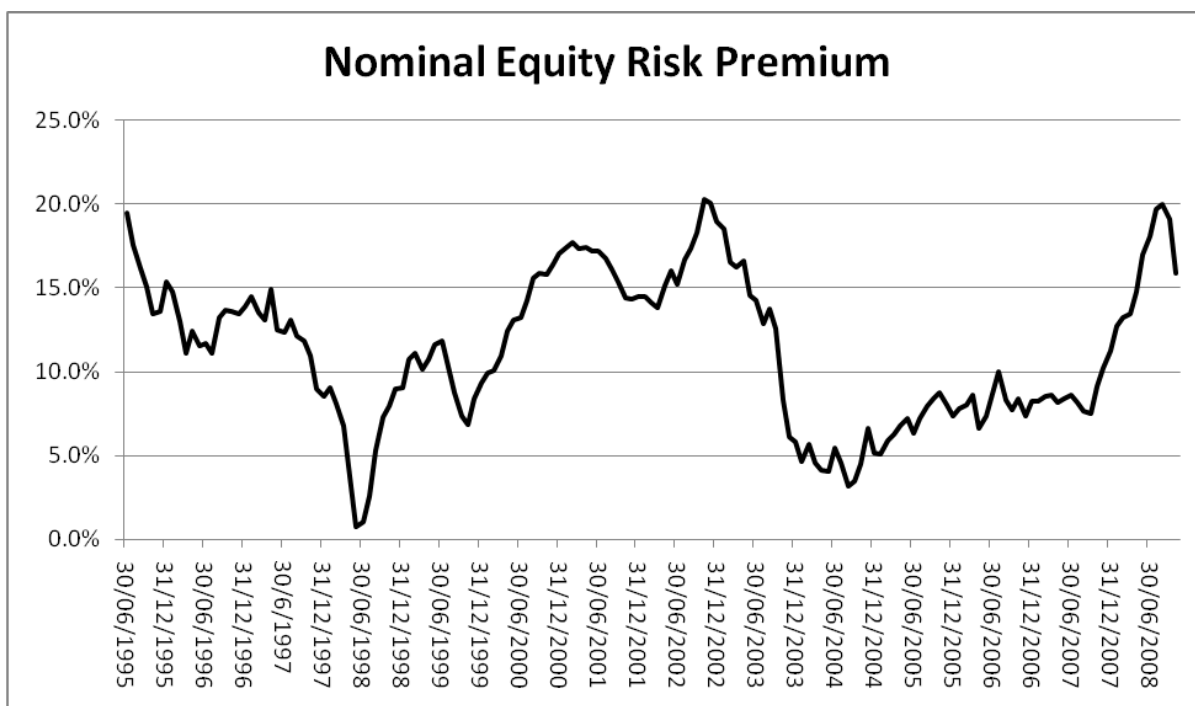
The acceptance of South Africa into the international financial community made it possible for important multilateral institutions to enter the domestic market. Institutions like the International Finance Corporation became actively involved in developing SA capital markets. In 1995 alone it approved its first investment amounting to $35.3 million.

The SA equity market became integrated with international markets after the JSE was included into the Morgan Stanley Index on 1 March 1995. With this acceptance, equity capital in South Africa became cheaper and as a result, the ERP began a steady decline from a high of 19.5% in the third quarter of 1995. By the end of that year it had reached 13.5%. Other factors that could have contributed to the decline included new capital which was raised in the primary equity market which more than doubled from R10 billion in 1994 to R21.4 billion in 1995. The total number of 27 new listings in 1995 and 16 in the first 6 months of 1996 reflected the interest in and strength of the share market as a source of finance.

Activity in the secondary equity market was extremely brisk and volatile in the first half of 1996 with the ERP rising to 15.4% in February 1996, but decreasing to 11.1% by May of that year. Towards the end of 1996, the ERP was at 13.6%. Increased investor confidence was evident with the gradual decrease of the ERP in 1997 with figures reaching 10.9% by December 1997. The value of shares traded increased from R117 billion in 1996 to R201 billion in 1997. The direction of the price-earnings ratio and dividend yield observed during the first five months of 1998 changed direction suddenly around June 1998 when non-resident investor sentiment towards the SA share market became less positive. It was around this time that the ERP began to rise again having reached a record low of 0.7% in June 1998.

In 1998, when Russia depreciated the rubble and restructured its external and domestic debt, capital flow began to be redirected to more advanced economies of the world, this aggravated the external financing difficulties of emerging market economies. The growth inhibiting problems of the developing economies such as overvalued exchange rates, low commodity prices, weak financial systems and balance of payments deficit, have been identified as reasons for loss of confidence in emerging markets. South Africa could not escape the spill over. This is evident in the rising ERP in 1998. Some of the reasons why the Asian contagion affected monetary and economic conditions in South Africa include among others, low domestic savings ratio, the inability to attract sustained inflows of foreign direct investment, high ratio of short-term external debt to international reserves and falling commodity prices.

The principle elements that transmitted the crisis to SA were heavy selling of fixed international securities by non-resident Portfolio investors which caused an unavoidable rise of the lending rate by 725 basis points from June to August 1998. The ERP rose sharply on the background of uncertainties caused by the crisis. By the end of the year it stood at 8%. For 1999 the ERP continued to rise but at a slower pace than 1998, this was in part due to the R22.9 billion capital that was raised by the private sector as they turned to the primary share market as a source of finance. Total value of equity capital raised on the JSE stood at R88.4 billion in 1998 which was more than the R50.3 billion raised in 1997. From September 1999 buoyant domestic economic activity, easing of monetary policy and prospects of higher corporate earnings supported a strong upward movement in share prices. Likewise the ERP responded and declined from 10.3% in September 1999 to 6.9% by the end of that year.

In the beginning of 2000 the ERP began to rise again, investor confidence was adversely affected by a depreciating rand, downward price corrections on the international markets and higher interest rates. By the end of the year the ERP was at 15.8%. The total value of equity capital raised in the primary share market by listed companies fell from R74 billion in 2000 to R24 billion in 2001. This was also evident in the 2001 ERP values which remained at high levels for the whole year. This was due in part to uncertain prospects for global economic growth and adverse conditions in the local share market.

From 2002 the ERP started at 15% but took an abrupt turn upwards around may of that year. This was in part due to a culmination of events which dampened investor confidence. These events included the September 11 attacks in the US and the technology bubble burst in 2000, which saw the NASDAG stock index experiencing a 54% decline, from its peak in March 2000 to its low in December 2000. Again low domestic and international share market returns and the geopolitical risks resulting in equity financing declining even further in the third quarter of 2002 saw the ERP reaching a high of 20.3% by December 2002.

The year 2003 saw an impressive bull run on the JSE that went on until October 2007 when the ALSI reached 31334.99. The ERP also dropped sharply from beginning of 2003. This was on the backdrop of improved optimism about the global economy and the Iraq war ending. Funding in the primary equity market amounted to R10.2 billion in the first half of 2003. Other positive news to come out of 2003 was the domestic and NYSE listing of state owned Telkom SA and its subsequent inclusion on the JSE-FTSE Top 40 at the end of its first week of trading.

For 2004 the ERP continued to drop on the backdrop of a strong bull run on the JSE. Equity financing gathered further momentum during 2004 reaching R33.9 billion in the first 7 months of 2004. There was however a slight upward movement in the ERP from 4% to 5.5% in August 2004. This could have been as a result of weak global markets. However it quickly declined to 3% by October of the same year. During the first half of 2005 the domestic share price lost some of its previous momentum as global share markets began to react to high energy prices and their impact on global growth. This was also evident in the ERP movement which closed just above 4% at the end of 2004 but began to rise again reaching 7% by mid 2005. By December 2005 it had reached 9%.

The year 2006 continued with the ERP remaining stable with minimal fluctuations. The buoyant commodity prices, an equity friendly policy environment with lower interest rates, positive sentiment towards the share market, the prospects of higher domestic growth and stronger international markets led domestic bourses to consecutive highs for 2005 and 2006.

The upward trend in share prices which started beginning of 2003 through to the third quarter of 2007 ensured that trading activity in the secondary share market remained brisk well into 2007. The total market capitalisation of the JSE at month ends increased by 41% from R4.1 trillion in may 2006 to an all time high of R5.8 trillion in March 2007. The ERP remained stable for most of 2007 averaging 8.2%.

Towards the end of 2007 the ERP suddenly began to rise on the backdrop of the subprime crisis that hit the US mortgage market and led to a loss of confidence in counterparties and a sharp decline in global share prices. In 2008 the ERP rose considerably. The high oil prices that characterised 2008 did not help the situation. In July 2008 the price of a single barrel reached a record high of $146. This obviously had a negative impact on the global economy including South Africa. Inflation figures increased markedly in both advanced and emerging markets including SA. Prices of energy and food reached high levels. The inflation figures for SA averaged 11.5% for 2008.

Towards the end of 2008 ERP figures began to decline after having reached 20% in October. The worst seemed to be over as investors began to have a positive outlook in the world economies including South Africa.

4 Bond Yield Spreads

4.1 Bonds

In finance, a bond is a debt security, where the authorised issuer owes the holders a debt and, depending on the terms of the bond, is obliged to pay interest (coupon) and/or repay a principal at a later date, termed maturity.

Simply put a bond is like a loan, the issuer being the borrower, the bond holder is the lender and the coupon is the interest. Bonds provide the borrower with external funds to finance long-term investments, or in the case of government bonds, to finance current expenditure. Global institutional investors continue to allocate assets primarily between equities and bonds. South Africa is no exception, equities take around 55% to 75% and the remainder being allocated to bonds and money market investment. South Africa has a heavy bias towards equities possibly because of a much younger population than more developed markets and an increase in defined contribution funds that revolves around life cycle investment options, Petzer (2006). It is against this backdrop that bond spreads have been incorporated into our proposed index.

4.1.1 Bond Spreads

A bond spread refers to the interest rate differential between two bonds. Bond spreads are the most popular way that market participants compare the value of one bond to another, much like price earnings ratios are used in equities. Bond spreads reflect the relative risk of the bonds being compared, usually the higher the spread, the higher the risk. The most common bond that is used to compare other bonds with is a government issued bond. This bond is considered a countries most creditworthy bond and will under normal circumstances never default.

For our paper we will make use of the following spreads: Corporate spread, Term spread, Credit spread and Country spread.

4.2 Corporate and Credit Spreads

A corporate spread (COS) is the difference between the yield to maturity of a coupon paying corporate bond and the yield to maturity on a coupon paying government bond. It measures the risk premium that compensates investors for holding risky corporate debt rather than default free debt. The COS reflects a number of risks associated with Corporate Bonds such as default risk, liquidity risk and tax risk among others. A COS curve will invert prior to and during an economic expansion and move upwards before an economic contraction.

The bond market has always been an important source of funding for corporations. Corporate bond yields reflect credit market tightness, which in turn affects investment decisions and future economic growth.

For this paper we will use a AAA rated bond which is Standard and Poor's highest rated bond. Such a bond has a credit risk that is almost zero. Some institutional investors such as fund managers are restricted by their mandates to holding bonds of a high level of credit rating. Since these ratings are standard across the world an AAA corporate bond in SA is the same as a AAA corporate bond in USA. The chances of any one of these bonds defaulting is highly unlikely. The government bond to be used is a 10 yr US Treasury Bond.

Credit Spreads (CRS) on the other hand measure the yield differential of a BAA rated cooperate bond and a AAA corporate bond. Since the 1900s, credit spreads have displayed a fairly consistent pattern over the business cycle, rising sharply immediately before and during recessions and compressing as economic conditions recover, Diaz and Davis (2009). The fact that a AAA has almost a zero percent chance of default means that it is similar to a Treasury Bond in its movements and yield. This is easily confirmed when we plot a Credit spread and a Cooperate spread series on the same graph as below
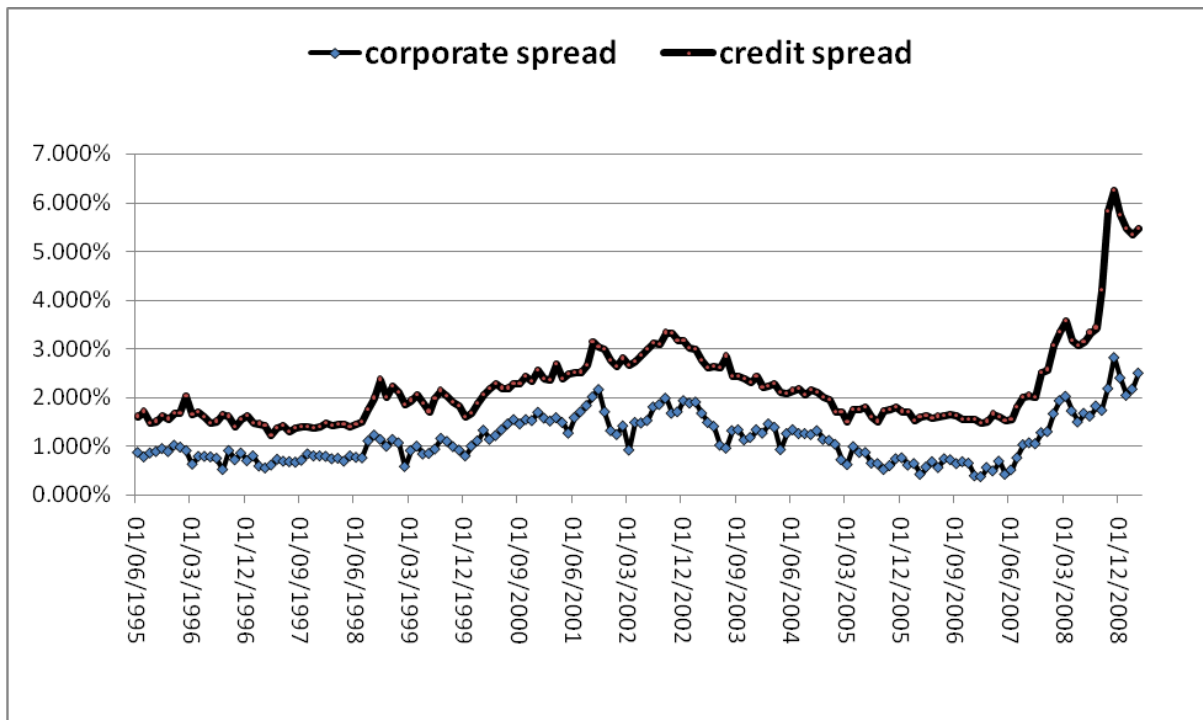
Figure 7:

The Credit Spread has wider spreads because of the higher risk associated with a AAA than a Treasury Bond. From the graph we can easily see the rise in both spreads in the beginning of the second quarter of 2002. This could have been as a result of yields rising due to uncertainties in the economy as a result of the September 11 attacks. Another more pronounced rise in spreads can be seen in mid 2007 when the subprime crisis in the US hit causing spreads to widen.

If we construct the ERP movement on the same axis as below, we notice a similar movement. When the ERP is down, the COS records a similar movement.
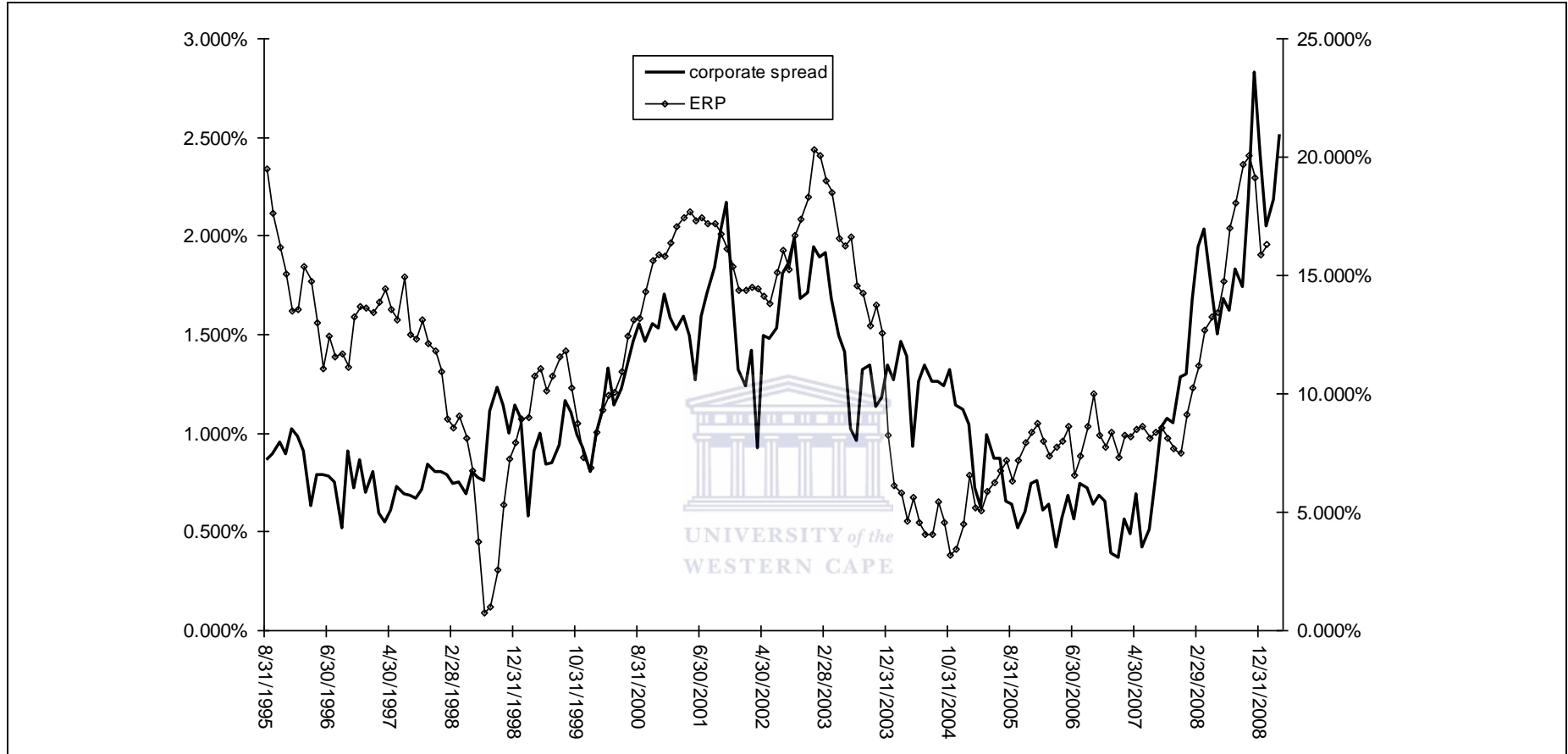
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Figure 8:

4.3 Term Spread

These are spreads that reflect the different interest rates between bonds of different maturity. Long-term interest rates are usually higher than short term interest rates, therefore the term spread is usually positive. For most developed countries in the past 20 years a negative term spread tended to precede a recession approximately three quarters later, Guidolin and Rodean (2007). One reason for this might be that negative term spreads result from monetary policy tightening and a rise in short-term interest rates. These high short-term interest rates in turn produce an economic slowdown. In recent times this has not been the case in developed markets. Why the forecasting power of the yield curve has deteriorated remains a mystery. They are economists who have argued that this relationship may depend on the types of shocks affecting the economy, e.g. (supply shocks from oil prices vs. demand shocks from increased consumption) - Smets and Tsatsanoris (1997). The forecasting power of the term spread on economic growth is based on the fact that interest rates reflect the expectations of investors about the future economic situation when deciding about their plans for consumption and investment. Below is the movement of the term spread (difference between a 10 year SA government bond rate and a 91 day Treasury bill rate).
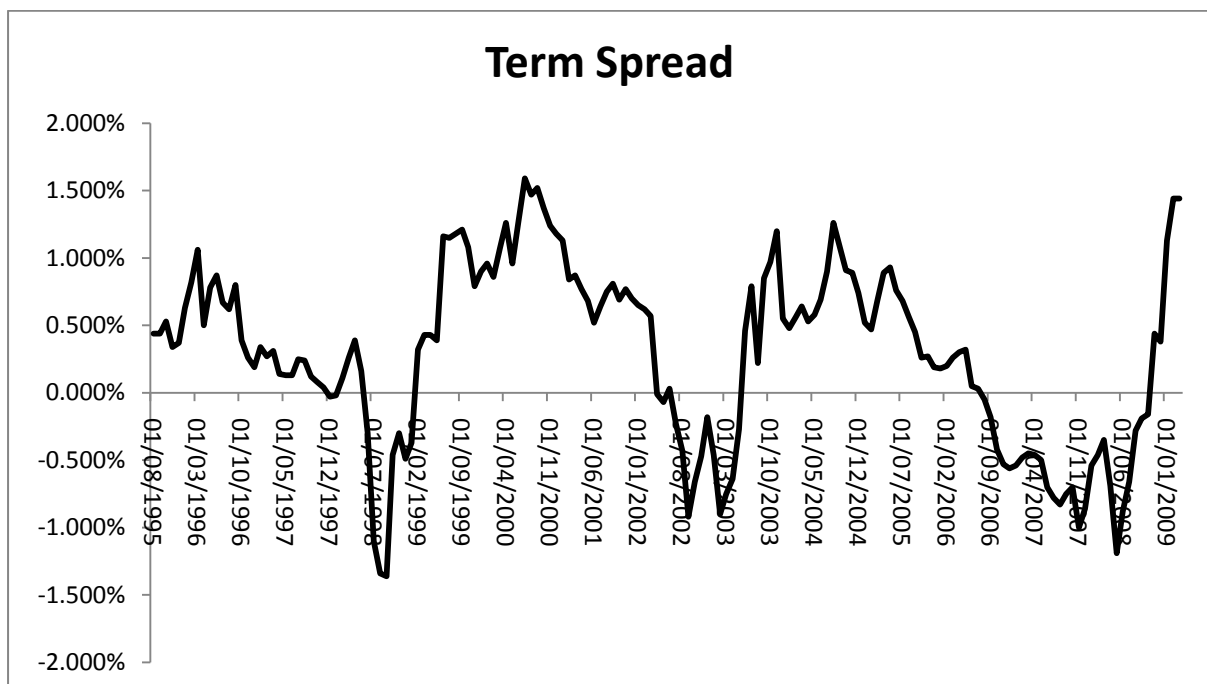

Figure 9:

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Points to note from the above graph are the negative term spreads. These correspond to a contraction in the economy. The second half of 1998 saw a negative term spread when the short-term interest rates recorded higher percentages than the long-term interest rates. This period corresponds to the Russian crisis which spread to emerging markets including South Africa. With the introduction of a new monetary policy in SA that was based on inflation targeting, the short-term interest rate has closely followed the movement of the inflation rate. From the second quarter of 2002 to the end of the first half of 2003 the term spread was again negative. This period corresponds with higher inflation figures which in turn caused interest rates to rise as well resulting in a slow down in economic growth. The third period of negative spreads was from the fouth quarter of 2006 to the beginning of the fourth quarter of 2008. This period witnessed high inflation triggered by high oil prices and subsequently food prices also rose. The short-term interest rates likewise reacted and rose significantly resulting in higher short term interest rates than long term interest rates. As a result of this, the economic growth rate slowed down. Below is a graph of the movement of the CPI and the short-term interest rates over the years.
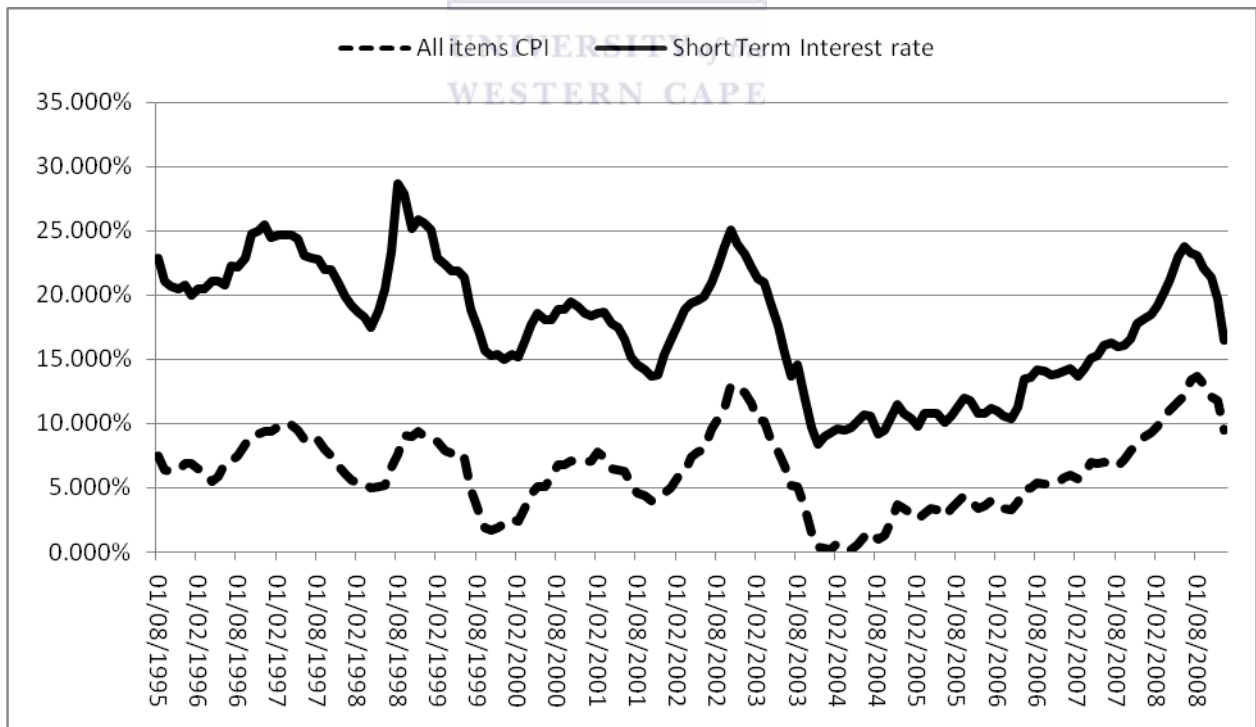

Figure 10:

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4.4 Country Spread

This spread incorporates a sovereign spread (SS) and a currency spread (CS).The sovereign spread represents the difference between bond yields issued on international markets by the country in question versus those offered by the US government. In this case the country is South Africa and the government is USA. Emerging economies have used external bond financing in the last few decades, South American countries alone account for over 60% of outstanding bonds in the Emerging Market Bond Index(EMBI) constructed by J P Morgan. Calvo, Leidermann and Reinhart (2003).

A SS is supposed to compensate investors for sovereign default risk. Emerging market spreads are influenced by global factors, risk appetite, industrial country interest rates and liberalisation of investment rules.

4.4.1 The driver of Sovereign Spreads in emerging markets

From a theoretical perspective, a rise in US policy interest rates could lead to an increase in emerging market spreads for several reasons. Calvo, Leiderman, and Reinhart (1993)

Since emerging market bonds are risky (there is a probability of default), the yield on emerging market bonds has to rise by more than any rise in the risk free rate. As an illustration

If a and i represent the interest rate on the risk free asset and the risky asset respectively, and P is the probability of repayment on the risky asset, then there is no arbitrage if

$$(1+a) = P*(1+i) + (1-P)*0 \qquad\qquad 1.6$$

The interest rate spread S, defined as the difference between the rate on the risky asset and on the risk free asset, in equilibrium is then

$$S = \frac{(1+a)(1-p)}{p} \qquad\qquad 1.7$$

$$\frac{ds}{da} = \frac{1-p}{p} \quad \text{which is positive as long as P<1} \qquad 1.8$$

So what the above is saying, is that as long as there is some risk of default, the rate on the risky asset will have to rise by more than any rise in the risk free rate in order to compensate investors for the risk.

A rise in the US interest rates could also raise emerging market spreads through its effects on the ability of debtor countries to repay loans. A rise in US rates would tend to increase debt service burdens in borrowing countries, which would reduce their ability to repay loans. As noted by Kamin and Kleist (1999), a rise in US rates could reduce investor's appetite for risk. This would then lead them to reduce their exposure in risky markets, in turn reducing available financial resources in borrowing countries.

Another driver of the sovereign spreads is the US monetary policy, Arora and Cerisola (2001). In 1994 when US monetary policy was tightened there was a substantial widening of SS and after the 1998 Russian crisis there was an easing of US monetary policy in response to the flight to quality and the concerns about a US credit crunch associated with the Russian default helped to restore global liquidity conditions and to reduce SS.

Other studies noted that falling US interest rates are generally associated with an abundance of capital in international markets which bring down yields hence spreads, Cline and Barnes (1997). Higher credit ratings have been known to translate to lower country spreads, Eichengren and Mody (1998)

Another driver of Country Spreads is the global investor's attitude towards risk which is referred to as global risk aversion. Risk issues are becoming increasingly relevant owing to the sophistication of financial markets, and the impact on emerging markets of international investor's appetite for risk is clearly recognised today, see Broner, Gelos and Reinhart (2004).

Country spreads, world interest rates and business conditions are all interrelated. Country spreads affect aggregate activity but also respond to domestic macroeconomic fundamentals. Uribe and Yue (2004). Below is a graph of the movement of the country spread (SA) from 1995 to the first quarter of 2009. A 10 year US Treasury bond yield is used as a proxy for the risk free rate and a 91 day treasury bill is used as the short term interest rate.
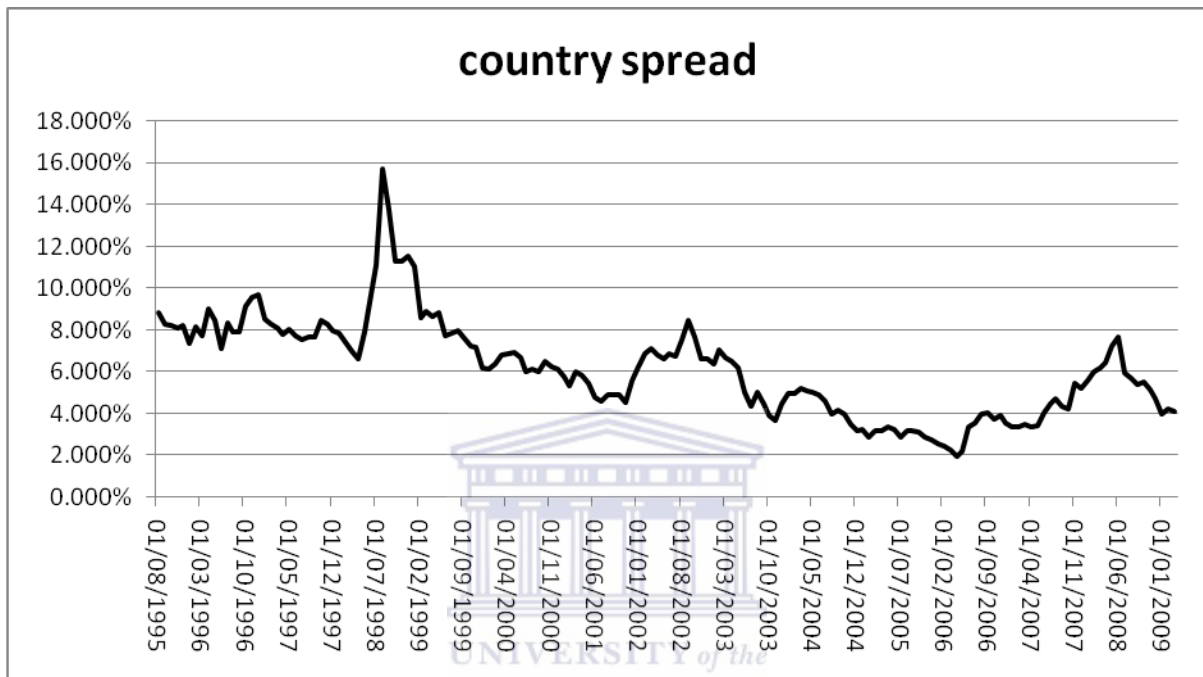

Figure 11:

From the graph a sharp rise is evident towards the end of the first quarter of 1998, it is around this time that the Russian crisis emerged raising US interest rates hence bond yields which in turn raised the CS. It was only after the US eased monetary policy did interest rates start falling resulting in the CS dropping around the fourth quarter of 1998. The relationship between CS and US interest rates was also evident after the September 11 attacks of 2001. Because of the uncertainties resulting from this attack, US markets reacted by raising interest rates which is typical in situations when the economy is depressed or it's percieved to be depressed. Around October of 2001 the CS rose from 4.5% to 8.48% by September 2002. The sub-prime crisis in the US in 2006-2007 also triggered a rise in interest rates which also had a profound effect on the CS as evident from the graph. It peaked to 7.68% in June 2008 before beginning to decline.

These three examples clearly show a strong relationship between Country Spreads and US interest rates.

5   Investment Climate Index (ICI)

From the previous two chapters, we managed to capture the risk and reward associated with equities in calculating the ERP. Bond Yield Spreads were also calculated. What remains now is to calculate the actual index itself. On adding the various spreads to the ERP we get a series that incorporates the ERP and Bond Spreads in a way that essentially measures investment confidence.
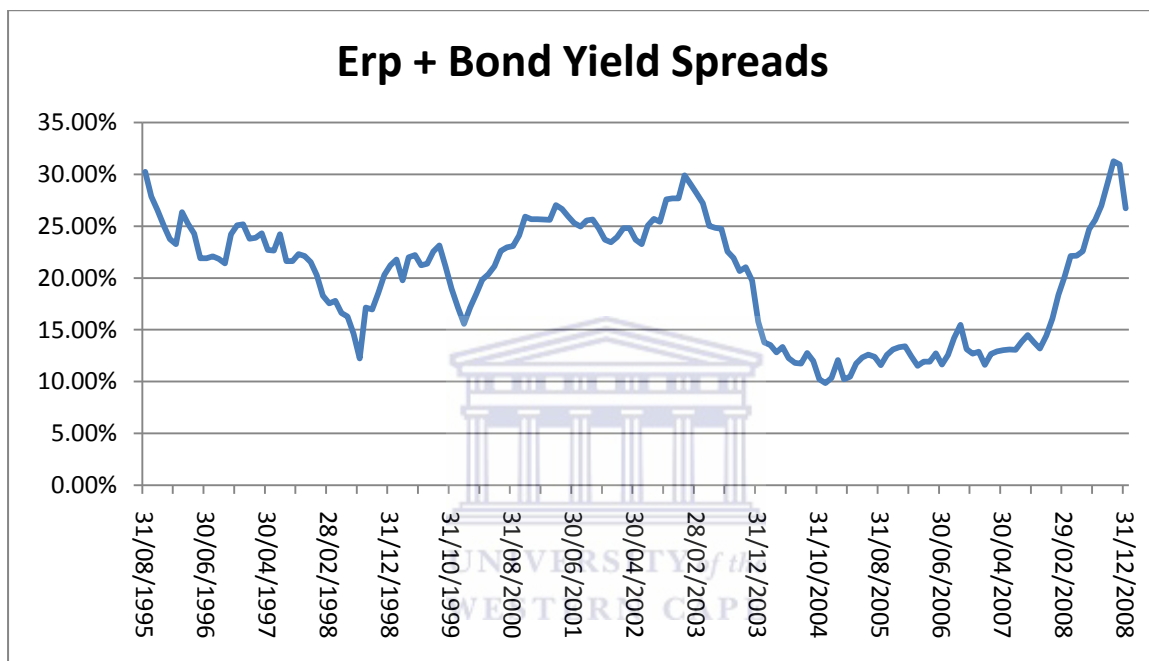

Figure 12

Figure 12 above is an illustration of the movement of the components which make up the ICI. Before we transform the above series into a true index, we shall introduce a very important technique which will help in understanding and describing the proposed index.

5.1 Purchasing Power Parity

Purchasing Power Parity (PPP) is an economic technique used when attempting to determine the relative values of two currencies. It is useful because often the amount of goods a currency can purchase within 2 nations varies drastically, based on availability of the goods, demand for the goods, and other factors which are sometimes difficult to determine.

What the PPP does to solve the above problem, is to take some international measure and determine the cost for that measure in each of the two currencies, and then compare the amounts. Gustav Cassel (1920) developed the PPP concept. In theory it states that in ideally efficient markets, identical goods should have only one price. Below is an illustration of the PPP

$$S = \frac{P_1}{P_2}$$

Were S represents the exchange rate of currency 1 to currency 2, P_1 is the cost of good x in currency 1 and P_2 is the cost of good x in currency 2.

The exchange rates between currencies are in equilibrium when their purchasing power is the same in each of the two countries. When a domestic price level is increasing (a country experiences inflation), that country's exchange rate must depreciate in order to return to PPP.

Exchange rates in the short term are news driven. Announcements about interest rates changes, changes in perception of the growth patterns of economies etc are all factors that drive exchange rates in the short run. PPP, by comparison, describe the long run behaviour of exchange rates. The economic forces behind PPP will eventually equalise the Purchasing Power of currencies, this however takes a long time. A time horizon of 4-10 years is typical.

Figure 13 shows the Premium/Discount of the PPP for South Africa and the USA. The series illustrates the movement of the premium from 1995 to the first quarter of 2009. While the PPP does not measure Investor sentiment it is strongly related to foreign exchange rates which in turn are related to investor sentiment. Movements of investor sentiment also mirror movements in the premium/discount of the PPP to a certain extent.
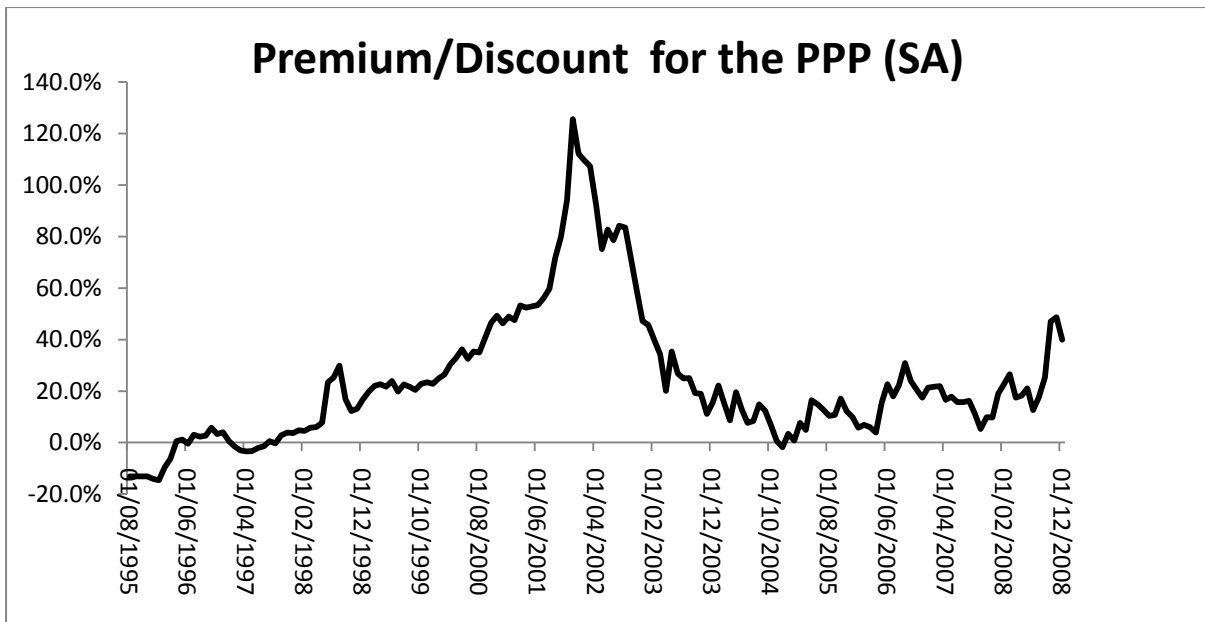
Figure 13

A high premium for the PPP indicates that the Rand is undervalued when compared to the dollar. In other words the same product theoretically costs less in SA than in the USA. The Rand therefore needs to appreciate against the dollar. From figure 13 it shows that the rand has been undervalued for most of the time. A premium that is close to 0% indicates that the price of goods in SA and USA cost almost the same when exchange rates are taken into consideration. From the 3rd quarter of 2003 to the beginning of the 3rd quarter of 2008 the PPP premium averaged just 14%. This period also coincides with the period when the investment confidence in SA was very high as illustrated in figure 16.

The correlation of the series in figure 12 (Erp + Bond Yield Spreads) and the series in figure 13 of the PPP gives an interesting insight into the relationship between Investor sentiment and PPP. From the period 1995-2008 the correlation was 0.39. While this is not a high correlation it confirms that there is a relationship between these two concepts. If we take the correlation from 2002-2008 we get a fairly strong positive correlation of 0.67.
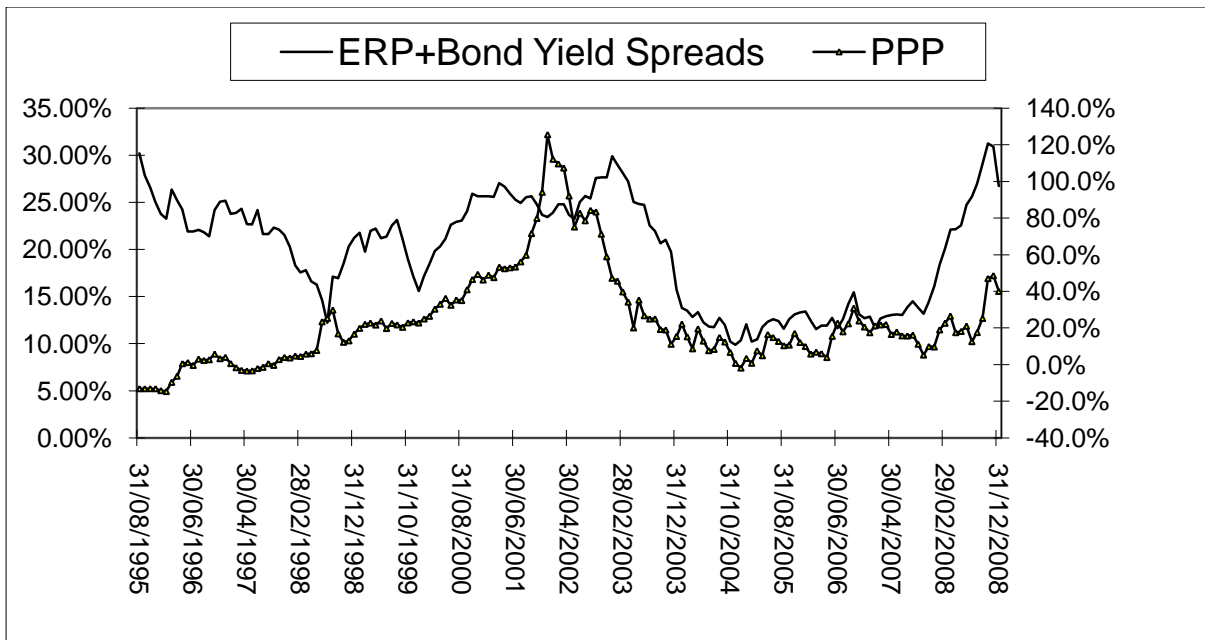
27

Figure 14

Investment Confidence Index

It is important to note that that the graph has a similar movement to the graph of the ERP. This is because the ERP is the biggest component in our proposed index and the various risk premia would be related. To convert the above series to an index in the strictest of sense we transformed the series using a Fisher transformation. This is a simple mathematical procedure that converts any data to a modified data set whose probability density function is approximately normal. With the transformation it confines the series to between -1 and +1 making it more convenient to interpret as an index. The equation below is for the Fisher inverse transform

$$y = 1 - \frac{e^{2x} - 1}{e^{2x} + 1} \qquad\qquad 1.9$$

Where *x is* the input (Erp+ Bond Yield Spreads) and *y* is the resulting index. This translation puts limits to our index for extreme conditions. An index number of zero would be the lower limit indicating no confidence or a risk premium so high that investment is impossible. An index number of 100 would be the upper limit indicating a perfect investment climate with

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zero risk and abundant capital. The index is therefore bounded and would never reach these two extreme conditions.

Fig 13 below is a series of the proposed Investment Confidence Index for South Africa.
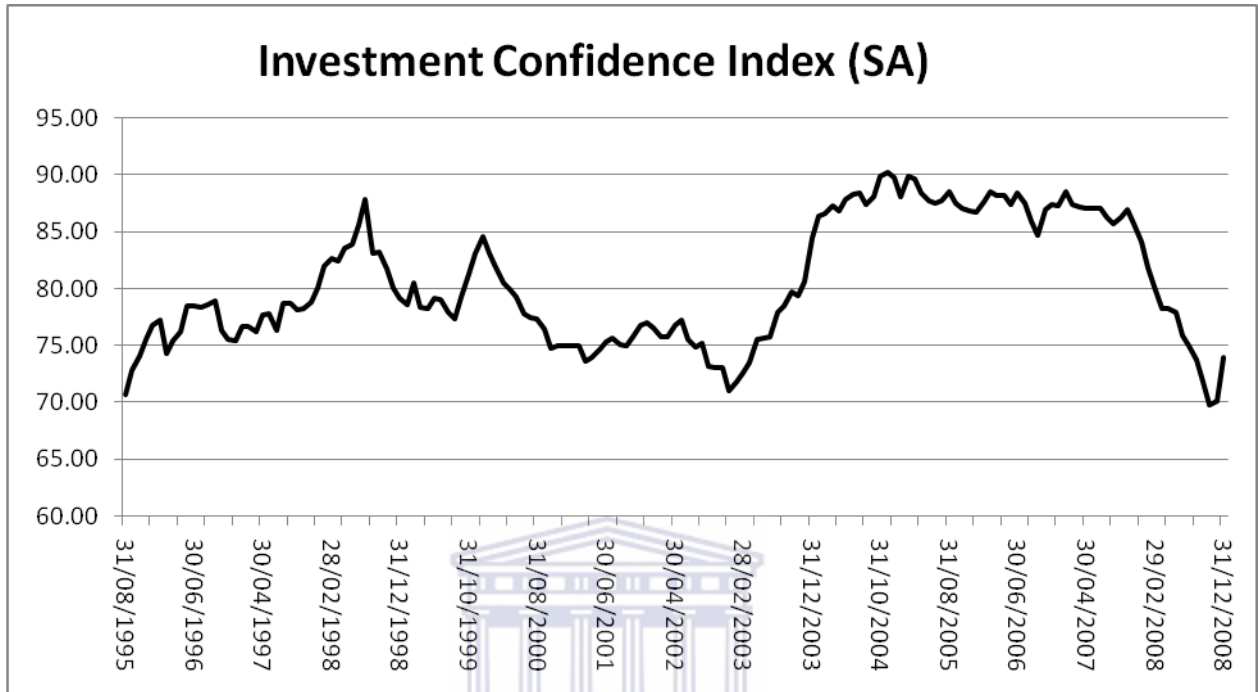

Figure 15:

Significant points to note on the graph

1. August 1998 saw the most dramatic fall in investor confidence, which was perhaps only equalled by the October 2007 drop. The Asian crisis of 1998 left many emerging markets reeling from the effects and South Africa was not spared either. Investor confidence fell from a high of 87.83 at the beginning of August 1998 to 79.09 by December of the same year.

2. January 2000 saw a drop in the investment confidence index (ICI) from 84.55 to 74.65 by October of that year. A weaker rand, downward price corrections on the international markets together with higher interest rates were some of the reasons for the downward movement.

3. December 2002 saw the index reach its lowest point since august 1995. A culmination of the September 11 attacks of 2001 as well as geopolitical risks resulted in equity financing declining resulting in the low investor confidence in last quarter of 2002.

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4. The subprime crisis of 2007 that hit the United States affected investors confidence in South Africa with the index dropping from 86.9 points in October 2007 to 69.73 exactly a year later. The crisis resulted in a loss of confidence in counterparties and a sharp decline in global share prices. High oil prices were also in 2008 also dampened investor confidence with the oil prices reaching $146/barrel in July 2008.

6 Conclusion

INVESTMENT CLIMATE INDEX

ERP   BOND YIELD SPREADS

COUNTRY   TERM   CORPORATE
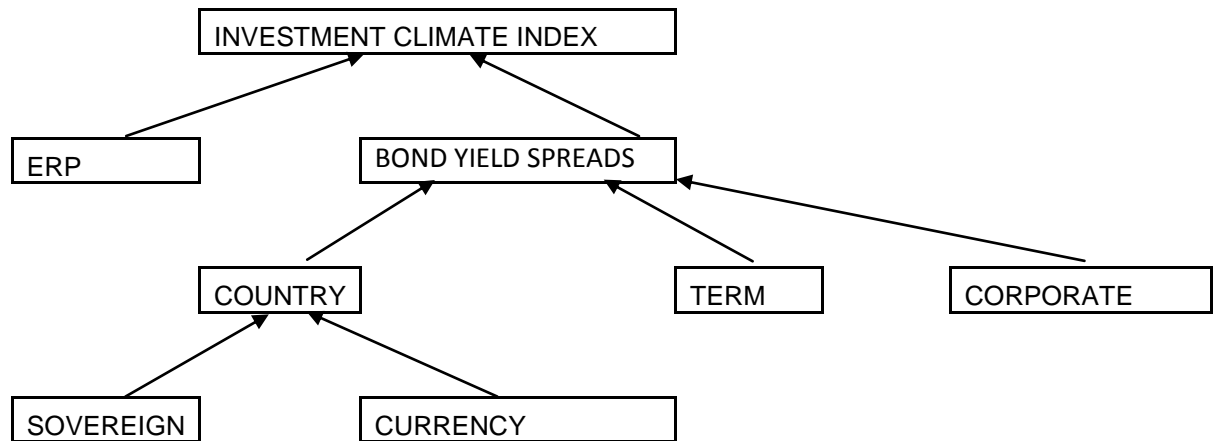
SOVEREIGN   CURRENCY

Figure: 16

In this study we set out to create a metric that would accurately describe the investment climate in South Africa.

An investment climate index (ICI) was compiled by calculating the equity risk premium of SA and amalgamating it with Bond yield Spreads. The resulting series was then transformed using a fisher inverse transform. This is a simple mathematical procedure that converts any data to a modified data set whose probability density function is approximately normal. With the transformation it confines the index to between 0 and 100 making it more convenient to interpret as an index.

Every investment decision is composed of three elements. The asset return, the risk associated with the asset and the risk appetite of the investor. Whilst the proposed ICI might not fully capture the risk appetite of the investor it can give some indication of the investment mood or climate in the market.

A high index figure would usually correspond to a confidence in the market for the investor, it might also mean investors are just not taking risk and are not necessarily confident about the market.

What makes this ICI for SA unique is that it is wholly quantitative and the market is presumed to be the culmination of all market participants' opinions and therefore represent the broadest opinion possible. No one's opinion was sort in coming up with the index.

The proposed ICI will be of great importance to policy implementation. It will offer some early notice of what the immediate investment climate might look like. This can prove useful for adjustments in target setting for collective investments and other investment products. The ICI can also be used in demonstrating trends and comparing the investment climate over different periods and market events.

Our ICI gives unique insight into investor confidence and is not intended to predict market events. It is simply a timely and quantitative tool indicating what the investor perception is at the present moment. It is a tool that will help investors make better informed investment decisions.

The ICI will enable horizontal comparison of investment conditions and climate as well as indicate trends and cycles in the investment climate of South Africa.
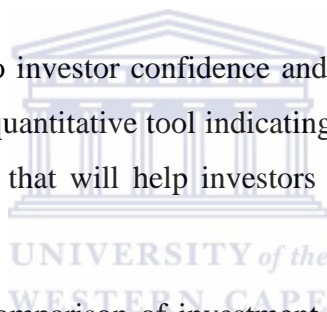
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Appendix

DATE	ALLSI(P)	DIVY(D/P)	(D)	g=	k	(rfr)	CPI	erp	nominal erp
6/30/1995	4883.44	2.50	122.02	20.8%	23.9%	14.1%	10.0%	8.6%	
7/31/1995	4922.01	2.46	121.02	20.0%	23.0%	13.9%	9.0%	8.0%	
8/31/1995	5011.39	2.51	125.65	20.7%	23.7%	13.9%	7.5%	8.6%	19.5%
9/30/1995	5131.82	2.44	125.43	20.0%	23.0%	14.0%	6.4%	7.9%	17.6%
10/31/1995	5238.14	2.36	123.40	20.0%	22.8%	13.7%	6.3%	8.1%	16.2%
11/30/1995	5377.13	2.38	127.85	20.0%	22.9%	13.7%	6.4%	8.1%	15.0%
12/31/1995	5598.73	2.26	126.43	19.2%	21.9%	14.2%	6.9%	6.7%	13.5%
1/31/1996	**6187.72**	**2.01**	**124.27**	**19.2%**	**21.6%**	**13.9%**	**6.9%**	**6.7%**	**13.6%**
2/29/1996	6012.91	2.12	127.67	20.5%	23.0%	14.0%	6.5%	7.9%	15.4%
3/31/1996	6071.50	2.15	130.64	19.9%	22.5%	14.1%	6.3%	7.4%	14.8%
4/30/1996	6338.50	2.04	129.40	19.7%	22.1%	15.1%	5.5%	6.1%	13.0%
5/31/1996	6213.43	2.14	132.86	18.7%	21.3%	16.1%	5.9%	4.5%	11.1%
6/30/1996	6212.22	2.15	133.36	20.1%	22.7%	15.1%	6.9%	6.6%	12.4%
7/31/1996	5975.95	2.30	137.39	18.5%	21.2%	15.1%	7.1%	5.3%	11.5%
8/31/1996	6083.70	2.33	141.68	18.2%	21.0%	15.8%	7.5%	4.5%	11.7%

$$D = ALLSI(P) * DIVY(D/P)/100 = 6187.2*2.01/100 = 124.27$$

$$g = \left(\frac{D_1}{D_0}\right)^{\frac{1}{10}} - 1 = \left(\frac{4438.49}{765.93}\right)^{\frac{1}{10}} - 1 = 19.2\%$$

$$k = MAX(1 + CPI, 1 + g) * DIVY/100 + MAX(CPI, g)$$

$$= MAX(1 + 6.9\%, 1 + 19.2\%) * \frac{DIVY}{100} + MAX(6.9\%, 19.2\%)$$

$$= 21.6\%$$

$$rfr = 1 \, month \, TB \, rate = 13.9\%$$

$$CPI = all \, items \, consumer \, price \, index = 6.9\%$$

$$equity \, risk \, premium \, (erp) = \frac{1+k}{1+rfr} - 1 = \frac{1+21.6\%}{1+13.9\%} - 1 = 6.7\%$$

$$nominal \, erp = (1 + erp)(1 + cpi) - 1 = (1 + 6.7\%)(1 + 6.9\%) - 1 = 13.6\%$$