

same volume of capital or investors will seek to reduce their exposure to risk by a greater conservatism or sluggishness in pushing down uncharted paths.

But if I tell you that it is important to distinguish between excessive rates of return and those necessary to attract venture capital, I do you no service unless I can tell you how to make that distinction. The fact that the U.S. Supreme Court has ruled that return must be commensurate with risk in a whole string of important cases has not ended the regulatory debates on rates of return. Federal Judge Harold Leventhal has published a masterful, and lengthy summary of the legal problems in the regulatory context in the *Yale Law Journal* of May 1965.

My earlier quotation was from *Willcox v. Consolidated Gas Company*. In 1923, in a case involving Southwestern Bell Telephone Co., Justice Brandeis explicitly referred to the need for a firm to receive "an allowance for risk incurred" if it were to attract capital. In *Bluefield Water Works* (1923) and *Hope Natural Gas* (1944) the Court again insisted that returns are to be concomitant with risks undertaken. To quote from the *Bluefield Water Works* case:

A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs from the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investment in other business undertakings which are attended by corresponding risks and uncertainties—

That is emphasized by me—

but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures.

But despite these injunctions, courts have had difficulty implementing them because there was no work done to make the concepts operational. To properly address this question requires an expansion of the quantitative approach of Lord Keynes on a more sophisticated basis. It requires, first, the measurement of risk and, second the establishment of a relationship between that risk and the required rate of return.

Economists have made attempts to solve these problems although most of these attempts have been of recent origin.

First of all, this work was hindered by the slow development of the necessary statistical tools. But even after those tools were developed, further work had to await the general availability of the large amounts of statistical data necessary to establish propositions in which probability and risk are involved. For example, one of the earliest of the recent studies was a test by Prof. George Stigler, of the University of Chicago, which, despite some very imaginative attempts to extract information from inadequate data could not extract enough to get statistically significant results. Good data first became available not for manufacturing industry but for financial markets. In 1959, Lawrence Fisher explained interest rate differentials on corporate bonds by risk variables, thus measuring the extra rate of return asked by bond investors for investing in more risky companies. In 1960 I did related work on holdings of commodity inventories related to the earlier work of Keynes.

By the time Prof. Daniel M. Holland and I turned to the question of industrial risk in 1962, we had unusual access to a large body