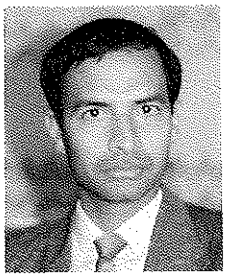
Risk/return: (don't take it for granted)



It is in the lore of the investment community that high risk and high return go together.

***Tapen Sinha** presents evidence that this is not always so, and proposes that portfolio managers can make profitable use of anomalies.*

In the 1960s great efforts were made by William Sharpe and others in gathering evidence to support the empirical proposition of the efficiency of the stockmarket. They argued that arbitrage opportunities would make the capital market react rapidly to any additional flow of information about securities. This process would force adjustments in the market price of securities. An equilibrium would entail "correct" pricing of securities: all securities would reflect their underlying value.

Anomalous evidence contrary to the efficient market began to appear in the mid-1970s. The first anomaly—seasonality of Australian share market data—was noticed by Robert Officer. Further evidence was recorded in the American and other sharemarkets. Each anomaly presented investors with a simple implication for asset allocation: by following specific strategies it is possible to outperform the market.

As a reaction to these empirical observations, researchers began to develop new models to incorporate the anomalies. For example, Robert Shiller made an interesting attempt to incorporate "fads" in share-purchase behaviour.

The general argument of these studies was that the actual return seemed to be higher (or lower) than it would have been if returns were predicted with a risk-adjustment. However, this kind of modelling did not question the implicit relationship between risk and return. It was presumed that there is always a positive relationship between risk and return: higher risk requires higher return. There was, at first, no controversy about that. However, experiments by psychologists showed otherwise.

Psychological theory

Before looking at the evidence, we need to expound the psychological basis of decision-making under uncertainty. Then we shall show that the empirical risk-return evidence is consistent with the psychological theory.

Expected utility theory tells us that a decision-maker *should* combine utility (value) and probability when making decisions under risk (uncertainty).[1] One consequence is that higher risk

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TABLE 1: Regression results from Australian company data (1977-85)
Rate of return on shareholders' funds

Fitted equation: standard deviation of return = a + b (average return) + error

Industry ASIC Codes	Number of firms	Below-median industry return on shareholders' fund			Above-median industry return on shareholders' funds		
		a	b	R^2	a	b	R^2
01	30	21*	-0.8*	0.22	17*	0.0	0.01
02	37	22*	-1.1*	0.32	0.4	1.6*	0.20
04	10	11*	-1.6*	0.92	-0.8	1.5*	0.46
06	15	19*	-1.5*	0.70	-31	2.9*	0.35
07	31	16*	-1.3*	0.50	5.4	0.1	0.01
09	20	71*	-7.9*	0.77	-4*	0.6*	0.70
11	17	19*	-1.3*	0.33	3	0.3	0.03
13	25	12*	-0.8*	0.26	3	0.2	0.01
15	19	12*	-0.4	0.06	10	-0.1	0.01
16	10	15*	-1.2	0.09	1.3	0.2	0.01
17	10	15	-1.3	0.04	0.5	0.3	0.04
19	36	16*	-1.5*	0.36	-3.3	1.0*	0.17
21	33	17*	-0.6*	0.32	4	0.3	0.01
22	48	17	-1.6*	0.37	0.0	0.6*	0.29

* *denotes a statistically significant coefficient at 5%.*
Note: Industries which have less than 10 observations are not included in the table.

should always be associated with higher (expected) return. However, Maurice Allais and others have shown that people make choices which are not always consistent with the expected utility theory.

Prospect theory looks at individual decision-making a little differently.[2] Kahneman and Tversky (and others) show that many of the routine violations of the expected utility theory can be accommodated by what prospect theory says about risk and return: that higher risk will be associated with higher return above a reference point and higher risk will be associated with *lower* return below a reference point.

There are two parts to prospect theory:

- Target (there is a "target" that a decision-maker takes into account).
- Above the target, the behaviour is "normal" in that higher risk will be associated with higher return. However, below the target, people will behave in a risk-loving fashion and hence produce higher risk associated with lower return.

Why is a "target" so important? Human decision processes in many dimensions tend to pin down a target around which other decisions are measured. Consider optical illusions. They are examples of setting targets (or "framing" effects) in a visual dimension. Similarly, our decisions under uncertainty are moderated by targeting.

To clearly see consequence of targets in decision-making under uncertainty, consider the following example. You are confronted with two prospects:

Prospect A has a 10 per cent chance of winning $1,000,000 and a 90 per cent chance of winning nothing;

Prospect B has a 10 per cent chance of losing $800,000 and a 90 per cent of winning $200,000.

Which prospect looks more attractive? Most people find A more attractive than B. However, both A and B have exactly the same mean and *variance*. Clearly, the prospect of losing money makes the difference. To put it differently, in this example, people decide with an implicit target of zero dollars. This highlights two points:

- Mean and variance are not sufficient in the choice of prospects for most people, given sufficiently stark alternatives;
- Either implicitly or explicitly, people tend to anchor their decisions under uncertainty to some targets.

Evidence from Australian industries

I used the Annual Report Record (1977-85) database of the Australian Graduate School of Management's Centre for Research in Finance (CRIF). (More recent figures are not available, as CRIF discontinued the updating of the Annual Report Record at the end of 1985.) The database contains records of all the publicly traded companies over the period, classified according to the Australian Standard Industry Classification (ASIC) two-digit codes. The number of companies was about 1,000.

As a measure of risk, I took the standard deviation of each firm's return on shareholders' funds.

The results (Table 1) show that there is a strong *negative* relationship between risk and return in a large number of industries for the group of companies categorised as "below median" return. There is a weaker positive relationship between risk and return for companies categorised as "above median" return for an industry. This evidence flies in the face of the positive risk-and-return relationship we would expect from our usual financial models.

Why do we choose median as the target? Simply because we postulate that managers in firms in a given industry behave in a way that reflects their wish to stay "in the top half" of the industry rate of return. Our model is supported by the evidence.

Why do we choose the arithmetic mean as the rate of return of a given firm over the observed period? There is no obvious justification; we could have chosen the geometric mean. But the important point is that the results would not alter at all.

Why do we choose standard deviation as the measure of risk? This choice is more controversial. A person steeped in financial markets may prefer to choose beta. However, Eugene Fama and Kenneth French have recently observed: "The relationship between beta and average returns for 1941-90 [for the stocks listed on the New York Stock Exchange] is weak, perhaps non-existent, even when beta is the only explanatory variable." Therefore, using beta (instead of the standard deviation) to salvage the positive relationship between risk and return is ruled out.

Policy implications for equity investment

In finance, we have grown accustomed to associating higher return with higher risk. This paper shows that for the sample of the "below median" firms in a given industry, a lower rate of return is associated with higher risk. The argument is simple: troubled firms take even higher risk to make things better, but often do not succeed.

What is the policy implication for stockmarket investment? To produce a "high-growth" equity portfolio, we usually recommend a strategy tilting towards high-risk stocks in the portfolio. The presumption is that high risk will be associated with high returns. As we have seen, this presumption is not necessarily correct. Thus investors in general, and fund managers in particular, should be very cautious about buying into high-risk stocks. Far from producing outperformance, a portfolio of these stocks may be likely to produce significant underperformance.

Over the past twenty years, the use of accounting data for choosing firms to invest in has become somewhat less fashionable. The new generation of financial "engineers", steeped in faith in the ability of the market place (and free competition) to "correct" errors, have become accustomed to using stockmarket betas to summarise the risk-return characteristics of a firm. The logic is the all-encompassing arbitrage. The arbitrage argument used does not entertain the possibility of limitations in the "rationality" of human behaviour.

I suggest that we can make use of the systematic biases we observe in decision-making under uncertainty. That is, in addition to looking at risk, an investor needs to look at a range of variables other than risk, in order to capture some of the biases. Incorporating biases is not a step backward; it is merely recognising realities in modelling decision-making under uncertainty.

One overriding fact is clearly demonstrated by the empirical evidence set out in this paper. The use of beta or standard deviation alone to identify high- or low-risk/reward stocks can be misleading if used in isolation from other variables which determine a firm's performance.

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NOTES

1. If x's represent payoffs of an uncertain outcome and p's denote the corresponding probabilities, the theory posits that the expected utility for the gamble is represented by $EU = \Sigma u(x).p$ where u is such that u is concave.

2. In contrast with the expected utility theory explained in note 1, the prospect theory uses

(a) The combination of utility and probabilities is done as follows: $\text{Prospect} = \Sigma v(x).f(p)$. In this sense, it is a generalised weighting scheme.

(b) The function f is such that $f(p) > p$ for low values of p and $f(p) < p$ for high values of p (except when p is close to zero or one).

(c) The value function v is such that it has an "S" shape around a reference point. Hence, unlike the utility function of the expected utility, it is not concave everywhere. ■