

New Ideas in Investment Philosophy: The Asset Mix Decision

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The volatility of investment returns over the last ten years has made many fund managers and trustees aware that the risk of their portfolio is as important as its expected return. Sophisticated techniques of risk analysis are now available as aids in selecting portfolios of shares (see the article by Paul Marsh and Elroy Dimson in the 1980 edition of this yearbook).

By comparison, the asset mix decision (the choice between equities, short and long-dated gilts, property, and overseas assets) is usually based on *ad hoc* judgements. Yet this decision is at least as important as the choice of the domestic equity portfolio, and the ideas of modern portfolio theory (MPT) have important implications here also. This article explains the consequences of MPT for the asset mix decision.

ASSET MIX: GOALS AND JUDGEMENTS

The purpose of the asset mix decision is to meet the strategic goals of the fund. The goal of a pension fund is to meet at the lowest possible cost the liabilities of the fund. This might seem to imply that the fund should invest all its money in the asset category that is expected to earn the highest return relative to wage inflation. MPT tells us, however, that such high returns are usually accompanied by higher than normal risk. Further, this risk can be reduced by diversification. The purpose of the asset mix decision is therefore to balance the expected returns and risks of different assets to give the portfolio that is most likely to achieve the strategic goals of the fund.

To make this decision, we must quantify those dimensions of asset performance which affect the expected return and risk of a portfolio. These factors are listed in Table 1. The expected returns on different assets determine the expected return of a

portfolio including those assets. The risk of the portfolio is affected by the variabilities of the individual assets and the diversification of the portfolio which cancels out some of the individual asset variability.

Table 1: Dimensions of asset performance

1. Expected return
2. Variability of return
3. Diversification potential

QUANTIFYING ASSET CHARACTERISTICS

A good place to look for clues to the future returns from different investments is in their past performance. As an example, we will consider the decision to divide a fund between equities, long-dated gilts and the money market.

AVERAGE RETURNS

Table 2 shows the average annual real return that has been earned on these three assets in the period 1923–1980. On average the return from equities has been 8.8% higher than the return from bills. This is the reward that has been earned as compensation for taking on the risk of equity investment. The reward for investing in long gilts rather than bills has been, on average, 0.7%.

Table 2: Average Returns 1923–1980

Asset	Treasury Bills	Long Gilts	Equities
Average real return	-0.6%	0.1%	8.2%

These returns are adjusted for inflation to give real returns and only equities, with an average 8.2% real return, have significantly outperformed the retail price index.

VARIABILITY

In Table 3 are measures of the variability of the returns from these assets over the same period. The variability (standard deviation) of annual real returns from bills has been 4.8%. In other words,

**Table 3: Variability of Returns 1923–1980
(Standard deviation)**

Asset	Bills	Long Gilts	Equities
Variability of Real Return	4.8%	13.1%	24.0%

approximately two years in three the real return from bills was within 4.8% of the long-term average. Long gilts had higher variability and equities even greater. Comparing Table 3 with Table 2 we see that high average return has been associated with high variability, and therefore superior performance could have been achieved only at the cost of subjecting the portfolio to greater risk.

DIVERSIFICATION POTENTIAL

Diversification is achieved by holding assets whose returns are not closely related. There is a limit to the diversification that can be achieved by holding a portfolio of oil shares, since all are influenced by the price of oil. Similarly there is a limit to the diversification that can be achieved by holding UK equities and gilts, since both are influenced by general UK economic factors.

Table 4 gives a measure (the correlation coefficient) of the degree to which the real returns on bills, equities and long gilts are influenced by the same economic factors. If the correlation coefficient is close to one, little diversification can be achieved. If the coefficient is close to zero, diversification potential is great.

The correlation between equity returns and gilt returns is about .5, that between bill returns and gilt returns about .4. Both these pairs are influenced heavily by common factors. Treasury bills and equities have less in common, and the correlation between their real returns is close to zero.

Table 4: Correlations between Real Returns 1923–1980

Asset	Bills	Long Gilts	Equities
Bills	—	.41	.02
Long Gilts	.41	—	.51
Equities	.02	.51	—

DIVERSIFICATION OVER TIME

Just as diversification can be achieved by holding a portfolio including uncorrelated assets, so you can achieve diversification over time. If an asset gives a low return in one year, but a high return the next, its average return over the two years will be much less variable than its one-year return. An asset which tends to have long runs of low or high returns will not give such diversification over time.

We can measure the potential for diversification over time (for a particular asset) by the correlation of its return in a given year with its return the year before. Table 5 gives this information (the serial correlation) for our three asset groups. Both long gilts and equities have high potential for diversification over time, since the serial correlations of their returns are low. Treasury bills tend to give long runs of low or high returns, so they have a high serial correlation and low potential for diversification over time.

Table 5: Serial Correlation of Real Returns 1923–1980

Asset	Bills	Long Gilts	Equities
Serial Correlation of real returns	.58	.06	.13

PUTTING IT ALL TOGETHER

Suppose that we wish to investigate the likely future behaviour of a portfolio split equally between bills, long gilts and equities. Using the historical values for average returns, variability, and correlations, such a fund would have an expected real return of 3.8% per annum and a variability of 11.3% per annum. The variability of the fund is computed by adjusting the variabilities of individual assets by the diversification achieved in the portfolio. This information on the likely behaviour of the fund gives us several useful pieces of information. For instance, we can compute the chance that the fund will earn a negative real return (i.e. underperform the inflation rate) in a particular year. For this particular fund, the chance is approximately one-in-three.

We can also compare this portfolio with alternative choices of asset mix. A fund split 50/50 between equities and long gilts has an expected real return of 4.1% and a variability of 16.3%. Compared with the bill/gilt/equity split, it has much higher variability, but very little extra expected return.

Finally, we can examine the likely behaviour of the fund over periods longer than one year. Over a five year horizon, the expected annual real return is still 3.8% for the bill/gilt/equity fund, but the annual variability is reduced by the longer horizon. In this case, the variability is 5.1%. This means that the chance of earning a negative real return over five years is approximately one-in-five.

WILL THE FUTURE BE LIKE THE PAST?

In the last section we looked at a portfolio assuming that average real returns, variabilities and correlations will be the same in the future as in the past. In fact, they probably will be similar, but not exactly the same. The reason that they will be similar is that the behaviour of investors and the impact of economic factors does not change very quickly as time passes.

If we believe, however, that changes have taken place, we could incorporate them into our analysis. We might believe that the low real return on long gilts has been caused by a series of unexpected events which will not be repeated in the future. So we would adjust our expected real return on long gilts from 0.1% to 1.5%, for example.

Even if we choose to make these adjustments to the historical estimates, the type of analysis illustrated above is still appropriate, and its lessons are still important. One lesson is that variability of investment returns is inescapable, so making explicit judgements about variability is just as crucial to the asset mix decision as making explicit judgements about expected returns. The second lesson is that markets tend to give higher expected returns only at the price of higher variability so the fund manager must be able to take into account both when making an asset mix decision.

WHAT ARE ASSET ALLOCATION MODELS?

In the USA, the quantification of goals and judgements affecting the asset mix decision has resulted in the development of computer-based models to investigate the risk and expected return implications of asset mix. These models are known as asset allocation models.

Such models perform at least three useful purposes. They force the fund manager to state explicitly the goals he is seeking to achieve by his asset mix decision. They incorporate a mixture of past history and judgement in forecasting future asset performance. They enable rapid evaluation of alternative asset mix strategies.

The thinking underlying these models is directly analogous to the simple example we have gone through here. The advantage of computerisation is the ability to include many more asset categories (property, indexed gilts, overseas assets), and the speed of analysis. For instance, the London Business School asset allocation service has seven categories of UK assets, five categories of assets from each of Japan, Germany and the US, and incorporates withholding taxes, back-to-back loans, exchange risk, etc.

However sophisticated one gets, however, the lessons of such models remain the fundamental lessons of MPT. Risk is as much an important aspect of expected performance as expected return; portfolio risk is affected by individual asset risk and the diversification achieved by the fund; and the past has much to tell us about the expected returns and risk from different assets in the future.

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