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Active share on the JSE

ABSTRACT

Fund managers earn a portion of their fees by out-performing a benchmark, typically an index. To out-perform, they may leverage the fund or engage in scrip lending, but usually they "stock-pick", taking positions in the market which differ from those of the benchmark, namely: "active share". Several factors in the fund's mandate may constrain the level of active share in a fund, *inter-alia:* limits on specific equities or sectors, tracking error constraints around the benchmark or limits on short-selling.

We find that the percentage of active share on the JSE has declined from around 50% to 15% over the last 20 years, which is consistent with research elsewhere. This indicates that fund managers are unable or unwilling to take active positions. In contrast to other studies, we find no relationship between the level of active share and a fund's return, raising doubts about the stock picking ability of fund managers. Finally, we observe that some index-tracking funds (with low active share) consistently out-perform around 80% of domestic general equity funds on the JSE over five-year holding periods. These findings challenge the high fees charged by many fund managers.

1. INTRODUCTION AND LITERATURE REVIEW

Investors pay a management fee for the activities required in managing a portfolio of financial assets. These activities include some level of due diligence in the selection of investments, day-to-day accounting, statutory and fiduciary duties and other administrative activities. In addition to a management fee, investors are typically happy to reward skill. A fund manager who is able to consistently out-perform her peers will grow the fund's asset base, despite charging performance related fees. The advent of low cost index tracking funds and the increasing proliferation of Exchange Traded Funds (ETFs) are indicative of investor disenchantment with managed funds. Index funds and ETFs enable investors to easily acquire, at significantly lower cost, a portfolio of well diversified assets which tracks a benchmark index. Consequently, unless they are able to add value beyond the administrative duties required in managing assets, managed funds face a decline in assets under management and pressure on fees.

'Active share' is a term introduced by Cremers and Petajisto (2009) to describe the proportion of a fund which does not overlap the benchmark index. Whilst leverage, scrip lending, short-selling and other tactical asset allocation strategies can be value enhancing, many funds have limitations on these activities. Apart from these approaches, it follows therefore, that those fund managers with high levels of active share are best able to significantly over (or under) perform the benchmark. In their study of 2650 United States fund managers over the period 1980-2003, Cremers and Petajisto (2009) found that those funds with the highest levels of active share (approximately 80%) typically out-performed the benchmark by around 1,5% pa.

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They also found that the level of active share had declined over the time period of their study. Their results showed that, until about 1986, almost all funds showed active share levels above 60%, but by 2003, only half the funds in their sample had active share at levels above 60%.

Cremers and Petajisto (2009) present the following equation to measure active share:

$$\text{Active share} = \frac{1}{2}\sum_{i=0}^{n}\left|w_{\text{fund}i} - w_{\text{index}i}\right| \quad \ldots (1)$$

where:

$w_{\text{fund i}}$ is the weighting of each share in the fund;

and

$w_{\text{index i}}$ is the weighting of each share in the index

The example below shows the simplicity of the concept for a fund with 20% active share:

Share	Fund Weight	Index Weight	Overlap	Active Share
A	30%	10%	10%	20%
B	30%	40%	30%	10%
C	40%	50%	40%	10%
	100%	100%	80%	40%
			Halved:	20%

From the above example, it can be seen that the overlap between the shares in the fund and the index is the passive share component in the fund, and to avoid double-counting the active share can then best be described as (1 – passive share).

Bhattacharya and Galpin (2005) identify two investment philosophies: 'stock picking' and 'indexing'. Their paper, which sets out to determine the dominant of the two philosophies, examines the level of stock

picking around the world, using a metric which they develop to measure the maximum volume of stock picking in a market. Based on the intellectual foundations of Markowitz's (1952) modern portfolio theory and Tobin's (1958) separation theorem, Bhattacharya and Galpin (2005:2) argue that if all investors seek the optimal market portfolio, then the "volume traded in stock *i* should be explained completely by the market capitalisation of stock *i*". If this is the case, they suggest that the deviation from the market portfolio would be explained by ($1-R^2$) of the cross-sectional regression of the log of the volume traded and the log of market capitalisation. They also note that their metric of ($1-R^2$) is an upward biased estimate of active share, because it is an "estimate of the maximum proportion of trade that can be explained by stock picking" (Bhattacharya and Galpin 2005:8). Although they note that the metric could be improved to give a better estimate of active share, they opt for the parsimony of ($1-R^2$) and ignore the modest bias.

Bhattacharya and Galpin (2005) examine the time-series of active share for 43 countries (including South Africa) and observe that stock picking is declining all over the world. They note that the maximum levels of stock picking are higher in emerging markets (63%) than in developed markets (45%), and they show (for example) that the maximum volume of stock picking in the US has declined from levels of 60% in 1960 to a low of 24% in the 2000s.

Based on the literature described above, we examine the proposition that stock picking on the JSE has declined over time. We also measure and compare the levels of active share in South African managed funds and test the proposition that high active share is associated with out-performance.

2. METHODOLOGY

We split the methodology into two sections. In the first we largely follow Bhattacharya and Galpin's (2005) approach to measure the maximum volume of stock picking. In the second we calculate the active share component of managed funds following Cremers and Petajisto's (2009) approach shown in Equation 1.

Section 1: The time-series of active share in the market

We use all the ordinary shares listed on the JSE. Over the period 1988 to 2010 (23 years) we measure, for each year and for each share, the end of year market capitalisation and the value traded during the year. Although Bhattacharya and Galpin (2005) use volume traded and not value traded, we prefer the latter measure because it conforms more coherently to the theory as initially expounded by Lo and Wang (2000).

Following Bhattacharya and Galpin (2005), we plot the log of value traded in the year (Y axis) against the log of market capitalisation (X axis) at the end of the year, for all listed shares, and then compute the maximum level of stock picking as ($1-R^2$) of the regression. Several data related issues were managed as follows:

Survivor bias can be a significant issue in studies of financial time series (see for example: Gilbert and Strugnell, 2010). To mitigate survivor bias, we include all the ordinary shares that were listed in each month of the study, adding new listings and removing delisted shares as they occur.

In instances where a large capitalisation share listed or de-listed during a calendar year, or where un-bundlings or other corporate actions occurred, the data points were observed as outliers in the scatter plot of the regression analysis. In these instances the value traded was *pro-rata* adjusted to estimate a full year's trading.

Rights issues required no special treatment because the market capitalisation and value traded were expected to increase in equal proportion. The same rational applied to share buy-backs. Some short-term anomalies were noted, but these were not expected to significantly influence the results.

In 2002 the JSE introduced a free float adjustment factor into the calculation of weightings in their capitalisation-weighted indices. The free float adjustment factor represents the proportion of shares that trade freely (as opposed to being tightly held by controlling parties) as a percentage of the shares in issue. Given the purpose of our investigation, we viewed this adjustment as material, and the JSE free float factors were applied to the market capitalisations of affected companies. Furthermore, we extrapolated these across the entire period; that is not just from 2002, but back to 1988.

Traditionally, capitalisation-weighted indexes include all the issued shares of constituent companies. However, many companies have listed shares on more than one exchange, and in these instances we deemed it inappropriate to compare the full market capitalisation with the value traded on one exchange. We therefore included only the fraction of shares listed on the JSE in the computation of market capitalisation.

Finally, instead of simple OLS regression used by Bhattacharya and Galpin (2005), we developed a capitalisation-weighted regression algorithm to provide appropriate bias to large companies versus small companies in the computation of R^2.

Section 2: Active share in managed funds

For the second section of our study we were unable to locate a suitable time-series of fund-holdings at individual stock level. As a substitute, we made use of the Association for Savings and Investment SA

(ASISA) database, provided on their website, which contains information on 893 unit trust funds. If one excludes fund of funds, bonds, fixed income and money market funds this number reduces to 387. Our sample comprises the 90 domestic general equity funds, over the period June 2006 to September 2010.

Since the database does not reflect fund holdings at an individual stock level, we made use of monthly aggregated holdings (as a percentage of the value of the fund) at sector level, for 39 JSE sectors. Accordingly, we adjust Equation 1 as follows:

$$\text{Active share} = \frac{1}{2}\sum_{i=0}^{n}\left|w_{\text{fund}i} - w_{\text{index}i}\right| \quad \ldots (2)$$

where

$w_{\text{fund i}}$ is the weighting of each sector in the fund;

and

$w_{\text{index i}}$ is the weighting of each sector in the index

To provide a measure of confidence in this sector level approach, we scrutinized the divergence in the estimate of active share between our sector level data and the individual stock level data advocated by Cremers and Petajisto (2009), through an example using the Allan Gray Equity Fund, the largest in its category, at 31st December 2010. The analysis is shown in Appendix 1, and we find Equation 2 to be an acceptable approximation.

For each fund in the database, we are able to calculate the active share component, using Equation 2, on a monthly basis, and using the September 2010 level of active share for each fund we show the distribution of levels of active share for domestic general equity funds.

Cremers and Petajisto (2009) found that those funds with the highest levels of active share out-performed the benchmark by around 1,5% pa. To test the relationship between active share and fund return, we compare the level of active share (calculated using Equation 2) in each of 90 domestic general equity funds with their returns. The level of active share for each fund was measured at 30 September for the years 2006 to 2010, and we use the five year average as the independent variable in a regression analysis.

We control for the different levels of risk in each fund using the standard deviation of monthly returns over the three years ending in 2010. For the dependent variable we compute a modified Sharpe ratio; with the annualised five-year return as numerator and the standard deviation as denominator. The fund return data was sourced from Profile Media.

Finally, we examine the performance of the lowest active share fund against the sample. Using the Stanlib Index Fund (active share = 5%), we rank the five-year holding return for each fund on a daily basis, over the period 1 March 2002 to 30 April 2011, and determine the standardised ranking of the Stanlib Equity Fund.

Similarly, we examine the performance of the SATRIX40 ETF against the sample, to evaluate how well this alternative investment vehicle performs. The SATRIX40 differs from the domestic general equity funds in several ways. It comprises (only) the top 40 shares, weighted by market capitalisation, whereas the general funds may have holdings in many more shares as well as cash and other securities. Consequently, the SATRIX40 has low active share, a low fee structure and high volatility. We repeat the standardised ranking explained above, but we do this in two ways. In the first instance we ignore risk and base the ranking on unadjusted 5 year returns. Secondly, we calculate the standardised ranking using the modified Sharpe ratio described earlier. The SATRIX40 was only listed as a collective investment scheme in 2004, and so we use the JSE Top 40 total return index (J200T) as a proxy for the SATRIX40 over the period 1988 to 2003 to extend the analysis.

3. RESULTS

To provide some context to the study, we observe that over the period 1988 to 2010 there were significant changes on the JSE; highlights of which are presented in Table 1 below:

Table 1: Summary of key statistics for the JSE

	1980	1990	2000	2010
Market capitalization (bn)	R74,7	R386,5	R1 551,5	R6 698,7
Value of shares traded (bn)	N/A	R22,2[1991]	R539,5	R2 930,2

Following Bhattacharya and Galpin (2005), we plot the log of value traded in the year (Y axis) against the log of market capitalisation (X axis) at the end of the year, for all shares listed in that year, to measure the maximum level of stock picking (active share). We do this for years 1988 to 2010. Figure 1 below shows the results for 2010.

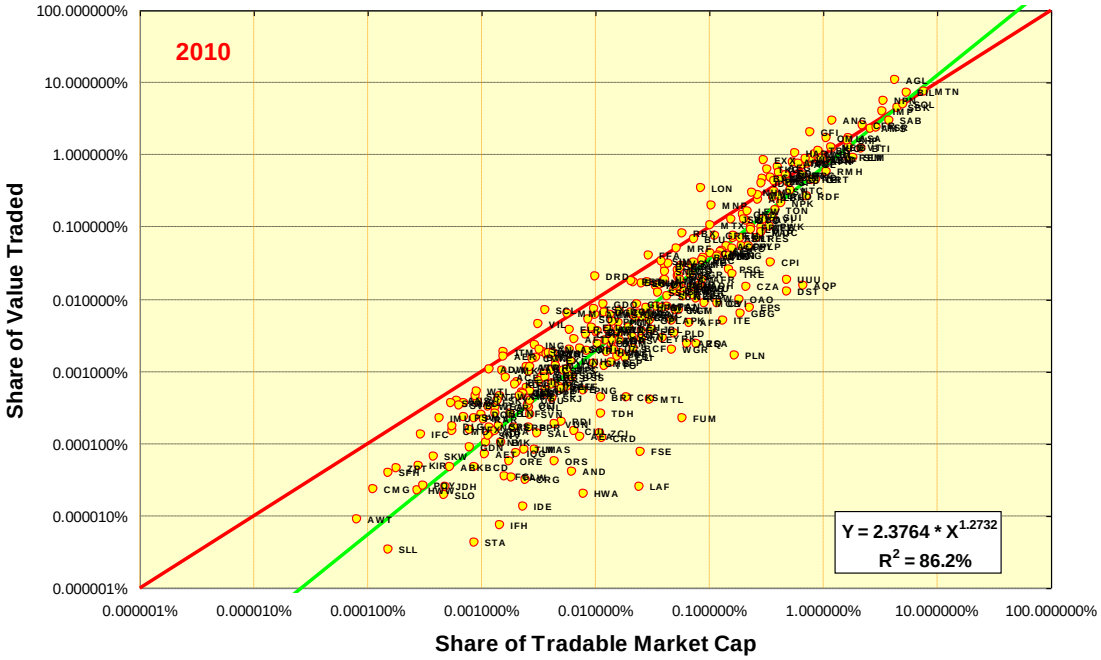

Figure 1: Share value traded vs tradable market cap for all JSE listed shares in 2010

From Figure 1, it can be observed that there is a strong association between Log(Value traded) and Log(Market cap). Although the fit is not along the 45 degree line as postulated by Bhattacharya and Galpin (2005), the explained variance using the weighted regression model is high (R^2 = 86,2%), reflecting the passive component of share holding in the data. In 2010, the maximum level of active share is therefore (1- R^2) = 13,8%.

From Figure 2 it can be observed that a steady decline in active share occurred between 1988 and 2001, from around 50% to only 15%. From 2001 the level of active share has remained at approximately 15%.

In section 2 of the method we examine the level of active share in the domestic general equity funds which are listed in the ASISA database, for which we provide selected statistics.

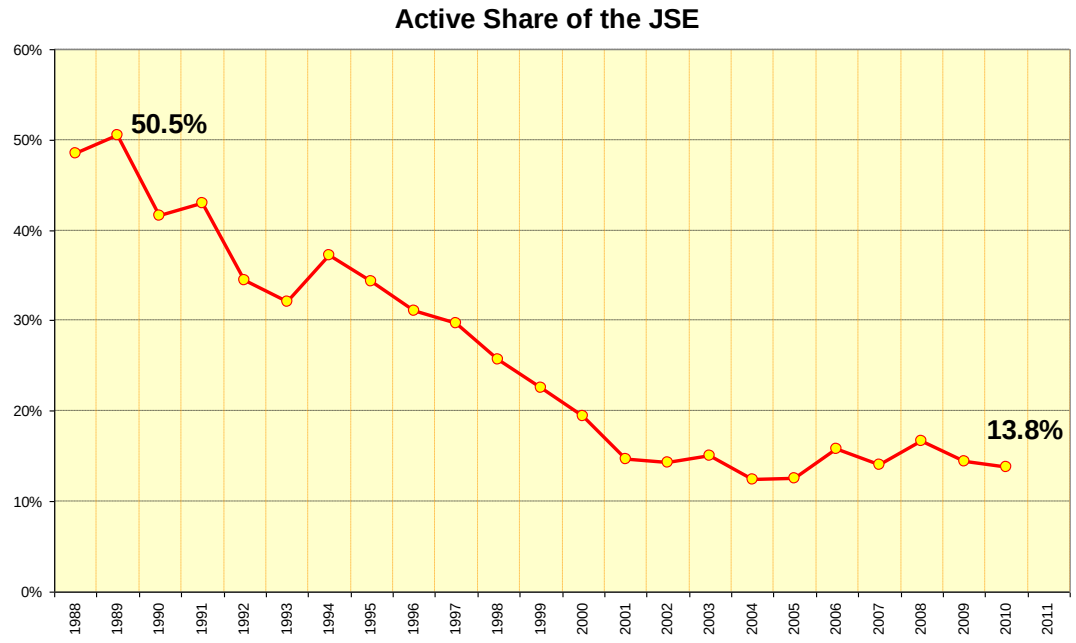

Figure 2: Summarises the trend in maximum stock picking over the 23 years of the study

Table 2: Selected statistics for the ASISA unit trust database (excluding fund of funds, bonds, fixed income and money market funds)

	Sep-06	Dec-10
Number of Funds	327	387
Total Market Capitalization (bn)	R250	R529
Average Total Expense Ratio (TER)	N/A	1,68%

From Table 2 it can be seen that whilst the number of funds only increased marginally, the value of funds under management more than doubled over the analysis period. We also note that at December 2010 the average total expense ratio (TER) is 1,68% for these funds. This compares with a TER of 0,62% for the Stanlib Index Fund (the fund with the lowest level of active share in our sample) and a TER of 0,46% for the SATRIX40 ETF.

As described above, data limitations required us to measure the level of active share in funds at sector level as shown above in Equation 2. This represents a variation of Cremers and Petajisto's (2009) metric which uses individual stock level data. In appendix 1 we contrast the difference in active share by applying each approach to the Allan Gray Equity Fund. At 31st Dec 2010, using individual stock level data we obtain an active share value of 50,8%. This compares with the 45,0% we obtain using sector level data. As can be seen, both approaches present challenges. We observe that 17% of the fund is invested in individual shares, the names of which Allan Gray does not disclose, because their holding is less than 1%. This makes it impossible to accurately calculate active share using Equation 1, and we conclude that our sector level approach is reasonable. Using Equation 2 we calculate the five-year average level of active share ending 31 December 2010 for the 90 domestic general equity funds for which we have data, and present a summary of the results in Figure 3.

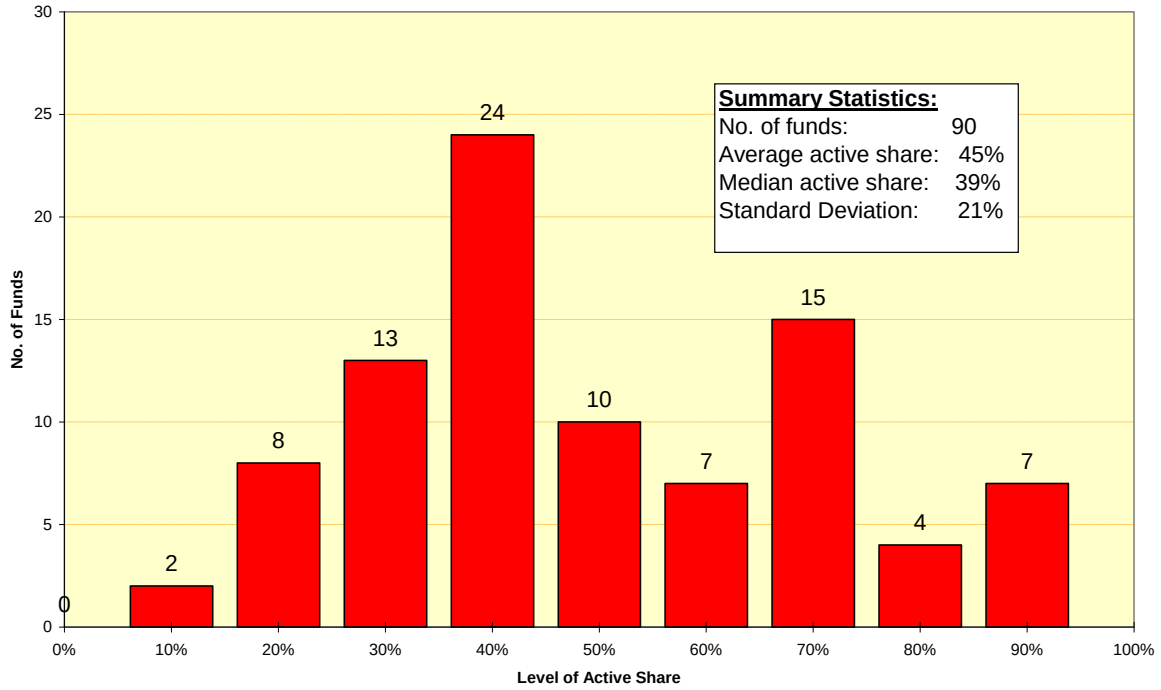

Figure 3: Distribution of the five-year average active share across domestic general equity funds

The five year average level of active share in the sample was 45%, with a median of 39%. As expected, index tracking funds dominate the lower levels of active share, whereas fundamental funds evidenced the highest levels of active share. The average level of 45% is significantly higher than the level of about 15% we obtained using the Bhattacharya and Galpin (2005) approach for the whole market in Figure 2.

To examine the relationship between active share and performance, we regressed the five-year risk adjusted returns (Y axis) against the five-year average level of active share (X axis) for the 90 funds in the sample. The results are shown in Figure 4.

In contrast to Cremers and Petajisto (2009), we find no significant relationship between the level of active share in a fund and the fund's five-year return. However, we do note that heteroskedasticity is evident in Figure 4; as active share increases, so the spread of returns increases. Although some funds with high

levels of active share do produce superior returns, many do not.

In Figure 5 we examine whether a fund with low active share is able to deliver superior returns to its more active counterparts. On a daily basis, commencing in March 2007 we calculate the standardised ranked performance of the Stanlib Index Fund against all other general equity funds, on the basis of ex-ante five-year holding period returns.

The StanLib Index fund had the lowest level of active share in our sample. From Figure 5 we observe that the number of funds reporting increased from 40 to 70 over the eight year period. The StanLib fund typically ranked at about the 20th percentile, although the fund's performance deteriorated significantly between June 2008 and June 2009, dropping briefly to the 80th at the height of the global financial crisis. The graph presents further evidence that active share is not a determinant of performance.

Finally, we repeat the standardised ranking of performance for the SATRIX40 ETF. Figure 6 presents the results.

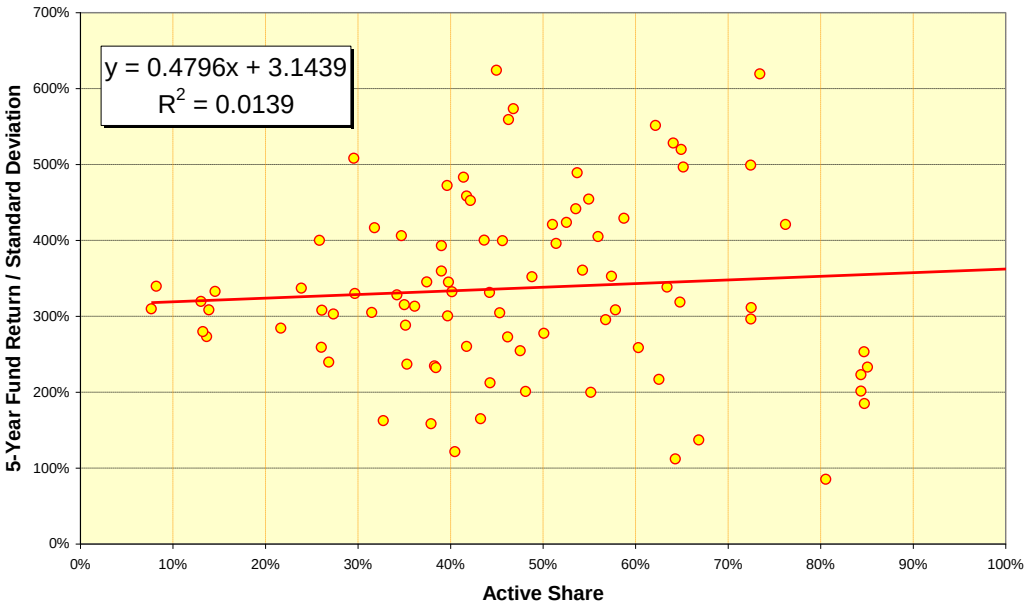

Figure 4: Regression analysis of active share versus the risk adjusted five-year fund return

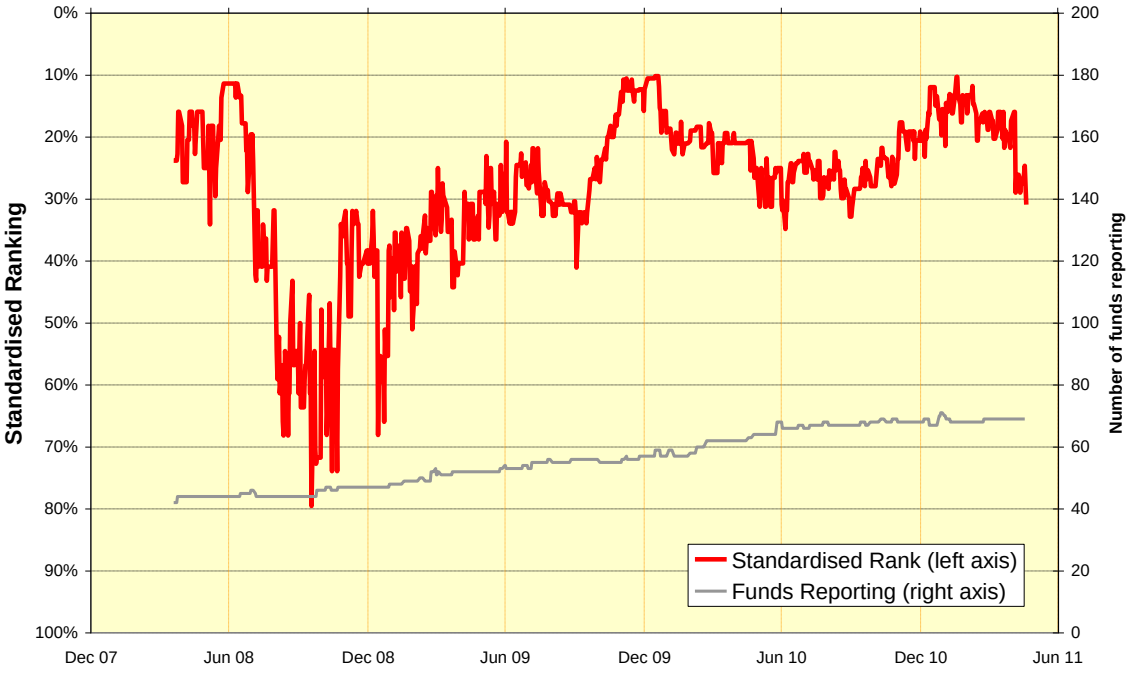

Figure 5: Stanlib Index Fund's standardised 5-year return rank against general equity funds

Figure 6 shows that on average, throughout the period, the SATRIX40 ETF shows a fairly volatile ranked position between the 10th and 50th percentiles. Towards the end of 2008, during the height of the global financial crisis, the SATRIX40's five-year ranked performance drops to around the 60th percentile.

We repeat the above analysis, but in this instance we adjust for risk by ranking on the modified Sharpe ratio described earlier. Figure 7 presents the results.

Figure 7 shows a significant difference in ranking if risk is considered. The standardised ranking of the SATRIX40 drops to between the 60th and 80th percentiles. At the height of the financial crisis, investors in the ETF would have experienced very significant volatility, dropping their performance to worst in the sample, after adjusting for risk.

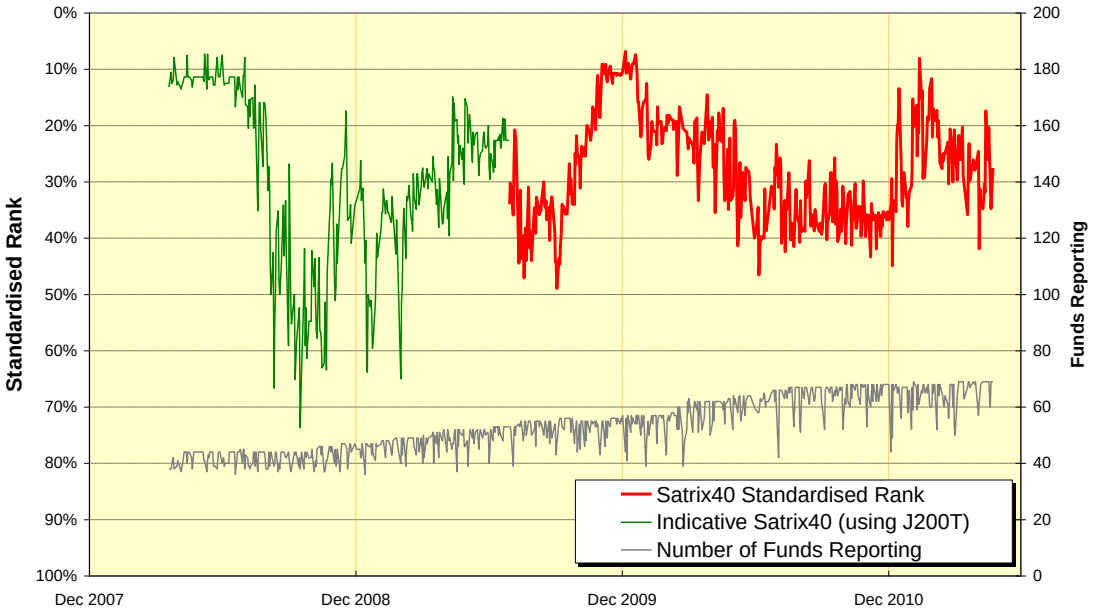

Figure 6: SATRIX40 ETF's standardised 5-year return rank against general equity funds

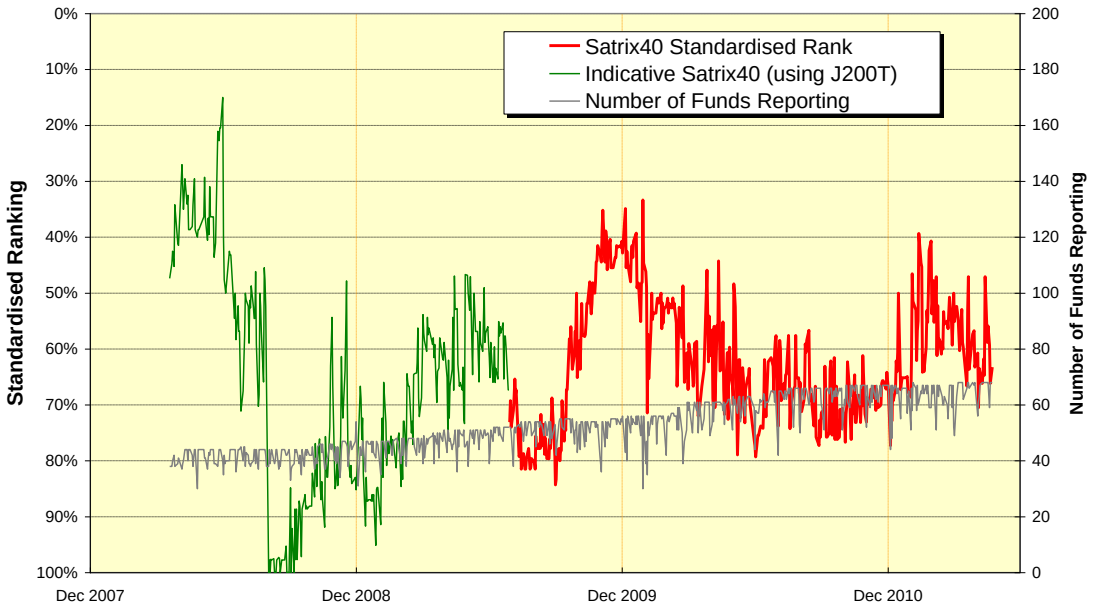

Figure 7: SATRIX40 ETF's standardised 5-year risk adjusted return rank against general equity funds

4. CONCLUSIONS

Following Bhattacharya and Galpin's (2005) approach, we find that the level of active share on the JSE declined from a level of 50% in 1988 to 15% in 2001, at which level it has remained through to December 2010. Our results support the general findings of Bhattacharya and Galpin (2005), who showed that stock picking had declined in 38 of 43 countries over the five-year period to December 2000. Whilst not directly comparable, our finding of a stock picking level of 15% on the JSE from 2001 is lower than the levels of 35% and 50% Bhattacharya and Galpin (2005) show for Developed and Emerging markets respectively. Bhattacharya and Galpin (2005:4) offer a general conclusion (with some reservations) for their findings, *viz:* "Modern Portfolio Theory has won", investors are increasingly moving to a single equity fund. Our results support the general finding that investors are congregating towards an optimal market capitalisation weighted equity portfolio.

At a fund level, data constraints required us to use an adaptation of Cremers and Petajisto's (2009) metric, using sector holdings instead of individual equity holdings. We show this produces comparable results. We find the median active share for domestic general equity funds to be about 40% for the five years ending 31 Dec 2010. However, in contrast to Cremers and Petajisto (2009), we find no relationship between the level of active share in a fund and the fund's risk adjusted performance. We note that as active share increases, so the spread of returns increases, raising doubts about the stock picking ability of fund managers.

We show that a low active share index fund outperforms around 70% of unit trusts on a five-year holding period basis, over the period 2002-2010. This out-performance is reasonably consistent, with the exception of the period between June 2008 and June 2009 - the height of the global financial crisis. This result adds weight to our earlier finding, that active share in not a determinant of fund manager's performance.

Finally, we examine the performance of the SATRIX40 ETF against the sample of domestic general equity funds. The SATRIX40 ETF provides an alternative investment vehicle to the managed funds in our sample, but has low active share, a low management fee and higher volatility. We find this ETF performs between the 20th and 40th percentile over the period 2002-2010 on the basis of five year returns. If the returns are risk adjusted, the ETF's performance is significantly worse.

Although active share positions are a necessary condition for out-performance, we find no evidence, in general, to support the notion that fund managers take good active positions and thereby justify their higher fees.

REFERENCES

Bhattacharya U and Galpin N. 2005. Is stock picking declining around the world? AFA 2007 Chicago Meetings Paper. Available at SSRN:http://ssrn.com/abstract=849627

Cremers M and Petajisto A. 2009. How active is your fund manager? A new measure that predicts performance. AFA 2007 Chicago Meetings Paper; EFA 2007 Ljubljana Meetings Paper; Yale ICF Working Paper No. 06-14. Available at SSRN: http://ssrn.com/abstract=891719

Gilbert E and Strugnell D. 2010. Does survivorship bias really matter? An empirical investigation into its effects on the mean reversion of share returns on the JSE (1984-2007). *Investment Analysts Journal,* 72: 31-42.

Lo, Andrew and Jiang Wang. 2000. Trading volume: Definitions, data analysis and implications of portfolio theory. *Review of Financial Studies,* 13: 257-300.

Markowitz H. 1952. Portfolio selection. *Journal of Finance,* 7: 77-91.

Tobin J. 1958. Liquidity preference as behavior towards risk. *Review of Economic Studies,* 25: 65-86.

Appendix 1a

Active share for the Allan Gray Equity Fund using individual share holdings at 31 Dec 2010

Code	Share Name	Value	Weight	Swix Weight	Active Share	Active Share
AGL	Anglo American plc	316 177 400	1,33%	4,53%	0,00%	
ANG	AngloGold Ashanti Ltd	1 463 042 585	6,15%	1,25%	4,89%	
BIL	BHP Billiton Plc	307 787 417	1,29%	5,94%	0,00%	
	British American Tobacco Corp	1 291 504 891	5,43%	0,00%	0,00%	
BTI	British American Tobacco plc	1 250 335 104	5,25%	0,00%	0,00%	
DTC	Datatec Ltd	262 956 813	1,10%	0,21%	0,89%	
GFI	Gold Fields Ltd	367 072 632	1,54%	0,87%	0,67%	
HAR	Harmony Gold Mining Company Ltd	692 009 180	2,91%	0,61%	2,30%	
ILV	Illovo Sugar Ltd	318 652 930	1,34%	0,20%	1,14%	
IMP	Impala Platinum Holdings Ltd	248 065 825	1,04%	3,47%	0,00%	
MND	Mondi plc	737 296 705	3,10%	0,27%	2,83%	
MTN	MTN Group Ltd	1 057 179 964	4,44%	8,07%	0,00%	
NPK	Nampak Ltd	529 949 576	2,23%	0,47%	1,75%	
NTC	Netcare Ltd	302 922 155	1,27%	0,76%	0,51%	
REM	Remgro Ltd	1 913 316 412	8,04%	1,81%	6,23%	
SAB	SABMiller plc	2 657 537 749	11,17%	4,00%	7,16%	
SLM	Sanlam Ltd	1 203 604 062	5,06%	1,93%	3,13%	
SAP	Sappi Ltd	600 877 376	2,52%	0,52%	2,01%	
SOL	Sasol Ltd	2 773 162 949	11,65%	5,44%	6,21%	
SBK	Standard Bank Group Ltd	648 628 242	2,73%	4,32%	0,00%	
SUI	Sun International Ltd	260 018 250	1,09%	0,42%	0,68%	
TON	Tongaat Hulett Ltd	482 744 602	2,03%	0,38%	1,64%	
	Sub Total:	19 684 842 819	82,71%	45,48%	42,05%	50,8%
Additional positions individually less than 1%		166 692 632	0,70%			
Consumer Gds positions individually less than 1%		570 315 309	2,40%			
Consumer Srvs positions individually less than 1%		340 254 443	1,43%			
Financials positions individually less than 1%		1 187 545 118	4,99%			
Healthcare positions individually less than 1%		151 411 638	0,64%			
Industrials positions individually less than 1%		399 974 614	1,68%			
Resources positions individually less than 1%		875 855 081	3,68%			
Technology positions individually less than 1%		7 634 624	0,03%			
Telecoms positions individually less than 1%		415 966 698	1,75%			
	Sub Total:	4 115 650 157	17,29%			
	Total:	23 800 492 976	100,00%			

Appendix 1b

Active share for the Allan Gray Equity Fund using sector holdings for the period June 2006 - September 2010