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The impact of survivorship bias on South African unit trust performance: 1972-2004

1. INTRODUCTION

Unit trusts[1] have experienced explosive growth, both in assets and the number of funds. This is a phenomenon that has been experienced universally. This phenomenon has given rise to numerous studies that analyse the performance of unit trusts. However, unit trust performance within a South African context is a largely unexploited research area, more specifically survivorship bias and the implications thereof.

Survivorship bias is the tendency to exclude failed companies from performance studies simply because they no longer exist. In other words the dataset is truncated thereby removing the existence of the failed companies, which is a phenomenon that largely occurs with the data vendor providers. Survivorship bias causes the results of some studies, where truncated datasets have been used, to skew higher generally as a result of successful companies continuing to remain in the dataset at the end of the period. Similarly unit trust fund performances may be misleading due to survivorship bias, namely that the asset management company merges or discontinues under-performing funds thereby removing these funds from future truncated unit trust fund datasets.

The implications for investors can be far reaching.

1. Given that average performances could be overstated, there may be a pseudo-perception that managed assets, or active investment mandates have a high probability of out-performance relative to a chosen benchmark.

2. Past performance may spuriously act as a good proxy for future performance with the removal of the failed funds.

3. An investor may spuriously select funds for asset allocation purposes, based on a long term mandate, believing fund longevity to be sound.

In the above context it is apparent that it would be prudent to research the South African data to reveal whether there is a survivorship bias present, the magnitude of any performance bias and the probability of fund failures.

2. LITERATURE REVIEW

Unit trust performance measurement has received considerable attention within academic literature. The majority of studies used a dataset that included funds that existed both at the beginning and at the end of a time period. Such studies included Connor and Korajczyk (1991), Grinblatt and Titman (1988, 1992), Henriksson (1984), Jensen (1968), Lehmann and Modest (1987), Sharpe (1966) and Treynor (1965). These studies clearly were inflicted with survivorship bias due to the sampling methodology. Interestingly, within a South African context there is very little material on unit trust performance; however Meyer (1998) proclaimed that survivorship bias was non-existent since no funds had ceased to exist. This was in stark contrast to Pawley (2002) where, although not the main thrust of the research and period specific, it was shown that for the period 1976–2001 marked survivorship bias existed and displayed an inverse relationship with time which corresponds with previous research, albeit for the U.S. market (Carhart, 1997). In a study by Wessels (2004), comparing a market benchmark to unit trust performance, all failed funds were excluded thereby including a survivorship bias, therefore any inferences made from the research could be invalid. Notably the bias was explained away by assuming an offset with benchmark portfolio costs, and clearly was an attempt at adjustment in the absence of research on survivorship bias.

Survivorship bias is a phenomenon that started to receive research attention relatively late, although it continues to do so. The more prominent studies include Elton, Gruber and Blake (1996), Brown and Goetzmann (1994), Grinblatt and Titman (1989) and Malkiel (1995). From a South African perspective there has to date been no attempt at researching survivorship bias exclusively. Many of the prior studies have attempted to record the magnitude of the bias. Blake and Timmermann (1998) conclude that there is a strong survivorship bias amongst mutual funds in the U.K., manifesting a 0,8 percent per annum shortfall over the truncated dataset. This result is similar to that of Quigley and Sinquefield (2000) who found a bias of 0,7 percent per annum for U.K. mutual funds. Within the U.S. market Brown and Goetzmann (1995), Grinblatt and Titman (1989) and Malkiel (1995) differ in their shortfall estimates, however they do agree that there is a bias. Grinblatt and Titman (1989) establish the bias to be between 0,1 and 0,4 percent per annum, Brown and Goetzmann (1995) establish a bias at 0,8

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[1]Unit trust is synonymous with mutual fund and, more recently, collective investment. The terms are used interchangeably.

percent per annum, whereas Malkiel (1995) establishes the bias at 1,4 percent per annum. The differences are largely methodological and dataset related. Notably the U.K. bias is similar to that in the U.S. market (Blake and Timmermann, 1998). Carhart (1997) interestingly produces bias estimates for varying time periods as a guide in order to adjust returns reported using datasets inclusive of survivorship bias. Carhart[2] (1997) suggests that for samples of one year the bias is on average 17 basis points, for periods of five years this expands to 43 basis points, and the bias seems to level off at approximately one percent per annum for periods of 15 years and greater.

Of importance are the implications for unit trust performance, when taking survivorship bias into account. Malkiel (1995) indicates that performance may appear to persist in the absence of the failed funds, and thereby overstate the success of unit trust management. Put more succinctly by Elton, Gruber and Blake (1996) "studying a sample with survivorship bias may introduce spurious correlation between these variables and performance." The persistence in performance phenomenon may be spurious. Pawley (2002) using a simple annual selection of winners methodology, found no persistence in performance. However over varying time periods, using an alternative methodology Wessels (2004) found that there may be short term persistence, although this persistence could be marred by survivorship bias due to the dataset used. In support of Wessels (2004) though Carhart (1997) demonstrates that evidence favouring persistence is weakened when only survivors are considered. Other implications for performance measurement include the overstatement of returns as indicated by Elton, Gruber and Blake (1996). These implications are of course serious. The overstatement of returns may result in active fund management appearing to be more effective at generating returns than passive alternatives[3], when in fact the converse may be true, and is certainly an area requiring additional research. However levels of return in isolation are meaningless. Of more relevance though when making such comparisons is the rate of unit trust attrition. Pawley (2002) determines the survival rate, for the period 1976-2001, to be 53,85 percent at 20 years, which equates to a failure rate of 3,05 percent per annum. This is not significantly different to the 3,6 percent failure rate for the U.S. market as established by Carhart (1997), which equates to a survival rate of 48,03 percent at 20 years. Any comparisons without indicating the attrition rates would therefore be of no practical value.

3. RESEARCH METHODOLOGY

3.1 Dataset

The primary data covered the period 1972–2004. The data was sourced from the Financial Mail up until 1997; thereafter data was sourced from the Association of Collective Investments. Electronic databases purged and truncated the dataset to exclude failed funds and therefore were largely useless for research purposes. Furthermore the private investor seldom has access to an electronic database and would have to base investment decisions on a freely available data source, albeit with some difficulty. The primary data was annual in nature selected closest to year end. The data included dividends. The reporting methodology applied by the Financial Mail changed after 1997 to reflect buy-sell and sell-sell return calculations until 2003 where the methodology changed to reflect NAV pricing (Net Asset Value). Previously purchase price, selling price and dividends were provided thereby allowing for the determination of returns, the cost spread and dividend yield. Post-1997 dividends were included in the buy-sell, sell-sell and NAV returns therefore calculations could not be verified. For the period 1997-2004 pricing for buy and sell were determined from the buy and sell returns, utilising the previously known pricing. Costs were determined using the spread between the determined buy and sell prices, except from 2003, where costs were derived from the Unit Trust and Collective Investment Handbooks. Overall the annual number of unit trust funds investigated varied dramatically from 10 funds in 1972 to 154 funds in 2004.

3.2 Fund selection rules

All funds that could be identified as having remained unaltered, which remained in existence at the end of the period were included. Any funds that failed[4] to be identified were treated as failed funds. Any acquired funds that were identifiable, were arguably treated as having remained in existence e.g. Guardbank Growth became Liberty Wealthbuilder, which in turn became Stanlib Wealthbuilder. Any changes to asset management companies were ignored. Unit trust fund mandate changes were ignored. The methodology presumed that the acquisition of funds did not necessarily result in mandate changes, and that the private investor could readily determine that the fund had remained intact. This aspect of the research is moot.

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[2]Applicable to the U.S. market.

[3]This phenomenon has been researched within a South African context by Pawley (2002) and Wessels (2004) albeit with different methodologies and datasets.

[4]It is acknowledged that relative to alternative databases some funds appear to have survived that have been categorised as failed. This is due to the lack of identification, on the assumption that the private investor would have to use publicly available information and would have deemed the funds to have failed.

A caveat to be aware of is a phenomenon known as look ahead[5] bias. There may be a bias due to the selection of annual data. No adjustment was made for the timing of the fund failure. This was made at the point at which the data was collected. The same applies for new data. It was presumed that the impact was small with failed fund differentials being offset by new fund differentials. This is supported by Carhart (1997) where he shows that a short term look ahead bias "does not significantly alter inferences". He goes on to indicate that a downward bias is "mostly offset" by an upward bias. Carhart (1997) explains further that the results are insensitive to look ahead bias since funds fail largely as a result of a "sequence of poor annual returns" as opposed to a single bad year.

3.3 Fund inclusion rules

All domestic unit trust funds of an equity nature were included in the dataset. More specifically the dataset excluded real estate, foreign, regional, income and worldwide funds. This dataset included a broad array of unit trust funds.

Given that there was no direct comparison to a market benchmark, which could be the subject of a future study, and given that the study objective was primarily to analyse survivorship bias, there were no implications of combining heterogeneous unit trust funds, although it is the researcher's contention that all funds of an equity nature are directly comparable based on the assumption of investor rationality and modern portfolio theory principles.

3.4 Performance returns

The average annual net rates of return, inclusive of dividends, were calculated for each fund, and each year for the period 1973–1999. These returns were inclusive of any subsequent failed funds, and therefore were survivorship bias free. Thereafter the annual rates of return were recalculated for five, 10, 15 and 20 year survival periods, each inclusive of the survivorship bias that may have been present during the period under review.

The average, equal weighted, annualised rates of return for the respective time periods were then compared to reveal any bias, and to quantify the magnitude of the bias for the different time periods. An equal weighting methodology was applied in line with methodologies applied by electronic data vendors. Multiple rolling time periods were analysed in order to prevent the findings being period specific.

3.5 Fund attrition rates

The average annualised survival rates were calculated for the time periods one, five, 10, 15 and 20 years. This calculation was derived by expressing the number of funds that survived within a time period as a percentage of the number of funds in existence at the end of the previous year prior to the outset of the time period. Fund failures were gross, namely fund growth was ignored to prevent an offset[6]

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[5]The inclusion or exclusion of data that was or was not available during the period under review, which may lead to a bias.

real return there are some startling findings. Admittedly these findings are volatile since they are subject to the dynamic differential between inflation and market performance.

Table 3 indicates that performance at the 20 year level could be overstated by as much as 47,47 percent. Given that this overstatement is on an annualised rate of return, the compounding effect over time for a researcher conducting an ex-post analysis would yield magnificently invalid results.

4.2 Fund attrition rates

If the overstatement of returns were the only implication of survivorship bias then there could be a "rule of thumb" adjustment in accordance with Table 2. However of greater significance is the rate of attrition. This is graphically represented in Figure 1.

Table 1: Average performance returns 1973 – 1999

	1 Year	5 Years	10 Years	15 Years	20 Years
1973 - 1984	14,51%	14,74%	15,01%	15,39%	15,56%
1973 - 1989	17,54%	17,82%	18,25%	18,55%	N/A
1973 - 1994	17,46%	17,69%	17,84%	N/A	N/A
1973 - 1999	16,24%	16,63%	N/A	N/A	N/A

Table 2: Average survivorship bias 1973 – 1999

	5 Years	10 Years	15 Years	20 Years
1973 - 1984	0,23%	0,50%	0,88%	1,05%
1973 - 1989	0,28%	0,71%	1,01%	N/A
1973 - 1994	0,23%	0,38%	N/A	N/A
1973 - 1999	0,39%	N/A	N/A	N/A
Average Bias Range	0,23%-0,39%	0,38%-0,71%	0,88%-1,03%	1,05%

Table 3: Return overstatement analysis

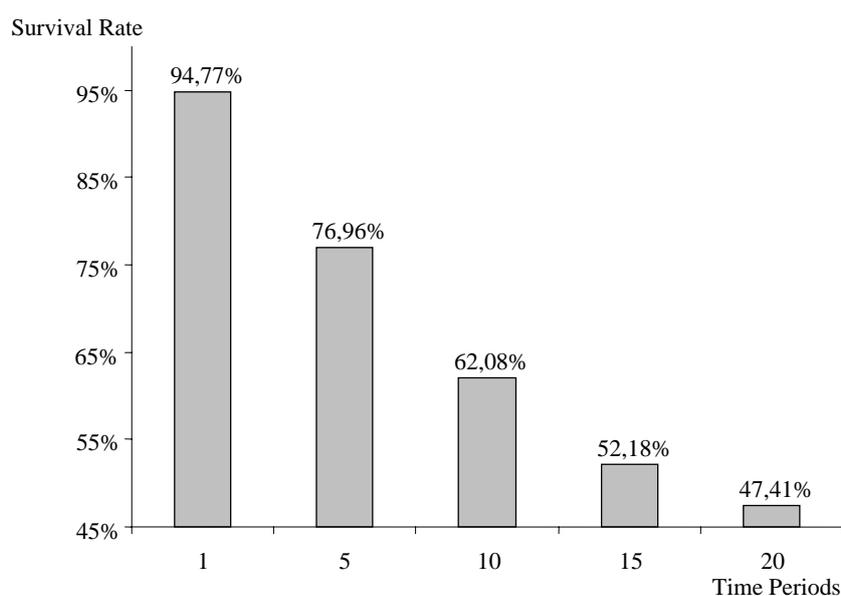|	Inflation	5 Years	10 Years	15 Years	20 Years
1973 - 1984	12,30%	10,39%	22,48%	39,93%	47,47%
1973 – 1989	13,29%	6,58%	16,71%	23,73%	N/A
1973 – 1994	13,09%	5,34%	8,71%	N/A	N/A
1973 - 1999	12,00%	9,25%	N/A	N/A	N/A

Figure 1: Fund survival rates 1973-2004

For the period 1973–2004 there is an average annual rate of failure of 5,23 percent, which is significantly greater than that of Pawley (2002)[8], using a larger dataset, or the U.S. market, as determined by Carhart (1997). What is very evident from Figure 1 is that the survival rate declines as the time period increases, which coincides with findings in previous studies. This has severe implications for the long term investor. With average survival rates of 47,41 percent at 20 years, it seems apparent that the investor may be compelled to select alternative investments throughout the chosen investment horizon, with the concomitant cost penalties.

Of significant importance in Table 4[9] is the observation that survival rates are dramatically on the decline within the same time period. This is confirmed by the relatively larger standard deviations for the five and 10 year time periods of 15,16 percent and 15,04 percent respectively. What is disturbing is that the average failure rates at the one year level, for the 5 year period 1999–2004, are 15,86 percent, which when extrapolated out could equate to a survival rate at 20 years of a mere 3,16 percent. In fact it is noted that the earlier years, namely 1972–1986 funds were characterised by few funds in existence, low failure rates and low fund growth rates. These stable earlier years evidently distort the averages significantly. Given that current levels of failure are exceptionally high, already at 49,63 percent at 5 years (1999–2004) compared to the 52,59 percent historical average at 20 years, it is prudent to suggest that future long-term survival rates will be significantly below the historical averages.

SUMMARY AND CONCLUSION

This study analysed the effect survivorship bias has on unit trust performance for the period 1972–2004, over varying time intervals, using a dataset that is survivorship bias free. The magnitude of the bias was quantified, increasing from a minimum of 0,23 percent at 5 years to 1,05 percent at 20 years, which was directly proportional to the time period under review, in other words as the time period increased so did the bias. This is important since it implies that poor fund performance is pervasive, namely that the funds that fail are as a result of persistently poor performance over multiple time periods. Importantly, the magnitude of the bias was found to overstate real annualised returns by as much as 47,47 percent at 20 years. Notably, the overstatement of returns increases with time. This implies that a cursory look at reported

average performance statistics, including a survivorship bias, are grossly exaggerated and any inferences would be invalid, particularly the ubiquitous use of statistics by practitioners. These findings should be used to adjust any performance results that have been derived using a dataset that includes a survivorship bias. In this way spurious inferences can be minimised.

The attrition rate of funds was a further variable that was analysed. This phenomenon is deemed to be of more significance than the magnitude of the bias itself since returns are irrelevant if the probability of sharing in such returns is low. The attrition rate, ranging from an average of 5,23 percent at the one year level to 52,59 percent at the 20 year level, although seemingly innocuous at the one year level transforms itself into a substantial impediment over time.

Disturbingly, and a significant caveat for long-term investors, is the finding that attrition rates are increasing dramatically, which are not apparent from the reported averages, suggesting lower future survival rates. At the one year level, the average for the period 1999-2004 already reflects an attrition rate of 15,86 percent versus the average of 5,23 percent for the period 1972-2004, which may translate into survival rates as low as 3,16 percent at the 20 year level. The increased rate of attrition seems to parallel the growth in the availability of funds on offer. The implication is that the pursuit of performance seems to produce higher casualties in the form of fund failures. Furthermore long term investors are expected to select funds ex-ante with the knowledge that fund attrition rates are dramatically on the incline.

In summary, it is an imperative that investors and advisors alike are aware that long term performance statistics in all likelihood contain a survivorship bias, based on the dataset used, which will result in the overstatement of average performances. Of greater importance, at the individual fund level, are the rates of attrition. There is no knowing in advance which funds will survive over an expected invested time horizon. It would be prudent to pursue a "certain return, rather than a hopeful one" (Ferri, 2002) and perhaps explore the benefits of a passive investment portfolio. In this way a certain return is assured, and the high probability of fund failure is avoided.

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[8]The dataset included a broader range of unit trust funds. This may suggest higher failure rates amongst specialist funds and is an area for further research.

[9]Table 4 has been sampled for the sake of brevity. Each time period displays the first and last three data observations. The full table is available upon request.

Table 4: Sample survival rates 1973 – 2004

Observations	1 Year	5 Years	10 Years	15 Years	20 Years
1	100,00%	100,00%	90,00%	50,00%	50,00%
2	100,00%	100,00%	90,91%	54,55%	54,55%
3	100,00%	90,91%	81,82%	54,55%	54,55%
4	88,10%	55,56%	47,06%	50,00%	45,45%
5	81,48%	54,55%	44,74%	52,63%	50,00%
6	77,39%	50,37%	45,24%	43,48%	41,67%

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