CHAPTER 21

STOCK PRICES AND ACCOUNTING NUMBERS AS PERFORMANCE MEASURES

CEO's often have stock price based incentives. The two primary forms of these incentives are stock ownership and stock option grants. Stock prices could serve as the only incentive information, and in some firms that is the case. However, we often see the use of both stock prices and accounting numbers. The argument in favor of stock prices instead of accounting earnings is that accounting earnings are inherently myopic – they only report the impact of the agent's actions on the short-term cash flows of the firm – whereas stock prices inherently reflect both the short and long run effects of an agent's actions. This would appear to justify using only the stock price as a performance measure. However, a careful look at this issue reveals reasons why a firm might use both accounting earnings and stock prices as performance measures. Our analysis is not an exhaustive examination of this issue. We merely discuss some insights that follow from our prior analysis.

The literature in this area has focused on the use of the end-of-period stock price as an *ex post* performance measure.[1] A key element of this analysis is that the firm's terminal value is not contractible because it is not observed by the principal until some date subsequent to the termination of the agent's contract. Hence, the stock price at the contract termination date (which we refer to as the *ex post* stock price) is based on the investors' imperfect information about the terminal value of the firm. Some of the investors' information may come from public reports, e.g., published financial statements, whereas other information may come from private information acquisition activities.

The stock price aggregates the investors' information into a single number. Under standard capital market assumptions, the stock price efficiently aggregates the investors' public information for valuation purposes. However, as discussed in Chapter 11 of Volume I, the stock price will not fully reflect the investors' private information if there is some form of noise in the price process. An issue of central concern in this chapter is whether the stock price efficiently

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[1] In Chapter 22 we consider a setting in which the agent has post-contract, pre-decision private information. In that setting, the "*ex ante*" stock price may play a role as a contractible aggregate for non-contractible investor information and management disclosures of private information (see Section 22.8).

aggregates the investors' information for incentive purposes. If it does not, then agency costs may be reduced by using both the stock price and other contractible information, such as accounting earnings, as performance measures.

21.1 *EX POST* EQUILIBRIUM STOCK PRICE

In this section we consider how the *ex post* equilibrium stock price, i.e., the stock price at the end of the contracting period, is influenced by the investors' information at that date. We view the risk and the investors' information as firm-specific such that investors are effectively risk neutral with respect to the information. The analysis is similar to that in the last section of Feltham and Xie (1994) (FX). Assume that there are only two tasks and two signals. Let $\mathbf{a}$ denote the action chosen by the agent, and let $\hat{\mathbf{a}}$ represent the investors' conjecture (belief) about the agent's action (in a rational expectations equilibrium they, of course, attach probability one to the action induced by the contract in place). Assume investors receive signals $\mathbf{y} = (y_1, y_2)^t$, which are normalized so that they have unit variance. The terminal value of the firm (before deducting the agent's compensation) is denoted x. However, a key element of this analysis is that x is *not* observed until after the contract termination date. We assume $(x, \mathbf{y})$ is jointly normally distributed, i.e.,

$$\begin{bmatrix} x \\ \mathbf{y} \end{bmatrix} \sim \mathrm{N}\left(\begin{bmatrix} \mathbf{b}^t\mathbf{a} \\ \mathbf{M}\mathbf{a} \end{bmatrix}, \begin{bmatrix} \sigma_x^2 & \boldsymbol{\Sigma}_{xy} \\ \boldsymbol{\Sigma}_{yx} & \boldsymbol{\Sigma} \end{bmatrix} \right),$$

where $$\mathbf{M} = \begin{bmatrix} \mathbf{M}_1 \\ \mathbf{M}_2 \end{bmatrix}, \quad \boldsymbol{\Sigma} = \begin{bmatrix} 1 & \rho_{12} \\ \rho_{12} & 1 \end{bmatrix}, \quad \boldsymbol{\Sigma}_{yx} = \boldsymbol{\Sigma}_{xy}^t = \begin{bmatrix} \rho_{x1}\sigma_x \\ \rho_{x2}\sigma_x \end{bmatrix}.$$

The (gross) stock price at the contract termination date is equal to the investors' expectation about x conditional on $\mathbf{y}$ and $\hat{\mathbf{a}}$, i.e.,[2]

$$P_1(\mathbf{y}, \hat{\mathbf{a}}) = \mathrm{E}[x \,|\, \mathbf{y}, \hat{\mathbf{a}}] = \Omega(\hat{\mathbf{a}}) + \boldsymbol{\omega}^t\mathbf{y}, \tag{21.1}$$

where $$\Omega(\hat{\mathbf{a}}) = [\mathbf{b}^t - \boldsymbol{\Sigma}_{xy}\boldsymbol{\Sigma}^{-1}\mathbf{M}]\hat{\mathbf{a}} \quad \text{and} \quad \boldsymbol{\omega}^t = \boldsymbol{\Sigma}_{xy}\boldsymbol{\Sigma}^{-1}.$$

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[2] We assume without loss of generality that there is only one share of the stock outstanding so that the stock price is equal to the market price of the firm.