**Financial INTEROFFICE MEMORANDUM**

**Services**

❑ *Priority* DATE: 9/6/1996

❑ *Action Needed* TO: Boss

❑ *R.S.V.P.* FROM: Mike Fulford

❑ *For Your Information* SUBJECT: Field training on Apples to Apples comparison

❑ *Per Your Request* CC: Boss

❑ *Per Our Discussion*

This memo is to demonstrate:

🔾 How to interpret data from Morningstar Principia specifically, and also other hypo database programs.

🔾 How to compare Mutual Funds and Variable Annuity subaccounts on an “apples to apples” basis.

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**Interpreting Mutual Fund & Variable Annuity Database Information**

Benchmark Index: This term is mentioned first because it’s at the center of most fund and subaccount comparisons. A benchmark index, or just a benchmark or just an index, is usually either a market index or just an average of a whole investment category. An example of a market index would be the S&P500. An example of an average would be taking all of the Variable Annuity subaccounts with the same investment objective (like Balanced) and then getting an average of some performance number. Here’s an analogy: Say that a particular cow you have produces 1 gallon of milk and you feel this is the average for this breed of cow. If you wanted to compare other cows of the same breed to this particular “average” cow, then this particular cow would be the benchmark cow. Another important concept that will be used later in this memo is called benchmark error. Getting strange results from comparing the benchmark cow to a different animal, or even a different breed of cow (comparing a Holstein to an Angus) would be an example of benchmark error.

Total return: 1 month, 3 month, 12 month, 3 year, 5 year, 10 year, and 15 year time frame. Most publishers

calculate ROR (rate of return) over a given time frame using this formula:

T

Ending NAV - Beginning NAV - 12b-1 - Management fees + Reinvested dividends and capital gains -1

Beginning NAV

Where the exponent, T, is the time period. For 1 year, T would be 1; for 10 years T would be 10, and for 3 months T would be 0.25. All time periods (12 month to 15 years) are annual compounded RORs from the time of the latest software update (currently 3/31/96), back in time. So a 12 month ROR is from 3/31/95 to 3/31/96, 1 month is from 3/1/96 to 3/31/96, and so on. Time periods less than 1 year are not raised to the power of T because they’re not an annual compounded ROR (it’s just the ROR in that time period).

% Rank in Objective: This is an apples to apples comparison. The fund is compared to all other funds with the

same investment objective and ranked as to where its performance fell in that time period. The best fund in its objective category would be #1.

Specific Year Annual Returns (E.G.- The ROR for 1994): This is just what it says and uses the formula given above.

Morningstar Ratings: This is too long of a story to list here, but you can look these up in their manuals. It’s their way of rating funds given their criteria, which changes every once in a while. It basically calculates performance using the risk free ROR (RF). It’s complicated, and most of the time it’s not an apples to apples comparison because of the reasons given in the next section.

Sharpe Ratio: This is complex too, but it’s apples to apples so it is useful. This is a measure of an investment’s “risk premium per unit of total risk.” Because it uses  (standard deviation) instead of β (Beta), it measures both total return and diversification. For comparison purposes, all you really need to know is that higher numbers are better. Higher numbers mean a more “efficient” portfolio. Don’t put too much weight in it because it’s just a gross measure of relative performance.

**The following are called “Modern Portfolio Statistics”, and ARE NOT apples to apples**

**comparisons using Principia (you need Principia Plus to do apples and apples):**

R2: I’m using this stat first because it’s at the root of most problems in making investment comparisons. R2 is a statistic used in regression analysis. Regression analysis is used to compare the variation in one thing to that of another for the purpose of trying to predict how one thing will react to changes in the other thing. Its long name is the “coefficient of determination” because its purpose is to determine the relationship between things.

The problem with R2 in Principia is that the benchmark used for funds/subaccounts that are equity-like is the only the S&P 500. For anything bond-like, it’s only the Lehman Aggregate Bond Index. In order to get valid R2 numbers for funds and subaccounts, you need to compare the fund/subaccount to its investment objective index. In order to do this, you to have the Principia Plus program.

The heart of the investment apples to apples vs. apples to oranges debate is what benchmark is used in making comparisons. Let’s look at an investment objective that’s not really similar to the S&P500- Equity Income. An Equity Income fund is an unweighted fund consisting of about 100 large stocks in the mature growth phase of its life cycle. About 60% is in U.S. stocks and the remainder is in international stocks, bonds, and cash. The S&P500 is a totally different animal because it’s a market cap weighted average of 500 large firms that most resemble the U.S. economy. There are no bonds in the S&P500, no cash, no international securities, and these 500 firms could be anywhere in their life cycles (which determines dividend payout policy- Equity Income funds purchase stocks with a high dividend payout history). A typical Principia R2 for an Equity Income fund is about 0.85. This means that about 85% of the variation in the Equity Income fund can be explained by variation in the S&P500. This is way too low to make meaningful comparisons, so a different benchmark should be used. For the Equity Income objective, the correct benchmark is just the average of all the Equity Income funds/subaccounts in the database. You won’t be able to use the proper benchmark with funds or subaccounts using Principia because you’re stuck with the S&P500 for equity-like investments.

Now let’s look at the investment objectives that most closely match the S&P500- Growth and Growth and Income. I used Principia to sort through all of the 3,709 equity funds to find the funds that had an R2 of more than 0.92, and were not index funds (the printout is in the back of this report). There were 29 funds; 19 were Growth & Income, and 10 were Growth funds. The only fund that we can sell in this list is American Funds Investment Company of America (Growth & Income). It has an R2 of 0.95. This fund has 9% in cash, 9.2% in international stocks, and 5.3% in bonds. Only 76.5% of this fund is in U.S. stocks, so comparing this fund to to the S&P500 is an apples to oranges comparison. A Growth & Income index should be used instead, and you need Principia Plus to do that.

Here is all you need to know about R2 (unless you have a program that can do R2 right in the first place): R2 values range from 0 to 1 (Principia lists them as 0-100. That’s not mathematically correct, but we don’t care because we’re not mathematicians). 0.0 means that absolutely none of the variance in the thing you’re comparing is related (or explained by) to the benchmark you’re comparing it to. An R2 of 1.0 means that 100% of the variation of what you’re interested in is explained by the variation in the benchmark.

What does all of this mean in your everyday life? If you’re using Morningstar Principia, and the fund/subaccount you’re interested in has an R2 of less than 0.95, then you’re comparing apples to oranges, and you can ignore the next 2 stats completely (Alpha and Beta).

Beta: β is used to compare the risk (systematic variation or market risk) of an asset to the same risk of a benchmark index. The purpose of this is to help predict what will happen to the value of the asset in response to fluctuations in the value of the benchmark. Again, the only 2 benchmarks used for funds in Principia are the S&P 500 and the Lehman Aggregate Bond Index. So if the R2 value of the fund/subaccount is lower than 0.95, then you’re comparing apples to oranges, and β is mostly meaningless.

Alpha: α is used as an indication of how an asset has performed in the past relative to a benchmark index. Using the CAPM formula (Capital Asset Pricing Model- if this is new to you, don’t worry about it), an investment’s performance can be “predicted.” If the asset’s performance is more than what the CAPM predicted, then the asset has a “positive α.” For example, if the CAPM predicted an asset to have a total return of 10% (using the S&P500 as the benchmark in one of the factors in the formula), and its total return was actually 11%, then its α is 1. If the actual was 9%, α is then -1.0. The same caveats go with α as with β: if R2 is less than 0.95, then you’re comparing apples to oranges, and the comparison is mostly meaningless with Principia.

**Comparing Fund/Subaccounts on an Apples to Apples Basis**

Benchmark errors exist when an investment performance comparison is made using dissimilar benchmarks or indices. An analogy would be saying that since a goat only produces a quart of milk, and the cow puts out a gallon, the goat is useless compared to the cow. The point is that the goat and the cow are two totally different animals and thus should not be compared solely on the basis of milk production.

The first step in making valid fund/subaccount comparisons is to use the correct benchmark index. You won’t be able to do this with Principia or most other hypo software for mutual funds. Once the correct benchmark index is used, the next step is to adjust the benchmark/index for all loads, 12b-1 changes, management fees, and M&E expenses. This is needed because the benchmark/index does not have loads, fees, or other expenses. You just

subtract these expenses from the ROR of the benchmark index.

For example, if you wanted to compare the AUL VA American Bond subaccount to the correct benchmark, the

VA Corporate Bond index, you need to take the index’s ROR and then subtract 1.95% (the total expenses from the actual subaccount).

The following charts show the differences in comparing apples to oranges vs. apples to apples. The first chart shows benchmark errors combined with the error from not adjusting for expenses. The next 3 use the correct benchmarks, and are adjusted for expenses which gives a true apples to apples comparison.

This 1 year time frame was 1/1/95 to 1/31/96 due to a software idiosyncrasy.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***VA Subaccount Name*** | ***Improper Benchmark Used*** | ***Bench-***  ***mark***  ***ROR*** | ***1 Year Sub-Account***  ***ROR*** | ***1 Year Delta*** |
| **Alger American Growth** | S&P 500 | 36.67% | 42.57% | +5.90% |
| **AUL American Bond** | Lehman Aggregate Bonds | 12.61% | 12.67% | +0.06% |
| **American Money Market** | Lehman Aggregate Bonds | 12.61% | 3.92% | -8.69% |
| **American Managed Portfolio** | S&P 500 | 36.67% | 16.43% | -20.24% |
| **AUL American Equity** | S&P 500 | 36.67% | 19.46% | -15.68% |
| **Calvert Capital Accumulation** | S&P 500 | 36.67% | 30.65% | -1.42% |
| **Fidelity Growth Portfolio** | S&P 500 | 36.67% | 38.09% | +1.42% |
| **Fidelity Asset Manager** | S&P 500 | 36.67% | 17.72% | -18.95% |
| **Fidelity Equity Income** | S&P 500 | 36.67% | 31.91% | +4.76% |
| **Fidelity High Income** | Lehman Aggregate Bonds | 12.61% | 19.48% | +6.87% |
| **Fidelity VIP II Index 500** | S&P 500 (OK) | 36.67% | 34.55% | -2.12% |
| **Fidelity Overseas Portfolio** | S&P 500 | 36.67% | 15.21% | -21.46% |
| **Fidelity Contrafund** | S&P 500 | 36.67% | 39.32% | +2.65 |
| **INVESCO Dynamics** | S&P 500 | 36.67% | 38.71% | +2.04 |
| **PBHG Growth** | S&P 500 | 36.67% | 52.33% | 15.66 |
| **20th Century TCI Growth** | S&P 500 | 36.67% | 25.22% | -11.45% |
| **20th Century Select** | S&P 500 | 36.67% | 26.55% | -10.12% |
| **20th Century Ultra** | S&P 500 | 36.67% | 42.97% | +6.3% |
| **20th Century Int’l Equity** | S&P 500 | 36.67% | 20.65% | -16.02% |
| **T. Rowe Price Equity Income** | S&P 500 | 36.67% | 31.37% | -5.3% |
| **Vangrd: Short Term Fed Bond** | Lehman Aggregate Bonds | 12.61% | 10.30% | -2.31% |
| **Vanguard Explorer** | S&P 500 | 36.67% | 26.86% | -9.81% |

**THE FOLLOWING CHARTS ARE APPLES TO APPLES USING THE CORRECT BENCHMARKS:**

All benchmarks are Variable Annuity (VA) indexes complied by CDA Weisenberger, Inc.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***VA Subaccount Name*** | ***Proper Benchmark Used*** | ***Bench-***  ***mark***  ***ROR*** | ***1 Year Sub-Account***  ***ROR*** | ***1 Year Delta*** |
| **Alger American Growth** | VA- Long Term Growth | 30.19% | 42.57% | +12.38% |
| **AUL American Bond** | VA- Corporate Bond | 11.05% | 12.67% | -1.62% |
| **AUL American Money Market** | VA- Money Market | 2.28% | 3.92% | +1.64% |
| **American Managed Portfolio** | VA- Balanced | 19.75% | 16.43% | -3.32% |
| **AUL American Equity** | VA- Long Term Growth | 30.19% | 19.46% | -10.73% |
| **Calvert Capital Accumulation** | VA- Small Company Growth | 27.21% | 30.65% | +3.44% |
| **Fidelity Growth Portfolio** | VA- Long Term Growth | 30.19% | 38.09% | +7.90% |
| **Fidelity Asset Manager** | VA- Asset Allocation | 19.35% | 17.72% | -1.63% |
| **Fidelity Equity Income** | VA- Equity Income | 28.44% | 31.91% | +3.47% |
| **Fidelity High Income Portfolio** | VA- Corporate High Yield | 15.56% | 19.48% | +3.92% |
| **Fidelity VIP II Index 500** | S&P 500 Composite | 35.12% | 34.55% | -.057% |
| **Fidelity Overseas Portfolio** | VA- International Equity | 16.31% | 15.21% | -1.10% |
| **Fidelity Contrafund** | VA- Long Term Growth | 30.19% | 39.32% | +9.13% |
| **INVESCO Dynamics** | VA- Small Company Growth | 27.21% | 38.71% | +11.50% |
| **PBHG Growth** | VA- Small Company Growth | 27.21% | 52.33% | +25.12% |
| **20th Century TCI Growth** | VA- International Equity | 16.31% | 25.22% | +8.91% |
| **20th Century Select** | VA- Long Term Growth | 30.19% | 26.55% | -3.64% |
| **20th Century Ultra** | VA- Small Company Growth | 27.21% | 42.97% | +15.76% |
| **20th Century Int’l Equity** | VA- International Equity | 16.31% | 20.65% | +4.34% |
| **T. Rowe Price Equity Income** | VA- Equity Income | 28.44% | 31.37% | +2.93% |
| **Vangrd: Short Term Fed Bond** | VA- Gov Securities (Closest) | 13.27 | 10.30% | -2.97% |
| **Vanguard Explorer** | VA- Small Company Growth | 27.21% | 26.86% | -0.35% |

**3 Year Period: 1/1/93 to 12/31/95**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***VA Subaccount Name*** | ***Proper Benchmark Used*** | ***Bench-***  ***mark***  ***ROR*** | ***3 Year Sub-Account***  ***ROR*** | ***3 Year Delta*** |
| **Alger American Growth** | VA- Long Term Growth | 10.69% | 17.75% | +7.06% |
| **AUL American Bond** | VA- Corporate Bond | 3.24% | 6.59% | +3.35% |
| **AUL American Money Market** | VA- Money Market | 2.79% | 2.42% | -0.37% |
| **American Managed Portfolio** | VA- Balanced | 6.35% | 8.70% | +2.35% |
| **AUL American Equity** | VA- Long Term Growth | 10.69% | 10.67% | -0.02% |
| **Calvert Capital Accumulation** | VA- Small Company Growth | 11.99% | 9.20% | -2.79% |
| **Fidelity Growth Portfolio** | VA- Long Term Growth | 10.69% | 15.88% | +5.19% |
| **Fidelity Asset Manager** | VA- Asset Allocation | 6.21% | 8.64% | +2.43% |
| **Fidelity Equity Income** | VA- Equity Income | 11.29% | 18.13% | +6.84% |
| **Fidelity High Income Portfolio** | VA- Corporate High Yield | 6.16% | 11.25% | +5.09% |
| **Fidelity VIP II Index 500** | S&P 500 Composite | 12.74% | 12.57% | -0.17% |
| **Fidelity Overseas Portfolio** | VA- International Equity | 8.13% | 13.86% | +5.73% |
| **INVESCO Dynamics** | VA- Small Company Growth | 11.99% | 15.62% | +3.63% |
| **PBHG Growth** | VA- Small Company Growth | 11.99% | 30.58% | +18.59% |
| **20th Century TCI Growth** | VA- Long Term Growth | 10.69% | 10.49% | -0.20% |
| **20th Century Select** | VA- Long Term Growth | 10.69% | 7.69% | -3.00% |
| **20th Century Ultra** | VA- Small Company Growth | 11.99% | 15.98% | +3.99% |
| **20th Century Int’l Equity** | VA- International Equity | 8.13% | 13.52% | +5.39% |
| **Vangrd: Short Term Fed Bond** | VA- Gov Securities (Closest) | 5.75% | 4.43% | -1.32% |
| **Vanguard Explorer** | VA- Small Company Growth | 11.99% | 12.27% | +0.28% |

**5 Year Period: 1/1/90 to 12/31/95**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***VA Subaccount Name*** | ***Proper Benchmark Used*** | ***Bench-***  ***mark***  ***ROR*** | ***5 Year Sub-Account***  ***ROR*** | ***5 Year Delta*** |
| **Alger American Growth** | VA- Long Term Growth | 12.15% | 20.24% | +8.09% |
| **AUL American Bond** | VA- Corporate Bond | 6.86% | 8.06% | +1.20% |
| **AUL American Money Market** | VA- Money Market | 2.61% | 2.67% | +0.06% |
| **American Managed Portfolio** | VA- Balanced | 10.36% | 9.56% | -0.80% |
| **AUL American Equity** | VA- Long Term Growth | 12.15% | 12.81% | +0.66% |
| **Fidelity Growth Portfolio** | VA- Long Term Growth | 12.15% | 19.28% | +7.13% |
| **Fidelity Asset Manager** | VA- Asset Allocation | 9.04% | 11.36% | +2.32% |
| **Fidelity Equity Income** | VA- Equity Income | 13.56% | 19.83% | +6.27% |
| **Fidelity High Income Portfolio** | VA- Corporate High Yield | 12.38% | 17.46% | +5.08% |
| **Fidelity Overseas Portfolio** | VA- International Equity | 7.37% | 6.78% | -0.59% |
| **INVESCO Dynamics** | VA- Small Company Growth | 12.90% | 23.31% | +10.41% |
| **PBHG Growth** | VA- Small Company Growth | 12.90% | 33.43% | +20.53% |
| **20th Century TCI Growth** | VA- Long Term Growth | 12.15% | 10.07% | -2.08% |
| **20th Century Select** | VA- Long Term Growth | 12.15% | 8.90% | -3.25% |
| **20th Century Ultra** | VA- Small Company Growth | 12.90% | 23.52% | +10.62% |
| **Vangrd: Short Term Fed Bond** | VA- Gov Securities (Closest) | 4.80% | 5.78% | +0.98% |
| **Vanguard Explorer** | VA- Small Company Growth | 12.90% | 19.46% | +6.56% |