Asset Allocation, Portfolio Optimization: Better Risk-Adjusted Performance?
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Would the results of a "mutual fund dart-throwing" contest provide evidence that the professional asset allocation specialist results in higher returns, on average, than the individual who throws a dart into the "sea" of mutual funds? The historic quarterly results of the Wall Street Journal "stock dart-throwing" contest provide some data that "professionals," on average, can select better-performing stocks than does random selection. The Wall Street Journal contest, however, does not emulate a true reflection of the investment experience of the individual, as the contest is limited to a brief three-month period and involves the selection of a single stock. We feel that active buying and selling is a natural process in mutual funds, in contrast to advertisers and columnists who recommend buying and holding for the long term. For a truer life reflection of the investor in managed funds, we decided to explore whether asset allocation performance exceeds the performance of "throwing darts" (that is, random selection) into the pool of managed funds.

The Brinson, et al.1 study suggests that over 90 percent of variation in performance from quarter to quarter comes from asset allocation decisions between stocks, bonds and cash. We wish to extend these studies by exploring performance results from year-to-year reallocation of asset allocation funds using techniques of optimization developed by Ibbotson Associates. We searched for historic representation of this modeling and learned that Pacific Life, using the consulting services of Ibbotson Associates, applied systematic modeling to actively managed funds.2 In this paper, we explore the outcome of the risk-adjusted performance of five Ibbotson models that were developed and applied to independently managed variable annuity funds, versus throwing a dart at a variable annuity and a mutual fund database.

Asset allocation is a commonly accepted technique for investment of funds. Professional acceptance of asset allocation stems from the Brinson study that has suggested that 93.6 percent of variation in total return from fund management comes from asset allocation policy.3 This has been challenged by Jahnke, who attributes only 14.6 percent of portfolio performance to asset allocation.4,5 A recent paper suggested that sector selection, style timing and aggressiveness may contribute more to performance than general asset allocation policy.6 Roger Ibbotson in a recent paper analyzed ten years of performance data on 94 balanced mutual funds ending March 1998. He found that only 40 percent of the variation of returns across funds came from the investment allocation policy, whereas "60 percent is explained by other factors such as asset class timing, style within asset class, security selection and fees."7 While it is not the goal of this paper to resolve this debate, we wish to shed light on whether portfolio optimization using risk-managed asset allocation models produces better risk-adjusted investment returns than through randomly selecting an individual fund.

Methodology

The methodology for this study compares the results of three years of data from five proprietary portfolio optimization models developed by Ibbotson Associates and applied by Ibbotson Associates to institutionally managed funds in Pacific Life’s Select Variable Annuity product. We chose the time period October 1, 1995, through September 30, 1998, to include the effects of a rising stock and bond market as well as sharply declining markets in 1997 and 1998. We specifically used the end date of September 30, 1998, as the markets were in a major decline phase and this would be a means to stress-test the value of diversification and optimization at a time when it should theoretically work the best—that is, at a time when investors would be most likely to lose confidence in their investments. We hypothesized that if the methodology held up during this period, we would have a basis for continuing our "lecture" to clients that diversification pays. If, on the other hand, the methodology proved to provide a lower-than-expected excess value, we would be inclined to reexamine our view of pundits who recommend concentration versus diversification and use of large growth stocks or IPOs over a blend of value and growth in large, medium and small stocks. We have used the September 30, 1998, Principia Pro Plus (Morningstar) databases for variable annuities and for mutual funds as a comparative search tool.

In developing this paper, we used the collective insight of members of The Nazrudin Group, The Advisor’s Network, discussion with Ibbotson Associates technical staff and the statistical information made available by Pacific Life.
Database Criteria for the Ibbotson Model

The five risk-adjusted models developed by Ibbotson Associates were based on input of historic data indices, their standard deviations and risk premium above the Treasury bill. Ibbotson Associates created five generic Optimized Model Portfolios (A, B, C, D, E) to meet certain levels of risk (standard deviation) through asset allocation across a broad number of investment styles (Appendix 1).

Ibbotson Associates applied these style requirements through attribution analysis to 13 actively managed funds of Pacific (see Appendix 2). Each portfolio was optimized to minimize risk through broad asset allocation across various classes of style (value versus growth), size (large capitalization, medium or small) and across classes of bond quality and duration. The specific fund percentages were generated to meet the requirements of the style analyses associated with the Ibbotson optimized models. The five portfolios ranged in increasing reward/risk from 77 percent bond and 23 percent stock for Portfolio A to 100 percent stock for Portfolio E, in increasing increments of stock investment. Ibbotson Associates annually created optimized models, analyzed the Pacific managed funds and set new percentages in order to "fit" the funds to the new risk-measured criteria (standard deviation).

Study Criteria

The question of "Does asset allocation and portfolio optimization produce better risk-adjusted performance?" was tested by comparing the three-year standard deviation and percent of annualized returns of the five optimized asset allocation model profiles (A–E) with all other variable annuity funds managed during the same time period. We have used the 9/30/98 Principia Pro Plus (Morningstar) "for Variable Annuities/Life" and for "Mutual Funds" databases as comparative search tools.

We searched among the 8,055 variable funds according to these criteria: For a three-year standard deviation of ‘x’ or less, how many variable annuity funds produced a three-year return equal or greater than ‘y’ (‘x’ was the standard deviation of these optimized portfolios and ‘y’ was the three-year annual return of the optimized portfolios). Of 8,055 funds in the current Morningstar database, 5,631 variable funds (70 percent) had three years of data history. Of these 5,631 funds, only 3,659 were identified as variable annuity funds.

Results

The results of the search for the variable annuity funds whose performance equaled or exceeded that of the model portfolios are exhibited in Table 1.

Only 18 out of 3,659 variable annuity funds, or 0.49 percent, equaled or exceeded Optimized Portfolio A with a standard deviation of 5.6 percent or lower. For Optimized Portfolio B, 17 funds, or 0.46 percent, equaled or bettered the portfolio; Portfolio C, 137 funds, or 3.74 percent; Portfolio D, 243 funds, or 6.40 percent; and Model E, 554 funds, or 15.14 percent, equaled or exceeded its performance. As the performance of individual funds that exceeded the optimized portfolios ranged from 0.49 percent of funds (Portfolio A) to 15.14 percent (Portfolio E), the results suggest that the Optimized Portfolios (A–E) exceeded the performance of between 99 percent (Portfolio A) and 85 percent (Portfolio E) of all individual variable annuity funds on a risk-adjusted basis over the three-year study period.

These results are striking as they demonstrate that it was statistically improbable (less than a five percent chance) that an investor could have "thrown a dart" in selecting an individual variable annuity fund and received a better return on a risk-managed basis than the Optimized Portfolios A, B or C. For Optimized Portfolios D and E, the data widens to 6.40 percent and 15.14 percent. The high percentage of international and emerging market stock investments in Portfolios D and E lowered their three-year returns due to the 1997 and 1998 market declines. These optimized portfolios, however, still strongly suggest that they outperformed random selection.

Risk-Management Results of the Optimized Portfolios

Over two prior test periods, once during the Asian decline in 1997 and again during the market decline of 1998, these five optimized portfolios provided safety through lower risk than the Dow Jones Industrials (Table 2).
All portfolios, including Portfolio E, which contains 100 percent stocks, had a lower risk than the Dow Jones Industrials. Most other stock indexes would be considered "riskier" than the Dow.

The three-year performance data for the optimized portfolios A–E are higher than the projected returns established by Ibbotson Associates as shown in Appendix 1. The three-year standard deviation data are shown as well and display a lower standard deviation (risk) than that of the projected Ibbotson Associates data. These portfolios outperformed the theoretical constraints of the Ibbotson long-term data series (Ibbotson uses a database for fixed income since 1970 and for equities since 1926), though these results may be skewed by above-average market returns for this time period.

**Variable Annuity Portfolios Versus the Morningstar Mutual Fund Database**

We repeated this testing of the optimized variable annuity portfolios versus all mutual funds with a three-year or greater data history. The number of funds with a three-year or greater history was 6,757 out of a universe of 10,296.

The optimized variable annuity portfolios (A–E) exceeded the performance of between 99 percent (Portfolio B) and 88 percent (Portfolio E) of all individual mutual funds on a risk-adjusted basis by for the three-year period. These results suggest that on a risk-managed basis, the variable annuity optimized portfolios produced a higher return than 88 percent of the universe of 6,757 mutual funds.

We found that on a risk-adjusted basis, the percentage of mutual funds (Table 3) was lower than the percentage of variable annuities (Table 1) whose performance equaled or exceeded the Optimized Portfolios A and B. We would have expected the opposite finding, particularly as bond returns (Portfolios A and B) would have been more sensitive to the slightly higher expense ratio of the variable annuity. This would suggest that asset allocation, optimization and superior managers are more important to the contribution of return than expenses in this study.

We also analyzed each individual portfolio (A, B, C, D and E) based on those funds that were within their stated individual standard deviation limits. We did not find a dramatic shift in results from that of Table 1 and Table 3. However, because the Morningstar base populations versus each optimized portfolio were smaller, the relative percentages of "outperforming funds" grew. The consistency of the increases between Tables 1 and 3 and Appendices 3 and 4 suggest that even if the question was asked differently (that is, not in context of "dart throwing"), the conclusions would be the same.

The results in both Table 1 and Table 3 support the proposition that asset allocation, optimization and excellent managers are key components of risk-adjusted performance.

**Variable Annuity Model C Versus Asset Allocation Mutual Funds**

Mutual fund "asset allocation funds" exist under the premise that a single fund provides diversification. We therefore tested how many of the asset allocation mutual funds exhibited superior risk-adjusted returns over Optimized Portfolio C (Optimized Portfolio C contains about 60 percent in U.S. and international stocks and 40 percent in bonds, representative of a typical asset allocation mutual fund).

Out of 165 asset allocation funds with three years of data history, only 34 (21 percent) exhibited superior performance (see Table 4). Of all asset allocation mutual funds, 79 percent underperformed the Optimized Portfolio C.

This suggests that four out of five asset allocation mutual funds might not be managed using a combination of portfolio optimization and multiple managers, but rather act as a "fund of funds" under a related team of analysts or managers. It is reasonable to assume that most mutual fund companies’ managers share from the same pool of research analysis and might be inclined to have correlated and overlapping portfolios, thus resulting in only partially diversified asset allocation funds. This aspect of the study, whose results are consistent with the variable annuity and mutual fund data (Tables 1 and 3), suggests that asset allocation by itself does not produce higher risk-adjusted performance than a portfolio that uses asset allocation, multiple managers and is optimized across style classes.

Thus, 21 percent of improvement in return may be related to asset allocation. This might be interpreted to say that asset allocation contributes but 21 percent to overall performance in a portfolio. This improvement is significant but
not as much as one would expect over random "dart-throwing into a single fund" (Table 512). Asset allocation appears to not be at the top of the hierarchy of the investment decisions that produce higher performance.

These findings are similar to the 14.6 percent finding by Jahnke and the 16.5 percent finding of Arnott (footnote 4). This study (footnote 6) might further suggest that 79 percent of improvement in return is related to other characteristic factors such as portfolio optimization, multiple managers and diversity across a broad number of investment styles. It is likely that additional other fundamental factors accounted for these differences, although we did not see much difference in test group factors such as percentage weightings in stocks versus bonds and U.S. versus international allocations.

It is interesting that only one in five asset allocation funds equaled that of Optimized Portfolio C, a similar numeric statistic above. Extrapolating this data, one might say that there is only a one-in-five chance that asset allocation alone will produce superior performance. Arnott found that beyond "general asset allocation policy," style timing contributes 27 percent to return, selection contributes 38 percent and aggressiveness contributes 28 percent. These factors are consistent with the modern portfolio theory hypothesis to use distinct investment styles as well as our hypothesis that superior managers excel primarily in stock selection and aggressiveness.

We considered the possibility that the high number (80 percent) was due to chance of random selection. We performed Poisson statistics on these data to assure that there was no statistical overlap between these two test population groups. We found it was statistically highly improbable that these results were from random selection or from noise. The statistical analysis showed that the difference was greater than three standard deviations (< 0.001 percent). It is a crucial finding that asset allocation alone, as undertaken by mutual fund complexes, produces lower performance than asset allocation plus portfolio optimization across broad asset classes by managers who are segregated from each other’s research and stock selection committees.

Five-Year Database Analysis

Individual fund manager’s performance typically does not persist over long periods of time. Although we do not have comparative five-year data for VA Model Portfolios A–E Optimization at this time, we have begun preliminary investigations. I searched the variable annuity database over the preceding five-year period for risk-adjusted performance that exceeded that of the three-year Ibbotson optimization. I found that the number of funds that exceeded the returns of the optimized portfolio was yet lower than the three-year study. This is not surprising as (1) the number of possible funds for the five-year universe reduced to 2,426 (that is, proportionate reduction) and (2) over the longer period of time, managers’ performances may have declined. We therefore suggest that use of multiple fund managers within specific asset class styles and optimization of the portfolio annually provide a higher probability of improving portfolio returns over time. Thus, it would be reasonable to suggest that the mutual funds that exceeded the optimized portfolios over the short three-year trial period may not continue to outperform in the future.

We also analyzed 4,007 mutual funds that existed with a five-year or greater history. We found that over a five-year period, the number of funds that equaled or exceeded the risk-adjusted optimized portfolios (Table 1) decreased: only 15 mutual funds (0.37 percent) exceeded the Optimized Portfolio A, only 12 mutual funds (0.30 percent) exceeded Portfolio B, 99 mutual funds (2.47 percent) exceeded Portfolio C, 151 mutual funds (3.7 percent) exceeded Portfolio D and 792 mutual funds (19.7 percent) exceeded the optimization results of Portfolio E.

The decrease in the number of mutual funds whose risk-adjusted return were higher than that of the optimized portfolios for the five-year period versus the three-year period (Table 3) is obvious. For mutual funds in Category A that exceeded performance of the three-year VA results, the percentage dropped from 2.56 percent (three-year period) to 0.37 percent (five-year period). For Portfolios A, B and C (that hold 73 percent, 60 percent and 40 percent bonds respectively), this decrease may be due in part to the lower returns in bonds over the past five years versus the past three years where interest rates declined more rapidly.

The near equal performance of Portfolio E (which holds 28 percent international and 6 percent emerging markets stocks) in the five-year mutual fund period compared with the VA three-year optimization period reflects the fact that both international and emerging market funds had a higher return over the past five years than over the most recent three-year period. Unfortunately, the number of emerging market mutual funds that had five-year performance data were limited to 14 funds. We do not have comparative five-year data for Model Portfolios A–E Optimization. However,
the data above intuitively suggests that the number of mutual funds that would have exceeded an optimized portfolio would have declined as performance of individual mutual fund managers tends to "regress to the mean."

**Expense Ratios**

Lay newspaper articles typically characterize the disadvantages of variable annuities over mutual funds due to their modestly higher expense ratio. Do expense ratios count? This study suggests that it is the combination of portfolio optimization, diversification and perhaps above-average variable annuity fund performance that accounts primarily for better risk-adjusted returns. While costs should always be considered, they do not appear to play a key role in this study.

To elicit differences within the focused population of the asset allocation funds that exceeded the risk-adjusted performance of Portfolio C, we attempted to break out the pattern that resulted in higher return. We found, in general, that a higher return was related to a higher stock concentration and a higher expense ratio. We separated the 34 asset allocation mutual funds that outperformed the Optimized Portfolio C into two groups: (1) higher than the mean expense ratio of the group and (2) lower than the mean of the group (Table 4). The lower expense group demonstrated a small positive differential (<0.5% in annual returns over three years). For this limited study, the differential contribution to performance of lower versus higher expense asset allocation funds was in the magnitude of 4.3 percent, much lower than would be expected (that is, 0.5%/11.58 %, Table 4). However, as several of these asset allocation mutual funds were listed in the Principia database as having no expenses whatsoever (0 percent expense ratio, front, back load and 12 b-1 cost) and might be in error, these data may overstate this performance differential. While most studies conclude that low expense ratios are critical to performance, we did not find this to be the case once the subgroup of higher performing funds was broken out. We do agree that at extremes of performance, expenses do count. An in-depth study would be useful to elicit the actual contributions of fund expenses to optimized risk-adjusted performance.

It is noteworthy that this study did not account for taxes that otherwise would have been paid by mutual fund owners, lowering net performance, and might have further skewed the data in favor of the tax-deferred annuity portfolio. The cost savings and higher long-term income payout from variable annuities over mutual funds has been previously demonstrated, but may not be material to this shorter study outcome. We intend to investigate these cross effects over longer-term periods.

**Rolling Three-Year Performance Data**

The Ibbotson methodology used in this study applied a long-term data series to this three-year study period. However, as we experienced two major market declines and recoveries during this period, these reported results may be typical for this current period of increasing market volatility.

It should be noted that the seemingly low returns for the optimized Portfolio E as of 9/30/98 are mostly related to its high concentration of emerging market and international funds, which declined twice during this study period. The performance data for the December rolling three-year period (Table 6) reflects the normalization of the data by including the recovery period that followed the summer 1998 decline. The three-year data ending December 30, 1998, are more typical of the history of these optimized portfolios.

**Discussion**

We chose the time period ending 9/30/98 to "stress test" the Ibbotson Asset Allocation model, as this was one of the most troubling times for advisors. One, we were in the midst of a severe market decline and two, the "markets" rewarded those who concentrated in large capitalization growth stocks and punished those who concentrated in small-value stocks. If a systematic asset allocation model adds value, it would be most pronounced during market declines, where the non-correlation components of the model reduced volatility and therefore loss of the portfolio.

Advisors may have recently been asked by clients, "Why am I not singularly invested only in the S&P 500?" We feel that once the true financial personality of the client is established and understood by the client, they are more likely to understand that the market extremes for 1998 speak to extremes of risk, not return. For example, for 1998, the largest 50 stocks of the S&P 500 produced a 41.3 percent return versus the remaining 450 stocks, which produced a 16.5
percent return—the largest differential we have seen over the past five years. Growth vastly exceeded value for 1998 as the Russell 1000 Growth Index (the largest 1000 stocks) returned 38.7 percent; the Russell 1000 Value Index returned but 15.6 percent. The remaining Russell 2000 stocks out of these top 3,000 stocks returned a –2.5 percent return for 1998.

Our investment methodologies over the past 15 years reflect a balance of application of technical analysis, fundamental analysis and tactical asset allocation. We concluded several years ago that clients in general do not easily accept portfolio management methods that (1) frequently change their portfolio allocation, (2) are irrelevant to their values, such as long term goals and (3) are difficult for them to understand. We have concluded that clients want (1) actively managed funds, (2) some degree of active reallocation and (3) need a "visual anchor" such as a graphical representation of the 40-month business cycle to understand that their asset allocation is matched to the current economic conditions.

We have concentrated on extensive interviewing and financial/psychological testing to identify our clients’ risk tolerance, which is translated into variance limitations—that is, portfolio standard deviation. We retest clients to ensure that we have a stable picture of their capacity to accept the modulation of declines and limitations of upside potential. We find that by focusing on target long-term returns, the 9/30/98 dips are within the acceptance of clients’ expectations. Ibbotson optimization software, as well as those of other vendors, provides excellent visual and statistical chart tools to communicate how variation (volatility) reduces over time and returns get closer to their target returns over time—that is, within their profile limits (5 percent to 95 percent standard deviation limits).

One of our largest challenges has been to monitor the consistency of each fund manager to stay within their discipline of capitalization, style and selection. We stay in close touch with our fund managers by monitoring them against their peers and using "attribution analysis" to see when and if changes in style and capitalization have occurred. We have experienced slippage from our models when fund management changes, fund managers change and when the manager of the fund changes focus in stock selection, style and capitalization.

As an asset allocation method produces systematic—and therefore a limited range of returns—we are in the pro-camp of using consistent "active managers," acknowledging that they have the potential to contribute a premium or deficiency to total return. We have also employed tactical asset allocation models using fund group managers whose disciplines are more momentum based, such as investing in stocks that reflect "growth at a reasonable price." This latter tactical approach requires a more active monitoring of the degree of positive or negative success a manager may have in style timing and selection.

**Conclusion**

The very low numeric chance of exceeding the optimized portfolio returns by random selection of an individual variable annuity or mutual fund suggests two possibilities: (1) that optimization and asset allocation do reduce risk and therefore enhance risk-adjusted returns and (2) that the managers of funds in this study (primarily institutional managers such as J.P. Morgan, Pimco and Banker’s Trust) exceeded performance of most mutual fund managers. These results are reinforced by the statistic that 79 percent of asset allocation mutual funds produced lower risk-adjusted performance than the Optimized Portfolio C.

While we recognize that this study was limited in scope, it does start to address probability outcomes of the non-diversified "dart thrower" who buys and holds a single variable annuity or mutual fund as a means of diversification in lieu of a broader-based, diversified portfolio of funds. Clearly, portfolio optimization and increase in holdings across bonds and stocks and across style and size of market capitalization do improve risk-adjusted returns. This study argues in favor of using multiple managers over a broad range of styles and capitalization, as well as using advanced optimization techniques. We can only report on the positive implications of Ibbotson Associates diversification methodology at this time. This does not rule out other approaches to optimization.

The question, "Does the risk/reward of these optimized variable annuity portfolios exceed those of similar optimized mutual fund portfolios?" is still an open question. To answer this, a study would need to analyze mutual fund companies who have optimized their funds into portfolios and have management styles that do not exhibit "style or market capitalization size drift." We will explore and contrast our findings in future studies.
Implications for the Financial Planning Community

Asset allocation optimization as applied by Ibbotson Associates to the funds provides a meaningful way to assist delivery of steadier returns within the risk constraints of client expectations. Testing a client’s risk profile assists in meeting their objectives.

The question is not solely whether an advisor "adds value" to passively managed index funds, but rather can an advisor help the client develop a livable framework of savings and investing that permits them to live in their financial house during periods of "exuberant excess" as well as periods of "market slips" so that their goals are reached.

Only when we, as advisors, gain insight to our own expertise and limitations can we begin to understand our clients comfort framework and value sets. We also believe that not all individual investors are willing to accept limited upside return potentials until they have knowledge of the pain of downside potential loss that may tie in to earlier life experience of other types of personal loss.

As the financial planning process for retirement seeks an after-inflation, after-tax "real rate of return" for growing client assets, the Ibbotson models support a means to match our clients’ goals and suitability to their investments. These portfolios and their risk/reward limits form the basis for client investment policy statements. We are inclined to use the highly bond-funded portfolios (A–C) as interest rates decline and for those with shorter time horizons, and the stock-funded portfolios (D–E) as the clients risk tolerance and time horizon are greater. As the goal of our financial planning practice is to provide steady long-term returns, we have adapted these models to our client’s mutual fund, 401(k), variable life and variable annuity holdings.

These studies also support the view that careful work on the part of the planner can contribute to identifying client risk requirements and optimizing around these criteria to provide realistic expectation outcomes. Meeting these goals may be more helpful to the client’s long-run benefit than simply selecting the lowest cost, highest return or a single index fund in vogue today. We intend to continue studies into this field of investigation as well as that of tactical asset allocation over the business cycle from a quantitative and technical viewpoint.

Endnotes


2. We were unable to find any other continuously monitored portfolio of either mutual funds or variable annuities that used this strict discipline while adhering to the Ibbotson Consulting model. Thus, we undertook this study with those data available.


7. This is not in disagreement with the Brinson studies of 1986 and 1991. Ibbotson also found that 87.6 percent of the variability of a fund’s return across time is explained by this variability of policy returns. R.G. Ibbotson and Paul D. Kaplan, "Does Asset Allocation Policy Explain 40%, 90%, or 100% of Performance? www.ibbotson.com/researh, April 1999, pp. 1–13.

8. Appendix 3 and Appendix 4. It is possible that a fund with slightly inferior return but a better (lower standard deviation) may be relatively more suitable for the investor at that lower risk-adjusted level.

9. "Asset Allocation" according to Morningstar’s prospectus objective, includes investments in stocks, bonds and cash.


12. That is, asset allocation, as developed by the fund manager, contributes 21% to the total return of those funds that exceeded the performance of Optimized Portfolio C.

13. "Attribution" as used here is not classical statistical attribution analysis in the manner performed by Ibbotson Associates. It is used here in a general manner to note which factors can be attributed to performance of these portfolios.

14. As only 164 funds of all mutual funds exceeded that of Portfolio C (Table 3), and 34 of these funds were asset allocation funds (Table 4), the residual 130 funds (164 – 34) were therefore not asset allocation funds. The ratio of these non-asset allocation funds to asset allocation plus non-asset allocation funds that exceeded the Portfolio C (130/164 = 79.3%), suggests that 79.3% of performance was due to non-asset allocation factors and 21 percent (34/164) was due to asset allocation (Table 5).

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