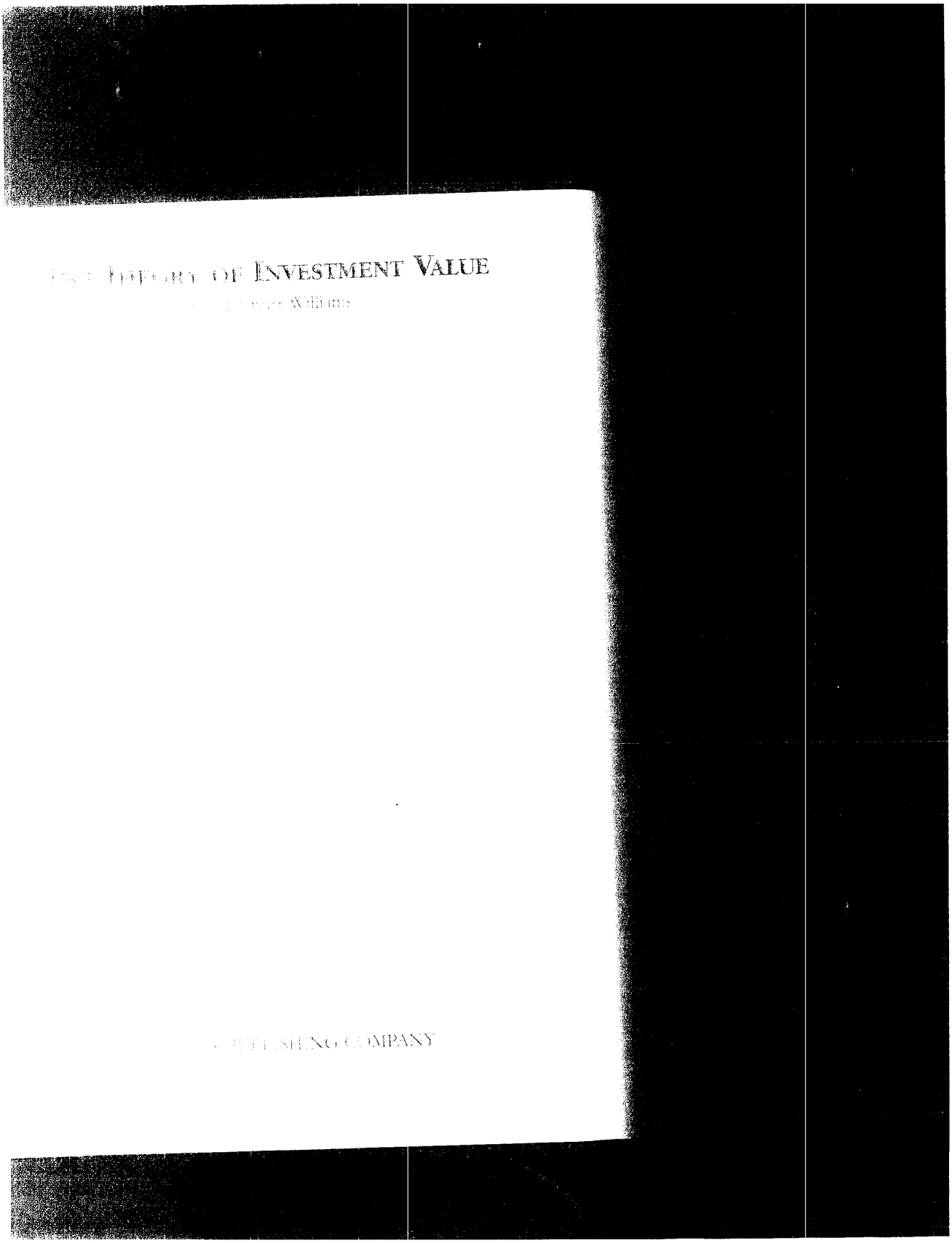
THE THEORY OF INVESTMENT VALUE


THE THEORY OF INVESTMENT VALUE
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CHAPTER V

EVALUATION BY THE RULE OF PRESENT WORTH

1. FUTURE DIVIDENDS, COUPONS, AND PRINCIPAL

Now that we have disposed of the troublesome misconception that stock prices are somehow determined in accordance with a quantity theory of money, we are at last ready to take up the main thesis of this book.

Let us define the investment value of a stock as the present worth of all the dividends [1] to be paid upon it. Likewise let us define the investment value of a bond as the present worth of its future coupons and principal. In both cases, dividends, or coupons and principal, must be adjusted for expected changes in the purchasing power of money. The purchase of a stock or bond, like other transactions which give rise to the phenomenon of interest, represents the exchange of present goods for future goods — dividends, or coupons and principal, in this case being the claim on future goods. To appraise the investment value, then, it is necessary to estimate the future payments. The annuity of payments, adjusted for changes in the value of money itself, may then be discounted at the pure interest rate demanded by the investor. This definition of investment value can be expressed by the following equations: [2]

[1] Cf. Robert F. Wiese, "Investing for True Values," *Barron's*, September 8, 1930, p. 5: "*The proper price of any security, whether a stock or bond, is the sum of all future income payments discounted at the current rate of interest in order to arrive at the present value.*" See also Chapter I, § 2.

[2] *Note for the non-technical reader:* It is not necessary to master all of the algebra in the following chapters to understand the rest of this book, for the text between the equations has been so written as to summarize the argument and make it possible to take the derivation of the formulas for granted. The symbols used in the formulas are defined one by one when first introduced, but for

For stocks —

$$(1a) \qquad V_o = \sum_{t=1}^{t=\infty} \pi_t v^t = \pi_1 v + \pi_2 v^2 + \pi_3 v^3 + \cdots.$$

where V_o = investment value at start
π_t = dividend in year t

$$(2) \qquad v = \frac{1}{1+i}, \text{ by definition}$$

i = interest rate sought by the investor

For bonds —

$$(1b) \qquad V_o = \sum_{t=1}^{t=n} \pi_t v^t + C v^n$$

where π_t = coupon in year t
C = face value, or principal, of bond
n = number of years to maturity

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easy reference they are reprinted with explanations in a systematic "Table of Symbols" at the end of the book.

The subscripts 1, 2, 3, etc., attached to the Greek letter π in the equations below signify the first, second, third, etc., value of the variable π. Thus π_1 is the amount of the dividend in the first year, π_2 in the second year, π_3 in the third, etc., and π_t in the tth year, where t means time.

The series of terms $\pi_1 v + \pi_2 v^2 + \pi_3 v^3 + \cdots$ is called an infinite series because there is no end to the number of terms. In this particular series each term is constructed according to the rule that the exponent of the factor v shall be the same as the subscript of the factor π, thus $\pi_3 v^3$, $\pi_t v^t$, etc. In certain special cases the sum of all the terms in an infinite series is a finite number and not infinity, even though the number of terms is infinite; under these circumstances, the series is said to be convergent. Suffice it to say that a series will often be convergent if each additional term is smaller than the preceding one; any further discussion of convergency would take us too far into higher mathematics.

Two ways of denoting an infinite series are as follows:

$$\pi_1 v + \pi_2 v^2 + \pi_3 v^3 + \cdots\cdots$$

and

$$\sum_{t=1}^{t=\infty} \pi_t v^t$$

The second notation, using the Greek letter Σ, means exactly the same as the first, but is briefer. This notation is read "Summation from t equals one to

The way in which dividends, or coupons and principal, should be adjusted for changes in the value of money in future years will be discussed later.[3]

2. FUTURE EARNINGS OF STOCKS

Most people will object at once to the foregoing formula for stocks by saying that it should use the present worth of future *earnings*, not future *dividends*.[4] But should not earnings and dividends both give the same answer under the implicit assumptions of our critics? If earnings not paid out in dividends are all successfully reinvested at compound interest for the benefit of the stockholder, as the critics imply, then these earnings should produce dividends later; if not, then they are money lost. Furthermore, if these reinvested earnings will produce dividends, then our formula will take account of them when it takes account of all future dividends; but if they will not, then our formula will rightly refrain from including them in any discounted annuity of benefits.

Earnings are only a means to an end, and the means should not be mistaken for the end. Therefore we must say that a stock derives its value from its dividends, not its earnings. In short, a stock is worth only *what you can get out of it*. Even so spoke the old farmer to his son:

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t equals infinity, of pi sub t, times v to the tth power." It should be noted that $\sum_{t=1}^{t=\infty}$ is not a factor to be multiplied by the other factors π_t and v^t, but is an operational sign applied to these two factors taken together.

If the series runs from $t=1$ to $t=n$, as in formula (1b) applying to bonds, the series is a finite series instead of an infinite series, because the number of terms is limited and is given in this case by the number of coupons payable during the life of the bond.

A series of the kind under discussion here, whether finite or infinite, is known as a geometric progression if π_t is constant.

[3] See Chapter VIII, § 2, and Chapter IX.

[4] See also Chapter XXII, "U. S. Steel," especially § 13.

A cow for her milk,
A hen for her eggs,
And a stock, by heck,
For her dividends.

An orchard for fruit
Bees for their honey,
And stocks, besides,
For their dividends.

The old man knew where milk and honey came from, but he made no such mistake as to tell his son to buy a cow for her cud or bees for their buzz.

In saying that dividends, not earnings, determine value, we seem to be reversing the usual rule that is drilled into every beginner's head when he starts to trade in the market; namely, that earnings, not dividends, make prices. The apparent contradiction is easily explained, however, for we are discussing permanent investment, not speculative trading, and dividends for years to come, not income for the moment only. Of course it is true that low earnings together with a high dividend for the time being should be looked at askance, but likewise it is true that these low earnings mean low dividends *in the long run*. On analysis, therefore, it will be seen that no contradiction really exists between our formula using dividends and the common precept regarding earnings.

How to estimate the future dividends for use in our formula is, of course, the difficulty. In later chapters ways of making an estimate will be given for such stocks as we now know how to deal with. In so doing, this book seeks to make its most important contribution to Investment Analysis.

3. PERSONAL VS. MARKET RATE OF INTEREST

In applying the foregoing formulas, each investor should use his own personal rate of interest. If one investor de-