THEORETICAL INTERPRETATION OF STOCK YIELD REVOLUTION

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I

During the latest several years, the securities market in various countries has experienced, at one time or another, what is called a stock yield revolution. Before that experience it was regarded as normal that the investment yield should be somewhat higher on stocks than on bonds (among various bonds, corporate debentures usually yielded the highest return, which, however, turned out lower than the yield on stocks).

But the normalcy thereafter has been such that the yield has been smaller on stocks than on corporate debentures, and even than on other bonds. The stock yield revolution refers to this reversal of yield conditions. Before that, the stock yield happened to be lower than the return on corporate bonds, but this was only an exceptional and temporary phenomenon. But the lower yield on stocks in recent years has been such a lasting phenomenon that it may well be dubbed a revolution.

In this paper, the author will try to explain the theoretical meaning of the stock yield revolution. Before beginning, however, he would like to clarify the following points:

1) The stock and bond yields referred to above are all calculated on the basis of definitely known figures. As for stocks, the yield refers to the percentage available through division of the latest annual dividend reported[1] by the current market price, and for the sake of convenience this may be called the latest dividend yield. In the case of bonds, the yield means the discount rate with which the current market price may be made equal to the present value of future coupons and the principal to be received according to the contract terms, i.e. the redemption yield. (To go into detail, there are several cases in which the redemption yield is calculated, but in this paper exhaustive analysis is avoided and the yield is regarded as calculated uniformly.)

For theoretical interpretation of the stock yield revolution, it must first of all be kept in mind that the latest dividend yield on stocks is compared with the redemption yield on bonds. The latest dividend yield differs from the possible return which may be expected in the future if, at the present time, investments are made in a certain stock (hereinafter called the expected investment yield). The latter yield is in the nature of a subjectively estimated value. For those who undertake continuous investments, it is the discount rate with which the present value of the infinite series of expected future dividends may be made just equal to the current market price; and for those who undertake investments within a certain fixed periods, it is tantamount to the discount rate with which the present value of the expected market price at a certain date in the future, plus the present value of the finite series of

[1] In Japanese practice, the latest semi-annual dividend reported is doubled for corporations which settle their account twice a year.

future dividends expected by that date, may be made to equal the current market quotation.

The latest dividend yield, therefore, coincides with the expected investment yield in a long-term investment program only if it is expected that future dividends will be paid infinitely at the same rate as the latest dividend has been (or if the calculated value of the expected investment yield turns out just the same as the latest dividend yield). In the case of an investment plan within a certain fixed period of time, the former does not equal the latter unless it is anticipated that the expected market quotation at the end of that period will be just the same as the current market price, and that expected future dividends in every term of that period will be paid at the same rate as that of the latest dividend (or if the culculated value of the expected investment yield turns out to be the same amount).

The latest dividend yield is different also from the yield which investors require of investments in stocks (hereinafter called the required yield). The required yield is in the nature of a subjectively attained value with complicated features: even if required of one and the same stock, it varies widely according to the amount of investment in that stock, and according to how these investments are combined with investments in other securities. All this stems from the fact that the bigger the risk of such investment, the higher the required yield is raised to cover this risk.

The required yield, as well as the expected investment yield, is essential to investors in working out investment plans of their own. In any investment portfolio chosen, the required yield on the amount of investment in various stocks included in it must be equal to or lower than the expected investment yield in each case. (The former is lower than the latter if and when, due to the lack of funds on hand or to the technical restriction incidental to the investment unit, investors find it hardly possible, however anxious they may be, to boost their investments to the extent that the two yields coincide with each other.) Much different from these two yields is the latest dividend yield, which has nothing to do with the decision of investors.

As for bonds, the redemption yield may be regarded as equal to the expected investment yield insofar as those who undertake successive investments in bonds up to the date of redemption are concerned. But this is not necessarily the case with those who complete their investment plans before the date of repayment. For the sake of convenience, however, the redemption yield is regarded as equal to the expected investment yield in the following analysis.

What has been said of the required yield on stocks is applicable to the required yield on bonds. In any investment plan adopted by each investor, the required yield on the amount of investment in each bond included in the plan must be equal to, or lower than, the expected investment yield (i.e. the redemption yield) in every case.

Such discrepancy and correlationship of various yields on stocks and bonds provides one of the important keys with which the relative positions of the latest dividend yield on stocks and the redemption yield on bonds can be interpreted from the theoretical point of view.

2) The second point the author wants to clarify before discussing his main subject is that in this paper the market price of each security is regarded as coinciding at all times with the equilibrium price of the same security.

The equilibrium price of a security can be defined in the following two ways, both of which lead to the same effect: (a) the price of a security at which its total demand and

supply in *stock* terms (i.e. the total demand to hold it[2] and its existing quantity) equal each other; and (b) the price of a security at which its total demand and supply in *flow* terms (i.e. total purchases and sales intended) are balanced with each other. In point of fact, the market price does not always equal the equilibrium price, though the former stands near and gradually approaches the latter. This is because it takes time for the market price to reach the equilibrium level and because the demand and supply schedules shift very frequently. But it would be safe, the writer believes, to assume that the market price always coincides with the equilibrium price, for it is the relatively long-term trends of security market quotations that are studied in the following analysis.

II

Among those who demand to hold a security at the current market price, some investors will reduce their demand to hold it if the market price goes up even slightly: they may be called marginal investors in that security. Insofar as such marginal investors are concerned, the required yield on that security in any investment plan adopted may be regarded as equivalent to the expected investment yield. In case the price is slightly above the current market quotation, the expected investment yield will drop below the required yield, and in order to recover the equilibrium of the two yields the demanded amount will have to be reduced accordingly. Thus, if an investor's demand price of a security be defined as the present value, computed with the required yield as the discounting rate, of the infinite series of expected future incomes, or the finite stream of expected future incomes and recovery of capital, marginal investors in a certain security will find their demand price just equal to the current market price. Such relationship seen in connection with marginal investors will greatly facilitate and simplify discussions for theoretical interpretation of the relative positions of the latest dividend yield on stocks and the redemption yield on bonds, so the author wants to make the best use of it in the following analysis.

If the expected investment yield on a bond, as already mentioned, is regarded as equal to the redemption yield, then the latter will equal the yield which marginal investors require of that bond, because the expected investment yield is equal to the required yield for marginal investors. In other words, the redemption yield on bonds, if interpreted theoretically under certain simplified conditions, turns out equal to marginal investors' required yield on bonds.

As for stocks, the expected investment yield for marginal investors may be considered equal to the yield required by them, but values of these yields cannot be estimated from the latest dividend yield. They can be estimated, in connection with marginal investors' required yield on bonds, like this:

As the investment risk is somewhat greater for stocks than for corporate bonds, marginal investors' required yield on stocks will be more or less higher than their required yield on bonds.

Of course there may be some exceptions, but the above statement refers not to the

[2] To go into detail, the total demand for a security in *stock* terms is equal to the sum of all investors' demands to hold it *plus* the total of planned bull speculations in it (including those under way), *minus* the total of its planned short sales (including those remaining unsettled).

relations between specified stocks and bonds but to the general relations between a large number of stocks and bonds, so that it would be safe to make a general estimation like this. How, then, the correlations between the latest dividend yield on stocks and the required yield or expected investment yield on them for marginal investors can be interpreted theoretically on the basis of the above estimation will be discussed in the following section. (The required yield and the expected investment yield, in the following discussion, always refer to those for marginal investors.)

III

The required yield on a certain stock may vary according to the investment attitude (attitude toward the investment risk) of each marginal investor. And each one may have his own investment plan, the period of which differs from that of any other investor's program. (It must be noted, however, that for each marginal investor the required yield is equal to the expected investment yield and the demand price to the current market price.) Thus, investors' calculations underlying the present market price of a stock, i.e., their expected values of future dividends and market prices as well as the size of the required yield, may differ widely from one another, and it is hardly possible to give them a uniform explanation.

In this light, let us simplify our discussions by adopting only the minimum value of the required yield and converting various calculations underlying the current market price into an infinite series of expected future dividends in a certain amount. The minimum value of the required yield is adopted for two reasons: (a) this value is so approximate to the redemption yield on bonds that it would be safe for us to regard it as equal to the redemption yield in some cases; and (b) it equals the expected investment yield for the investors who have made the most conservative expectation among marginal investors, so that it is the most convenient means to explain investors' calculations underlying the present market price. And the conversion of various calculations underlying the current market price into an infinite stream of expected future dividends in a certain amount is proposed merely because this is the simplest way for nullification of differences in calculations. How then can the relative positions of the latest dividend yield on stocks and the redemption yield on bonds be interpreted theoretically? The question will be explained in the following two cases:

(1) *If the Latest Dividend Yield is Lower Than the Redemption Yield.*

Let us first assume that the redemption yield on the best corporate bonds stands at 7 percent a year, and that the latest annual dividend reported on a certain stock is ¥5 per annum, with the current market price at ¥100. In that case, the latest dividend yield comes to 5 percent, or lower than the aforementioned redemption yield on the best bonds. How can these relationships be explained?

If it is safe to suppose that the minimum required yield on the stock is 7.5 percent, investors' expectations underlying the current market price will be equivalent to an infinite series of expected future dividends in the amount of ¥7.5 a year. In other words, the expected investment yield on the stock will come at 7.5 percent, or higher than the 7.0

percent redemption yield. The reverse cannot be the case.

If the latest annual dividend of ¥5 is deemed normal for the year concerned in view of the past performances of that corporation, it may be interpreted as indicative of the anticipated growth of future dividends that the most conservative of marginal investors' expectations turns out equivalent to an infinite stream of expected future dividends in the amount of ¥7.5 a year. The growth of future dividends means that future dividends on the present one share will have a trend to increase up to a certain date in the future, including the effective increase of dividends through stock splits, no-paid allotment of new stocks or paid-in new stock issues to shareholders.

The multiplier of the assumed ¥7.5-a-year level of expected future dividends against the ¥5 latest annual dividend stands at 1.5. Generally speaking, this is one of the yardsticks with which the degrees of the expected growth of future dividends can be compared with one another. Needless to mention, this can be applicable only when the latest annual dividend stands at a normal level. If this is not the case, the multiplier of the assumed level of expected future dividends against the estimated normal value (not the actual figure) of the latest annual dividend will have to be regarded as an indicator of the expected growth of future dividends. In the latter case, however, this indicator won't necessarily be bigger than 1 when the latest dividend yield on the stock is lower than the redemption yield on the bond, and it may be equal to 1 (i.e. expected future dividends will remain at the present normal level for some time to come) under some conditions, or may be less than 1 (i.e. expected future dividends will decline below the present normal level) under other conditions.

If the redemption yield on the best corporate bonds is represented by B, the required yield on a certain stock by $(B+k)$ (k denotes the premium for risk difference), the latest annual dividend on the stock by D, the current market price of the stock by P, and the assumed level of expected future dividends by E, then the latest dividend yield is D/P, and

$$(1) \quad P=\frac{E}{B+k}$$

In case the latest annual dividend D stands on the normal level for the year concerned, the indicator of the expected growth of future dividends E/D can be rewritten as follows:

$$(2) \quad \frac{E}{D}=\frac{E/P}{D/P}=\frac{B+k}{D/P}$$

In other words, E/D is equal to the multiplier of the required yield against the latest dividend yield (i.e. the multiplier of 7.5 percent against 5 percent, or 1.5, in the aforementioned case). And the relative position of the latest dividend yield on the stock against the redemption yield on the bond can be expressed by

$$(3) \quad \frac{D/P}{B}=\frac{B+k}{B}\div\frac{E}{D}=\left(1+\frac{k}{B}\right)\div\frac{E}{D}$$

Thus, it can be seen that the greater becomes the precentage of the premium for risk difference against the redemption yield on the bond, the higher the relative position of the latest dividend yield against the redemption yield $\left(\frac{D/P}{B}\right)$ will become, and that the greater the value of E/D (the indicator of the growth of expected future dividends), the smaller the value of $\frac{D/P}{B}$.

In case the latest dividend D does not represent the normal value for the year

concerned, with the estimated normal value represented by D_n, the growth of expected future dividends can be expressed by

$$(2') \quad \frac{E}{D_n}=\frac{D}{D_n}\times\frac{B+k}{D/P}$$

That is to say, the indicator (E/D_n) can be available through multiplication by D/D_n of the multiplier of the required yield against the latest dividend yield. D/D_n will be less than 1 if the latest dividend is smaller than the normal value, and it will be more than 1 if the latest dividend is greater than the normal value. And the relative position of the latest dividend yield on the stock against the redemption yield on the corporate bond can be expressed by

$$(3') \quad \frac{D/P}{B}=\left(1+\frac{k}{B}\right)\frac{D}{D_n}\div\frac{E}{D_n}$$

It is clear that the more the relative position $\frac{D/P}{B}$ will increase, the greater k/B or D/D_n gets, and that the more it will decrease, the greater E/D_n becomes.

If the latest annual dividend comes to nil, calculations by the second and the following formulas would be meaningless. And there is left no alternative but the first formula for interpretation of investors' calculations underlying the current market price.

(2) *If the Latest Dividend Yield Equals or Exceeds the Redemption Yield.*

The previously explained formulas are all applicable to this case. If the latest annual dividend on a stock is a normal value for the year concerned, there are three possibilities: (a) in case the percentage of the latest dividend yield D/P to the redemption yield B is smaller than $(1+k/B)$ or the ratio of the required yield on the stock to B, the indicator of the expected future dividend growth E/D will be greater than 1; (b) in case the ratio of D/P to B is equal to $(1+k/B)$, E/D will be 1 (or expected future dividends will remain on the present level); and (c) in case $\frac{D/P}{B}$ is greater than $(1+k/B)$, E/D will be less than 1 (i.e. expected future dividends will decrease). This is evident from the third formula.

In case the latest annual dividend D is not a normal value for the year concerned, the value of E/D will fluctuate quite the same as in the former case, but it cannot be an adequate indicator of the expected future dividend growth, which has to be expressed by E/D_n.

Incidentally, the value of E/D_n might be greater than, equal to, or smaller than 1, irrespective of whether $\frac{D/P}{B}$ is less than, equal to, or more than $(1+k/B)$. There is no fixed relatioship, unlike the situation when D is a normal value.

IV

From the foregoing, it may be concluded that factors responsible for the reduction of the relative position of the latest dividend yield on stocks against the redemption yield on corporate bonds are those factors which are to reduce k/B and which are to boost E/D, and that in recent years these factors must have been so strong and lasting as to bring about the stock yield revolution.

What then are the factors to boost E/D? As already mentioned, $E/D=E/D_n \div D/D_n$. But, as regards the relatively secular trends of many stocks to be explained here, the difference between D and D_n cannot be an important factor. Moreover, this difference has been getting smaller because business companies have been trying to stabilize their dividends as much as possible. Thus, E/D may well be regarded as an indicator of the growth of expected future dividends, if not an exact one. Factors to boost E/D in such thinking are these:

1) Many companies have been attaining a steady growth of dividends actually paid, and there is the increasing possibility that dividends will continue growing in the future. Responsible for all this is, in the final analysis, the steady growth of the national economy based upon the firmness of demand for real capital formation and the boost of production capacity resulting mainly from technical innovation, briskness of consumption demand, and successful enforcement of fiscal and other economic measures to support these tendencies. It is also to be noted that the steady elevation of economic stability, brought about by various improved measures for business control, has encouraged general investors to be optimistic as to the future of dividends.

2) The increase in the existing amount of stocks through new issues has failed to keep abreast of the sharp boost of the demand to hold stocks stimulated by the increasing interest in stock investments of relatively low-income groups and the remarkable development of investment trusts and other institutional investments. This means a short supply of stocks, i.e. the excess of demand over supply. Under such conditions, people with more optimistic anticipations become marginal investors. For the question of who will become marginal investors in a stock is very much dependent upon the existing amount of that stock, and in case the existing amount is small relative to demand, those who are more optimistic in expectation will become marginal investors.

3) The steady rise of commodity prices has often occurred, and there is strong possibility that it will repeat itself in the future. In case the price advance is anticipated, business firms can expect that their profits in terms of money will increase more than they will in case no price rise is expected, provided that the firms are well able to adapt themselves to the upward price movement, and that E/D will increase accordingly.

Let us then turn our attention to the factors to reduce k/B (the ratio of the premium for risk difference to the redemption yield).

1) Thanks to the improvement of business control measures, the cycle of business fluctuations has been getting smaller and the term of slump shorter. This is tantamount to the higher reliability of expectations about future dividends (or the smaller fear that expectations will fall wide of the mark).

2) Stimulated by the growth of dividends in the past, the possibility of future growth, and the short supply of stocks, stock quotations have been following a secular upward curve, and the reactionary downturn, if any, has been temporary in nature and small in margin. And these phenomena are expected to occur in the future as well. All this can be said to have substantially dwarfed the price risk involved in stock investments.

It must be noted here that expectations about future stock quotations, too, will bring about influence upon E/D. This is evident if account is taken of the fact that marginal investors' investment plans are usually finite in time and may widely differ from one another in term, and that investment decision is made on the basis of expectations about quotations

at the time when the investment plans will be finished. For analysis of the lasting tendency of E/D for a relatively long period of time, however, due consideration must be paid only to the secular trends of stock prices, which depend mainly upon the general tendency of dividends and the increasing tempo of stock supply and demand.

In the foregoing factor analysis for E/D, therefore, expectations about stock quotations have not been taken up as an independent factor. For analysis of the price risk involved in stock investments, on the other hand, it is essential to take into consideration stock price expectations (including long-term trends and short-term fluctuations) as an independent factor.