Does Asset Allocation Policy Determine Performance?

Introduction

In 1986 G.Brinson, R.Hood and G.Beebower published a widely known article "Determinants of Portfolio Performance" (BHB). Based on the analysis of returns of 91 US corporate pension funds for 1974 to 1983 authors concluded that "investment policy (Strategic Asset Allocation – SAA) dominates investment strategy (Tactical Asset Allocation – TAA, and Security Selection – SS) explaining on average 93.6 per cent of the variation in total plan return". In 1991 G.Brinson, B.Singer and G.Beebower repeated the calculations based on updated data (Brinson et al, 1991 - BSB) and concluded that "asset allocation policy (SAA) … is the overwhelmingly dominant contributor to total return.

At the same time as BSB an article appeared by C.Hensel, D.Don Ezra and J.Ilkiw, which highlighted errors in calculations in BHB and BSB. In the second half of 1990s W.Jahnke, J.Surz et al and others published a number of articles, in which they claimed that in BHB and BSB the calculations were conducted not as was necessary and they calculated also not what was necessary. Ibbotson and Kaplan summed up the discussion and formulated the "three distinct questions about the importance of asset allocation". Authors stated that the discussants simply looked at the different aspects of the importance of asset allocation (more precisely, the importance of factors, determining funds' returns). Finally, in 2003 M.Kritzman and S.Page provide their definition of the importance and offer a methodology of determination of the most important factor.

We believe that all factors, which determine a fund's return, are valuable. Instead of discussing whose definition of importance is more important, we propose to answer a question, which we believe lies at the heart of BHB and BSB: what factor determines the performance of a fund better than others? The proposed methodology is based on Attribution Analysis (AA) of funds returns.

The remainder of the article is organised as follows. We begin by analysing BHB and BSB from the point of view of AA problem. Next, we describe our data and conduct calculations, similar to BSB. Then, we use the obtained attributes to find the factor, which determines return. We then provide additional comments and calculations as well as some conclusions.

1. Analysis of BHB & BSB

Firstly, let's briefly describe the AA problem (Kirievsky L. and A. Kirievsky). We have a given set Ω of feasible values of independent variables $u, v, \ldots$ and an objective function $f = f(u,v,\ldots)$. In the set Ω there are selected two points: a benchmark position $\{u_1,v_1,\ldots\}$ and an analysing position $\{u_2,v_2,\ldots\}$. It's required to decompose the deviation of the function $\Delta f = f(u_2,v_2,\ldots) - f(u_1,v_1,\ldots)$ into pure effects of deviations of the variables $\Delta f_u = f(u_2,v_1,\ldots) - f(u_1,v_1,\ldots)$, $\Delta f_v = f(u_1,v_2,\ldots) - f(u_1,v_1,\ldots)$,… and the remainder, called Interaction or Cross Product. Variables can be of different nature, for example vectors or matrices.

In BHB and BSB two AA problems are initially solved:

1. Fund's total return for the selected time interval [1..T] is considered as a function of two vector series: weights $\{w_{it}, i = 1..n, t = 1..T\}$ and returns $\{r_{it}, i = 1..n, t = 1..T\}$ of n sectors. The set Ω of feasible variable values is defined by the constraints:

$$\sum_{i=1}^{n} w_{it} = 1 \text{ for any } t; \quad w_{it} \geq 0 \text{ for some } i \in [1..n] \text{ and } t \in [1..T]$$

The benchmark position is defined as the fund's strategic allocation and sector indices returns. Actual asset allocation and actual sector returns define the analysing position.

2. In the second problem the same objective function is considered as a function of one variable - $\{w_{it}, i = 1..n, t = 1..T\}$, and the benchmark of the first problem is selected as an analysing position. Benchmark position was not defined at all (or defined as $f(u_1)=0$, which is equivalent). Naturally, entire change in the function has to be attributed to the change of the only variable – asset allocation.

The error regarding the definition of the benchmark position in the second problem was pointed out by most of the critics of BHB and BSB, beginning with C.Hensel, D.Don Ezra and J.Ilkiw[1]. Note that as such position must be feasible and sector indices returns could be considered as nonnegative, then the function will only be equal to 0 when the returns of all sectors with non-zero weights are also equal to 0.

In conducting the calculations, authors made two "simplifications" (In BSB it was referred to as "[a lack] of some precision because of performance data limitations"). Firstly, they did not have the "normal weights" (Strategic Asset Allocation), and thus they approximated them by a 10 year mean average of actual allocation for every fund and every sector. Such approximation can significantly bias the values, attributed to SAA and TAA: if the true SAA is constant throughout the whole time period, then the use of approximation will, probably, reduce the values of TAA. If, however, the strategic allocation was changed during the calculation period, then changes in values for SAA, SS and TAA can only be calculated post factum. The critics of BHB did not attach importance to this significant issue (in our opinion), despite the fact that authors themselves "were worried". However, as the authors assumed, "since 10 years covers several business cycles … this is probably not a serious problem in the analysis". At the same time in BSB they noted that it "may have created an inefficient benchmark" and could explain some irregularities in results.

The second simplification is related to sector weights. Portfolios "consisted of common stocks, marketable bonds, cash equivalents and a miscellaneous category, "other"". Weights of the other component were 8.6 per cent on average and more than 50 per cent in some portfolios. Authors did not have the complete information on the other component, and thus they decided to exclude it entirely, and to distribute its weight proportionately between the remaining three sectors. Note that the authors thought that in some cases the "other" category referred to real estate.

The summary of the reported results is presented in Table 1. Based on the fact that values for strategic return were significantly higher than for TAA and SS, authors drew the conclusion about the "ability of investment policy to dictate actual plan [fund] return".

[1] It is interesting to note that C. Hensel, D. Don Ezra and J. Ilkiw worked for Frank Russell in early 1990s, where at that time a methodology for the AA problem in case of multi period time interval was being developed. The resulting scheme is fundamentally different from that used in BHB and BSB (Carino, Kirievsky et al).

Table 1: Selected results from BHB and BSB
per cent

	Strategic Return*	TAA	SS	Interaction	Active Return
			BHB		
Average	10.11	-0.66	-0.36	-0.07	-1.10
St. Dev	0.22	0.49	1.36	0.45	1.45
Max	10.57	0.25	3.60	2.57	3.69
Min	9.47	-2.68	-2.90	-1.17	-4.17
			BSB		
Average	13.49	-0.26	0.26	-0.07	-0.08
St. Dev	0.49	0.47	1.52	0.80	1.67
Max	14.56	0.86	6.12	1.33	6.73
Min	12.43	-1.81	-3.32	-3.50	-3.43

Note: * We refer to it as strategic return and not SAA as the benchmark for SAA was not defined and its return was not subtracted from the strategic return

Next, authors made an attempt to quantify the influence of funds' strategic returns on their actual returns. In doing this they did not use the obtained attributes for the selected 40 quarters interval: they calculated actual return and strategic return (and strategic return plus TAA, strategic return plus SS – in other words they solved the same two AA problems, although they did not calculate the pure effects) but for every single quarter in that 10 year period, and conducted a regression analysis between a time series of actual returns and strategic returns. R. Ibbotson and P. Kaplan noted that these calculations provide an answer to the question of how much of fund's variability in return through time could be explained by variations in strategic return (93.6% and 91.5% on average). Furthermore, such simultaneous variation of actual return and strategic return in time is due to fluctuations of "the capital markets in general, not from the specific asset allocation policies of each fund". As we mentioned earlier, we are interested in a completely different question, which is this: "The attribute of which variable determines the return of the fund better, than attributes of other variables"?

To demonstrate "the dominance" [of SAA] authors in BSB calculated coefficients of determination for actual returns and other return time series. If instead of the correlation analysis of series across time they calculated coefficients of determination for actual returns of funds for the whole interval and their strategic returns, TAA and SS, then we probably would even 10 years ago believe that SS is the determinant of portfolio return.

In the concluding part of BSB authors made an attempt to determine the degree of use of futures and options by fund managers. Positive equity returns of some funds in the last quarter of 1987 "when the market as a whole was down by almost 25%" indicate that the funds used hedging, but the absence of data did not allow for its extent to be quantified.

BHB and BSB describe a framework for analysis, which somewhat repeats the analytical framework from the article by G. Brinson and N. Fachler. Unfortunately, in describing

computational aspects of the framework in all three publications the authors provide formulas only for the single period AA problem, that is where the asset allocation and sector returns are given for only one moment in time.

The framework and the main result from BHB and BSB on the dominance of strategic return in explanation of fund's variability of returns through time, based on single period calculations, have been extensively cited in the literature. At the same time we are not aware of any publications on AA methodology for the multi period time interval, where the scheme used in BHB and BSB was analysed.

2. Data

To demonstrate the suggested methodology to find the determinant of portfolio return and to compare the results with those in BSB we use data on the Australian growth funds.[2]

The database contains information on monthly strategic and actual asset allocation and actual fund returns. Funds' assets were allocated to the following 8 sectors: Australian Shares (AS), International Shares (IS), Listed Property (LP), Unlisted Property (UP), Australian Bonds (AB), Australian Inflation Linked Bonds (AILB), International Bonds (IB) and Cash. The following were used as indices: S&P/ASX 300 Merged Accumulation Index, MSCI World Ex Australia Index in $A (Unhedged), ASX Property Trusts Accumulation Index/ S&P/ASX 200 Property Merged Accumulation Index, Asset Weighted Average of Unlisted Property Funds, UBSWA Composite Bond Index All Maturities, UBSWA Inflation Linked Bond Index All Maturities, SB World Govt Bond Index Ex-Aust Hedged/ SB World Govt Bond Index Ex-Aust in LC and UBSWA Bank Bill Index.

We selected two three-year periods for our analysis: from January 1997 to December 1999 and from January 2000 to December 2002. From the 31 funds in the universe we selected 26, for which data was available for the entire 1997-2002 period.

Strategic asset allocation is not constant. It changes both in time and from fund to fund in both selected time periods. The range for SAA among the broad categories of shares, bonds and property is presented in Table 2. A more detailed breakdown for SAA is presented in Table 3.

Table 2: Strategic Asset Allocation Range
1997-2002

	Min (%)	Max (%)
Shares (AS+IS)	45.0	67.0
Bonds (AB+AILB+IB)	11.7	35.0
Property (LP+UP)	4.0	15.0

[2] Data was provided by InTech Research Pty Ltd (www.intech.net.au).

Table 3: Strategic Asset Allocation
Per cent, 1997-1999 vs 2000-2002, by sector

Sector	AS	IS	LP	UP	AB	AILB	IB	Cash
1997-1999 period								
Average	37.99	20.76	6.26	3.40	19.40	1.42	4.14	6.62
St. Dev	3.158	2.817	3.202	3.512	4.600	2.388	3.513	3.786
Max	42.92	27.00	12.00	15.00	35.00	9.17	13.44	15.00
Min	30.00	15.00	0.00	0.00	10.28	0.00	0.00	0.00
2000-2002 period								
Average	37.93	22.21	6.26	2.20	19.84	0.80	5.19	5.56
St. Dev	2.693	3.538	2.292	2.634	5.485	1.756	3.242	3.128
Max	40.00	31.81	12.00	9.91	35.00	6.28	13.08	10.56
Min	30.00	15.00	3.00	0.00	10.64	0.00	0.00	0.00

3. Calculation of Attributes

In 1991 Hensel et al assumed that the average asset allocation held by large pension funds was 50 per cent US stocks, 5 per cent IS, 30 per cent US bonds, 5 per cent real estate and 10 per cent cash. Such allocation is close to average allocations, mentioned in BHB and BSB: 57.5 per cent and 53 per cent stocks, 21.4 per cent and 24.5 per cent bonds, 12.4 per cent and 12.1 per cent cash and 8.6 per cent and 10.5 per cent "other". In 1999 Surz et al provided the following average allocations: 51.7 per cent in stocks, 35.2 per cent in bonds and 13.2 per cent in cash for mutual funds and 43.7 per cent in stocks, 38 per cent in bonds, 13.3 per cent in cash and 13.3 per cent other for pension funds. If we take the stated in Hensel et al allocation as a starting point, and following the procedure in BHB and BSB distribute the "other" category between stocks, bonds and cash, then we will obtain 57.89 per cent in stocks, 31.58 per cent in bonds, and 10.53 per cent in cash. This allocation or even a rough 60/40 split between stocks and bonds can be used as a benchmark for SAA.[3]

As we show below, to find the answer to the question as to which variable determines return better than others we use the ranks of SAA attributes. Their calculations do not require the use of a benchmark for the SAA (that is, there is no need to solve the second AA problem). However to conduct Attribution Analysis on Australian data it is necessary to select an allocation corresponding to US allocations {50, 5, 30, 5, 10} and {60, 0, 40, 0, 0}. Based on the average SAA values in Table 3 we start with an allocation of {38, 21, 6, 3, 20, 1, 5, 6} in the same order of sectors, as that used in describing the Australian data. Next, we substitute IS with AS, UP with LP and combine all bonds in AB: {59, 0, 9, 0, 26, 0, 0, 6}. Finally, we allocate the 'other' LP category between AS, AB and Cash: {65, 0, 0, 0, 28.5, 0, 0, 6.5}. The results of benchmark returns are given in Table 4.

[3] Our intentions were to simply feel the gap in the results in BHB and BSB with the values for benchmarks and thus recalculate the attributes for the SAA. Unfortunately, our numerous attempts to obtain the index data used in BHB and BSB were unsuccessful.

Table 4: Benchmark Returns
Per cent

Benchmark Allocation	38/21/6/3/20/1/5/6	59/0/9/0/26/0/0/6	65/0/0/0/28.5/0/0/6.5	70/0/0/0/30/0/0/0
1997-1999	14.408	11.029	11.056	11.464
2000-2002	1.907	5.181	4.24	4.104
1997-2002	7.977	8.066	7.594	7.721

The exclusion of some sectors and subsequent redistribution of their weights among the remaining sectors significantly changes the value of SAA benchmark during the 1997-1999 and the 2000-2002 periods (Table 4). However, for the 1997-2002 period as a whole, differences in benchmark returns are not great.

The summary of attribution analysis results for the 1997-1999 and the 2000-2002 periods is presented in Table 5. For all funds the attributes were calculated under two scenarios: first used the actual strategic asset allocation, whilst the second used the average actual fund asset allocation for the corresponding period as the SAA.

Table 5: Summary of Attribution Analysis Results

Benchmark Allocation	SAA 38/21/6/3/20/1/5/6		SAA 65/0/0/0/28.5/0/0/6.5		TAA		Security Selection		Interaction		Active Return	
	1*	2*	1*	2*	1*	2*	1*	2*	1*	2*	1*	2*
1997-1999 period												
Average	0.003	-0.364	3.355	2.988	-0.325	0.041	0.149	0.168	0.051	0.033	-0.125	0.242
St. Dev	0.713	0.792	0.713	0.792	0.471	0.205	1.273	1.197	0.164	0.145	1.188	1.157
Max	1.573	1.130	4.925	4.482	0.561	0.444	3.997	3.459	0.419	0.268	2.495	3.805
Min	-1.408	-2.517	1.944	0.835	-1.238	-0.496	-2.437	-2.208	-0.405	-0.490	-2.397	-1.793
2000-2002 period												
Average	-0.300	-0.378	-2.633	-2.711	-0.222	-0.144	0.281	0.267	0.001	0.015	0.060	0.138
St. Dev	0.857	0.831	0.857	0.831	0.634	0.247	1.276	1.232	0.139	0.068	1.597	1.316
Max	1.364	2.044	-0.969	-0.289	0.745	0.385	3.694	3.368	0.360	0.142	3.974	3.294
Min	-2.728	-1.697	-5.061	-4.030	-2.268	-0.728	-3.187	-3.135	-0.308	-0.131	-3.409	-3.745

Note: * 1 – actual strategy, 2 – average asset allocation as strategy

The replacement of the actual SAA has slightly reduced the average of the SAA attribute and correspondingly increased the average TAA value. However whilst the volatility of SAA did not change significantly, the volatility of the TAA has more than halved. This fact, in our opinion, can be of interest to those, discussing the importance of asset allocation. The value of the SS attribute does not seem to be affected by the replacement in the SAA.

4. Determinant Determination

The proposed methodology to find the determinant of fund's return is based on the analysis of the results of solving the same AA problem as that Brinson et al were solving. We propose to determine which attribute better predicts the productivity of the fund by comparing an attribute's relative position in an ordered list of funds' attribute values and a relative position of return of the same fund in an ordered list of funds' returns.

More precisely, we propose to calculate the ranks of total return, strategic return[4], TAA, SS and then to evaluate the deviations of Total Return ranks from ranks of corresponding attributes.

Let's denote the rank of total return of fund ***i*** as R_i^F, the ranks of its strategic return, TAA and SS as R_i^{SAA}, R_i^{TAA}, and R_i^{SS}. We calculate the mean deviation (deviation per fund) of the ranks of return from the ranks of each of the attributes:

- $\frac{1}{n}\sum_i Abs\left(R_i^F - R_i^{SAA}\right)$ **(1)**
- $\frac{1}{n}\sum_i Abs\left(R_i^F - R_i^{TAA}\right)$ **(2)**
- $\frac{1}{n}\sum_i Abs\left(R_i^F - R_i^{SS}\right)$, **(3)**

  where n is the number of funds.

The attribute with the lowest calculated mean deviation better determines the relative position of fund's return among its peers.

Additionally, we calculate the rank correlation coefficients (Spearman rank coefficients) as:
$\rho = 1 - \frac{6\sum_i D_i^2}{n \times \left(n^2 - 1\right)}$, where $\boldsymbol{D_i}$ are the same differences between two paired ranks for a fund ***i*** as in (1) – (3) above.

Spearman rank coefficient is symmetrically distributed between –1 and 1. It reaches a value of 1 when the rank of return is equal to the rank of an attribute for every fund. A value of –1 indicates a perfectly negative correlation between ranks.

Results of rank deviation analysis are given in Tables 6-8. Apart from the sums of deviations and means (deviations per fund) there are percents of funds, which deviation is less than 3 and 5, Spearman coefficients, the maximum deviation for each attribute and rankings of all attributes for the fund, for which the maximum was obtained. According to those results Security Selection is the determinant of the return of Australian funds.

[4] We imagine that that the same SAA benchmark is used for all funds in the universe, which is why the rank of the strategic return and the rank of the SAA coincide.

Table 6: Rank Deviations of Growth Funds Attributes in Period 1997-1999

	Sum	Mean	≤ 3 (%)	≤ 5 (%)	Spearman coeff.	Maximum deviation in ranks						
						Max Value	Rank R	Rank SAA	Rank TAA	Rank SS	Rank AR	Rank SAA+ TAA
SAA	158	6.077	30.8	50.0	0.48	15	9	24	21	2	5	25
TAA	210	8.077	23.1	30.8	0.14	24	1	4	25	1	1	11
SS	96	3.692	50.0	61.5	0.77	13	11	1	15	24	24	1
Active Return	84	3.231	57.7	76.9	0.80	13	11	1	15	24	24	1
SAA+TAA	140	5.385	30.8	57.7	0.59	16	9	24	21	2	5	25

Table 7: Rank Deviations of Growth Funds Attributes in Period 2000-2002

	Sum	Mean	≤ 3 (%)	≤ 5 (%)	Spearman coeff.	Maximum deviation in ranks						
						Max Value	Rank R	Rank SAA	Rank TAA	Rank SS	Rank AR	Rank SAA+ TAA
SAA	171	6.577	23.1	42.3	0.41	17	22	5	25	22	24	18
TAA	172	6.615	26.9	38.5	0.43	15	16	26	1	2	2	25
SS	102	3.923	34.6	73.1	0.76	14	16	26	1	2	2	25
Active Return	86	3.308	53.8	73.1	0.80	14	16	26	1	2	2	25
SAA+TAA	116	4.462	42.3	61.5	0.68	15	18	14	5	23	18	3

Table 8: Rank Deviations of Growth Funds Attributes in Period 2000-2002

	Sum	Mean	≤ 3 (%)	≤ 5 (%)	Spearman coeff.	Maximum deviation in ranks						
						Max Value	Rank R	Rank SAA	Rank TAA	Rank SS	Rank AR	Rank SAA+ TAA
SAA	194	7.462	26.9	38.5	0.20	22	23	1	19	26	26	3
TAA	196	7.538	26.9	38.5	0.13	23	26	24	3	25	25	21
SS	80	3.077	46.2	84.6	0.83	15	25	21	26	10	23	26
Active Return	68	2.615	69.2	80.8	0.88	12	16	26	1	13	4	17
SAA+TAA	186	7.154	26.9	30.8	0.29	20	23	1	19	26	26	3

5. Comments

We think that the results can be easier and better understood when presented graphically. Thus, Figures 1-3 present the scatter diagrams of ranks of funds' returns and ranks of one of attributes (plus Active Return and SAA+TAA). At the bottom of each diagram we also present the corresponding Spearman coefficient.

Figure 1: Ranks of Return Versus Ranks of Its Attributes, 1997-1999

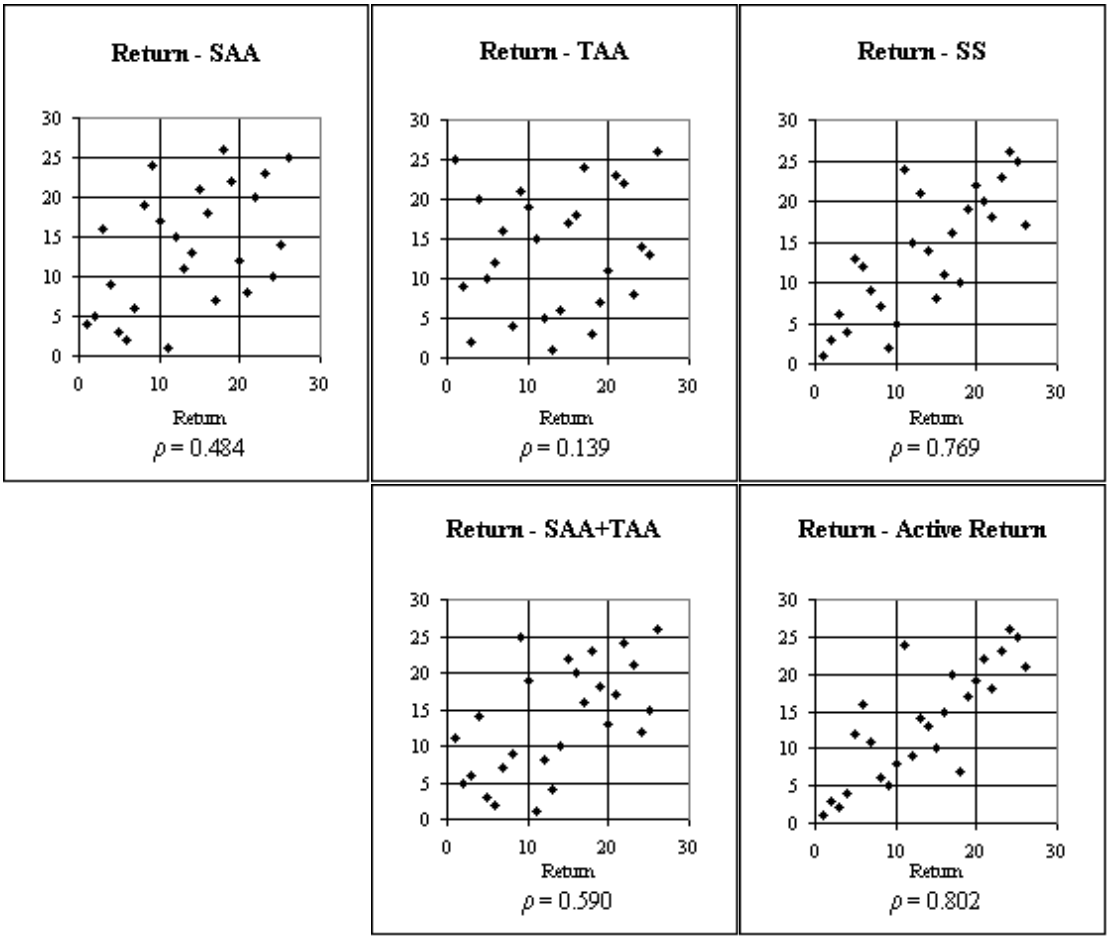
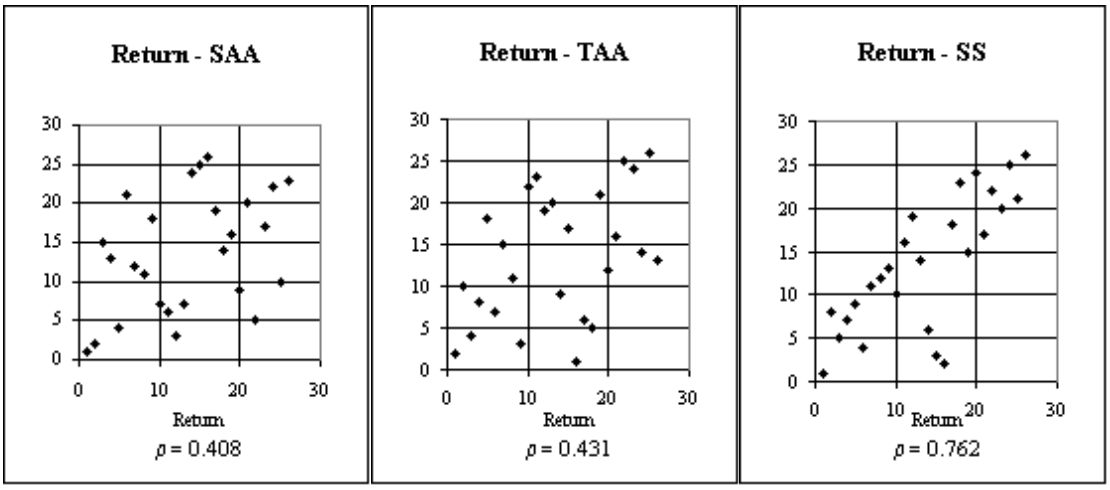


Figure 2: Ranks of Return Versus Ranks of Its Attributes, 2000-2002



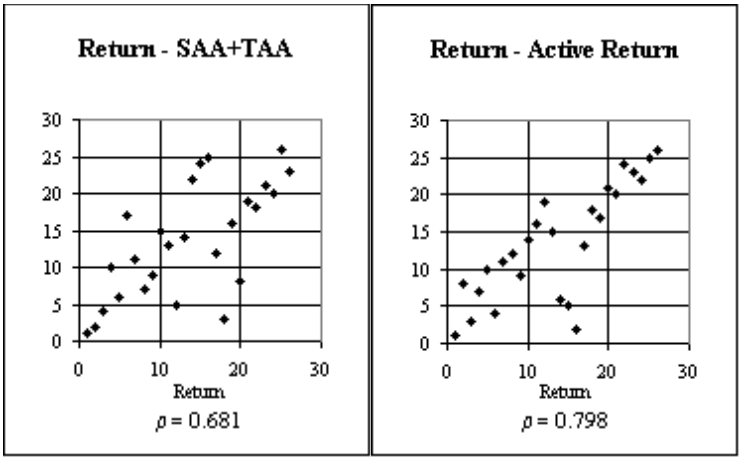
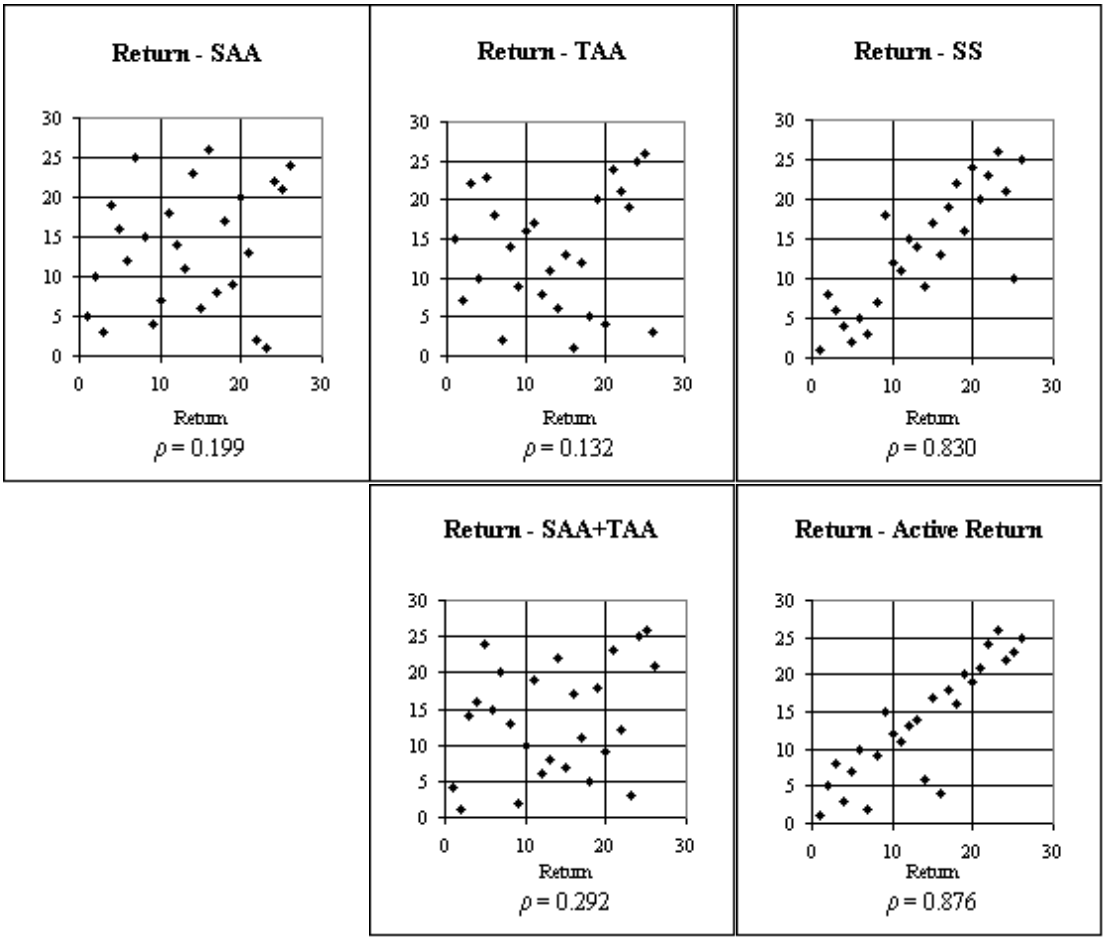


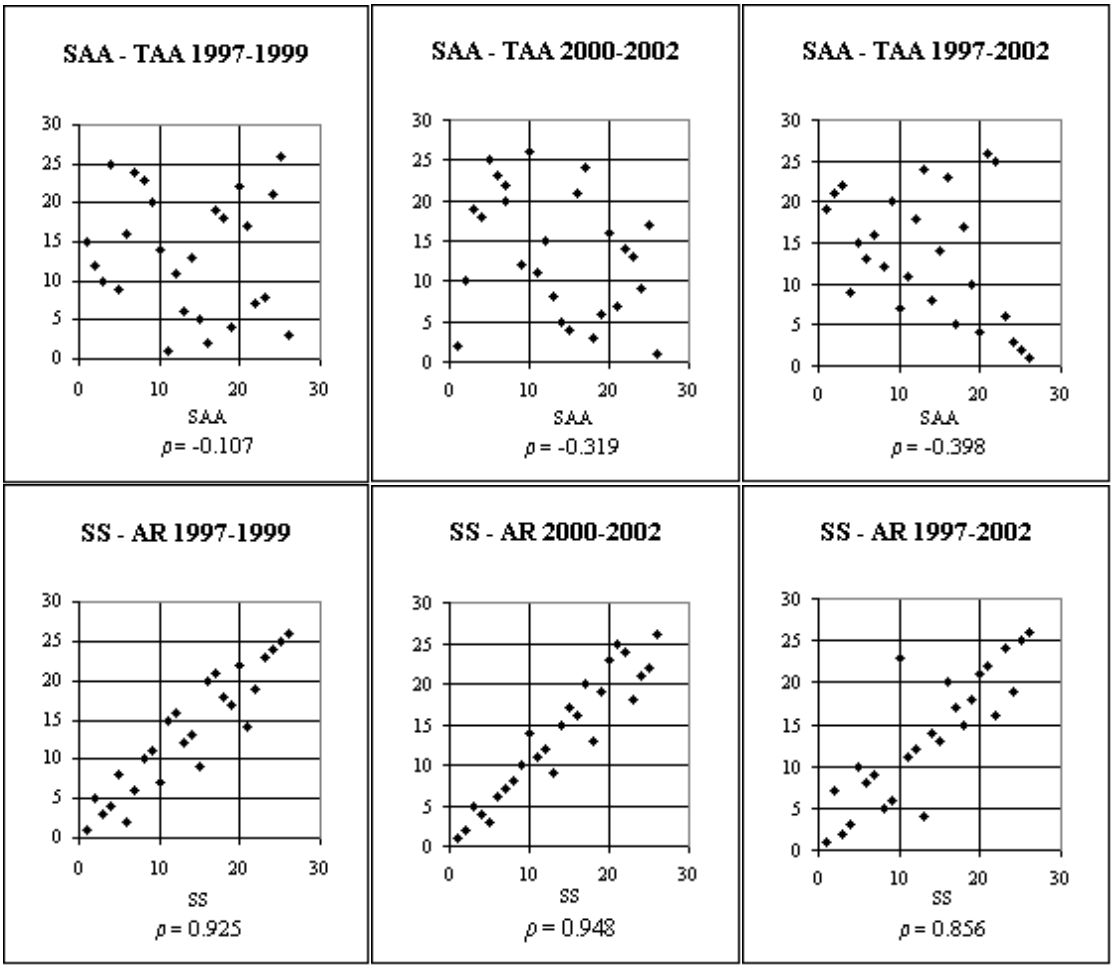
Figure 3: Ranks of Return Versus Ranks of Its Attributes, 1997-2002



It is easy to see that for every presented time interval SS ranks correlate better with ranks of Return than SAA or TAA. Active return determines total return best of all, but a distance between it and SS is quite small. As the SS - Active Return diagrams indicate they are highly correlated (Figure 4).

The sum of TAA and SAA is a better determinant of total return, than any of them separately. The Spearman coefficient shows a negative correlation between SAA and TAA. It can be said that TAA partially compensates for the inefficiency of Strategy.

Figure 4: Relationships between SAA and TAA, SS and Active Return

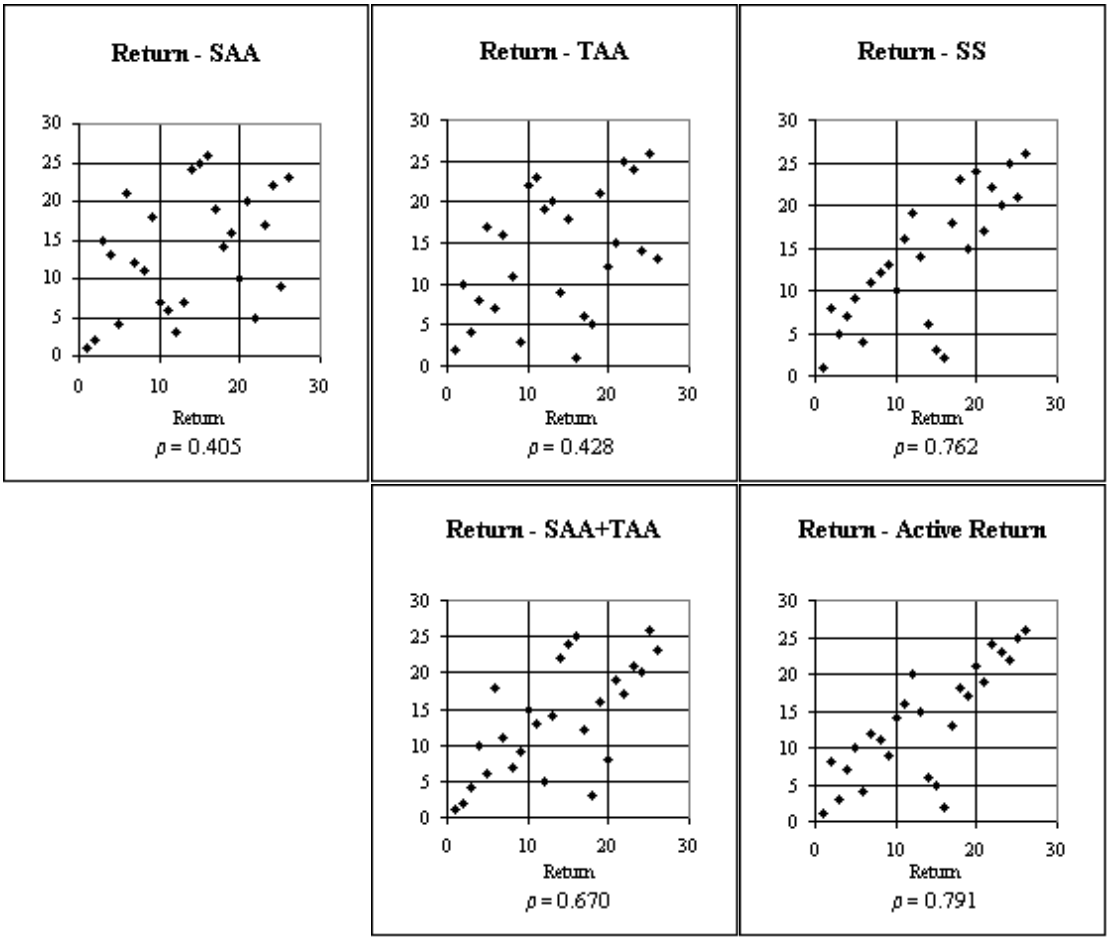


As was shown in (Kirievsky L. and A. Kirievsky), if we conduct attribution analysis for a multi period interval by calculating attributes in each single time period, and then adding up the values through time, this produces errors in attributes, compared with solving the AA problem for the multi period interval as a whole. However, since in finding the determinant we use the rankings of attributes and not their values, then it is interesting to check whether SS calculated for all single time periods determines the fund return better, than SAA and TAA.

We calculated the rankings of average monthly values for SS, SAA and TAA during 2000-2002, as well as SAA+TAA and Active Return and produced scatter charts, similar to those above (Figure **5**).[5] Readers may notice that ranks of SAA and TAA for a couple of funds close to each other swapped places, which, however, doesn't change the central result – the calculated rank of SS better determines the rank of return than SAA and TAA.

[5] In creating these diagrams we used the ranks of fund returns for the entire 2000-2002 period. The ranks of average monthly returns differ from those used by only one pair of funds, next to each other, swapping places. For them SS also is the determinant. However we are interested in the determinant of return for the whole period.

Figure 5: Ranks of Average Monthly Returns and Attributes, 2000-2002



As we noted above in analysing BSB, the authors calculated coefficients of determination for the return time series. Coefficient of determination measures the degree of closeness between two series: if it equals to 1 then the series are perfectly correlated (positively or negatively). If Brinson et al wanted to analyse the relationship between actual returns and attributes they should have calculated a cross sectional ("among funds") and not a time series ("across time") coefficients of determination.

The results of calculations of coefficients of determination for Australian growth funds returns and their attributes are provided in Table 9. For all analysed periods they show a much closer relationship between Return and SS than between Return and asset allocations.

Table 9: Coefficients of Determination

	SAA	TAA	SS	Active Return	SAA + TAA
1997-1999	0.261	0.011	0.668	0.733	0.277
2000-2002	0.219	0.236	0.77	0.775	0.588
1997-2002	0.067	0.053	0.659	0.785	0.211

6. Conclusion

1. We conducted a detailed analysis of the articles by Brinson et al (BHB and BSB) on the topic of finding the determinant of the investment fund's return.
2. In BHB and BSB the authors attributed Strategic Return, Tactical Asset Allocation and Security Selection in case of a multi period time interval. At the same time the AA problem was not formulated and thereby the attributed Strategic Return value was mistakenly found instead of the Strategic Asset Allocation one.
3. The authors of BHB and BSB had limited data. Consequently they made a number of "simplifications", which potentially introduced some bias into the attributes.
4. The second halves of those articles referred to regression analysis of time series of fund returns and attributes from single time periods. It is those results that are mainly critiqued in the literature.
5. The results of both articles confirm the fact that the strategic benchmark determines a greater part of fund's return. When funds are joined in a universe, based on their strategic benchmark, it can be said that the universe determines the major part of the return.
6. However neither the results of these articles, nor the numerous published suggestions on changes to that methodology do not answer the question of what attribute is a determinant of fund's return.
7. We propose a methodology which defines the determinant of return. It is based on a comparison of ranks in the universe of funds' returns and their attributes, derived as a result of solving the AA problem.
8. When this methodology was applied to Australian growth fund universe, it showed that their performance is determined by Security Selection.

We did not pose a question in this article of providing an economic explanation for our results, nor did we attempt to interpret them. We hope to do so in the future.

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