

## PORTFOLIO MAGIC

*This is one of a series of Research Briefs created by Brinton Eaton to keep our clients informed about key developments — in financial planning, tax strategy, and investment management — that we research and implement as appropriate on your behalf.*

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**“Any sufficiently advanced technology is indistinguishable from magic.”**

*(Arthur C. Clarke)*

In our *Research Brief* on “Risk & Return”, we examined some surprising, counter-intuitive phenomena that occur when the investment performance of a single asset is viewed over extended (i.e., “real life”) holding periods. At its conclusion, we hinted that things get even more interesting when multiple assets are combined together in a diversified portfolio and followed over similarly extended investment horizons. In this current *Research Brief*, we highlight three examples of increasingly intuition-defying results.

### **Opposites Are Attractive**

The Holy Grail in portfolio construction is to find assets that have “perfect negative correlation” with each other. What does that mean and why is it desired?

Consider two assets, A and B, each with an expected annual return of 8%. As is typical of most assets, Asset A and Asset B do not come with a guaranteed 8% return each year — the actual return is subject to quite a bit of variation from year to year. Let’s suppose that your holding period is ten years, and that Asset B is subject to twice as much annual variation as Asset A over that period. If there existed an “Ideal Asset” that did return a guaranteed 8% each year, it would be much preferred to either A or B. In addition to the comfort of knowing that you could count on your 8% return every year, you would actually be wealthier at the end of ten years with this Ideal Asset! (See our *Research Brief* on “Risk & Return”[\[link\]](#), for a demonstration of this extraordinary result.)

Can such an asset be found? Well, if Asset A and Asset B happen to be perfectly negatively correlated with each other<sup>1</sup>, indeed it can. In fact, you can construct this Ideal Asset by simply putting two-thirds of your investment in Asset A and one-third in Asset B<sup>2</sup>. If you maintain this asset allocation each year through rebalancing, your return will be exactly 8%, each and every year, guaranteed. The following table illustrates this.

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<sup>1</sup> For example, should Asset A’s return in a given year depart from its expected return of 8% by, say, +5%, then Asset B’s return that year would depart from its expected return of 8% by twice as much *in the opposite direction*, i.e., by -10%. The resulting returns in this case, of 13% and -2% for Assets A and B respectively, are those that occur in year 1 of the example in the following table.

<sup>2</sup> That is, in inverse relationship to their variations.

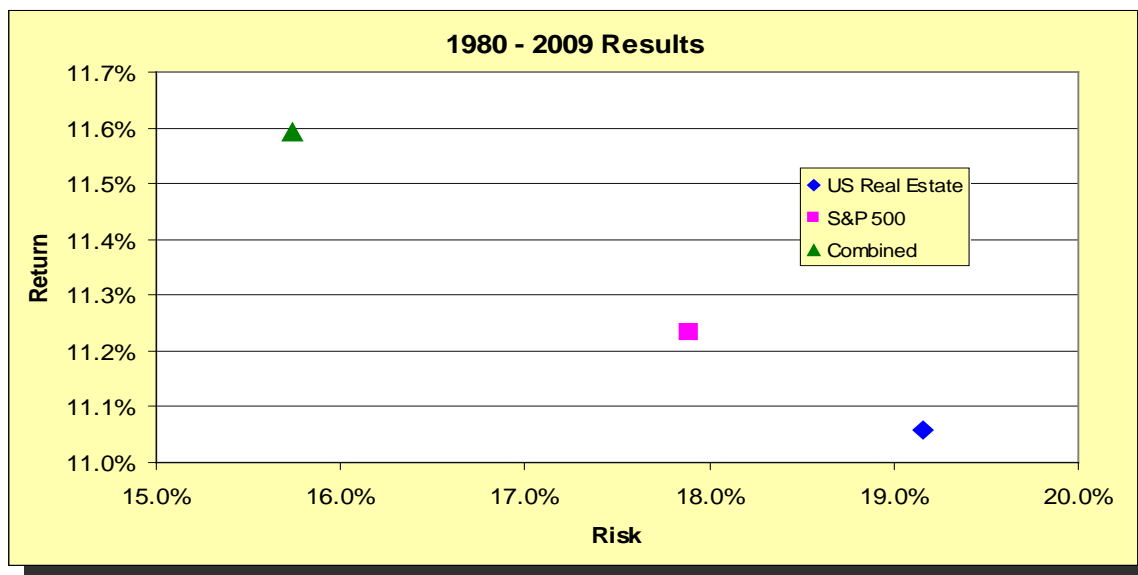
	Asset A			Asset B			Portfolio Balance (A + B)	Portfolio Return
	Annual Return	Account Balance	Rebalanced Amount	Annual Return	Account Balance	Rebalanced Amount		
		\$200	\$200		\$100	\$100	\$300	
Year 1	13%	\$226	\$216	-2%	\$98	\$108	\$324	8.0%
Year 2	18%	\$255	\$233	-12%	\$95	\$117	\$350	8.0%
Year 3	1%	\$236	\$252	22%	\$142	\$126	\$378	8.0%
Year 4	16%	\$292	\$272	-8%	\$116	\$136	\$408	8.0%
Year 5	3%	\$280	\$294	18%	\$161	\$147	\$441	8.0%
Year 6	11%	\$326	\$317	2%	\$150	\$159	\$476	8.0%
Year 7	11%	\$352	\$343	2%	\$162	\$171	\$514	8.0%
Year 8	-7%	\$319	\$370	38%	\$237	\$185	\$555	8.0%
Year 9	8%	\$400	\$400	8%	\$200	\$200	\$600	8.0%
Year 10	6%	\$424	\$432	12%	\$224	\$216	\$648	8.0%
Average Return	8.0%			8.0%				8.0%
Standard Deviation	7.5%			15.1%				0.0%

Now, it is highly unlikely that two assets with perfect negative correlation with each other will ever be found in nature. But it is not necessary for the relationship to be “perfect” for there to be beneficial effects in combining assets together, as the next example shows.

**2 + 2 = 5**

Let’s look at the actual performance of two very common assets, stocks and real estate, over the 30 years ending 2009. These two assets are far from having perfect negative correlation with each other. In fact, they have a positive correlation of 44%. The important point is that, like most any two assets encountered in real life, they are not *perfectly* positively correlated — they do not move in lock step.

In the chart below, stocks are represented by the Standard & Poor’s 500 Index; real estate, by the Dow Jones US Select REIT Index. The asset labeled “Combined” is a simple portfolio consisting of a 50/50 allocation to stocks and real estate, rebalanced annually. The chart plots each of these three assets on the risk/return map favored by financial analysts<sup>3</sup>. The best assets are those that are the furthest northwest on the map — i.e., those assets with high return and low risk.



<sup>3</sup> On the chart, return is calculated as the 30-year compound annual growth rate (assuming reinvestment of dividends); risk, as the annual standard deviation in the individual annual returns. These are commonly accepted measures of risk and return in financial analysis.

This extremely simple two-asset example illustrates a truly remarkable phenomenon. It is fairly common knowledge that, by combining assets, you can get a portfolio with less risk than you get with any one asset alone. This “diversification benefit” is also evident from the chart. Here’s the remarkable part: By combining assets appropriately (and regularly rebalancing), you can get a return for the portfolio that is greater than the return for any asset within it! The chart highlights this rather dramatically.

Is this result a fluke of this particular 30-year period and these two particular assets? No. Similar phenomena can be “reproduced in the laboratory”, and have, through our simulation analyses<sup>4</sup>. It doesn’t always happen, though. Determining the right assets to put into a portfolio, and the proper allocations among them, is a matter of considerable analytical effort.

### The Ugly Duckling Scenario

If you have a perfectly good portfolio, is there any reason to consider adding to it an obviously inferior asset? If, for example, your existing portfolio enjoys a return of 11% and a risk (standard deviation) of 18%, would it make sense to add an asset whose return is also 11% and whose risk is higher at 19%? Well, the preceding example provides the answer. (In fact, it is from this example that the just-cited risk/return figures are taken.) Take as the “existing portfolio” the single-asset portfolio consisting of stocks. Take as the “inferior asset” real estate. Plainly, adding the inferior asset to the portfolio improves it considerably.

This is also no isolated peculiarity. Examples abound of cases where an asset, itself no stellar performer, can improve both the risk and the return of the portfolio it is added to.

### So What?

All this may be interesting, but what does it mean to you? Simply this. When you view the individual assets in your portfolio, recognize that *the characteristics and behavior of any single asset in isolation are inconsequential*. The thing that really matters is the asset’s effect on your portfolio in its entirety. The operative question should be: Is your *portfolio* better, or worse, with this asset in it? To be sure, this is not an easy question to answer — and, clearly, intuition could lead one astray. But, supported by rigorous state-of-the-art analysis and substantial technological firepower, this is precisely the behind-the-scenes question we continually ask and answer on your behalf. If not exactly magical, we trust you find that reassuring.

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<sup>4</sup> How does this happen? The result is a combination of several not-commonly-understood phenomena, described in our article “The Alchemy of Risk Management” and in our *Research Brief* on “Risk and Return.”