Asset Manager Performance Analysis

Data Mining, Optimization, and Data Visualization (2010 Fall) Mentor: Daniel Egger, JD
SrujanAlluri / MargeirAsgeirsson / Tushar Karkhanis / Mengxi Lu / Devashish Singh / Inho Yoon

ABSTRACT

In this study we analyzed data from developed equity markets excluding the US and performance of asset managers in those markets. Our main finding is that a model that adjusts excess returns for number of holdings in portfolio and cross-sectional dispersion in the market, can model the overall pattern of manager returns. Also that managers seem to show attributes of herding.

INTRODUCTION

The ex-US Global (Repceafe) Equity Universe consists of 26 developed equity markets excluding the US. In this project we used 4 methods to identify patterns within the data that might be of use to investors regarding which managers they should choose to invest with. We also studied if the managers outperformed the market benchmark as a group.

DATA STUDIED

Two data sets with data from December 2003 to April 2009 have been used, market data and manager performance data.

- Market Data: This includes daily closing prices for all stocks in the ex-US Global (Repceafe) Universe. We calculated monthly equal-weighted discrete returns and the cross-sectional dispersion for each month to use for further analyzes.
- Managers Data: Discrete returns for each individual manager and the number of stocks that particular manager was holding. We used data for 43 managers in our analysis

BENCHMARK SELECTION

Three benchmarks were used in this project: (1) Equal-weighted return of all stocks in Repceafe Universe; (2) MSCI EAFE Benchmark (excludes Canada); (3) Mean monthly returns of the 43 managers.

We identified the best fitting benchmark by comparing the 'MSCI' and 'Equal weighted returns' benchmarks against the 'Managers average return'. Fitting a regression with Manager average returns on MSCI and Manager average returns on the equal weighted return gives the best fit having the least standard error of regression(0.053) with the MSCI benchmark, compared to the model with mean combined return(0.073). A simple line-plot shows that the MSCI almost perfectly superimposes on the Managers average return. This analysis clearly implies that the MSCI bench mark is a better fit. The analysis discussed below is made by comparing the managers' data against the MSCI EAFE index.

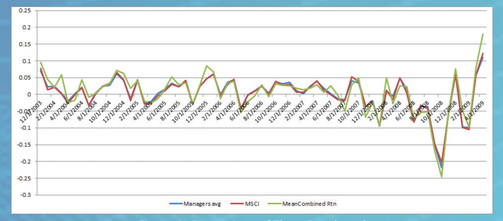

Figure 1 Comparison of Three Benchmarks

AUTO CORRELATION ANALYSIS

Auto-correlation for the discrete excess returns with the same time series lagged one month, was calculated for each manager and compared to average discrete excess returns for the managers.

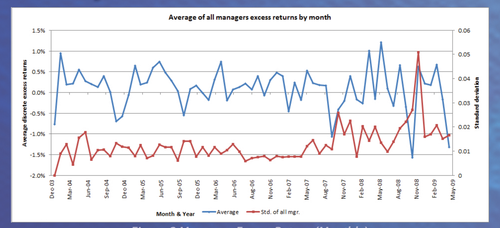

Figure 2 Managers Excess Return (Monthly)

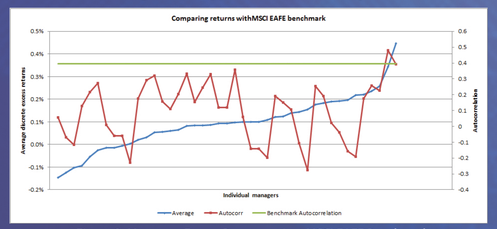

Figure 3 Managers Excess Return against MSCI EAFE Benchmark

In Figure 2 and Figure 3, data was sorted in ascending order of average discrete excess returns. By looking at those graphs there are no identifiable patterns that link the performance of managers and their auto-correlation. We also sorted the data by ascending auto-correlation values and did not see any patterns in those graphs either. It is interesting to note that during the studied period the market benchmark had higher autocorrelation than almost all of the managers.

We also compared the average discrete excess returns of all the 43 managers for each month and the monthly standard deviation of returns for the 43 managers. That graph shows no recognizable pattern that indicates high or low returns on average when the standard deviation is high.

HERDING

Histograms of the excess return were plotted for all managers every month.

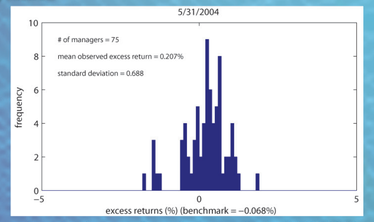

Figure 4 Manager's Excess Return Distribution (05/31/2004)

An important result from this analysis was the inherent herding amongst managers. Figure 5 shows that the returns of all managers are closely 'boxed'. For most months they are herded around zero mean. However, we observed that for a few months, the managers were herding around a different value than zero.

i) Managers are hugging the benchmark. However, we observed that for several months, the managers were herding around a different value than zero.

ii) Managers are perhaps investing in the same stocks within the Repceafe Universe.

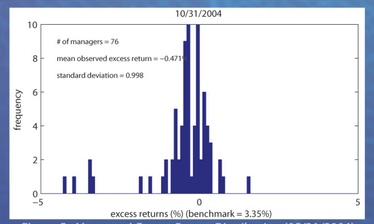

Figure 5 Managers' Excess Return Distribution (05/31/2004)

Z-SCORE ANALYSIS I

Excess return was adjusted for number of holdings (n) and cross-sectional dispersion by calculating a z-score, using the following formula:

Z-score = Excess return*sqrt(n)/X dispersion.

We then made two sets of histograms for the managers' z-scores.

- Manager specific: Histogram for each individual manager z-scores grouped into bins with width 0.25. Then a standard normal curve with mean 0 and standard deviation was superimposed on to of the histograms.
- Month specific: We made similar histograms of managers' returns for each month.

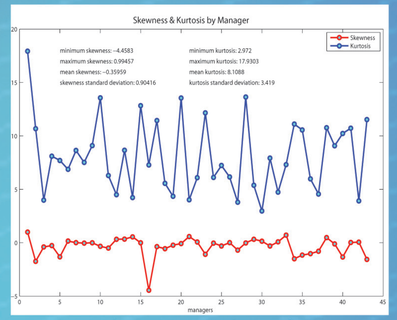

Figure 6 Skewness & Kurtosis Information by Managers

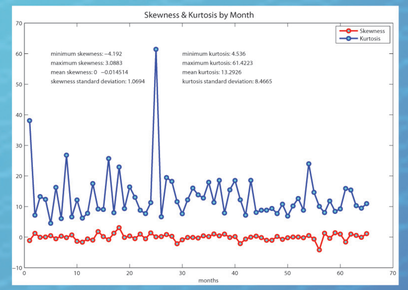

Figure 7 Skewness & Kurtosis Information by Months

Table 1 Summary of Skewness and Kurtosis Analysis

	Skewness		Excess Kurtosis	
	Per Manager	Per Month	Per Manager	Per Month
min	-4.456	-4.192	2.972	4.536
max	0.995	3.088	17.93	61.422
mean	-0.36	-0.015	8.109	13.293
st. dev.	0.904	1.069	3.419	8.467

Z-SCORE ANALYSIS II

Based on the histograms of total observation for different benchmarks (not normalized), we fitted a Gaussian function to the histograms to validate randomness of the manager performance over extended period of time.

$$y=y_0+(A/(w\times\mathrm{sqrt}(\pi/2)))\times e^{(-2((x-x_c)/w)^2)}$$

The fitting result tells us that the manager performance distribution is not deviating from normal distribution function over time. High chai-square and adjusted R^2 values of fitting (b) is strong indication that distribution of manager performance is close to normal distribution.

Table 2 Fitting Results of Three Benchmarks

	(a)	(b)	(c)
χ^2	432.3642	440.6926	386.69285
Reduced χ^2	122.3921	412.3325	467.213
DOF /bin size	56 / 1	24 / 1	22 / 1
RSS	6853.95991	9895.97922	10278.68647
$\bar{R}^2$	0.99142	0.99256	0.99255

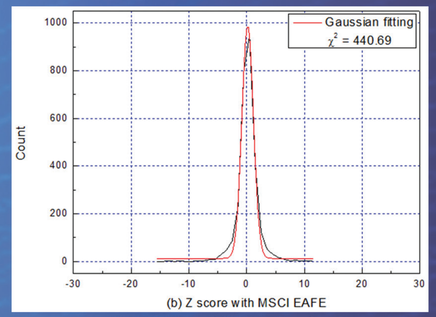

Figure 8 Z-Score of MSCI EAFE Benchmark

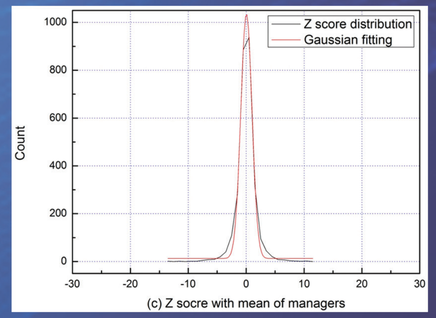

Figure 9 Z-Score of Managers' Mean Return

CONCLUSION

The key finding is that when discrete excess returns are adjusted for number of holdings in portfolio and cross-sectional dispersion of returns we can model the return pattern of all the managers over a long period of time using a normal distribution.

- Managers seem to be herded around the MSCI EAFE Benchmark. For most months close to normally distributed around zero excess returns.
- Herding behavior of managers is not always observed around zero excess return, their returns are occasionally centered and herded above or below the zero.

A possible explanation is that the managers might be investing in similar stocks. A significant change in prices of these stocks can shift the excess returns values for the managers we are analyzing away from the zero excess return value.

Also we find that auto-correlation of a manager's return does not give us any valuable information about the future returns for that manager.

ACKNOWLEDGEMENTS

We are indebted to Daniel Egger for his guidance and input on the statistical methods we used to look for patterns in the data. We also acknowledge Joseph Lust for providing us with MATLAB script to convert daily returns to monthly returns.

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