

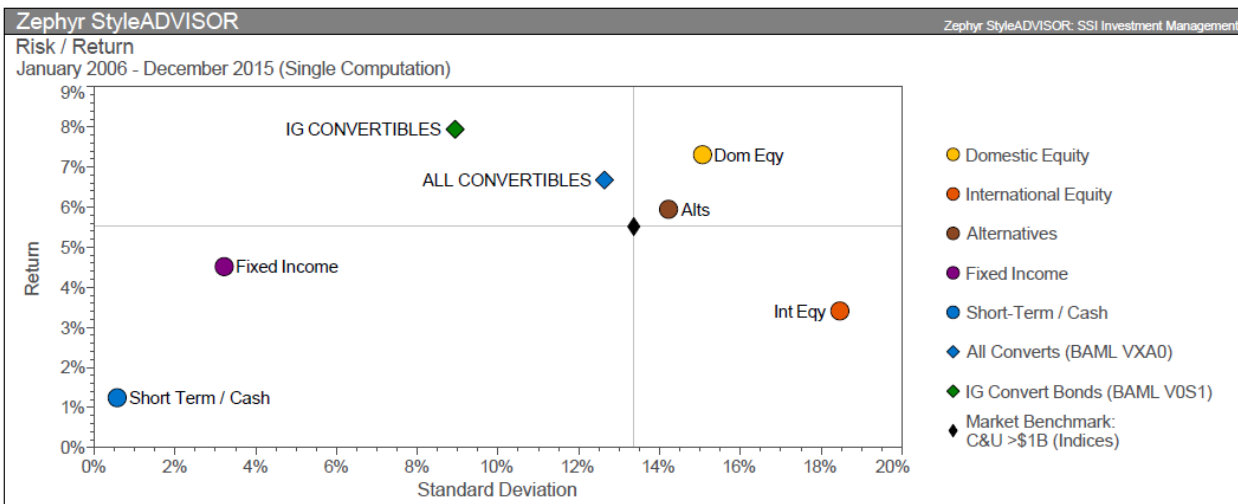
How Convertibles Fit in Educational Endowment Portfolios

Convertible securities are often used to improve the overall risk/return profile of a broad investment portfolio. Their combination of fixed income and equity-like attributes can make convertibles an attractive alternative to conservative equity, high yield, or alternatives allocations. Using data from the 2015 NACUBO¹-Commonfund Study of Endowments, which analyzes several hundred U.S. college and university endowment portfolios, SSI analyzed the impact of adding an allocation of convertibles to a typical Endowments portfolio. This white paper discusses the results of these studies.

The NACUBO-Commonfund study breaks down college and university endowments into six categories, based on market value (see table below). This study shows that five major asset classes are represented in the typical U.S. College & University endowment: *Domestic Equities*, *International Equities*, *Fixed Income*, *Alternative Strategies*, and *Short-Term & Cash securities*. Large endowments tend to put more money in the alternatives bucket and less into domestic equities, while allocations for small endowments seem to do the opposite. This could be due to anything from prohibitive fee structures to required rate of return. Average allocations are as follows:

| Size of Endowment | Domestic Equities | Fixed Income | International Equities | Alternative Strategies | Short-term / Cash / Other |
|--------------------------------|-------------------|--------------|------------------------|------------------------|---------------------------|
| Over \$1 Billion | 13% | 7% | 19% | 57% | 4% |
| \$501 Million to \$1 Billion | 21% | 9% | 20% | 44% | 6% |
| \$101 Million to \$500 Million | 27% | 13% | 21% | 34% | 5% |
| \$51 Million to \$100 Million | 33% | 17% | 20% | 25% | 5% |
| \$25 Million to \$50 Million | 40% | 20% | 18% | 16% | 6% |
| Under \$25 Million | 42% | 24% | 15% | 11% | 8% |

Below is a risk/return plot of these five major allocation categories, with two convertibles indices (BAML's VXA0 All US Convertibles and V0S1 US IG Convertible Bonds Only) and the typical > \$1 Billion endowment portfolio as the 'benchmark', for comparison. Both convertible benchmark indices appear as comparatively attractive, with Investment Grade (IG) especially being a standout risk adjusted performer.



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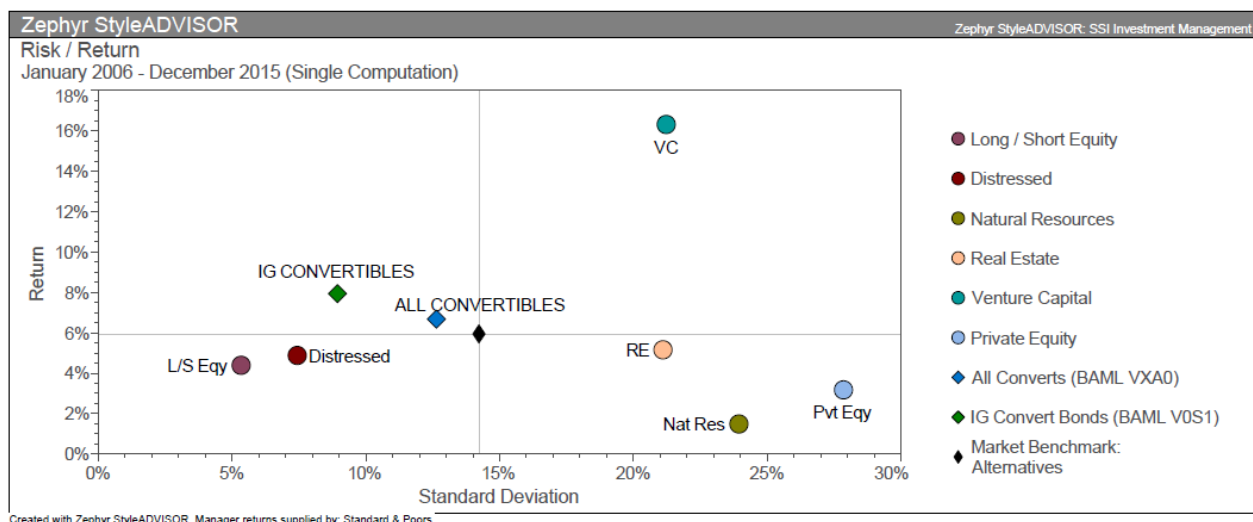
For the purposes of this paper, the following benchmark indices were used as representative assets. The goal was to make certain that each asset had at least ten continuous years of return streams, and that the resulting performance should represent a portfolio's return gross of fees.

| Typical College & University Endowment Assets | | | |
|---|------------------------------|-----|-----|
| | | min | max |
| Short Term / Cash | BAML US 3-Month T-Bill Index | 2% | 10% |
| Fixed Income | Barclays US Aggregate Index | 5% | 25% |
| Domestic Equities | S&P 500 Index | 10% | 45% |
| International Equities | MSCI World Ex. US Index | 15% | 30% |
| Alternatives | average C&U Endowment mix * | 5% | 60% |

| * Alternatives Allocation | | Average C&U Endowment mix: |
|---------------------------|--|----------------------------|
| Long/Short Equity | BarclayHedge Equity Long/Short Index | 40% |
| Private Equity | LPX Direct Listed Private Equity Index | 21% |
| Natural Resources | S&P Natural Resources Sector Index | 13% |
| Real Estate | S&P BMI Global Real Estate Index | 12% |
| Venture Capital | Thomson Reuters Venture Capital Index | 11% |
| Distressed | HFN Distressed Index | 3% |

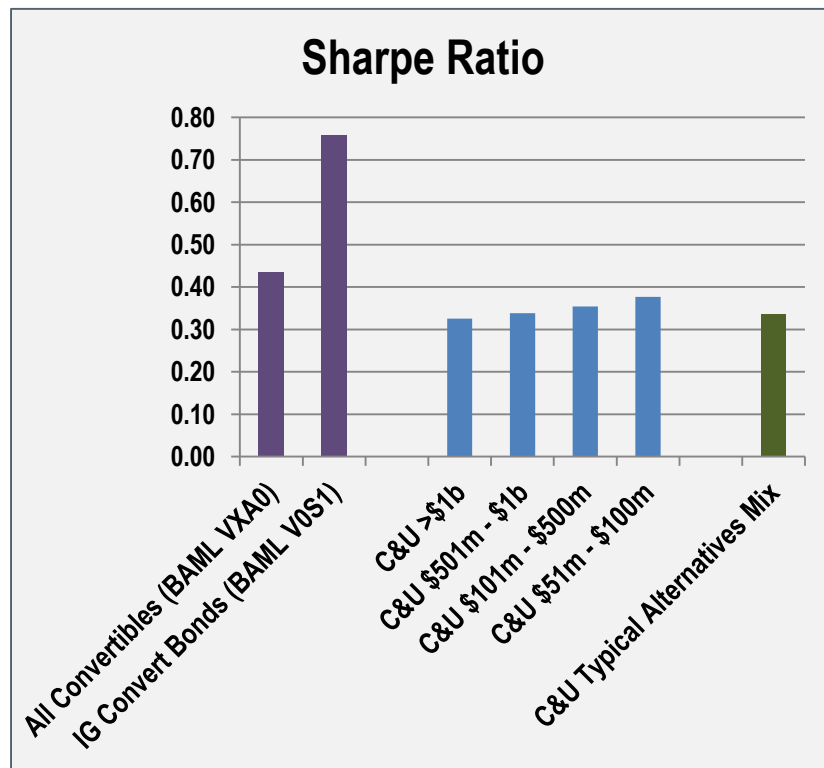
| Convertible Products |
|--|
| BAML All US Convertibles (VXA0) |
| BAML IG US Convertible Bonds (V0S1) |

As can be seen in the blue table above, four out of the five major asset class categories are easily replicated, but for the "alternatives" bucket, there is no single index that encapsulates the typical alternatives strategy. As such, the average endowment's allocation to six alternative categories was used (see the green box above), with the largest allocation typically going to Long/Short Equity. Since the size of the total endowment portfolio has a large impact on the size of the allocations within the alternative bucket, SSI took the institutional average allocation seen above, which came from the NACUBO-Commonfund study. Below is another risk/return plot with these six alternatives categories, again compared with both convertibles indices, and including the average alternatives asset mix shown as a 'benchmark'. Convertibles appear to compare favorably once again.



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As the two previous risk/return charts have illustrated, both convertibles benchmarks have superior risk adjusted returns versus the typical > \$50 Million endowment as a whole, as well as having better risk adjusted returns than the average 'alternatives' bucket within an endowment portfolio. This is historically evidenced by looking at Sharpe ratios over the last ten years (the maximum time frame examined in the 2015 NACUBO-Commonfund study). Again, while Investment Grade convertibles are the real standout product, both convertible indices have favorable risk adjusted returns when compared to the current asset mixes found in typical college and university endowments.



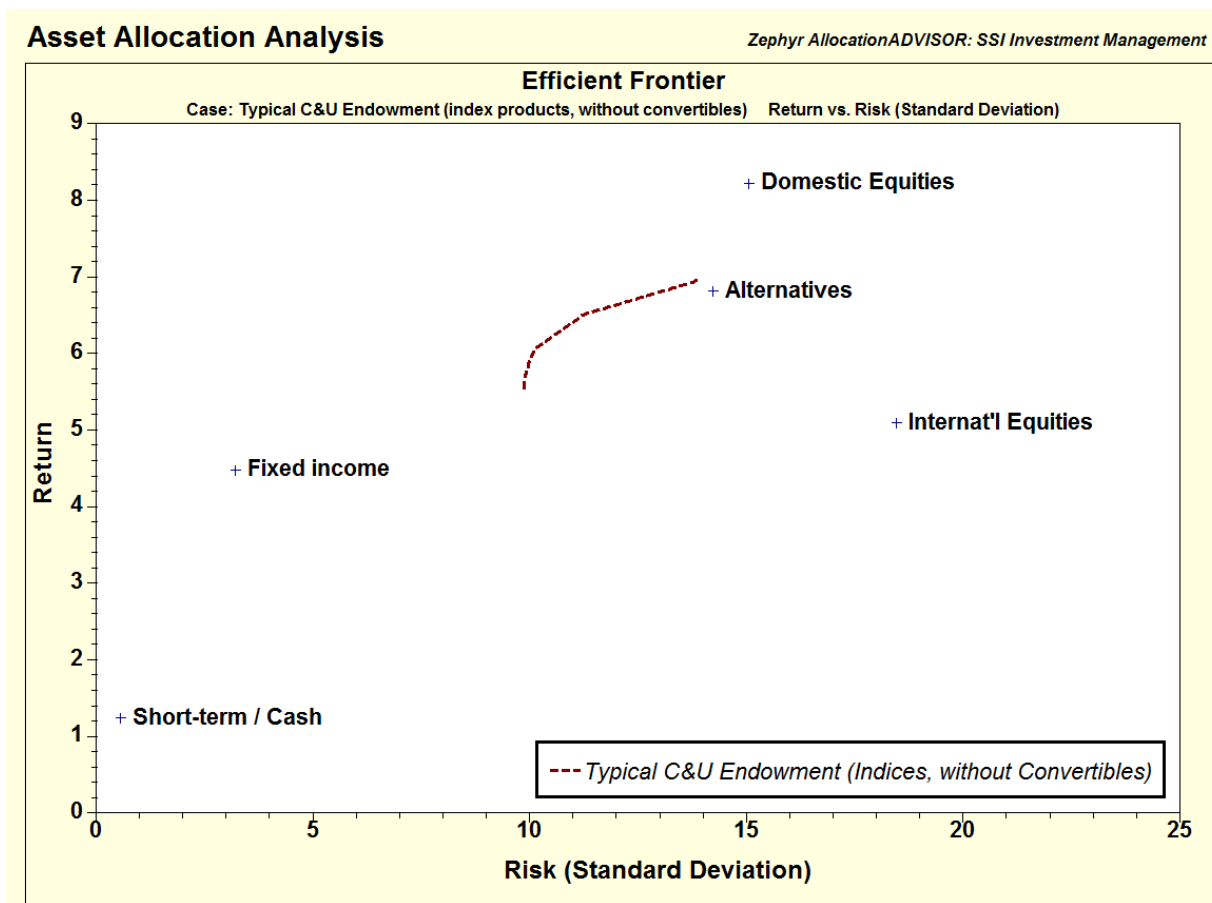
Trailing 10-Year, as of 12/31/2015

Thus far, it appears that convertibles could be a benefit to the typical educational endowment portfolio, from a risk/return perspective. Now that each of the assets that typically make up an endowment have been examined, it is necessary to assess the impact of adding convertibles as an allocated asset within an endowment portfolio. This can be accomplished through constructing efficient frontiers.

The blue table on the previous page (p. 2) shows the range of allocations to each of the five major asset classes, which are highly dependent on the size of the endowment. As previously mentioned, larger endowments tend to allocate more to the alternatives bucket and less to domestic equities and fixed income, while small endowments typically allocate in the opposite manner. Using the minimum/maximum range of allocations from the blue table on the previous page, an efficient frontier can be constructed which represents the wide range of educational endowments.

How Convertibles Fit in Educational Endowment Portfolios

The chart below shows the efficient frontier on which a typical college and university endowment lies. Positioning on the frontier is dependent upon the allocation to each of the five major asset groups within an endowment portfolio, which we have shown is tied to the total size of the endowment.

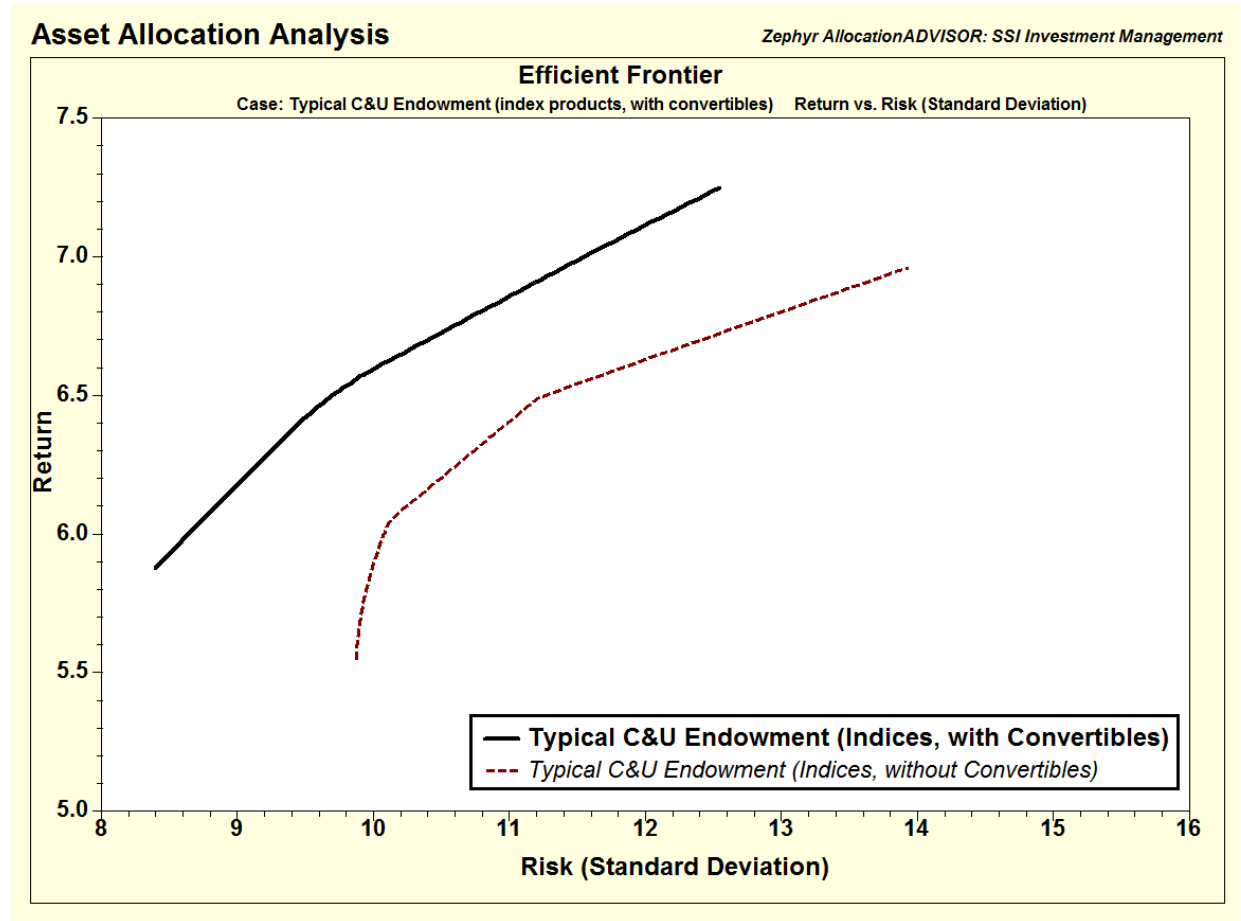


Trailing 10-Year, as of 12/31/2015

Now that the efficient frontier for a typical endowment portfolio has been built, the final step is to determine the impact of adding an allocation to convertibles. For the purposes of this study, the same two BAML convertible indices (VXA0 All US Convertibles and V0S1 US IG Convertible Bonds Only), were used to represent the convertibles asset class. As with the rest of the assets in this study, each convertible index was assigned a minimum/maximum allocation range, from 0-20% of the total endowment portfolio. Based on the data that has been presented thus far in this study, one would expect a positive overall impact from adding convertibles to an educational endowment portfolio, given the favorable risk/reward profile that convertibles exhibit.

How Convertibles Fit in Educational Endowment Portfolios

Using the discussed minimum/maximum ranges for convertibles within an educational endowment portfolio, a new efficient frontier was constructed. The results are shown below.



As expected, there is meaningful improvement to the existing range of endowment portfolios by adding convertibles. The graph indicates that improvements can range from +100 bps increased return to -175 bps reduced risk (as measured by standard deviation), a strong argument for the inclusion of convertibles within a college or university endowment portfolio. While both convertible benchmark indices improve the risk/return profile of a typical college or university portfolio, Investment Grade convertibles get a higher recommended weighting than the fully discretionary All Convertibles strategy, regardless of where one wants to sit on the efficient frontier. This is because of the standout risk/return profile of Investment Grade convertibles, a high credit quality asset class with meaningful exposure to the technology and healthcare sectors.

The higher recommended relative weighting in Investment Grade convertibles is due to the fact that the return profile of the All Convertibles index more closely resembles assets that already exist within the typical educational endowment portfolio (somewhere between alternatives and domestic equity, albeit with an improved Sharpe ratio), while the Investment Grade Convertible Bonds index presents an optimal risk reward profile that stands separate from the rest of the asset mix. It follows that the typical college or university endowment portfolio could benefit from adding a blend of Investment Grade and fully Discretionary convertible products, with a higher weighting on the Investment Grade portion of the portfolio.



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¹The National Association of College and University Business Officers (NACUBO).

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