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Are unit trust performances inflated at quarter-ends?

1. INTRODUCTION

Public evaluations of unit trusts' performance receive a lot of publicity. While a good performance compared to its peers is good for the prestige of the firm and the career of the fund manager, there are also major financial implications. Investors place great importance on historical performance when choosing unit trusts. Consequently there exists an incentive for fund managers to have their funds perform as well as possible at quarter-ends, when the comparative performance evaluations are published. Apart from creating an excellent marketing opportunity, a good performance can translate into an influx of new investments into the fund.

Tweaking the performance of unit trust at quarter-ends is commonly referred to as "ramping" or "window-dressing", and entails a flurry of trading activity in the last half-hour of trading of each quarter in order to get rid of shares with disappointing performances, and raising the prices of others to enhance good performances. (Gleason, 1998; Wood, 1999).

The two models of the marking-up strategy under consideration are firstly, managers marking up to beat the JSE index (which we shall refer to as "beating a benchmark"), and secondly, "leaning-for-the-tape", in which funds are marked up at the end of a period to improve performance. The calendar year and calendar quarters were selected as reference periods, as analysis of returns over calendar quarters and years is prominent in the press and fund ratings. In the absence of market micro-data and intra-day trading information, the current study cannot distinguish between these two causes of window-dressing. The focus is therefore strictly on testing whether observed pricing behaviour is consistent with the hypothesis of "window-dressing" in South African unit trusts.

The paper is structured as follows: Section 2 contains a literature review while Section 3 describes the tests done to establish whether quarter-end returns are abnormally high and investigates the relationship between end-of-quarter and beginning-of-quarter returns. Section 4 contains a summary and the conclusions reached.

2. LITERATURE REVIEW

Many seasonal peculiarities in equity returns have been uncovered and analysed in the finance literature. Especially month-end effects and the days around the year-end has received a lot of attention[1]. As the tax-year in the USA coincides with the calendar year, a lot of these anomalies have been explained as tax-loss selling, with window dressing also mentioned as a probable cause.

Apart from irregular equity returns around holidays and weekends, there is strong evidence of equity return manipulation around financial year ends, as examined in Degeorge, Patel and Zeckhauser (2001). They found that because investors, directors, customers etc. measure executives by a company's earnings, there are strong incentives for executives to manage earnings in order to exceed certain thresholds. The three thresholds examined are reporting positive profits, sustaining recent performance, and meeting analysts' expectations. They conclude that earnings just short of these thresholds will be managed upward, while earnings far above will be understated, with the understated amount used to make thresholds more attainable in the future.

In a study conducted in the USA (Carhart, Kaniel, Musto and Reed, 2002), intraday patterns in equity transactions were examined for evidence of NAV inflation. They found that

- price inflation occurred mostly within the last half-hour before the close of trading;
- that during the last half-hour of trading of a quarter, trading activity was considerably more intense that on other days; and
- the equities in the portfolios of the best performing funds show relatively more price inflation.

This study uses models of similar form to some of the models used in Carhart *et al.* in order repeat the study in a South African context.

If one acknowledges the existence of seasonality in equity returns, it might then seem redundant to examine the seasonality of equity-fund returns. Any seasonality might just be as a result of the underlying equity returns patterns. The fundamental difference between an equity return and an equity-fund return is that an equity return represents the earnings if an investor bought at a specific price and sold at a later price, while an equity-fund return is the difference between two net-asset value (NAV) calculations, with each NAV calculated from the closing prices of the fund's holdings (Carhart *et al.*, 2002). One cannot know what equity returns another investor might have

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[1] See Le Roux and Smit (2001) for a comprehensive review.

achieved, as the prices depend on size, directions and other circumstances. In contrast, the NAV directly represents the hypothetical investor's experience. In all probability investors could not have purchased or sold all of the fund's equity at the closing prices, but they could have invested or divested in the fund.

In South Africa Robins, Sandler and Durand (1999) examined a sample of ordinary JSE shares over the 9 year period November 1986 – November 1995, and found that January's return and risk-adjusted return outperformed the average return of the other months more than 15 times. In fact, they attributed sixty percent of total risk-adjusted return to January, although the short time span of the study poses a caveat.

Le Roux and Smit (2001) examined share indices on the JSE for two periods, namely 1978 to 1989, and 1990 to 1998. In contrast to previous studies, they did not find a significant month-of-the-year effect in either period. They did, however, find a significant and positive effect at the end of a month and the beginning of the following month (turn-of-the-month effect) for the period 1990 to 1998. They then took the study a step further, to test if turn-of-the-quarter days (the days at the end of one quarter and the beginning of the next quarter) are a significant factor in explaining variation in returns. They concluded that although the last days of end of quarter months are not a significant factor in explaining the variation of returns, the last days of non-quarter months is a significant factor. However, they did not regard this as sufficient evidence that portfolio managers manipulate the markets in order to enhance their funds' performance, as such manipulation is expected to be the strongest at the end of quarters.

3. DATA AND STATISTICAL ANALYSIS

In this section, we examine the question if equity funds are overpriced at the close of calendar quarters. If this is the case, one would expect abnormally high returns on the last day of each quarter, followed by abnormally low returns on the first day of the new quarter.

3.1 Tests using unit trust indices

This investigation uses the daily NAV performances of South Africa's domestic equity funds, as obtained from the MoneyMate database. In all cases, the NAV performance was calculated as if income was re-invested on the ex-dividend date. The benchmark index performance is subtracted from the average NAV performances of the funds in the sector, to correct for movements in the market. The benchmark index used within a sector differs from fund to fund; the index most commonly listed[2] as the benchmark was used in most sectors, but where no one benchmark dominated the FTSE/JSE TR All Share index was used. The JSE keeps both Capital indices and Total Return indices. The Capital index is calculated based on market capitalisation, while the Total Return index is the Capital index plus dividends – thus the return should dividends be re-invested.[3] In all cases, the Total Return indices were used.

Originally, data for the ten-year period 1993 to 2002 was collected. This proved to be problematic, as data for the indices used as benchmarks was only available since July 1995. It was therefore decided to only use data from 1996 to 2002, which means that a relatively short period of seven years was examined. For 1996, some funds document daily returns on public holidays, which is not the case in subsequent years. This occurred because management companies used to provide a combined figure including weekends and holidays, which is not the case any more.[4]

Data was extracted in blocks representing roughly 3 months each. The MoneyMate database returns a performance of zero if the fund did not exist on the first date of the query[5]. These zeros were deleted to avoid skewing the data. This means that the performance figures for individual funds may miss up to 3 months worth of data at the start of the fund.

The NAV performance less the index is called excess return, and is denoted by ER_i. Therefore, ER_1 refers to the excess return of the average fund performance of Equity Financial & Industrial funds over the FTSE/JSE (TR) Finan & Industr 30 J213T index, ER_2 to the excess returns of Equity Financial Sector funds and so forth. $ER_{i,t}$ denotes the excess return of the sector i on day t. The nine sectors are as follows:

1. Financial & Industrial
2. Financial
3. General
4. Growth
5. Large Capitalisation Companies
6. Resources & Basic Industrial
7. Smaller Companies
8. Value and
9. Varied Specialist Funds

As the excess return at quarter-ends compared to other month ends are investigated, six binary variables are identified: $YEND_t$ has a value of one when t is the last trading day of a calendar year, and zero on all other days. $QEND_t$ is equal to one on the last trading day of a calendar quarter that is not a year-end, and similarly $MEND_t$ is one on the last day of a month that is not a quarter-end. $YBEG_t$, $QBEG_t$ and $MBEG_t$ are one on the first trading day of a year, quarter and

[2] MoneyMate database: Fund details

[3] Email from JSE helpdesk

[4] Email from MoneyMate support, 28 May 2003

[5] Email from MoneyMate support 25 August 2003

month, respectively, and zero otherwise. Note that, analogously to the last days, the first day of a quarter excludes first days of a year, and the first day of a month excludes first days of quarters.

Once values have been assigned to the six variables, the following regression model was estimated:

$$ER_{i,t} = b_{i,0} + b_{i,1}YEND_t + b_{i,2}YBEG_t + b_{i,3}QEND_t + b_{i,4}QBEG_t + b_{i,5}MEND_t + b_{i,6}MBEG_t + \varepsilon_{i,t}$$

The results of the regression are shown in Table 1.

Table 1: Regression coefficients: Yearly, quarterly, monthly

	Coefficients								
	ER1	**ER2**	**ER3**	**ER4**	**ER5**	**ER6**	**ER7**	**ER8**	**ER9**
Intercept	0,01% *p=0,63*	0,01% *p=0,43*	0,00% *p=0,77*	-0,02% *p=0,21*	0,01% *p=0,61*	0,03% *p=0,15*	0,01% *p=0,60*	0,01% *p=0,40*	0,01% *p=0,67*
YEND	**0,44%** ***p=0,06***	0,14% *p=0,52*	0,21% *p=0,29*	0,34% *p=0,14*	0,11% *p=0,45*	0,24% *p=0,48*	**0,58%** ***p=0,09***	**0,46%** ***p=0,08***	0,24% *p=0,43*
YBEG	-0,03% *p=0,90*	0,17% *p=0,46*	-0,05% *p=0,80*	-0,12% *p=0,61*	-0,10% *p=0,53*	-0,49% *p=0,16*	-0,04% *p=0,90*	-0,05% *p=0,84*	-0,38% *p=0,20*
QEND	0,09% *p=0,52*	0,10% *p=0,44*	0,08% *p=0,48*	0,09% *p=0,49*	**-0,16%** ***p=0,06***	0,09% *p=0,67*	0,29% *p=0,14*	0,12% *p=0,45*	0,02% *p=0,91*
QBEG	-0,16% *p=0,24*	0,07% *p=0,59*	**-0,24%** ***p=0,04***	**-0,33%** ***p=0,01***	**-0,25%** ***p=0,00***	**-0,43%** ***p=0,03***	**-0,34%** ***p=0,09***	**-0,38%** ***p=0,01***	-0,11% *p=0,53*
MEND	**-0,15%** ***p=0,08***	-0,11% *p=0,16*	-0,10% *p=0,17*	-0,11% *p=0,17*	-0,01% *p=0,90*	-0,15% *p=0,23*	-0,19% *p=0,13*	-0,02% *p=0,80*	-0,16% *p=0,13*
MBEG	**-0,22%** ***p=0,01***	-0,05% *p=0,53*	**-0,20%** ***p=0,01***	**-0,21%** ***p=0,01***	**-0,15%** ***p=0,00***	**-0,38%** ***p=0,00***	**-0,35%** ***p=0,00***	**-0,24%** ***p=0,01***	**-0,31%** ***p=0,00***

Observed significance levels less than 10% are depicted in bold

The results indicate a reversal pattern, especially across year-ends and quarter-ends. Only the Equity Financial sector (ER2), and to a lesser extend the Equity Large Cap funds (ER5), do not consistently follow the predicted direction. The evidence about month-ends, not on quarter-ends are weak by comparison, with month-ends only somewhat better than month-beginnings. It is interesting to note that ER7 (the Smaller Companies funds) has the largest spikes at both year-ends and quarter-ends followed by average troughs, while ER6 (Resources and Basic Industrial funds) consistently have the deepest troughs, but only average spikes. These results also fuel speculation that share prices are manipulated at quarter-ends, as the smaller companies' share prices would conceivably be a lot easier to inflate with a flurry of last-minute trading than those of the large companies. In terms of statistical significance, however, the results are weaker than those of Carhart *et al.* (2002).

In the previous analysis, quarter-ends excluded year-ends, and month-ends excluded both quarter-ends and year-ends. To compare all quarter-ends (including year-ends) with all month-ends (including quarter-ends and year-ends) the nine regressions are repeated, but this time the variables are regrouped as follows:

$$ER_{i,t} = b_{i,0} + b_{i,1}(YEND_t + QEND_t) + b_{i,2}(YBEG_t + QBEG_t) + b_{i,3}(YEND_t + QEND_t + MEND_t) + b_{i,4}(YBEG_t + QBEG_t + MBEG_t) + \varepsilon_{i,t}$$

Results are documented in Table 2.

Again, a strong spike at quarter-ends is visible, followed by a sharp decline. Interestingly, ER5 (Large Cap funds), remain relatively constant, with month-ends slightly higher than month-beginnings, but no significant increase at quarter-ends. In contrast, ER7 (Smaller Companies funds) has by far the biggest jump at quarter-ends, while underperforming the markets at month-ends. Also note that, with the exception of the Equity Financial Sector funds, YBEG+QBEG+MBEG (all month-beginnings) are consistently lower than YEND+QEND+MEND (all month-ends).

While five all-quarter-beginnings are statistically significant at the 10% level, the rest of the results, with the exception of all-month-beginnings, tend to be non-significant.

3.2 Tests using daily individual unit trust returns

In this section, abnormal returns at period ends are further analysed, this time comparing all funds' performances on certain days with the performance of the FTSE/JSE All Share index, and not grouping funds into categories. The percentages of funds beating the index are shown in Table 3.

Table 2: Regression coefficients: Quarter-ends vs. month-ends

	Coefficients								
	ER1	**ER2**	**ER3**	**ER4**	**ER5**	**ER6**	**ER7**	**ER8**	**ER9**
Intercept	0,01% *p=0,63*	0,01% *p=0,43*	0,00% *p=0,77*	-0,02% *p=0,21*	0,01% *p=0,61*	0,03% *p=0,15*	0,01% *p=0,60*	0,01% *p=0,40*	0,01% *p=0,66*
YEND + QEND	**0,32% *p=0,02***	**0,23% *p=0,10***	**0,21% *p=0,08***	**0,26% *p=0,06***	-0,08% *p=0,35*	0,28% *p=0,19*	**0,55% *p=0,01***	0,23% *p=0,16*	0,24% *p=0,20*
YBEG + QBEG	0,09% *p=0,51*	0,14% *p=0,29*	0,01% *p=0,95*	-0,07% *p=0,62*	-0,06% *p=0,50*	-0,07% *p=0,74*	0,08% *p=0,69*	-0,05% *p=0,74*	0,13% *p=0,48*
YEND + QEND + MEND	**-0,15% *p=0,08***	-0,11% *p=0,16*	-0,10% *p=0,17*	-0,11% *p=0,17*	-0,01% *p=0,90*	-0,15% *p=0,23*	-0,19% *p=0,13*	-0,02% *p=0,80*	-0,16% *p=0,13*
YBEG + QBEG + MBEG	**-0,22% *p=0,01***	-0,05% *p=0,53*	**-0,20% *p=0,01***	**-0,21% *p=0,01***	**-0,15% *p=0,00***	**-0,38% *p=0,00***	**-0,35% *p=0,00***	**-0,24% *p=0,01***	**-0,31% *p=0,00***

Observed significance levels less than 10% are depicted in bold

On average, around 50% of funds beat the index on any given day. At year-ends, however, nearly 65% outperform the index, followed by 43% on the next trading day. At quarter-ends that are not year-ends 52% beat the index, with only 39% managing that on the following trading day. It is interesting that such a big difference exists between quarter-ends and – beginnings, considering that quarter-end performance is only slightly higher than the average.

Table 3: Percentage of funds beating the ALSI

	% of funds beating the JSE All Share index Jan '96 – Dec '02
At year-ends (YEND)	64,74%
At year beginnings (YBEG)	43,32%
At quarter-ends (QEND)	51,66%
At quarter beginnings (QBEG)	38,55%
At month-ends (MEND)	47,45%
At month beginnings (MBEG)	40,59%
Other days	50,27%
All days	49,79%

The strong evidence of abnormally high returns at the end of March, June and September indicates that seasonality in equity fund returns cannot be explained exclusively by year-end holidays. Similarly, the scant evidence of NAV inflation around non-quarter month ends suggests that the effect at quarter ends cannot be explained by monthly events such as monthly adjustments of investments.

The percentage of funds beating zero is interesting in that the only points which beat the overall average occur at year-ends and month beginnings. This may indicate that beating zero is not such an important goal as beating the index. In addition, in a bear market characterised by negative returns, it should be easier to beat the index than to show positive returns, while in a bull market, positive returns should occur without any intervention from the fund manager.

Table 4: Percentage of funds beating zero

	% of funds beating zero Jan '96 – Dec '02
At year-ends (YEND)	69,10%
At year beginnings (YBEG)	41,37%
At quarter-ends (QEND)	53,26%
At quarter beginnings (QBEG)	26,36%
At month-ends (MEND)	53,09%
At month beginnings (MBEG)	61,05%
Other days	53,63%
All days	53,84%

3.3 The relationship between period ends and beginnings

It has been shown that an end-of-quarter positive return is regularly followed by a beginning-of-quarter negative return. However, a relationship between these events has not yet been shown. It is conceivable that rising fund returns at quarter-ends occur independently from reduced returns at the beginning of quarters. If the effects are related, there should be negative correlation in a cross section of funds, as quarter-end returns will rise and quarter-beginning returns fall if NAV is inflated. Therefore, this section investigates whether the relationship between two consecutive days' return of a cross section of funds are more negative when those two days are the end and the beginning of quarters.

Firstly, consider the following model:

$$R_{f,t} = b_{0,t} + b_{1,t}R_{f,t-1} + \varepsilon_{f,t}$$

where $R_{f,t}$ is fund *f*'s excess return on day *t* (excess of the FTSE/JSE (TR) All Share J203T index), and b_1 the cross-sectional slope coefficient. The model seeks to explain today's excess return as a function of yesterday's excess return.

Secondly, we use the model

$$b_{1,t} = \lambda_0 + \lambda_1 YBEG_t + \lambda_2 QBEG_t + \lambda_3 MBEG_t + \varepsilon_t$$

to establish whether, when t is the first day of a quarter, the slope coefficients $b_{1,t}$ are significantly lower. YBEG, QBEG and MBEG are defined as before. There are 1754 observations on $b_{1,t}$. The results are shown in Table 5.

The hypothesis is that the coefficients of both YBEG and QBEG should be negative. Although this is true for λ_1, it is not true for λ_2. From this it can be concluded that the year-end high return and the low return on the following day are both caused by the inflated year-end NAV, but the same cannot be concluded for the quarter-end returns. The results, however, are not statistically significant.

Table 5: Cross-sectional coefficients

	λ_0	λ_1	λ_2	λ_3
All funds	**2,80%**	-11,99%	4,67%	0,11%
p-value	***0,0132***	*0,4929*	*0,6448*	*0,9860*
Funds 1996 - 1999	**2,63%**	-13,53%	15,56%	-5,94%
p-value	***0,0786***	*0,5598*	*0,2473*	*0,4751*
Funds 2000 - 2002	**3,03%**	-9,95%	-9,85%	8,18%
p-value	***0,0796***	*0,7090*	*0,5241*	*0,3924*

Observed significance levels less than 10% are depicted in bold

The regression was repeated, this time splitting the data in two periods, namely 1996 – 1999 and 2000 – 2002. In the first case (1996 – 1999) only the YBEG and MBEG's coefficients were negative, but in the second (2000 – 2002) both the YBEG and QBEG's coefficients were negative, while MBEG's were positive. Once again the results are not statistically significant. However, the evidence provided by the signs of the coefficients support the idea that the quarter-end high return and the next-day low return have a common cause in the inflated year-end or quarter-end unit trust value. This is especially interesting in the light of the statement "Everybody window-dressed in the old days but fund managers now realise that it just puts up a higher hurdle for the next quarter's results. Internal compliance has also improved radically in the industry" (Hendrik du Toit, as quoted in Wood (1999:43)). The evidence suggests that upping performance has not been eradicated totally.

4. SUMMARY AND CONCLUSION

The patterns described in year-end and quarter-end pricing behaviour of unit trusts, tend to confirm the findings of Carhart *et al.* (2002) in the USA market and are consistent with a hypothesis of "window dressing". However, the evidence provided here is weaker in the sense that the results tend to be less statistically significant than those of Carhart *et al.* (2002). This may be due to a much smaller data base, but a more probable cause can be found in the difficulty of establishing reasonable benchmarks for the different sectors and the individual trusts within those sectors.

For the individual investor, the most important lesson to be learned from this study is that one should invest in unit trusts at the beginning of a quarter and sell at the end, and not the other way round. This could have a cumulative effect if investors were investing on a monthly basis; they would be well advised to make his payment at the beginning of each month instead of the end, as the returns achieved can differ markedly from investing at month ends.

The investor might even be tempted to buy Smaller Companies funds a week before a quarter ends, and sell at the end, thereby locking in all possible price inflation. However, the transaction costs involved, and delays in execution of the order, make unit trusts ill suited for such short-term speculative transactions.

Payment and incentives in the world of money management poses a conundrum: Because so much depends on a fund doing well (future investment, prestige to the firm, etc.) one would want to reward the managers who attain such performance. However, this also gives those same managers a vested interest in artificially enhancing those performances. This is of course not only true for unit trust managers, but it does provide a motive for "beating a benchmark" or "leaning for the tape".

Market manipulation is illegal in South Africa, with hefty fines and even jail time as penalties. In addition, investors who suffered as a result of price manipulation could institute civil claims in order to receive compensation for their losses (Gleason, 1998). The threat of possible scandal resulted in most firms adopting international standards. These include the standard of the UK-based Investment Management Regulatory Authorities (IMRO) and the US standard of the Association for Investment Management & Research (AIMR) (Wood, 1999). Similar to insider trading, cases of market manipulation are not always easy to prove, and self-regulation would appear to be the most effective way to address these issues. However, it appears that despite the best efforts of regulators, stamping out performance inflation in the unit trust industry is near impossible in an environment which provides both the incentive and opportunity for such behaviour.

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