UBS
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A Research Brief

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Alternative Assets in a Globally Diversified Portfolio

Introduction

One of the most important decisions investors need to make is determining their asset allocation. The asset allocation is the portfolio's composition in terms of asset classes such as U.S. stocks, European stocks, U.S. bonds, etc., to achieve the best risk-return ratio. In order to arrive at the optimal ratio, the following crucial questions must be answered:

- What asset classes are included in the asset allocation?
- In what proportions are they included?

These questions have already been tackled in the context of conventional assets in the 1980s and 1990s. In their seminal article, Brinson, Diermeier, and Schlarbaum[1] show what a U.S. investor's global asset allocation should look like based on the risk and return characteristics of individual asset classes. In another, frequently cited article, Brinson, Singer and Beebower[2] demonstrate that portfolio performance is mainly determined by the portfolio's composition on the asset class level rather than within asset classes.

For the past few years, plan sponsors, endowments and private investors have been increasingly interested in nontraditional, "alternative" investments such as private equity,[3] natural resources and hedge funds – in short, assets that are not regularly traded. What does the global asset allocation look like if we add alternative assets to the asset mix?

Within an extensive study, we have dealt with this question in depth, as it has not yet been tackled satisfactorily.[4] In this abbreviated version of our paper, we elaborate the following points:

- Estimating clear-cut risk and return characteristics for all asset classes is the pivotal part of asset allocation.
- While this seems relatively straightforward for liquid assets, it is a challenge in the area of alternative assets. We show why the use of historical data may be misleading.
- When alternative assets are part of the asset mix, asset allocation on the basis of optimization fails, since an optimization ignores the effects of reduced liquidity.
- Instead of a portfolio optimization, we employ a simulation analysis. Apart from risk and return characteristics, our simulation also takes alternatives' lack in liquidity into consideration.

Historical data are problematic

In practice, the asset allocation is usually derived by an analysis of historical data, which means an extrapolation of the past into the future. This is not necessarily correct. If alternative investments are involved, the consequences are intensified; however, as for alternatives even the past is recorded incorrectly. The perception of alternatives, is quite often that they not only yield high returns and low risk, but also that they hardly correlate with traditional asset classes.[5]

In fact, from 1981 through 2000, we calculate a correlation of -0.46 between the S&P 500 and venture capital, which indicates a contrary behavior of the two asset classes. The corresponding volatilities[6] are 12.8% for the S&P 500, 10.4% for venture capital and 6.9% for real estate. Meanwhile, the average annual returns for the same period are 14.8%, 20.7% and 7.8%, respectively.

These numbers suggest a free lunch for venture capital: more return for less risk. If we optimize with these parameters, the resulting portfolio will consist mainly of alternative assets. However, the fact that the "average" investor only invests gingerly in alternatives indicates that an analysis of historical data does not capture their essence.

Where do these discrepancies come from? Ultimately, they are driven by the fact that alternative investments are not traded on stock exchanges; continuously observable market data are thus not available. In practice, missing data are often replaced by constant values or expert appraisals. Unfortunately, this is tricky, as constants do not reflect any risk at all, and appraisals tend to be overly optimistic.[7]

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1 Brinson, Gary P., Jeffrey J. Diermeier and Gary G. Schlarbaum: "A Composite Portfolio Benchmark for Pension Plans." Financial Analysts Journal, March-April 1986, 15-23.

2 Brinson, Gary P., Brian D. Singer and Gilbert L. Beebower: "Determinants of Portfolio Performance II: An Update." Financial Analysts Journal, May-June 1991, 40-48.

3 The term "private equity" defines the entirety of venture capital and buyouts.

4 Singer, Brian, Renato Staub and Kevin Terhaar: "The Appropriate Policy Allocation for Alternative Investments." UBS Global Asset Management Working Paper, 2002.

5 Correlation is a means to measure the systematics of movements. A correlation of +1 / 0 / -1 between two assets means they move perfectly in line / absolutely unsystematically / perfectly contrarily. For purposes of diversification, one should choose assets that correlate little with the other assets.

6 Volatility measures the distribution of returns. The volatility of a given series of returns can be calculated. The bigger the distribution of returns, the higher the volatility. In practice, volatility is often used as a measure for risk.

7 Often, the same experts appraise the same objects over a long period of time and thus further smoothe the data. Furthermore, there are indices which are updated on a quarterly basis, but only partially, which also filters volatility.

The risks of alternative assets are not insignificant...

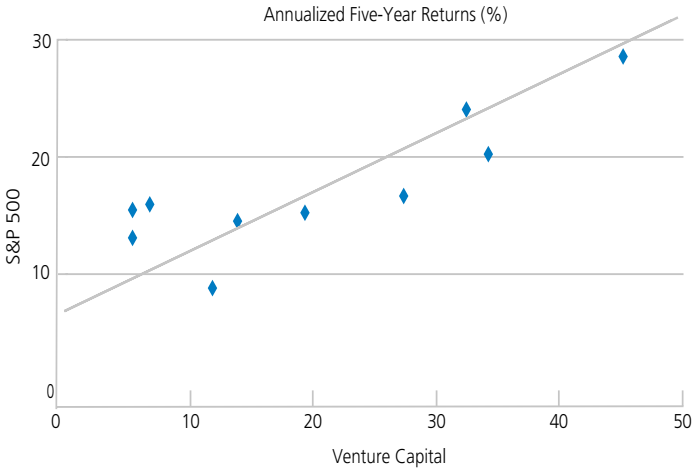
The returns of the individual asset classes depend on their risks and correlations. Hence, in order to estimate these returns, we first need to estimate the risks and correlations of these assets.[8]

The inherent data challenges of illiquid assets mean that market value estimates are considerably smoother in the short run than they are in reality. Nonetheless, in essence, smoothing is an approximation of the trend. Whereas the trend reflects long-term market movements fairly well, this is not the case over the short term.

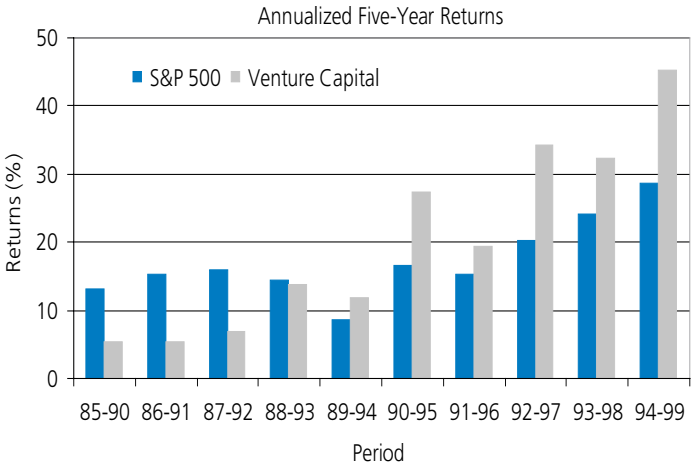
A realistic estimate of the risks and correlations thus is only possible using long-term data. In order to illustrate this, we conduct the following experiment: For every calendar year, we record the new venture capital inflow. Then we calculate the annualized return over the first five years for every one of these "vintage" years. In addition, we calculate the annualized S&P 500 returns for the same intervals.

The advantages of this experiment are evident: First, we use a more relevant time horizon for a long-term investor; and, second, the result does not depend on short-term market movements. An index of illiquid assets is unable to reflect these, and has not been designed to do so.

The historical correlation between the S&P 500 and venture capital is best illustrated with a scatter graph. In such a graph, one axis represents the annualized five-year returns of the S&P 500, and the other axis shows the returns of venture capital. The closer the dots are on a straight line with a positive slope, the higher the correlation.



Apparently, there is a positive correlation between the S&P 500 and venture capital. Our calculations suggest that it was significantly above 0.50 during the 1990s, indicating that exchange-traded equities and venture capital move rather systematically.



Next, we want to indicate the historical risks of the S&P 500 and venture capital with a bar chart: The greater the difference between the smallest and the biggest bar, the more volatile the respective asset class.

While the S&P 500 returns are within a 20% range, venture capital moves within a 40% range. This and other examinations demonstrate distinctly that the long-term risk of venture capital is at least twice as high as for liquid equity.

Ultimately, venture capital reacts to the various risks very much like liquid equity, albeit with a much higher sensitivity.[9] It is not plausible, anyway, why otherwise similar assets should react differently to the same risks simply because they are subject to different degrees of liquidity. Rather, we have to assume that changes of their market values depend on fundamental economic factors and not on their legal structure.

Based on these findings, we estimate the risks of alternative assets. And finally, we model their correlations through their supposed relationships to traditional asset classes such as U.S. equities, European equities, U.S. bonds, etc., which constitute the foundation of the whole correlation structure.[10]

As a result, we get high risks and correlations for venture capital and management buyouts and moderate risks with fairly small correlations for real estate. Does this imply that venture capital and management buyouts, are unattractive investments? This question cannot be answered yet, since no such conclusion can be drawn without an idea about returns.

...and neither are their returns

As aforementioned, returns must be estimated after the risks and correlations, as returns depend on them. A third driver to be accounted for is the degree of segmentation. Segmentation describes to which extent capital in- and outflows are hampered by legal and practical barriers. A higher degree of segmentation implies a higher return, since the capital invested in a particular market is less prone to be rivaled by "mobile" external capital.

[8] "Estimating" in this context does not mean "guessing"; rather it is a methodic approach to evaluate a parameter.

[9] The recent market corrections vividly document the positive correlation.

[10] In technical terms, this is a so-called factor analysis.

These elements characterize liquid asset classes fairly well. However, a further element is required for illiquid assets. No rational investor will choose — between two otherwise identical assets — the illiquid over the liquid one if he does not get compensated for his loss of flexibility. This additional compensation for illiquidity, the so-called liquidity premium, increases with the combination of illiquidity duration and risk.[11]

Overall, alternative assets generate returns beyond what could be expected in a world of perfectly integrated markets. Even more, in the case of venture capital and management buyouts, these returns are markedly higher due to the relatively high degree of segmentation and the long duration of illiquidity combined with high risk.

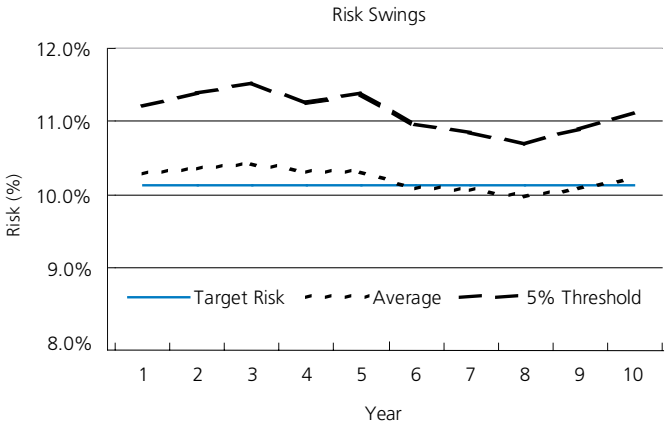
The 80/20 portfolio

Market movements cause permanent deviations of the actual portfolio from its — theoretical — asset allocation. However, once alternative assets are included, these deviations become pivotal, as immediate rebalancing between the liquid and illiquid portion of the portfolio becomes impossible. This means that the portfolio can substantially deviate from its predetermined asset allocation over longer periods. In this regard, we talk about involuntary portfolio drift. Although the optimization results indeed in a precise allocation, this does not resolve the drift problem. The crucial point here is not that the optimal portfolio would not look fine; rather, the problem is that illiquidity-based inertia does not allow the real portfolio to permanently match the theoretical portfolio. Further, it is not clear what these deviations mean in practice.

For these reasons, we run a simulation analysis which requires various asset allocations as an input and simulates their development over the course of several years. Thereby, the simulation incorporates our risk, correlation and return estimates. Every allocation is simulated repeatedly, and the body of all simulations is evaluated statistically. Most importantly, the simulation depicts the illiquidity of alternative assets by allowing rebalancing only to the extent possible in reality. This is mainly driven by the maturity of alternative assets.

The simulation results show an interesting pattern: The portfolio risk swings cyclically. While the average deviation from the target risk is not very big, it can be substantial in individual instances. The graph below illustrates the risk threshold for our recommended asset allocation which is exceeded in 5% of all instances.

This cyclicality can be explained as follows: Given a temporary overweight in an illiquid asset class, investors generally refrain from additional investments in the same asset class for a lack of options. This in turn is likely to lead to an underweight a few years later. In line with this cyclical deviation from the asset allocation, however, the portfolio risk also deviates from the risk of the recommended asset allocation, the so-called target risk.



This fluctuation of the actual risk around the target risk is unavoidable and constitutes an important element of risk analysis. Even though the efficiency of an asset allocation may be very high, the risk swings might be of intolerable magnitude. Asset allocation aims to achieve the best ratio between risk and return, while accounting for a tolerable risk fluctuation.

We find that the efficiency of a globally diversified portfolio[12] can be increased by approximately one fifth, if it includes 20% of alternative assets, of which 10% are allocated to real estate, 5% to private equity, and the rest to hedge funds and natural resources.

These results are subject to two restrictions. The first one requires no increase in target risk due to the addition of alternative assets. This implies a relatively high real estate portion, which neutralizes the high risk contribution of private equity. The second restriction claims that the risk swings, as represented by the 5% threshold, stay within a predefined margin. If an investor accepts a higher target risk and a higher margin, then we recommend increasing the private equity portion at the expense of real estate. This implies, however, that the client needs to be involved in setting the asset allocation, as the decision depends on his risk aversion and his liabilities. For a pension plan, the tolerance for risk swings tends to be larger the larger the proportion of young beneficiaries is, as the degree of immediate payment obligations and thus liquidity needs are smaller.

[11] Staub, Renato: "Segmentation, Illiquidity, and Return." UBS Global Asset Management Working Paper.

[12] A balanced portfolio is substantially invested in stocks and bonds.

Conclusion

Unlike an optimization, the simulation approach does not provide an asset allocation as an output. Rather, it tests a variety of asset allocations. Adding alternative assets to the portfolio mix enhances the efficiency of the portfolio considerably. Venture capital and real estate should not be played against each other because of their different characteristics. Whereas venture capital is likely to increase the total portfolio return significantly, real estate proves an excellent instrument for diversification. The art is the combination of these two asset classes.

Is the increased portfolio efficiency a "free lunch?" By no means. The investor pays with reduced liquidity, as he foregoes the ability to immediately liquidate his entire portfolio. On the other hand, in most cases, full-fledged liquidity is a waste of resources and, indeed, should be prevented by all means.

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