Original Research Article

Risk and Concentration of Portfolios on the Zimbabwe Stock Exchange After Currency Reform

ABSTRACT

Aims: The objectives of this study are to assess the level and impact of concentration of portfolios on the ZSE and to determine the number of stocks to be held in a concentrated portfolio to achieve effective risk reduction.
Study design: Portfolio Model.
Place and Duration of Study: Zimbabwe, Department of Insurance and Actuarial Science and Department of Finance, between February 2013 and March 2013.
Methodology: We analysed the level of concentration of portfolios held on the Zimbabwe Stock Exchange (ZSE). The market capitalization weights and the daily closing prices of 62 stocks in the industrial index for the four-year period form 19 February 2009 to 31 December 2012.
Results: The Herfindahl-Hirschman Index and the Roll measure of concentration were employed to analyse the level of concentration of portfolios mimicking the industrial index and it was observed that portfolios held on the ZSE are highly unconcentrated with an approximate measure of 14% under the HHI measure as at 31 December 2012. The daily returns over the period were calculated and used to estimate the risk of the portfolio. The findings indicates that stocks in the industrial index of the ZSE have relatively low correlation due to the small difference in risk between equally weighted portfolios with no correlation and equally weighted portfolios with historical correlation.
Conclusion: The empirical evidence highlights that an optimal portfolio size averaging 20 to 25 stocks of the Industrial Index stocks will have to be included inorder to achieve effective risk reduction.

Keywords: Zimbabwe Stock Exchange; concentration; currency reform.

1. INTRODUCTION

Much of the focus of financial theory in relation to investment strategy for both corporates and individuals has focused on the importance of diversification as the major tool for portfolio optimisation and effective reduction of unsystematic risk in a portfolio of investments. Markowitz (1952) came up with the principle of diversification which postulated that in order

to lower the portfolio risk without sacrificing return, a portfolio with returns that are less than positively correlated can be created. Brealey, Marcus and Myers (2001) consider diversification as a strategy that is designed to reduce unique risk by spreading an investment portfolio across many investments, thus reducing variability of the returns of the portfolio. As the debate between the ideology of portfolio diversification and portfolio concentration rages on, several famous investors have adopted a concentrated position of investment strategy. Berkowits of Fairholme Capital was also quoted as saying, "The history of success, those who have succeeded well… they are focused on few activities." (Market Folly, 2012). Berkowitz's ideology stems from the fact that one can only opt for diversification when one is not confident of their picks. Berkowitz believes that an investor needs only "a few good ideas" to do extremely well in his lifetime (Market Folly, 2012). Other famous investors (Benjamin Graham, John Maynard Keynes, Bill Gates, John Rockefeller and Phillip Fisher) also followed this principle of investing more in one's best idea rather than investing in one's tenth best idea (JP Morgan, 2009). Concentration is the exact opposite of a diversification strategy. Although no rigid definition of the concept of concentration has been documented in literature due to the little attention afforded to this concept, several scholars have sought to define it in different studies. Brands, Brown and Gallagher (2005), in their study of active Australian equity managers, define concentration as "the extent to which the portfolio weights held in stocks, industries and sectors deviate from the underlying index or market portfolio". The risk of a portfolio decreases as the number of different stocks in it increases. Evans and Archer (1968) observed that the risk reduction effect diminishes rapidly as the number of stocks increases, however concluded that the benefits of diversification almost exhausts when a portfolio consist of approximately 10 stocks. Concentration and diversification of stocks in a portfolio are relevant to risk return measurements of a portfolio and hence the work of Evans and Archer (1968) adds a theoretical basis for the study. Bradfield and Kgomari (2004) refer to concentration as the "extent to which portfolio weights skew away from an equally weighted distribution of portfolio weights". Bradfield and Kgomari (2006) further explain that if concentration is low, then the portfolio is more skewed towards equal weighting for all stocks in the portfolio whereas high concentration entails that most investors tend to concentrate most of their investments in a few stocks, for example 90% of investments held in 3 stocks in a stock market consisting of over 100 counters. Ivković, Sialm and Weisbenner (2008) listed several reasons why investors would hold a concentrated position as compared to a diversified portfolio namely; behavioural bias such as familiarity or overconfidence which involves investing in a small subset of stocks which one is familiar with or confident about its performance (cognitive resource limitations), the investors identifies only those stocks that will provide higher expected abnormal returns after considering the cost of higher total risk and increasing the number of different investments may lessen one's ability to effectively monitor any of them. Concentration of portfolio weights directly impacts on the specific risk of a portfolio. The specific risk of a portfolio is determined by the covariance of the underlying assets and the weighting structure of the portfolio (Bradfield and Kgomari, 2004). Furthermore, Bradfield and Kgomari (2004) argue that although investors have no influence over the correlation structure among the assets, they can control their weighting structures, depending on their investment choices. In turn, the investor's choice in weighting structure affects the degree of concentration of the portfolio that investor holds. It has been widely suggested that concentration plays an important part in the structuring of portfolios in smaller markets such as the Johannesburg Stock Exchange (JSE) and ZSE (Bradfield and Kgomari, 2004). Most researches in finance were carried out for countries with developed stock markets (Evans and Archer, 1968). Hence the need arises to analyse the risk and concentration of portfolios emerging markets such as ZSE.

The debate over holding a concentrated stake or a diversified one has been raging on in recent years as most famous investors such as Warren Buffet have evidently strayed away

from the Markowitz principle of diversification. Since concentration is less rigid, in terms of the definition and how many stocks constitute a concentrated portfolio, there is no universally acceptable definition of concentration that has been postulated (The Brandes Institute, 2004). As a benchmark and starting point to measuring concentration, investors often look at the number of stocks held in a portfolio (The Brandes Institute, 2004). However, in using such a measure for concentration, the Brandes Institute identifies the major pitfall that does not factor in the portfolio weights of the holding such that a portfolio comprising of 50 stocks may be equally-weighted (i.e. 2% invested in each stock) or the investor may hold 50% of his portfolio in one stock, while holding the remaining 50% in equal weights in the rest of the stock holding. This definition of concentration is, in many ways, similar to the percentage share approach (Cummins, Denenberg and Scheel, 1972). The percentage share approach gauges the extent to which only a few firms account for a larger chunk of the industry's output (Cummins, Denenberg and Scheel, 1972). This approach would, for example, present the percentage share of the market accounted for by the top 5, 10 or 20 companies within the industry. Kruger and Rensburg (2008) employed Richard Roll measure of concentration (RRC) in measuring portfolio concentration which was used initially for industrial concentration but has since been expanded to financial markets. Another measure, the Herfindahl-Hirschman Index (HHI), was first developed by economists Orris C. Herfindahl and Albert O. Hirschman to measure market competiton and the relative size if firms in comparison to the industry. Although this measure was initially developed for the industrial set-up, it has evolved over the years and hence its current adaptation in stock market concentration measures. Although investors such as John Rockefeller and John Keynes have adopted the concentrated investment strategy, very few studies have been conducted to explore concentration in portfolios and its impact on risk. Most of these studies were conducted in smaller markets, compared to the New York Stock Exchange, as it has been documented that portfolios held in small markets such as the Johannesburg Stock Exchange tend to be highly concentrated in a few larger stocks (Bradfield and Kgomari, 2004). Maritz (2003) studied the different pension fund equity benchmarks on the JSE and observed that one of the many reasons that the All Share Index was not used as a benchmark by fund managers is due to the fact that it is highly concentrated in the larger stocks. Maritz noted that the All Share Index (ALSI) on the JSE was highly concentrated in larger (Resources) stocks and that the first share totalled 16% of the index. The addition of the first eight shares gave a total of over 51% of the All Share Index on the JSE. Bradfield and Kgomari (2004) studied the level of concentration in South Africa and the impact of concentration on the risk of a portfolio. The study assessed the level of concentration of six benchmarks; namely ALSI Top-40, ALSI, ALSI Equally weighted, CAPI All Share, PENI All Share and the General Equity Average and two measures of concentration, HHI and RRC, were employed for the assessment. The HHI measure of the ALSI Top-40 was observed to be nearly twice as high as that of the General Equity Average, while the ALSI's HHI measure was approximately one and a half times higher than the average General Equity fund. Bradfield and Kgomari (2004) highlighted that these differences depicted the aversion that South African fund managers have to the high levels of concentration in the South African market. The level of expected total risk for each category was also consistent with the rankings based on the level of concentration. This article is inspired by the study carried out by Bradfield and Kgomari (2004) and this article adopts their methodology to investigate the concentration of portfolios on the ZSE.

2. METHODOLOGY

The data was colleted from the ZSE website. The period of study is from 19 February 2009 to 31 December 2012. The daily stock prices and market capitalization quoted in United

States dollars (USD) were collected. The study is limited to industrial index stocks and a total of 62 stocks are used in the analysis. The ZSE industrial index was assumed to be a good proxy for a market portfolio held by an investor attempting to effectively reduce exposure. The industrial index was used because it accounts for more than 90% of the total stocks listed on the ZSE. The methodology employed for the analysis was adopted from (Bradfield and Kgomari, 2004).

2.1 Measures of Concentration

We computed the market capitalisation weights for each stock as a ratio of the market capitalisation of each stock to the total market capitalisation (in USD) of the 62 stocks that constitute the Industrial index, that is:

$$\text{Market Capitalisation Weight of Stock } i = \frac{\text{Market Capitalisation of Stock } i}{\text{Total Market Capitalisation}}$$

We defined four 3-month phases in each year such that the concentration of a portfolio mimicking the industrial index was evaluated on the last trading day of March, June, September and December for each year. Two measures of concentration were employed in this study and these are spelt out as follows:

2.1.1 Herfindahl-Hirschman Index

The HHI was used as the primary measure for concentration. The index was computed by squaring then summing the investment weights in a portfolio:

$$HHI = \sum_{i=1}^{N} W_i^2$$

where W_i is the investment weight in the i-th counter (Bradfield and Kgomari, 2004). The index was adopted because it gives more weight to those counters that account for a larger proportion of the market share and at the same time, the index is mathematically tractable and simple to analyse. The HHI is also well known and has been used in other academic literature studying the ideology of concentration of portfolios.

2.1.2 Roll's Measure of Concentration

This measure of concentration was calculated by:

$$RRC = \frac{N}{N-1}\left(\sum_{i=1}^{N} W_i^2 - \frac{1}{N}\right)$$

where N is the number of counters in the portfolio (Kruger and Rensburg, 2008). The RRC has the desirable quality of measuring the deviation or departure of the portfolio under consideration from that of an equally weighted portfolio. Since it is a relative measure, interpretation of the results is very simple. It was however adopted as a second measure as it is less familiar than the HHI.

2.2 Calculation of Return

The return of the individual stocks was calculated using the formula:

$$r_t = \log\left(\frac{P_t}{P_{t-1}}\right)$$

where P_t is the stock price at time t and P_{t-1} is the stock price at time $t-1$.

The model for calculation of return was used because it has both mathematical and modelling properties compared to using the simple return model (West, 2006). This model is particularly suited for calculating return on individual stocks and not the return in portfolios.

2.3 Estimation of the portfolio risk

In attempting to determine the average number of stocks to be held in a concentrated portfolio for effective risk reduction, the risk of the simulated portfolios was calculated. We adopted the Markowitz definition of a risk as this was mathematically tractable and in line with the assumptions made about the research. The variance of a portfolio under the Modern Portfolio Theory is given by:

$$\sigma_p^2 = \sum_{i=1}^{N} W_i^2 \sigma_i^2 + \sum_{i=1}^{N} \sum_{j=i, j \neq i}^{N} W_i W_j \sigma_{ij}$$

where W_i is the weight of the ith security in the portfolio, σ_i^2 is the individual stock variance and σ_{ij} is the covariance between stocks *i* and *j* (Beste et al., 2002).

2.4 Assessing how various levels of concentration affect the resulting risk of the portfolio

Bradfield and Kgomari (2004) analysed four scenarios with regard to the portfolio weighting structure. However, for the current research purposes, three different scenarios were considered. These variables under consideration in the three scenarios are namely; portfolio weighting structure (as a proxy for concentration in the portfolio), and correlation structure of the stocks. The three scenarios are given below:

Scenario 1: Equal weighting among the stocks in the portfolio, assuming no correlation between stocks.
Scenario 2: Equal weighting among the stocks in the portfolio, assuming their historical correlation structure.
Scenario 3: Market capitalisation weighting of stocks in the portfolio, assuming their historical correlation structure.

Scenario 1 is an oversimplified case that is not applicable under a real world scenario but rather is developed as a control and for comparison purposes. Scenario 2 is more realistic as the returns of stocks tend to correlate and is proxy of the famous Markowtiz portfolio

diversification. This scenario is also indicative of studies conducted on large markets such as the New York Stock Exchange, and thus symbolises the adoption of international studies and assumptions on the local market, the ZSE. Scenario 3 is an adopted study of Markowitz diversification, adopted to fit the characteristics of the ZSE.

Since the methodology (as adopted by Bradfield and Kgomari, 2004) is based on 500 simulations for each portfolio size, we made use of both Microsoft Excel functions and VBA programming to achieve this. The advantages of using VBA programming include efficiency in automating repetitive tasks such as simulation, and it extends the range of functions offered by Microsoft Excel (Jackson and Staunton, 2001).

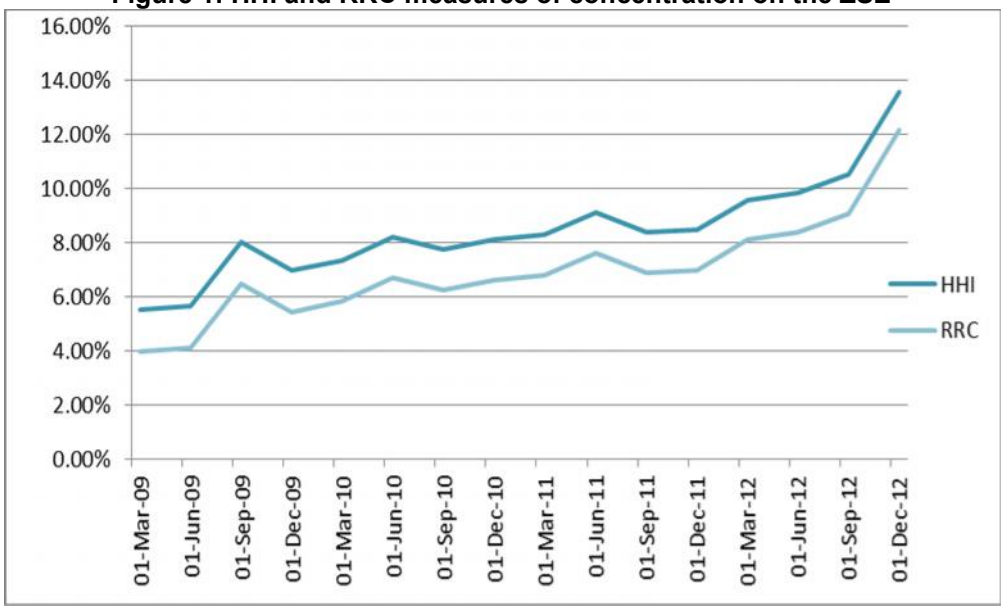
The methodology followed is summarised below:

- *k* stocks are randomly selected from the universe of 62 stocks, starting from *k*=1.
- A portfolio of the *k* stocks is formed and depending on the scenario under consideration, the portfolio is based on either equal weights or market capitalisation weights.
- The portfolio weights are rebased to sum to one.
- The risk (from Markowitz definition of risk) of the portfolio is computed.
- The process is repeated 500 times to obtain 500 estimates of the risk of the portfolio of size *k*.
- The 500 estimates for portfolio size *k* is averaged and recorded.
- The portfolio size is increased by one stock to *k*+1 and the entire process repeated up to *k*=10 (We sampled these first 10 portfolios because Evans and Archer (1968) found that maximum risk reduction effect by increasing the number of stocks is limited to 10 stocks in a portfolio.).
- Thereafter 5 stocks are added to the portfolio for sampling purposes and the exercise is completed when all 62 stocks have been sampled, i.e. *k*=62.

3. RESULTS AND DISCUSSION

The level of concentration of a portfolio created by mimicking the ZSE industrial index was calculated over the four-year period. The concentration of such a portfolio was evaluated as at the last trading day of March, June, September and December using the market capitalisation weights given in Annexure 1 and Annexure 2.

Figure 1: HHI and RRC measures of concentration on the ZSE

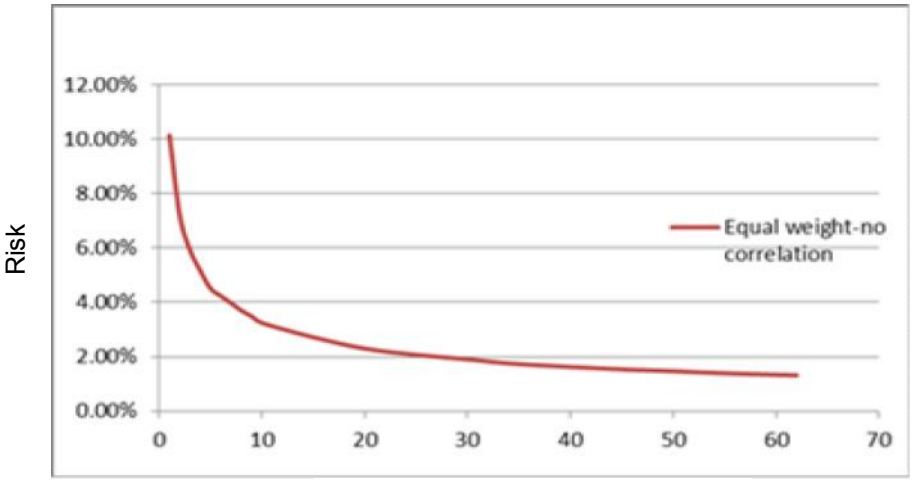


As noted from Figure 1 above, it is evident that the rankings between the HHI measure and the RRC are fairly similar. The level of concentration of the Industrial Index on the ZSE has risen over the years since 2009. The RRC measure of concentration in December 2012 is approximately three times higher than the RRC measure of concentration in March 2009. As for the HHI, the level of concentration in December 2012 is over two and a half times higher than it was in March 2009. Figure 1 also shows a sharp increase in concentration in the year 2012. The high level of concentration can be attributed to the risk aversion of investors who hold portfolios on the ZSE.

3.1 Scenario 1: Equal weights with no correlation between stocks

Figure 2 below displays the graph for equally-weighted portfolios increasing in size form 1 stock in a portfolio to 10 stocks. Thereafter samples of portfolios after adding 5 stocks to the portfolios were taken and for each number of stocks the simulations were based on a sample of 500 samples which were averaged thereafter.

Figure 2: Equally weighted portfolio assuming independent stocks

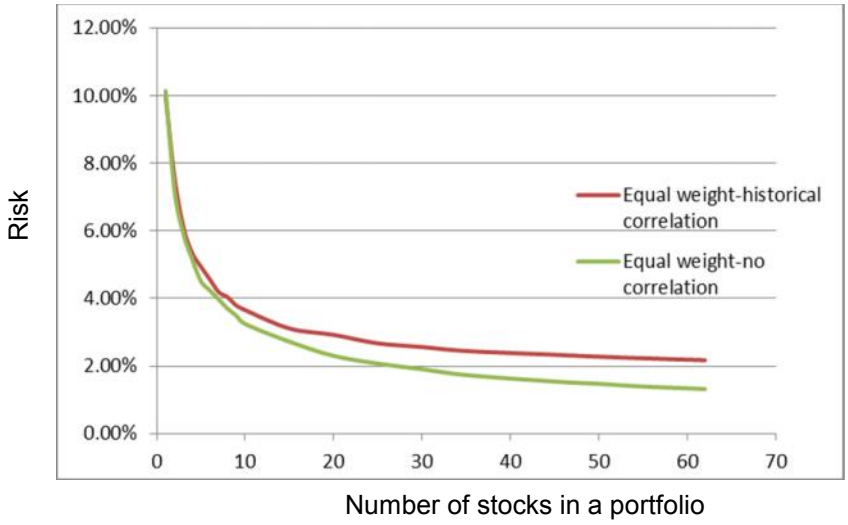


From Figure 2 above, we observe that the average volatility (standard deviation) of single stocks in the Industrial Index on the ZSE is approximately 10% over the four year period. This gives an annualised volatility of 2.50% p.a. Moreover, if the 62 stocks constituting the Industrial index were equally weighted and uncorrelated, the portfolio risk could be reduced to below 2.00% (about 1.32%) by creating a portfolio constituting all 62 stocks as given by Figure 2.

3.2 Scenario 2: Equally weighted portfolios assuming historical correlation structure

In the second scenario, we simulated portfolios assuming the stocks are equally weighted and also assuming the historical correlation structure of the stocks, estimated over the prior four-year period.

Figure 3: Equally weighted portfolios – historical correlation structure

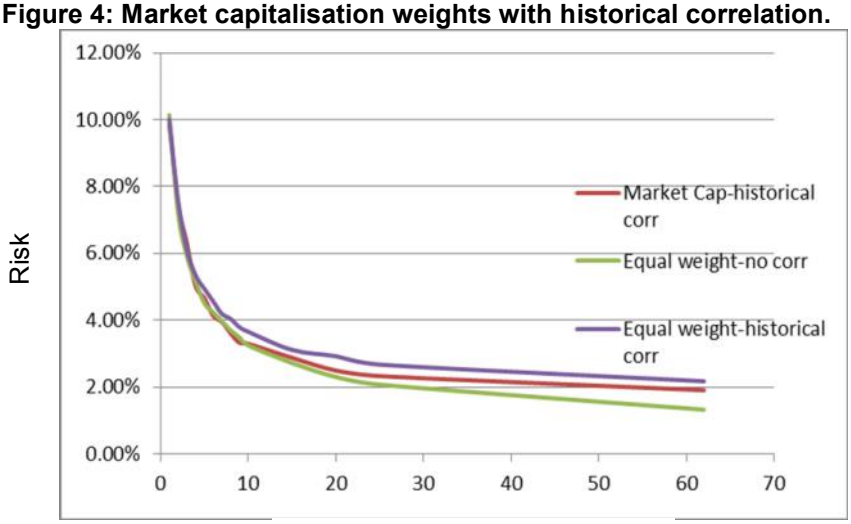


From Figure 3 above, it is evident that introducing the historical correlation between stocks increases the risk of the portfolio. The risk increases from about 1.32% (for the 62 stock portfolio assuming no correlation between stocks) to 2.17% (for the 62 stock portfolio assuming the historical correlation between stocks). It can be noted that there is an increase of less than 1% in risk by the introduction of the correlation structure between stocks. The relatively small increase in risk between the two scenarios shows that stocks constituting the Industrial index on the ZSE have very low correlation between them. Therefore, by further identifying stocks that behave independently, the component of risk attributable to the correlation structure can be largely reduced.

3.3 Scenario 3: Market capitalisation weights – historical correlation assumed

In scenario 3, we simulated portfolios assuming the market capitalisation weights of the portfolios rebased to sum up to 1. Stocks in the Industrial index were also assumed to exhibit their historical correlation structure.

Figure 4: Market capitalisation weights with historical correlation.



As given in Figure 4 above, the risk of a portfolio constituting 62 stocks on the ZSE with market capitalisation weights and the historical correlation structure is approximately 2%. As noted above, there is not a great difference among the risk of a 62 stock portfolio with equal weight and no correlation, equal weight and historical correlation; and one with market capitalisation weights and historical correlation. Therefore, although portfolios held on the ZSE are highly concentrated, the level of concentration does not affect the risk in the portfolio greatly. Therefore from the above graph, in order to effectively reduce the portfolio risk to a minimum possible of a portfolio for stocks held on the ZSE (market capitalisation and historical correlation structure). An investor has to hold more than 10 stocks in a portfolio of the Industrial Index on the ZSE up to a total of 62 stocks.

4. CONCLUSION

The objective of this study was to analyse the level of concentration of portfolios on the ZSE. We considered the period from 19 February 2009 and 31 December 2012 for the study and conducted the research based on the 62 stocks constituting the ZSE industrial index. For the

period under review, the level of concentration of the Industrial index was reviewed on the last trading day of each of the months March, June, September and December. The results show that portfolios mimicking the ZSE industrial index are highly unconcentrated with a concentration level of approximately 14% on the Herfindahl-Hirschman index. These results show that the portfolios held on the ZSE are generally highly unconcentrated. From the findings, it is noted that although the weighting structure of portfolios on the ZSE is rather skewed from that of equally weighted portfolios, the structure does not have a clear and direct impact on the risk of a portfolio. It was also noted that stocks on the ZSE have relatively low correlation due to the small difference between the risk of a portfolio consisting of 62 stocks on the ZSE with equal weighting and no correlation and that of a portfolio with 62 stocks with equal weighting and exhibiting the historical correlation structure. Most of the risk in the portfolio is diversified away in the first 10 stocks held. Further risk reduction can be achieved by holding more than 10 stocks in a portfolio up to the total of 62 stocks to achieve the lowest level of risk possible for a portfolio of the Industrial Index on the ZSE. An interesting point to note is that in order to achieve effective risk reduction, a portfolio must constitute an average optimal size of 20 to 25 stocks of the Industrial index on the ZSE. To our knowledge, this study is the first of its kind on the ZSE and can be expanded to investigate the relationship between concentration of a portfolio and the expected returns of that portfolio as well as factors that determine the level of concentration held by different investors, both institutional and individual.

We recommend that investors monitor concentration levels because higher concentration poses a higher risk in the event that the overall ZSE underperforms, they stand to lose out. Investors should also keep an optimal portfolio of an average size of 20 to 25 stocks to achieve an effective risk reduction. Pension funds are the major investors on the ZSE, as such they should come up with a risk appetite model that take cognisance of the concentration and such framework should come from the board of trustees who have the capacity to influence investment decisions on the stock market.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Annexure 1: Market Capitalisation Weights from 2009 to 2010

	31-Mar-09	30-Jun-09	30-Sep-09	31-Dec-09	31-Mar-10	30-Jun-10	30-Sep-10	31-Dec-10
INDUSTRIALS								
ABCH	0.02346	0.00700	0.00397	0.00821	0.00649	0.00872	0.01347	0.01805
AFDIS	0.00343	0.00650	0.00358	0.00449	0.00418	0.00440	0.00408	0.00391
AFRICAN SUN	0.02591	0.02085	0.01520	0.02360	0.01105	0.00798	0.00714	0.00501
AICO AFRICA	0.03336	0.03211	0.03409	0.03720	0.02977	0.02617	0.02769	0.02618
APEX	0.00155	0.00074	0.00040	0.00051	0.00051	0.00046	0.00033	0.00034
ARISTON	0.00277	0.00170	0.00180	0.00162	0.00105	0.00096	0.00218	0.00182
ART ZDR	0.00434	0.00380	0.00423	0.00394	0.00323	0.00371	0.00169	0.00177
ASTRA	0.00257	0.00124	0.00100	0.00096	0.00121	0.00137	0.00106	0.00114
B A T	0.01094	0.00957	0.00852	0.01023	0.01185	0.01437	0.01065	0.00951
BARCLAYS	0.06091	0.07106	0.06707	0.05733	0.06991	0.06406	0.06269	0.05306
BORDER	0.00541	0.00710	0.00815	0.00602	0.00507	0.00568	0.00658	0.01059
CAFCA	0.00304	0.00204	0.00157	0.00135	0.00133	0.00037	0.00032	0.00142
CBZ	0.01206	0.02262	0.03708	0.03070	0.03435	0.03281	0.02728	0.02998
CFI	0.00955	0.01291	0.00942	0.00851	0.00566	0.00625	0.00329	0.00398
COLCOM	0.00794	0.01303	0.00940	0.00972	0.00977	0.01315	0.01463	0.02091
DAIRIBORD	0.01728	0.01134	0.01115	0.00721	0.00861	0.00783	0.01210	0.01598
DAWN PROP	0.03032	0.01326	0.00999	0.00896	0.00798	0.00813	0.00904	0.00808
DELTA	0.15403	0.12042	0.19089	0.16164	0.16172	0.18407	0.17859	0.21002
ECONET	0.04755	0.07776	0.12723	0.13111	0.13667	0.15132	0.14618	0.11853
EDGARS	0.00526	0.00307	0.00227	0.00313	0.00329	0.00258	0.00385	0.00458
FBCH	0.00271	0.00183	0.00244	0.00354	0.00426	0.00567	0.00525	0.00566
FIDELITY	0.00041	0.00071	0.00070	0.00109	0.00076	0.00124	0.00087	0.00066
GB HOLDINGS	0.00132	0.00058	0.00057	0.00045	0.00033	0.00035	0.00016	0.00022
HIPPO	0.02188	0.07072	0.04708	0.05142	0.05700	0.05619	0.06216	0.07137
HUNYANI	0.00999	0.00655	0.00473	0.00409	0.00328	0.00317	0.00343	0.00350
INNSCOR	0.08398	0.10434	0.10101	0.09058	0.09731	0.09648	0.07822	0.07397
INTERFRESH	0.00153	0.00134	0.00112	0.00068	0.00043	0.00048	0.00045	0.00053
LAFARGE CEMENT	0.04030	0.04188	0.01951	0.02468	0.02363	0.02382	0.02699	0.02147
M & R	0.01058	0.00405	0.00572	0.01036	0.01372	0.01193	0.01304	0.01194
MASH HLDS	0.01873	0.00666	0.00655	0.00938	0.00714	0.00769	0.00741	0.00967
MEDTECH	0.00146	0.00080	0.00031	0.00032	0.00034	0.00059	0.00037	0.00033
MEIKLES	0.03932	0.05642	0.03723	0.03852	0.03024	0.02186	0.02861	0.03057
N T S	0.00239	0.00139	0.00096	0.00071	0.00090	0.00100	0.00093	0.00083
N.M.B	0.00421	0.00414	0.00273	0.00377	0.00446	0.00545	0.00456	0.00779
NATFOODS	0.01021	0.02048	0.01668	0.02589	0.01999	0.02036	0.02055	0.01892
NICOZ	0.00126	0.00220	0.00173	0.00448	0.00413	0.00370	0.00343	0.00383
OK ZIMBABWE	0.01153	0.01271	0.01429	0.01478	0.01362	0.02275	0.03314	0.02104
OLD MUTUAL	0.03417	0.02741	0.03137	0.03657	0.04117	0.02937	0.02981	0.02670
PEARL	0.01439	0.00630	0.00558	0.00641	0.00563	0.00454	0.00444	0.00712

PROPERTIES								
PELHAMS	0.00164	0.00060	0.00049	0.00056	0.00029	0.00036	0.00061	0.00049
PG INDUST	0.01372	0.00720	0.00630	0.00733	0.00515	0.00270	0.00357	0.00207
PHOENIX	0.00210	0.00069	0.00069	0.00072	0.00076	0.00071	0.00066	0.00051
PIONEER	0.00104	0.00114	0.00045	0.00039	0.00049	0.00004	0.00052	0.00090
POWERSPEED	0.00478	0.00157	0.00185	0.00106	0.00123	0.00069	0.00105	0.00156
PPC	0.07647	0.04748	0.01407	0.01953	0.03104	0.01980	0.01493	0.01499
RADAR	0.00349	0.00336	0.00210	0.00373	0.00246	0.00458	0.00340	0.00304
SEED-CO	0.02648	0.03686	0.04209	0.05102	0.05203	0.04706	0.05602	0.05120
STAR AFRICA	0.02889	0.01405	0.01267	0.01311	0.01004	0.00928	0.01191	0.00992
T. S. L	0.00648	0.00756	0.00930	0.00587	0.00963	0.00794	0.01000	0.00753
T.P. H	0.00046	0.00080	0.00265	0.00295	0.00289	0.00301	0.00283	0.00253
TA HLDS	0.02482	0.04343	0.03777	0.02667	0.01550	0.01627	0.01156	0.00921
TN BANK	0.00302	0.00084	0.00052	0.00090	0.00265	0.00210	0.00130	0.00165
T.H.L	0.00148	0.00194	0.00178	0.00092	0.00069	0.00109	0.00144	0.00167
TRUWORTHS	0.00071	0.00145	0.00174	0.00169	0.00156	0.00187	0.00196	0.00361
TURNALL	0.00450	0.00302	0.00258	0.00401	0.00422	0.00473	0.00467	0.00874
WILLDALE	0.00448	0.00196	0.00120	0.00125	0.00105	0.00088	0.00136	0.00146
ZBFH	0.00362	0.00356	0.00448	0.00322	0.00284	0.00433	0.00278	0.00382
ZECO	0.00292	0.00255	0.00189	0.00130	0.00082	0.00015	0.00010	0.00019
ZIMPAPERS	0.00200	0.00190	0.00125	0.00194	0.00136	0.00114	0.00124	0.00103
ZIMPLOW	0.00094	0.00074	0.00081	0.00209	0.00396	0.00281	0.00451	0.00600
ZIMRE	0.00964	0.00632	0.00415	0.00365	0.00452	0.00430	0.00375	0.00335
ZPI	0.00432	0.00236	0.00186	0.00193	0.00279	0.00312	0.00316	0.00353

Annexure 2: Market Capitalisation Weights from 2011 to 2012

	31-Mar-11	30-Jun-11	30-Sep-11	30-Dec-11	30-Mar-12	29-Jun-12	28-Sep-12	31-Dec-12
INDUSTRIALS								
ABCH	0.01704	0.01277	0.01609	0.01799	0.01373	0.01123	0.00907	0.00952
AFDIS	0.00344	0.00358	0.00343	0.00260	0.00363	0.00332	0.00509	0.00384
AFRICAN SUN	0.00434	0.00375	0.00266	0.00152	0.00182	0.00237	0.00211	0.00201
AICO AFRICA	0.02610	0.03199	0.03471	0.02629	0.02619	0.01524	0.02106	0.01292
APEX	0.00023	0.00020	0.00016	0.00013	0.00010	0.00008	0.00007	0.00004
ARISTON	0.00218	0.00167	0.00166	0.00162	0.00135	0.00225	0.00194	0.00155
ART ZDR	0.00167	0.00059	0.00084	0.00051	0.00042	0.00075	0.00061	0.00032
ASTRA	0.00144	0.00175	0.00130	0.00073	0.00152	0.00157	0.00205	0.00188
B A T	0.00831	0.00693	0.00880	0.00701	0.00953	0.01450	0.02130	0.01683
BARCLAYS	0.03891	0.03240	0.04018	0.02411	0.02617	0.02048	0.01758	0.01505
BORDER	0.00611	0.00592	0.00527	0.00515	0.00131	0.00177	0.00181	0.00173
CAFCA	0.00376	0.00121	0.00150	0.00150	0.00173	0.00143	0.00123	0.00088
CBZ	0.03185	0.03089	0.02519	0.02495	0.01042	0.01974	0.01933	0.01840
CFI	0.00272	0.00265	0.00290	0.00165	0.00167	0.00167	0.00163	0.00139
COLCOM	0.01851	0.01596	0.01696	0.01533	0.01454	0.01276	0.01344	0.01069

DAIRIBORD	0.01953	0.02203	0.02044	0.01725	0.01775	0.01792	0.01661	0.01994
DAWN PROP	0.00629	0.00616	0.00563	0.00448	0.00576	0.00623	0.00519	0.00463
DELTA	0.21357	0.23712	0.22686	0.21544	0.24547	0.24426	0.26032	0.31865
ECONET	0.11474	0.11183	0.10053	0.09820	0.11178	0.13167	0.11993	0.11509
EDGARS	0.00685	0.00708	0.00817	0.00654	0.00719	0.00695	0.00641	0.00605
FBCH	0.00764	0.00919	0.01244	0.01000	0.01136	0.01164	0.01217	0.01194
FIDELITY	0.00099	0.00410	0.00447	0.00454	0.00528	0.00415	0.00460	0.00352
GB HOLDINGS	0.00014	0.00013	0.00016	0.00018	0.00048	0.00050	0.00004	0.00001
HIPPO	0.05990	0.06052	0.04375	0.05782	0.05880	0.06121	0.06007	0.05762
HUNYANI	0.00331	0.00377	0.00554	0.00500	0.00662	0.00811	0.00540	0.00318
INNSCOR	0.08800	0.08536	0.08930	0.07667	0.09544	0.09318	0.10118	0.10168
INTERFRESH	0.00038	0.00024	0.00026	0.00038	0.00030	0.00017	0.00021	0.00026
LAFARGE CEMENT	0.02172	0.01605	0.01600	0.01459	0.01730	0.01345	0.02028	0.01506
M & R	0.01100	0.00860	0.00857	0.00642	0.00653	0.00340	0.00241	0.00173
MASH HLDS	0.00962	0.01073	0.01190	0.01453	0.01133	0.01474	0.01356	0.01295
MEDTECH	0.00046	0.00070	0.00075	0.00146	0.00060	0.00089	0.00008	0.00023
MEIKLES	0.03036	0.02057	0.01619	0.01033	0.01054	0.01245	0.01106	0.00990
N T S	0.00078	0.00076	0.00081	0.00079	0.00093	0.00097	0.00215	0.00205
N.M.B	0.00956	0.00951	0.01048	0.00841	0.00855	0.01113	0.00593	0.00491
NATFOODS	0.01769	0.01579	0.01459	0.01532	0.02292	0.02430	0.02697	0.02428
NICOZ	0.00195	0.00309	0.00448	0.00437	0.00341	0.00355	0.00221	0.00211
OK ZIMBABWE	0.01979	0.02541	0.02833	0.02636	0.03308	0.03444	0.04078	0.04172
OLD MUTUAL	0.02619	0.02525	0.02517	0.02131	0.03267	0.03140	0.03073	0.02578
PEARL PROPERTIES	0.01025	0.00901	0.01057	0.10320	0.01207	0.00997	0.00959	0.00932
PELHAMS	0.00041	0.00040	0.00212	0.00205	0.00243	0.00237	0.00140	0.00054
PG INDUST	0.00188	0.00300	0.00370	0.00249	0.00219	0.00152	0.00135	0.00064
PHOENIX	0.00044	0.00054	0.00046	0.00040	0.00078	0.00023	0.00019	0.00007
PIONEER	0.00085	0.00097	0.00227	0.00139	0.00059	0.00113	0.00046	0.00015
POWERSPEED	0.00235	0.00181	0.00121	0.00119	0.00150	0.00168	0.00150	0.00143
PPC	0.01258	0.01297	0.01277	0.00832	0.01135	0.01230	0.01006	0.00818
RADAR	0.00573	0.00626	0.00296	0.00115	0.00295	0.00176	0.00184	0.00179
SEED-CO	0.06779	0.06051	0.06273	0.05525	0.06110	0.05201	0.04779	0.03993
STAR AFRICA	0.00402	0.00130	0.00248	0.00135	0.00111	0.00115	0.00292	0.00209
T. S. L	0.00711	0.00690	0.00734	0.00672	0.00841	0.00875	0.01117	0.01067
T.P. H	0.00319	0.00637	0.00534	0.00401	0.00471	0.00540	0.00392	0.00458
TA HLDS	0.00466	0.00699	0.00787	0.00512	0.00729	0.00572	0.00485	0.00441
TN BANK	0.00155	0.00151	0.00801	0.00780	0.01029	0.01000	0.00585	0.00671
T.H.L	0.00276	0.00135	0.00105	0.00103	0.00087	0.00182	0.00050	0.00019
TRUWORTHS	0.00663	0.00662	0.01005	0.00883	0.00574	0.00394	0.00340	0.00253
TURNALL	0.01084	0.01608	0.01538	0.01284	0.01352	0.01016	0.00694	0.00729
WILLDALE	0.00189	0.00138	0.00119	0.00056	0.00054	0.00068	0.00015	0.00024
ZBFH	0.00361	0.00353	0.00745	0.00910	0.00747	0.00556	0.00567	0.00377
ZECO	0.00024	0.00012	0.00012	0.00012	0.00037	0.00029	0.00026	0.00001

ZIMPAPERS	0.00089	0.00120	0.00146	0.00105	0.00123	0.00164	0.00089	0.00124
ZIMPLOW	0.00634	0.00779	0.00741	0.00596	0.00717	0.00800	0.00521	0.00588
ZIMRE	0.00247	0.00288	0.00296	0.00239	0.00234	0.00287	0.00238	0.00248
ZPI	0.00444	0.00431	0.00664	0.00622	0.00575	0.00517	0.00508	0.00554