Discounted Cash Flow Models Incorporating the Payment of Stock Dividends

金鉄英

(Jin, Tiein)

Associate Professor, Dept of Finance, Chaoyang University of Technology

摘要

本文探討發放股票股利的意義及其影響，並推導出發放股利下的普通股評價模式。
關鍵字：股票股利，股利評價模式。

Abstract

This paper addresses the significance of the payment of stock dividends in corporate finance, and incorporates it into the Discounted cash flow models.

Key Word: Stock Dividend, Discounted cash flow models.

* 朝陽科技大學財金系副教授
Introduction

Discounted cash flow models (hereafter DCF models) are based on the concept that the value of a share of stock is equal to the present value of all cash flows that the stockholder expects to receive from it. In practice, it is necessary to forecast the cash flows each year from now to infinity. Because of uncertainty, the future cash flows have to be evaluated according to all information available at present and would be adjusted in response to the arrival of new information. A number of different assumptions about the patterns of expected cash-flow stream have been made and embodied in infinite horizon DCF models. Elton and Gruber (1995:452) classified them as one-period (derived from Williams, 1938; Gordon and Shapiro, 1956), two-period (Malkiel, 1963), and three-period growth models (Molodovsky et al., 1965). According to previous studies or standard textbooks (e.g., Van Horne and Wachowicz, 1998 and Brealey and Myers, 1996), a dividend means a cash dividend, and only cash dividends are taken into account in estimating future cash flows. Researchers omit to consider the situation of payments of stock dividends, because they will be reflected in future cash flows. It is not incorrect to state the problem in this manner. However, frequently companies declare stock dividends. The payment of stock dividends will increase the number of shares holding, and therefore has influence on the way of computing future cash flows. If the payments of stock dividends are taken into account, the DCF models will become more explicit. And only if models become more explicit can an organization or an individual evaluate and improve their performances more practically over time. The objectives of this paper are to address the significance of the payment of stock dividends for companies, and to integrate it into the DCF models.

Literature Review

Many corporations distribute stock dividends to their stockholders. A stock dividend is a distribution of additional shares of capital stock, called dividend shares, to stockholders in proportion to their existing holdings. "Common on common" is the typical of stock dividend; such a distribution is known as an ordinary stock dividend. Generally accepted accounting principles require that corporations paying stock dividends transfer from the "retained earnings" account to the "common stock" and "capital surplus" (often called "the share premium" or "capital contributed in excess of par") accounts an amount equal to the market value of the shares distributed (Nikolai et al., 1989).

---

1 It would seem preferable to make the payment of stock dividends explicitly, rather than implicitly.
2 The "common stock" account would increase by an amount equal to the par value times the number of new shares. The remainder of the increase would go into the "capital surplus" account.
In the U.S., for small (less than 20%) stock dividends, the market value (as of the date of declaration) per share is transferred from retained earnings to paid-in capital accounts. For large (more than 25%) stock dividends, only the par value per share is transferred. Stock dividends between 20% and 25% are left to managers’ discretion but usually treated as small stock dividends. For all stock dividends in Taiwan, the par value per share is charged either against the retained earnings account or the capital surplus account, and there is no legal restriction on the range of stock dividend if firms have sufficient retained earnings or capital surplus to cover the issue.

In an economic sense, a stock dividend is not really a "dividend" but a transfer between stockholders' equity ledger accounts. That is, even though the number of shares increases (each share represents a smaller equity in the corporation), no assets are distributed to the stockholders and each stockholder's percentage ownership stays the same. The total assets, contributed capital, and stockholders' equity remain unchanged. The principal argument for stock dividends is that they enable a "growth company" to retain accumulated earnings, and yet provide stockholders with additional shares of common stock as evidence of the growth in the net assets of the corporation (Block and Hirt, 1994:523). Mayer (1990) showed that in eight developed countries, retention rates were the dominant source of corporation finance, and those companies did not raise a substantial amount of finance from securities markets. In the U.S., every year hundreds of companies declare stock dividends. For instance, Archer Daniels Midland has paid a yearly stock dividend of 5 percent for nearly two decades (Brealey and Myers, 1996:419). In Taiwan, the stock dividend has been employed more frequently than the cash dividend by firms listed on the Taiwan stock market in the recent decade (see Table 1).

Empirical studies have demonstrated the positive announcement effect of stock dividends (e.g., Grinblatt et al., 1984; Liljebom, 1989; McNichols and Dravid, 1990; Hietala and Loyttyniemi, 1992). Why do investors react favorably to a stock dividend announcement? From an accounting standpoint, a stock dividend is not accounted for as a stock split, but instead, is recorded in a manner similar to other dividends. The U.S. Committee on Accounting Procedure of the AICPA suggested that a stock dividend is a simultaneous payment of a dividend and a sale of stock. The decision of the board of directors, acting on

---

3 See Mosich and Larsen (1986) and Section 703.02 of the NYSE Listed Company Manual.
4 Large stock dividends are frequently debited to paid-in capital accounts rather than to retained earnings.
5 Stock splits do not affect retained earnings or capital surplus but cause only a reduction in par value. Splits are not the rule of game in Taiwan since the par value per share is unified since 1982.
6 The eight countries are the U.S., Japan, Germany, U.K., France, Canada, Italy, and Finland.
Table 1. Comparison between the frequency of the stock dividend payments and the frequency of the cash dividend payments for all companies listed in the Taiwan stock market

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of listed companies</th>
<th>Number of listed stocks</th>
<th>Frequency of the stock dividend payments</th>
<th>Frequency of the cash dividend payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>199</td>
<td>213</td>
<td>134</td>
<td>39</td>
</tr>
<tr>
<td>1991</td>
<td>221</td>
<td>234</td>
<td>158</td>
<td>68</td>
</tr>
<tr>
<td>1992</td>
<td>256</td>
<td>286</td>
<td>168</td>
<td>81</td>
</tr>
<tr>
<td>1993</td>
<td>285</td>
<td>325</td>
<td>208</td>
<td>91</td>
</tr>
<tr>
<td>1994</td>
<td>313</td>
<td>354</td>
<td>236</td>
<td>118</td>
</tr>
<tr>
<td>1995</td>
<td>347</td>
<td>383</td>
<td>167</td>
<td>133</td>
</tr>
<tr>
<td>1996</td>
<td>382</td>
<td>425</td>
<td>311</td>
<td>138</td>
</tr>
<tr>
<td>1997</td>
<td>404</td>
<td>470</td>
<td>363</td>
<td>121</td>
</tr>
<tr>
<td>1998</td>
<td>437</td>
<td>497</td>
<td>449</td>
<td>99</td>
</tr>
<tr>
<td>1999</td>
<td>462</td>
<td>510</td>
<td>302</td>
<td>134</td>
</tr>
</tbody>
</table>

Source: Status of Securities Listed on Taiwan Stock Exchange (1990 to 1999)

behalf of the stockholders, to issue a stock dividend constitutes a dedication of earnings to the permanent capital of the corporation. This dedication of earnings for permanent use may be viewed as the equivalent of distributing earnings to stockholders and immediate return by them of such earnings to the corporation, thus increasing the contributed capital. Since shareholders have to sacrifice present cash dividends for a reinvestment, they may anticipate an increased amount of cash dividends from their investments. For instance, the corporation may have a history of paying the same fixed cash dividend per share. If the corporation continues to pay the established rate of cash dividend per share (and not decrease proportionally), then present share holders will have increased cash dividends on their investment, so that a stock dividend can be interpreted as a positive signal to the market about future dividends. On the other hand, a “risk” is at once introduced for shareholders after a stock dividend distribution (Heinkel and Schwartz, 1986). The risk arises from the possibility that an intended or unintended change in dividend policy is induced by the issuing firms and that a simple downward adjustment of dividends may lead to a depressed stock price (Fama et al., 1969).

Management is generally believed to have better information than investors about the intrinsic value of the firm’s assets and future prospects (Myers and Majluf, 1984). Since the issue of stock dividends tends to dilute the earnings per share (Asquith and Mullins, 1986; Patterson and Ursel, 1993), it has been argued that such distributions would be made only when
when managers do not expect the balance of retained earnings to constrain future cash dividend payments. Kothari and Shanken (1992) showed that in the U.S. nearly 90% of the portfolio return variation could be explained by dividend and expected return variables. Edwards and Mayer (1989) showed that managers tended to avoid decreases in the dividend per share and the managers in the U.K. gave top priority to non-decreasing dividends. Lkonishok and Lev (1987) showed that firms paying stock dividends exhibited a significantly higher cash dividend growth rate than non-distributing firms during the 12, 24, and 60 months post-announcement periods at 0.05 level.

Lintner (1956) and Marsh and Merton (1987) reported that managers had target dividend payout ratios, and that they sought to avoid making changes in the dividend ratios. In relation to earnings and stock prices, Bernard and Thomas (1990:338) pointed out: "Evidence is consistent with the hypothesis that stock prices partially reflect a naive earnings expectation: that future earnings will be equal to earnings for the comparable quarter of the prior year." Charest (1978), Aharony and Swary (1980), and Eades et al. (1985) showed that unexpected dividend changes did convey information to the market about expected future cash flows. Unexpected changes in dividends were on the average associated with stock-price changes of the same sign, and dividend decreases tended to be stronger signals than dividend increases. That is, when a company first implicitly promised dividends in the share issue but reduced the subsequent dividend per share, the share price would fall below its price before the announcement of the share issue. The net drop in the share price is the cost of false signaling. In other words, a stock dividend may be interpreted by investors as a message about future changes in the firm's expected cash flows. The researchers hypothesize that those issuances might be interpreted as a message about dividend increases (once the additional shares are issued), which in turn implies that the managers of the firm feel confident that it can maintain a permanently higher level of cash flow. Moreover, it is found that most stock distribution announcements were followed by cash dividend increases, as evidenced by Barker (1958), Foster and Vickrey (1978), Cohen et al. (1973), and Grinblatt et al. (1984). Hence, Fama et al. (1969) pointed out probable cash dividend increase is the information causing the favorable market response.

Model Development

(a) Assume that a company paid a cash dividend of $D_0$ dollar per share yesterday, and cash dividends will grow at a constant rate into the indefinite future. If the dividend occurs at the end of the period, the estimate is:

8 Lintner also found that major changes in earnings "out of line" with existing dividend rates were the most important determinants of a company's dividend decisions.
\[ P_0 = \sum_{t=1}^{\infty} \frac{E(C_t)}{(1 + k)^t} = \sum_{t=1}^{\infty} \frac{D_0(1 + g)^t}{(1 + k)^t} = \frac{D_0(1 + g)}{k - g} = \frac{D_1}{k - g} \]  

(1)

where \( P_0 \) = the current price of the share  
\( E(C_t) \) = the expected cash flow in period \( t \)  
\( D_t \) = the cash dividend per share in period \( t \)  
\( k \) = the appropriate discount rate  
\( g \) = the growth rate in cash dividend per share  
\( t = 1, 2, \cdots, n, \cdots \)

(b) Let \( \delta \) stand for the distribution rate of stock dividend.\(^9\) Assume that a company concurrently paid a cash dividend of \( D_0 \) dollar per share and a (distribution rate of) stock dividend of \( (\delta) \) S dollar per share yesterday, and the company will maintain the current cash dividend and (the distribution rate of) stock dividend per share in perpetuity. The estimate is:

\[ P_0 = \sum_{t=1}^{\infty} \frac{E(C_t)}{(1 + k)^t} = \sum_{t=1}^{\infty} \frac{D_0(1 + \delta)^t}{(1 + k)^t} = \frac{D_0(1 + \delta)}{k - \delta} = \frac{D_1}{k - \delta} \]  

(2)

It is noted that:

(i) Under the assumptions given, both Equation (1) and Equation (2) are the sums of geometric progressions. They are mathematically equivalent and will obtain exactly the same solution of \( P_0 \), given all terms in (1) and (2) respectively identical values. It means that in DCF valuation of common stock, the stock dividend distribution rate \( \delta \) in (2) can be regarded as the growth rate \( g \) in (1).\(^10\)

(ii) Either a pure stock dividend or a stock split (in the case of \( D_0 = 0 \)) will simply increase the number of shares holding, and therefore could result in increased future cash flows. Under single-period assumptions, this paper extends the DCF models to the payments of stock dividends. The simple one-period model derived in this paper can be used to derive two-period, three-period, or \( N \)-period model in determining firm value under assumptions of more complex growth patterns for a company.

---

\(^9\) There are some differences in terminology. In the U.S., stock dividends are typically stated in percentage terms—such as 30 percent stock dividend, meaning a 30 percent increase in the number of shares outstanding, i.e., \( \delta = 0.3 \). In Taiwan, stock dividends are usually stated in dollars, the par value of the bonus issues that old shares each can acquire. Since the par value per share is NT$10 for all shares in Taiwan, hence \( \delta = S \).

\(^{10}\) The rationale for them may be different. e.g., a stock dividend will increase the firm size but a cash dividend won't.

\(^{11}\) Equation (2) is also adapted for stock splits.

\(^{12}\) This paper does not intend to challenge the arguments of MM (Miller and Modigliani, 1961).
Conclusion

Dividends are not always in the form of cash. Frequently companies declare stock dividends. A stock dividend will increase the number of shares holding, and therefore has influence on the way of computing future cash flows. Under the single-period assumptions, this paper incorporates the payment of stock dividends into the DCF models and retains their simplest form. The one-period model derived in this paper can be used to derive two-period, N-period, or dynamic model in determining firm value under assumptions of more complex growth patterns for a company.

References


