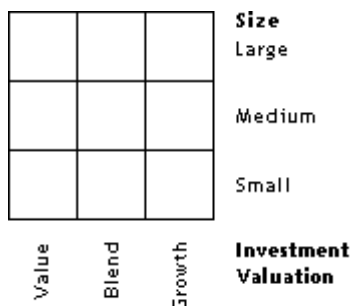


Recent Mutual Funds Performance and Efficient Investment Strategies

This document is a glimpse on performance of the US mutuals in last three years. The analyses aimed to provide basis for decisions on portfolio allocation and investment risk management employs data on 63 mutual funds marketed in the US. It summarizes basic performance data and uses statistical measures in their assessment. Morningstar Style Box is used as a tool in defining basic categories of investment strategy. The stress is on analyses of investment risk as core returns determinant and risk adjustment of returns. Outcomes and prospects of most common investment strategies (growth, value, index) are discussed and confronted with long-term equity market trends.

Morningstar style box is a graphic tool aimed to provide easy orientation in core portfolio characteristics that determine investment risk. The box presents a two-dimensional matrix composed of Investment valuation (P/E ratio) and Size (market capitalization) with nine possible output categories. This is applicable to any portfolio e.g. mutual funds investing in stocks, stock index and indicative on overall market move. [Morningstar](#) is a premier market data source and use its box extensively in the market coverage.



Basic assumptions are that (under efficient markets hypothesis) higher returns can only be achieved by accepting higher investment risk. In the Morningstar box risk increases from value and large size toward growth and small and so should long-term averaged returns. Thus investors can base on this typology their investment strategies as projected on their target investment time and risk aversion.

Output data are based on 63 mutual funds marketed in the US. The source of the data is Morningstar. There is some inevitable bias in sample selection. For sample to be standardized vast majority of the funds allocate their portfolios in US equity markets and S&P 500 is used as standard index unless otherwise specified. Sample was designed to be representative for each Morningstar Style Box category as possible but this is not easily achievable as some categories of funds are much more common than others. This results in trade-offs between sample standardization and its representative power. In general larger funds with higher total assets of established fund families were preferred as they are more common investment targets. Large growth and large value funds are most common funds in the US and

are also relatively overrepresented in the sample. On the other hand medium size value and medium blend are most scarce and as there are only two and three respectively included in the sample for these categories results may have lower statistical power. However, this represents investment trends in the US. It may be noted that as Morningstar Style Box methodology is not a standard its classification may differ in some cases from claims of the fund on their investment strategy. For example Vanguard Large Cap Index is categorized as large blend according to Morningstar methodology.

The results are expected to be close to those of average American investor and the analysis indicative for investment decisions. Analyzed data traits three years plus 5y and 10y returns are included unless applicable. Complete data set used in the analysis can be downloaded [here](#).

In following series Morningstar Style Box is used to be filled with values for the corresponding categories with different variables associated with fund performance. This starts with investment risk measured by volatility as the core investment variable. Measure of risk clearly match anticipated values. Most risky are small growth stocks and large value are associated with lowest risk. For investor it may be interesting that large growth portfolios were less risky than small value.

Morningstar Style Box – SD (volatility) averages			
9.16	9.86	12.09	Large
9.01	11.77	13.78	Mid
12.28	12.67	14.07	Small
Value	Blend	Growth	

When comparing risk to 3y pa returns some patterns corresponds to underlying risk analysis. For each size returns increase toward growth valuation. As expected riskier stocks with less certain future profits brought higher returns in 3y run. However, anomaly on the vertical scale is evident. Smaller size investments although riskier did not bring higher returns during last three years.

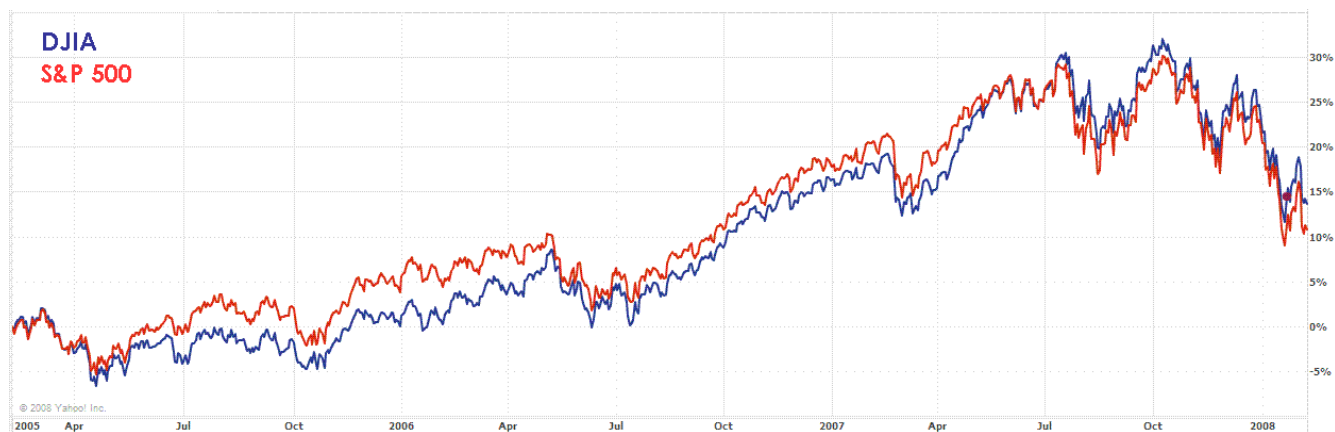
Morningstar Style Box – 3y pa averages			
6.36	7.03	7.17	Large
4.66	5.78	6.29	Mid
4.41	4.23	4.61	Small
Value	Blend	Growth	

Even more puzzling are 5y returns as there are not clear trends. It is also important to note that in the sample there are included some mutuals that operate for less than five years. Therefore 5y returns averages table include only figures of 52 funds compared to 63 of full sample.

Morningstar Style Box – 5y pa averages			
13.84	14.65	12.69	Large
15.55	16.50	13.39	Mid
14.95	14.51	15.69	Small
Value	Blend	Growth	

However, when medium value and blend results are not considered as there are only two funds for the both contrary to 3y returns table figures point out to higher returns associated with lower size. Important fact on all risk and returns data are they high dispersions. It can be well observed on the chart further bellow relating P/E to 3y returns.

When finding clues for the returns distribution it may be useful to draw developments of market defining indeces in last 3 years. Bellow is the chart comparing returns of Dow Jones Industrial Average and S&P 500. Basic fact is that S&P 500 has lower average capitalization than DJIA that consist of 30 large US companies. S&P 500 is a match for large blend in terms of Morningstar Style Box methodology but the trend is clear. S&P 500 has inevitably higher risk but provided some lower returns in the last three years. The margin is even more evident in medium and small size equivalent indeces such as Russel 2000.



Consequences of unexpectedly low returns in small size can be clearly traced in alpha values as well. Values for the small categories show distinctively negative values. Alphas just show what is evident from figures shown above. That low small size returns are low compared to risk.

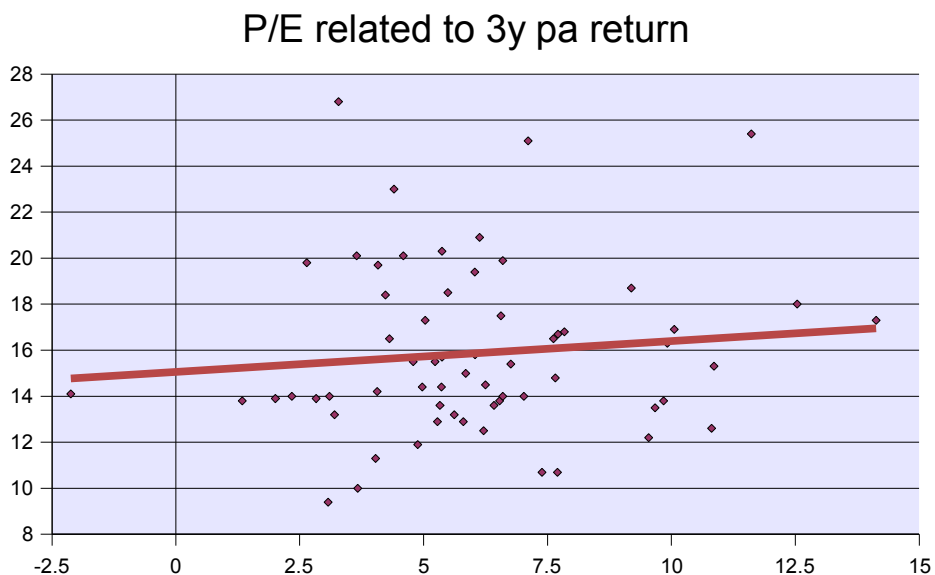
Morningstar Style Box – average alphas			
0.42	0.88	0.51	Large
-0.78	-0.29	-0.07	Mid
-1.72	-1.90	-1.30	Small
Value	Blend	Growth	

However, it is not easy to generalize on low returns of small size. Considering that three years is short time to assess equity returns fact that they do not match long term average is not surprising. This is also confirmed by 5y returns that are closer to expected relations. There is not a reason to expect that risk/returns distribution patterns will be different in future and therefore the fact of small size under performance can hardly have any indicative value. At least according to assumptions of Efficient

Markets Hypothesis (EMH) of course. The one pitfall (within scope of EMH) is measurement of risk as volatility is increasingly criticized not to be the best indicator of investment risk. However, opponents may argue that the EMH is increasingly criticized as well and explain abnormally low returns as excess volatility suggested by behavioral finance school. Anyway, one clear conclusion is that investor might be confused when superficially assessing alphas and may have been discouraged to invest into small sizes equivalents on this base while the alphas fundamentally do not relate to actual relative fund performance in this case..

The data show that there is not substantial difference in returns in value vs. growth strategies. There is not a difficulty to point to higher risk to justify slightly higher returns of growth portfolios. This is in line with previous observations and efficient markets hypothesis claims that portfolios with the same risk provide the same returns..

Further investigating P/E return relationship bellow is graphic representation of P/E and 3y return dependence. Correlation between P/E and the return is in fact weak when equal to 0.105. This can be seen on the trend line which relates lower P/E with lower returns and vice versa. High dispersion is noticeable as well. This can be concluded that increasing of portfolio P/E lead to slightly higher returns and there is no distinct justification for value nor growth strategies as superior in returns.



Many of the findings of this analysis supports image of efficient markets but with one exception. Index funds seems to be less successful in the sample as some other research claims. In risk unadjusted returns 57.14 % of the funds overperformed S&P 500 index. The explanations is higher risk premia that is taken by the funds. Average beta of the sample is 1.16 indicating 16 % higher risk taken by the funds compared to the index. Average alpha is -0.15 what is slightly bellow to S&P 500 index funds (-0.07 and -0.06 for index funds in the sample). This corresponds to 46.03 % of mutual funds overperforming the index when their returns are risk adjusted. Considering statistical constraints there is virtually no difference between active and passive portfolio management.

However, there are some indirect points which may be interpreted as skeptical evidence on active portfolio management. They are statistical insignificance of differences in portfolio management performance and absent correlation of time series of mutual funds returns.

Some investors (especially those who trust active portfolio management) may assume that it is substantial to choose the best portfolio manager and it may sound for them reasonable that some fund family will have reproducibly different results over time depending on their experience. By investigating the sample for investment success in relation to fund family (portfolio manager) table shown bellow is produced. In the table only fund family with at least five funds (in the sample) is included to lower statistical error. However, as the variations do not exceed 0.41 SD for the alpha and 0.31 SD for Sharpe ratio variables they are not statistically significant anyway. In the fund family table alpha values dispersion is much lower than in Morningstar Style Box average values what also points out that fund manager is not major determinant of the performance.

Fund family	Av Sharpe ratio	Av Alpha
Vanguard	0.38	-0.74
Pioneer	0.28	-0.85
Fidelity	0.41	0.84
JPMorgan	0.30	-0.46
Allianz	0.39	0.72
USAA	0.35	0.23

Much stronger and more interesting indicator is correlation of fund performance in different time series. Morningstar provides 10, 5, 3 years and shorter returns for the funds. As described above not all funds of the sample have 5y performance and even less have 10y performance figures. Anyway, crucial assumption of active portfolio management is a certain stability in returns as it is assumed to be provided by the portfolio manager experience. Correlation in equities time series is one of central and unresolved issues in market research with dramatic consequences on views on market efficiency. For this reason many much more sophisticated measures had been performed by various economists. The mainstream claim derived from EMH and backed by solid research is absence of any correlation (unjustified by risk premia) in equities time series. The correlation in the sample is 0.596 for 3y to 5y returns and 0.276 for 3y to 10y. These values are of course not worthwhile until subtracted from the overlapping parts. Interpolated values are -0.004 for 3y to 5y and -0.034 for 3y to 10y or virtually equal to zero. Therefore it can be assumed that historical returns of the mutual funds does not have any future indicative value.

Conclusions may be that:

- Morningstar Style Box presents useful tool for investment strategy typology helping investors to assess their investment risk and expected returns. Target investment time seems to be the only crucial allocation determinant for rational investors. Furthermore risk aversion may be important for irrational investors. But non-market circumstances like fees, taxation play substantial role rather than market timing or other attempts to overperform the market.
- Long term average returns of mutual funds with portfolios allocated on the US market are close to 7 % pa. In last three years riskier investments of smaller size provided lower returns but returns

distributions are closer to expected values in 5 years run.

- There is no “special” advantage from neither value nor growth investment strategy – the market discounts against risk only. Slightly higher average returns can be achieved by accepting higher P/Es but the relationship is weak. In the sample there are not “exceptional” performers and alternative investment strategies seem to be problematic.
- Index investing provides lower than average risk and according to this research only slightly higher risk adjusted returns compared to actively managed funds. Most of mutual funds take higher investment risk than those of S&P 500 index
- There seems not to be justification for any correlation patterns of past returns in line with other research. In general findings point out that the market works quite efficiently and has difficulty to produce abnormal profits.