

# Asymmetric Information, Corporate Myopia, and Capital Gains Tax Rates: An Analysis of Policy Prescriptions\*

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We develop a model of corporate myopia in which the interaction between asymmetric information and short-term trading by equity holders induces firms to undertake short-term rather than long-term projects, which are intrinsically more valuable. We study the effectiveness of alternative policy prescriptions in eliminating myopia. We show that a capital gains tax cut for long-term equity holders induces optimal project selection; an across-the-board tax cut has no such impact. We characterize the long-term capital gains tax rate which eliminates corporate myopia. Further, we show that a long-term capital gains tax cut does not induce a bias toward inefficient long-term projects when it is, in fact, short-term projects which are more valuable. In contrast, an investment tax credit directed at long-term projects leads to such a bias. Finally, we show that reducing the long-term capital gains tax rate to the level required to eliminate myopic investment behavior may also lead to an *increase* in government tax revenues. *Journal of Economic Literature* Classification Numbers: H21, G31, D82. © 1999 by Academic Press

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## 1. INTRODUCTION

In recent years there has been considerable debate in academia and in the popular press regarding “short-termism” in American corporations. Corporations with short-term horizons are regarded as less willing to forego earnings today in order to increase performance in the future, a characteristic which manifests itself in lower long-term R&D investment, lower investments in new product and long-term market development, and lower willingness to invest in the training of workers. In other words, an excessive concern for the next period’s earnings figures is supposed to have induced U.S. corporations to take up “short-term” projects at the expense of maximizing “long-term” firm value.<sup>1</sup>

A recent paper by Poterba and Summers (1995), which presents the results from a survey of CEOs at 1000 of the largest American firms, provides several interesting facts related to this issue. First, a large percentage of American CEOs believe that their firms have systematically shorter time horizons than do their major competitors in Europe and Asia.<sup>2</sup> Second, most CEOs believe that the U.S. equity market undervalues long-term investments.<sup>3</sup> Further, their responses indicate that the average firm would increase its long-term investments by just over 20% if the stock market “correctly” valued these investments. Third, the average fraction of the respondents’ firms’ R&D budget devoted to projects with no expected payoff in the first 5 years was only 21.1%. Finally, most CEOs supported some policy reform to lengthen the horizons of American corporations.

The most commonly offered reason for corporate myopia is asymmetric information. Narayanan (1985) and Stein (1989) show that myopia can result from “signal-jamming” by corporate managers, attempting to influence perceptions of their ability and/or stock prices.<sup>4</sup> Thakor (1993) argues that some firms may choose an early-cash-flow-generating project over a (higher intrinsic value) late-cash-flow-generating project to signal favorable private information. In his model, the early cash flow generated from a project undertaken in the first period can be used to fund

<sup>1</sup> See, for instance, Hayes and Abernathy (1980) and Hayes and Garvin (1982), who argue that this short-term behavior by U.S. corporations has led to a decline in U.S. competitiveness. Jacobs (1991) and Edwards (1993) summarize this debate and suggest possible solutions to the myopia problem.

<sup>2</sup> This belief seems to be shared by Asian managers as well. Sony founder Akio Morita (Morita *et al.*, 1986) contends that most U.S. corporate managers unduly emphasize short-term profits rather than making their products competitive over the long haul; in contrast, Japanese managers strive to achieve growth targets in order to ensure long-term competitive success, even at the expense of short-term profits.

<sup>3</sup> There is some empirical evidence to support this belief about the U.S. stock market. For instance, Jacobson and Aaker (1993) document that the ratio of the effect of future-term to current-term business performance on stock returns is smaller in the U.S. stock market than in the Japanese stock market. They attribute this to the lower degree of asymmetric information in Japan (resulting from the fact that a much larger proportion of stock market investors in Japan than in the U.S. have business links to the companies they invest in).

<sup>4</sup> While the myopia in these papers arises from the inability of outsiders to observe hidden managerial actions, it arises in our model (to be discussed shortly) due to the *ex ante* private information about project quality.

a project undertaken in the next period; in the absence of this internal cash flow, the latter project has to be funded with external financing. The equity market therefore reacts favorably to the choice of an early-cash-flow project, realizing that, in an asymmetrically informed equity market, it is the undervalued firms that attempt to minimize the use of external financing.<sup>5</sup> The conclusion to be drawn from this literature, as well as from the popular debate on this issue, is that short-termism, or myopia, while often inevitable, is undesirable, because it is value-dissipating.

Although the recent experience of Southeast Asian countries leaves considerable room for a healthy discussion as to whether the long-term outlook of Asian managers is truly superior to the short-term orientation of their American counterparts, it is none the less useful to ask: *Are there any structural mechanisms, such as changes in the tax code, that can influence the investment horizons of managers, and if so, how?* The objective of this paper is to answer this question. To accomplish this, we first develop a simple model of myopic project selection in which corporate myopia is "contagious" and generated by "short-term trading" in the firm's equity by portfolio managers and others. We then make use of this model to examine the impact of some policy initiatives on the corporate planning horizon, after which we develop implications for how myopia cures should be structured.

The notion that the tax code can be used to correct corporate myopia has been alluded to in recent years in the public policy debate. Some of the alternatives proposed include a cut in the capital gains tax rate (either across the board or for investors who hold equity in a firm for a certain length of time), a variety of investment tax credits directed at longer term investment projects meeting certain criteria (e.g., a permanent tax credit on R&D projects), a cut in the corporate tax rate, and a tax on all securities transactions.<sup>6</sup> The suggestion for different tax rates on short-term capital gains and on long-term capital gains, in particular, has received wide public attention. For example, former senator and presidential candidate Paul Tsongas has suggested that the capital gains tax rate on securities held for more than 5 years be reduced to zero, on the grounds that this would considerably increase the productivity of the American economy. Investment bankers like Felix Rohatyn have called for raising the tax rate on short-term capital gains and reducing the tax rate on long-term gains.<sup>7</sup> Finally, the reduction in corporate myopia has been cited as one of the rationales for the provisions in the 1997 tax law which specified a maximum capital gains tax rate of only 20% for assets held for

<sup>5</sup> See also Thakor (1990), who makes use of a *symmetric* information model to provide a rationale for firms adopting capital budgeting procedures emphasizing short-term cash flows, based on the argument that in certain settings, internal cash flow is more valuable to a firm which maximizes the current stock price.

<sup>6</sup> The arguments for a transactions tax are made by Stiglitz (1989) and by Summers and Summers (1989).

<sup>7</sup> The political support for differential short-term and long-term capital gains tax rates has by no means been confined to Democrats. Earlier, Republican Senator Nancy Kassebaum introduced a bill that would impose a 10% tax on capital gains earned by pension funds on assets held less than 30 days and a 5% tax on assets held less than 180 days. The Bush administration also considered including a similar provision in its tax bill.

more than 18 months, while specifying a maximum rate of 28% for assets held for at least 12 months (but less than 18 months), with capital gains on assets held for less than 12 months taxed at the same rate as ordinary income.<sup>8</sup>

In much of this debate, the exact mechanism by which a cut in the capital gains tax rate would help the economy is left vague, apart from the general notion that it would somehow reduce the concern of investors for next period's earnings, which, in turn, is supposed to diminish management's concern for quick profits at the expense of long-term benefits. The objective of this paper is to bridge this gap by analyzing explicitly how some of these policy prescriptions affect the corporate planning horizon.

In our model, a fraction of the firm's shareholders are long-term shareholders, while others are short-term traders, who plan to sell their shares early. Corporations, with private information about the quality of their projects, have to choose between investing in two kinds of projects: short-term projects, in which uncertainty about project quality is resolved faster, and long-term projects, where this uncertainty is resolved at a slower pace.<sup>9</sup> Firm management makes its project choice so as to maximize the wealth of current equity holders, taking into account that a fraction of these equity holders will be forced to trade out of the firm's shares early due to liquidity shocks. Inefficient investment in short-term projects is generated in this setting because even a manager with a good project may be motivated to undertake a lower NPV (net present value) short-term project, since it has a higher probability of generating a good news signal earlier than a higher NPV long-term project, thus enabling the manager to minimize the short-term mispricing of the firm's equity.

In this setting, our analysis produces a key policy-relevant result—a lowering of the long-term capital gains tax rate relative to the short-term rate encourages the firm, in the interests of its shareholders, to maximize long-term, rather than short-term, market value. Such a tax cut induces time 0 equity holders (and therefore firm management) to reduce the effective weight that they put on the short-term stock price relative to the long-term stock price. Thus, a long-term capital gains tax cut (for stockholders who hold their equity in the firm beyond a certain length of time) pressures the firm toward the full-information policy of maximizing long-term firm value; we demonstrate that an across-the-board tax cut has no such impact. This beneficial effect of a long-term capital gains tax cut, while present even if the proportion of short-term equity holders is independent of the capital gains tax

<sup>8</sup> For example, Treasury Secretary Robert Rubin explicitly cited a reduction in corporate myopia as the justification for such a capital gains tax regime on one of his appearances on CNN's *Evans and Novak* program in 1997.

<sup>9</sup> For instance, a short-term project may involve the modification of an existing product of the firm, so that management may have a high degree of confidence in the success of the project, and, in any case, the success or failure of the project may become known in a reasonably short period of time; a long-term project, on the other hand, may involve investing large amounts of money in R&D for long periods of time, without a great deal of information becoming available about the project's potential for success.

differential, will be even more pronounced if introducing such a tax differential reduces short-term trading by motivating some of the short-term equity holders to hold their shares longer term. In this case, a long-term capital gains tax cut combats corporate myopia in two different ways, so that only a smaller tax cut is required. We further demonstrate that an important advantage of a cut in long-term capital gains tax rates as a way of combating corporate myopia, relative to other policy prescriptions such as a tax credit for long-term investments, is that it does not lead to inefficient investment even in situations where the assumption that long-term projects are intrinsically more valuable is violated for some firms. Finally, we show that, under suitable conditions, a cut in the long-term capital gains tax rate has the added advantage of *increasing* government tax revenues while lengthening the corporate planning horizon.

Thus, our model provides several insights useful for choosing public policy. First, it highlights the central role in generating myopic corporate behavior played by asymmetric information. The conclusion is that myopia will be most severe not in industries where most projects are long-term—like the aircraft industry—but in industries where there are many competing technologies available, with uncertainty in the development of these technologies being resolved at different rates. In such a setting, a targeted cut in the long-term capital gains tax rates for shareholders in such industries will be useful in minimizing the effects of corporate myopia. Second, it demonstrates that even in a situation with asymmetric information, firms where most investors hold equity for extended periods will not be motivated to make myopic corporate investment decisions. This means that firm managers may be justified in trying to increase the proportion of shareholding by long-term investors (“relationship investing”) in their firm. The reason is that long-term investors are less concerned with short-run mispricing of the firm’s equity and therefore would not exert pressure on firm management to favor short-term projects. Third, our model demonstrates that a long-term capital gains tax cut is not an unduly sensitive policy instrument, in that it does not create a bias toward inefficient long-term projects in those firms where it is in fact short-term projects that are more valuable. Thus, at the very least, such a tax cut does not do harm even when it is not particularly beneficial. Finally, our model demonstrates that implementing such a tax cut may not necessarily be a significant revenue loser for the government: in fact, it may even enhance tax revenue in many situations where it is successful in lengthening corporate planning horizons. Further, investors also gain in after-tax terms from such a tax cut, thereby lowering their cost of capital. Assuming that this results in a greater level of future investment, our model also provides some support for the oft-debated public-policy conjecture that a long-term capital gains tax cut not only leads to increased tax revenues in the immediate future, but generates even greater revenue growth further out into the future.

The paper most closely related to ours is that of Hirshleifer and Chordia (1993), in which asymmetric information about managerial ability does not always lead to corporate myopia. In that model, managers can manipulate the timing of the

resolution of uncertainty about their firm's project cash flows. It is shown that while high-quality managers will be biased toward advancing resolution, low-ability managers may favor either advancing or deferring resolution. Managerial reputation effects may thus lead to either under- or overinvestment in long-term projects, depending on parameter values.<sup>10</sup> Bebchuk and Stole (1993) also analyze a situation of unobservable investment and argue that short-term managerial objectives may lead to either over- or underinvestment in long-term projects. However, theoretical analyses of *cures* for the corporate myopia problem have been sparse in the existing literature.<sup>11</sup> This motivates our work. We conduct a detailed analysis of how differential capital gains tax rates and other tax-related policy prescriptions can address the problem of corporate myopia in a setting of asymmetric information.

The rest of the paper is organized as follows. Section 2 presents the essential features of the model. Section 3 characterizes the equilibrium of the model and develops results. Section 4 develops a simple extension of the basic model, allowing the extent of short-term trading among the firm's equity holders to be a function of the difference between the tax rates on short-term and long-term capital gains. Section 5 concludes.

## 2. THE MODEL

The model has three dates. At time 0, each firm chooses to undertake a single project, which may be a short-term (S) or a long-term (L) project. Both kinds of projects have a single cash flow at project completion, which occurs at time 2. The firm's choice of horizon (short-term or long-term) is publicly observable. However, the firm's management (insiders) also have private information at time 0 about the magnitude of the time 2 cash flow from each project, which may reflect (in addition to other things) their assessment of their own and their employees' expertise and abilities, the quality of their plant and equipment, etc. We refer to all these items (which affect the project's time 2 cash flow and which are private information to the manager) collectively as "project quality." The project may be of "good" (G) quality or "bad" (B) quality. Thus, once the project is undertaken, any given firm falls in one of four categories, as captured by a variable  $f \in \{GL, GS, BL, BS\}$ . The objective of firm management in choosing project horizon is to maximize the expected value at time 0 for the after-tax cash

<sup>10</sup> Another related paper is that of Paul (1992), in which the stock market observes imperfect signals of the firm's future cash flows and in which the firm manager *invisibly* allocates resources between short-term and long-term projects in order to maximize the current stock price. In such a setting, the firm will under- or overinvest in long-term projects, depending on whether short-term cash flows are better or worse predictors of the firm's total profitability than the market's signals about long-term cash flows.

<sup>11</sup> An exception is Hagerty *et al.* (1991), who argue that call options in managerial contracts may be useful in mitigating corporate myopia.

flow accruing to investors in the firm's equity (we discuss this objective in detail later).

We assume that good projects (regardless of horizon) have larger net present values than do bad projects and that both types of projects have positive net present values. Further, good long-term projects have larger net present values than good short-term projects. In other words, the net present values of the projects available to firms depend both on project horizon, which is chosen by management and is publicly observable, and on firm quality (or "type"), which is private information to management, and which cannot be altered by firm management. Thus,

$$NPV_{GL} \equiv C_{GL} - I_L > NPV_{GS} \equiv C_{GS} - I_S > NPV_{BL} = NPV_{BS} \equiv C_B - I_B. \quad (1)$$

Here  $C_{GL}$  and  $C_{GS}$  denote the time 2 cash flow from good long-term and good short-term projects, respectively;  $C_B$  is the corresponding cash flow from bad projects (regardless of whether the project is long-term or short-term).  $I_L$  and  $I_S$  are the investment amounts required for good long-term and good short-term projects, respectively;  $I_B$  is the investment amount required to undertake a bad project, whether long-term or short-term. We assume that these investment amounts are not observable by outside investors, so that outsiders cannot infer project quality by observing these amounts. Clearly, by assuming that the time 2 cash flows as well as the investment amounts required are the same for all bad projects regardless of project horizon, we have essentially assumed that the net present values are the same for all bad projects. This assumption, however, is made only for modeling simplicity: for the intuition behind our results to go through, all we need is that the difference in NPVs between the bad short-term and the bad long-term projects be much smaller than that between good and bad projects.<sup>12</sup>

At time 0, outsiders have only a prior probability assessment about firm (project) quality which may reflect, among other things, their information about the proportion of good long-term and good short-term projects in the economy, in a pooling equilibrium where bad firms mimic good firms.<sup>13</sup> Let  $\theta_L$  denote the outsiders'

<sup>12</sup> The focus of this paper is on studying the effects of asymmetric information on firms with good projects, and we are therefore interested in studying situations where firms with bad projects have no incentives to separate from those with good projects by their choice of project horizon. Assuming that the bad short-term and the bad long-term projects have identical net present values ensures that managers with bad projects always have an incentive to mimic those with good projects in equilibrium. However, the nature of the equilibrium will remain essentially the same even if we assume that bad short-term projects have smaller NPVs than bad long-term projects, provided that the NPV from the latter is significantly smaller than that from a good short-term project, so that the benefit to bad firms from mimicking good firms is always much higher than that arising from choosing a bad long-term project instead of a bad short-term project. We choose not to adopt the latter modeling approach since it only adds complexity to the model without significantly affecting results.

<sup>13</sup> Of course, this will not be the case in a separating equilibrium, where good and bad firms choose different project horizons in equilibrium (so that outsiders are able to distinguish between good and bad firms with probability 1 merely by observing the firm's choice of project horizon). However, we will demonstrate later that the equilibrium in our setting involves pooling by the two types of firms.

probability assessment, conditional on the information available to them at time 0, that the project undertaken by the firm is good, given that it is a long-term project; let  $\theta_S$  denote the corresponding probability if the project undertaken is a short-term project. At time 1, outsiders obtain additional (noisy) information about quality. We model this information arrival by assuming that at time 1, outsiders obtain a signal which can be either good ( $s = g$ ) or bad ( $s = b$ ), with the probability of a good signal being higher for a good short-term project than for a good long-term project. Thus, we assume

$$\begin{aligned} \text{Prob}(s = g | f = \text{GS}) &\equiv \delta_{\text{GS}} > \text{Prob}(s = g | f = \text{GL}) \equiv \delta_{\text{GL}} \\ &> \text{Prob}(s = g | f = \text{B}) \equiv \delta_{\text{B}}. \end{aligned} \quad (2)$$

Here  $\delta_{\text{GS}}$  and  $\delta_{\text{GL}}$  denote the probability that a good signal is observed, given that the project undertaken is a short-term project or a long-term project, respectively, and provided that the project is of truly good quality;<sup>14</sup>  $\delta_{\text{B}}$  is the probability of receiving a good signal for truly bad projects. For simplicity, we assume the probability of obtaining a good signal to be the same for both bad short-term and bad long-term projects.<sup>15</sup> The probabilities of receiving a bad signal at time 1 for each kind of project are clearly given by the complements of the probabilities in (2). Outsiders update the market value of the firm's equity based on the additional information about firm value that becomes available at time 1; we will discuss this updating in more detail in Section 2.1.

From (2), it can be seen that the essential difference between short-term and long-term projects in this model is that the probability of an earlier (partial) resolution of information asymmetry about project quality is higher for short-term projects than for long-term projects. We have chosen to model the distinction between short-term and long-term projects in this manner, rather than assuming that short-term projects will have earlier cash flows, for instance. We do this because it is the

<sup>14</sup> For ease of exposition, we have described the information release at time 1 as outsiders receiving a good signal (with a certain probability) or a bad signal (with the complementary probability). However, we can also think about the same information structure as good news about the project arriving at time 1 with some probability and not obtaining any information at all with the complementary probability. In this case, since good news is expected by a certain time, not receiving any information is *equivalent* to bad news. This is perhaps closer to many real-world situations in which many ambitious projects which ultimately prove to be great successes and which lead to revolutionary new products go through long periods during which they consume large amounts of the firm's R&D money without any indication to outsiders that progress is being made in the right direction (long-term projects in our setting); on the other hand, if the firm undertakes less ambitious projects along the lines of existing projects (short-term projects in our setting), outsiders' uncertainty about the success or failure of the project may be resolved earlier.

<sup>15</sup> Again, the assumption that the probability of a good signal is the same both for bad short-term projects and for bad long-term projects, made only for modeling simplicity, can be relaxed if one adopts an alternative modeling approach along the lines discussed in footnote 12.

differential resolution of information asymmetry between the two kinds of projects which induces myopic project selection, rather than any difference in the timing of project cash flows themselves.<sup>16</sup>

At time 1, after the information release, the firm's time 0 shareholders sell a fraction  $\gamma$  of their equity to outsiders, to satisfy their liquidity requirements, at the price prevailing in the equity market at this time. They hold the remaining fraction  $(1 - \gamma)$  till time 2, at which time all cash flows from the project undertaken by the firm are realized and distributed to equity holders. We will not model how  $\gamma$  is determined here, and take it to be exogenous:  $\gamma$  can be thought of as a measure of the extent of equity holding by short-term traders in the firm.<sup>17</sup> Alternatively, one can think of  $\gamma$  as the probability assessment of each insider at time 0 of having to divest his or her entire equity in the firm at time 1 due to a liquidity shock.<sup>18</sup>

We assume that all agents are risk-neutral and that the risk-free rate of return is zero. To summarize the sequence of events, each firm initiates a project at time 0. At time 1, an intermediate signal of project quality is observed, after which stockholders divest a certain proportion of their equity at the prevailing market price. The project is completed at time 2, and its cash flow realized; so that all information asymmetry between insiders and outsiders is resolved at this date. The sequence of events is depicted in Fig. 1.

<sup>16</sup> Thus, our results would remain essentially unchanged if we assumed (for instance) that *all* projects (regardless of quality) would yield a certain additional cash flow at time 1, since such a cash flow will not convey any information about project quality.

<sup>17</sup> Stein (1989) uses a similar construct to motivate "market pressure" on firm managers; he provides another way of looking at  $\gamma$ , arguing that such pressure may arise from managers' fear that a raider may take over the firm after buying its equity when it is undervalued. Thus, in general,  $\gamma$  can be thought of as a measure of the degree to which existing equityholders are concerned with their short-term return from the firm's equity (even when they do not necessarily plan to liquidate the equity at time 1) as against the long-term return. One group of equityholders who are concerned with short-term return are portfolio managers of mutual funds, whose compensation depends critically on the yearly performance of these funds.

<sup>18</sup> The assumption that a proportion  $\gamma$  of investors liquidate their equity holdings at time 1 can be partially endogenized using an approach similar to that adopted by Diamond and Dybvig (1983). Let all investors be identical at time 0. However, each investor faces a privately observed, uninsurable risk of being type 1 or type 2. At time 1, each investor learns his or her type. Type 1 investors care only about consumption at date 1, while type 2 investors care only about consumption at date 2. At time 1, a fraction  $\gamma$  of the continuum of investors in the economy are of type 1 and the remaining proportion  $1 - \gamma$  are of type 2, with all investors in the economy having an equal and independent chance (at time 0) of being type 1. Each investor is endowed with \$1 worth of consumption goods at time 0, with no further endowments at the other two dates. Agents can costlessly store consumption goods across time periods. This implies that, if  $c_t$  represents the consumption goods "received" to store or to consume by each agent at time  $t$ , and  $\psi$  represents the state realized at time 1, each investor  $i$  has a state-dependent utility function of the form  $U(c_1, c_2; \phi) = u(c_1)$  if  $i$  is of type 1 in state  $\phi$ ;  $U(c_1, c_2; \phi) = u(c_1 + c_2)$  if  $i$  is of type 2 in state  $\phi$ . In the above setup, a fraction  $\gamma$  of the investors who invest their time 0 endowment (wealth) in the firm's equity will sell their equity to outside (type 2) investors at time 1 in order to consume at this date. The remaining fraction retain their original stake in the firm till time 2.

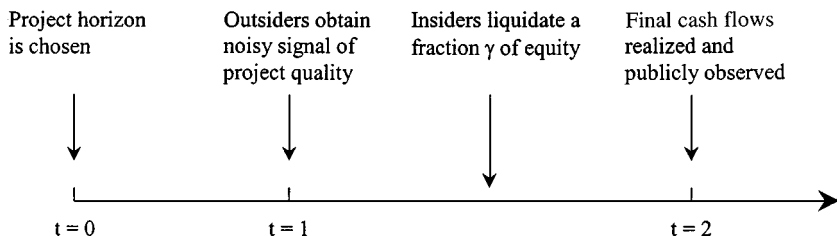


FIG. 1. Sequence of events.

### 2.1 Firm Valuation at Time 1

Based on the signal received at time 1, outsiders revise their probability assessment about the quality of the project undertaken by the firm using Bayes' rule and compute the market value of its shares accordingly.<sup>19</sup> If the project undertaken by the firm is a long-term project, the revised probability that the project is good given the signal observed at time 0 is given by

$$\text{Prob}(f = \text{GL} | s = g) = \frac{\delta_{\text{GL}}\theta_{\text{L}}}{\delta_{\text{GL}}\theta_{\text{L}} + \delta_{\text{B}}(1 - \theta_{\text{L}})}, \quad (3)$$

$$\text{Prob}(f = \text{GL} | s = b) = \frac{(1 - \delta_{\text{GL}})\theta_{\text{L}}}{(1 - \delta_{\text{GL}})\theta_{\text{L}} + (1 - \delta_{\text{B}})(1 - \theta_{\text{L}})},$$

depending on whether the signal observed is good ( $s = g$ ) or bad ( $s = b$ ). The probability that the long-term project is bad will be the complement of the probabilities given by (3); i.e.,  $\text{Prob}(f = \text{BL} | s = g) = 1 - \text{Prob}(f = \text{GL} | s = g)$ , and  $\text{Prob}(f = \text{BL} | s = b) = 1 - \text{Prob}(f = \text{GL} | s = b)$ . Using these probabilities, we can compute the market value of a long-term project conditional on a good signal (denoted by  $V_{\text{L}}(g)$ ) or a bad signal (denoted by  $V_{\text{L}}(b)$ ) as

$$V_{\text{L}}(g) \equiv \frac{\delta_{\text{GL}}\theta_{\text{L}}C_{\text{GL}} + \delta_{\text{B}}(1 - \theta_{\text{L}})C_{\text{B}}}{\delta_{\text{GL}}\theta_{\text{L}} + \delta_{\text{B}}(1 - \theta_{\text{L}})}, \quad (4)$$

$$V_{\text{L}}(b) \equiv \frac{(1 - \delta_{\text{GL}})\theta_{\text{L}}C_{\text{GL}} + (1 - \delta_{\text{B}})(1 - \theta_{\text{L}})C_{\text{B}}}{(1 - \delta_{\text{GL}})\theta_{\text{L}} + (1 - \delta_{\text{B}})(1 - \theta_{\text{L}})}. \quad (5)$$

<sup>19</sup> As in Stein (1988), we assume that firm management (insiders) cannot *fully* signal their private information to the market at either time 0 or time 1 by mechanisms other than their choice of project horizon (e.g., through their choice of the firm's capital structure). This assumption does not require that the various other methods of signaling private information that have been discussed in the literature never be used in our setting. Rather, the assumption reflects the fact that these signaling methods are also costly, so that the information-transmission mechanism specified here (namely, the firm's choice of project horizon, with a noisy signal arriving at time 1 about project quality) is also relevant at the margin. Thus, one can think of the asymmetric information between firm insiders and outsiders prevailing at time 0 in our model as the *residual* information asymmetry after cheaper means of credibly revealing private information have been employed.

Working similarly, the updated time 1 market value for a short-term project conditional on a good signal (denoted by  $V_S(g)$ ) or on a bad signal (denoted by  $V_S(b)$ ) is given by

$$V_S(g) \equiv \frac{\delta_{GS}\theta_S C_{GS} + \delta_B(1 - \theta_S)C_B}{\delta_{GS}\theta_S + \delta_B(1 - \theta_S)}, \quad (6)$$

$$V_S(b) \equiv \frac{(1 - \delta_{GS})\theta_S C_{GS} + (1 - \delta_B)(1 - \theta_S)C_B}{(1 - \delta_{GS})\theta_S + (1 - \delta_B)(1 - \theta_S)}. \quad (7)$$

## 2.2 The Insiders' Objective

At time 0, the firm selects its project horizon in order to maximize the wealth of its current shareholders (firm insiders), taking into account that a fraction of these shareholders will be forced to liquidate their equity holdings in the firm at time 1. We assume that the firm management's interests are aligned with those of insiders. Typical compensation packages, which include stock and stock options, will induce managers to care about both current and future stock prices. Thus, firm insiders (and therefore management) select a project horizon to maximize the expected value of the cash flows accruing to current shareholders from their investment in the firm net of any capital gains tax payable.

Denote by  $J_{GL}$  and  $J_{GS}$ , respectively, the value of this objective if insiders' private information is that their project is good, depending on whether the project horizon selected is long-term or short-term. This is given by

$$J_{GL} = \gamma(1 - t_S)[\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b) - I_L] \\ + (1 - \gamma)(1 - t_L)(C_{GL} - I_L), \quad (8)$$

$$J_{GS} = \gamma(1 - t_S)[\delta_{GS}V_S(g) + (1 - \delta_{GS})V_S(b) - I_S] \\ + (1 - \gamma)(1 - t_L)(C_{GS} - I_S). \quad (9)$$

Here  $t_L$  and  $t_S$  are the capital gains tax rates for long-term capital gains (i.e., on securities held till time 2) and on short-term capital gains (i.e., on securities sold at time 1), respectively. If, on the other hand, the insider's private information is that the firm's project is bad, the values of this objective are denoted by  $J_{BL}$  or  $J_{BS}$ , respectively (again depending on whether the project chosen is long-term or short-term), and are given by

$$J_{BL} = \gamma(1 - t_S)[\delta_B V_L(g) + (1 - \delta_B)V_L(b) - I_L] \\ + (1 - \gamma)(1 - t_L)(C_B - I_B), \quad (10)$$

$$J_{BS} = \gamma(1 - t_S)[\delta_B V_S(g) + (1 - \delta_B)V_S(b) - I_S] \\ + (1 - \gamma)(1 - t_L)(C_B - I_B). \quad (11)$$

It is important to note that our paper differs markedly from other papers (e.g., Stein's, 1988, model) where corporate myopia is driven by a conflict of interest between the firm's managers and its shareholders. The assumption here is that the contract between the shareholders and the firm's management is the optimal contract, motivating firm managers to undertake the exact investment policy that shareholders want. To illustrate this point further, consider a scenario in which all shareholders are identical, and each shareholder obtains a private signal about his or her time 1 liquidity requirement immediately after he or she has bought stock in the firm; i.e., each shareholder comes to know  $\gamma$ , the fraction of his or her equity holding that he or she will have to liquidate at time 0 (while holding the remaining fraction  $(1 - \gamma)$  till time 2). Once the shareholders receive their private signals, they vote on whether the firm should undertake the long-term or the short-term project, each shareholder voting for the project that will maximize the present value of the cash flow from his or her equity holdings. In other words, there is no manager in this scenario: shareholders decide on the firm's investment policy directly by voting on it. While, in the interest of simplicity, we choose not to model such a scenario explicitly, the investment policy chosen by the firm in the above scenario will be exactly the same as that discussed in this paper.

Therefore, the myopia problem in this setting cannot be solved by adjusting the compensation scheme between the firm's management and its shareholders, since the myopia is generated by short-term trading in the firm's equity by shareholders, and not by the self-interested behavior of firm management at the expense of its shareholders. Further, unlike many other papers where the objective function of the managers can be reduced to some average of current and future shareholders' wealth (e.g., signalling models like that of Miller and Rock (1985) or the myopia analyses of Bebchuk and Stole (1993) and Hirshleifer and Chordia (1993)), here the weight placed by the insiders' objective on the short-term stock price,  $\gamma$ , is not specified exogenously. In our setting this weight emerges endogenously, being a function of the extent of short-term trading in the firm's equity and the short-term and the long-term capital gains tax rates involved.

It is also not possible to eliminate the myopia problem in our setting through current shareholders and managers entering into long-term contracts precommitting themselves to ignore the short-term (time 1) stock price and focus only on the long-term (time 2) stock price when selecting the firm's projects (along the lines discussed by Dybvig and Zender (1991) in the context of a firm making an equity issue in an asymmetric information environment). First of all, there is a time-inconsistency problem inherent in such contracts arising from the incentive and the ability of current shareholders (who are better informed than outsiders) to renegotiate such contracts in their own favor at the expense of outsiders (see, e.g., Persons, 1994). Apart from this, in our setting there is no motivation for current shareholders to enter into such contracts in the first place. In settings where potential value-reducing actions may take place *after* the issue of securities, such precommitment contracts eliminating future inefficiencies will benefit insiders by

increasing the future sale price of the securities issued. In contrast, in our model project selection by the firm takes place *before* stock trading, so that such precommitment contracts can only leave current shareholders *worse off* by preventing them from taking into account an important variable affecting their expected utility when selecting the firm's projects.

### 3. EQUILIBRIUM

The equilibrium concept we use is based on the sequential equilibrium of Kreps and Wilson (1982). An equilibrium in our model consists of project choices by firm managers and beliefs formed by outsider investors in response to these choices such that: (a) Firms' project-horizon choices maximize the insiders' objective, given the equilibrium beliefs of outside investors; (b) outsiders' beliefs are rational, given the firms' equilibrium choice of project horizon, and are formed using Bayes' rule along the equilibrium path; and (c) outsiders' beliefs in response to out-of-equilibrium project choices by firms (insiders) are consistent with insiders' equilibrium strategies and are such that they yield insiders a lower value of their objective compared to that they obtain in equilibrium.

In order to highlight the three essential ingredients which generate corporate myopia in our setting, we note that there will be no corporate myopia in equilibrium, regardless of the relative magnitudes of  $t_L$  and  $t_S$ , if any one of the following three conditions is satisfied: (a) there is no asymmetric information about project quality; (b) asymmetric information exists, but no insider divests his or her equity holdings in the firm at time 1 (i.e.,  $\gamma = 0$ ); (c) asymmetric information exists, but good short-term projects and good long-term projects are identical in terms of the pace of the resolution of information asymmetry (i.e.,  $\delta_{GS} = \delta_{GL}$ , with  $\theta_S = \theta_L$ ). The intuition here is as follows. First, asymmetric information about project quality between firm insiders and outsiders is required to induce myopia. In the absence of asymmetric information all securities will be correctly valued at all dates, so that there is no interim mispricing, and therefore no benefit to either type of firm from choosing the short-term project. Second, insiders should care sufficiently about any interim mispricing. This will be the case, for instance, if they plan to liquidate a significant portion of their equity in the firm before all information asymmetry about project quality is resolved. Finally, the extent of expected mispricing should be lower if the firm undertakes the short-term project than if it undertakes the long-term project. Thus, the central tradeoff which may induce firms to pass up more valuable long-term projects in favor of short-term projects is that undertaking the long-term projects leads to their equity remaining undervalued for longer periods of time. In other words, undertaking the short-term project minimizes the short-run mispricing of equity. We now characterize the equilibrium under asymmetric information where the firm engages in myopic project selection.

**PROPOSITION 1.** (a) (*Myopic Equilibrium*) Assume that the capital gains tax rates on both long-term and short-term projects are the same (i.e.,  $t_S = t_L$ ). Then,

both types of managers will undertake the short-term project in equilibrium if  $\gamma > \gamma^*$ , where

$$\gamma^* = \frac{(C_{GL} - I_L) - (C_{GS} - I_S)}{[C_{GL} - \{\delta_{GL} V_L(g) + (1 - \delta_{GL}) V_L(b)\}] - [C_{GS} - \{\delta_{GS} V_S(g) + (1 - \delta_{GS}) V_S(b)\}]}$$
(12)

If  $\gamma \leq \gamma^*$ , the long-term project will be undertaken in equilibrium.

(b) This equilibrium satisfies the Cho–Kreps refinement.<sup>20</sup>

(c) (Across-the-Board Tax Cut) Assume that  $\gamma > \gamma^*$ , and  $t_L = t_S$ . Then an across-the-board cut in capital gains tax rates cannot be used to induce firms to choose the long-term project instead of the short-term project.

If the extent of short-term trading by insiders in the firm's equity is greater than a certain value  $\gamma^*$ , the benefit of minimizing short-run mispricing by undertaking the short-term project overcomes the fact that the long-term project is intrinsically more valuable, so the firm undertakes the short-term project. Equation (12) states that this minimum amount of short-term trading required to induce corporate myopia is given by the ratio of the difference in NPVs between the long-term and the short-term projects to the difference in the extent of the expected mispricing (conditional on insiders' information) of the firm's equity between the case where the short-term project is chosen and that where the long-term project is chosen. In equilibrium, firms with bad projects will choose the same project horizon as those with good projects, since the value obtained by the insiders in these firms for equity divested at time 1 will be greater if they pool with good firms compared to that obtained if they reveal their type. Since the equilibrium involves pooling by good and bad firms, outsiders set the probability that a given firm is good equal to  $\theta_S$  if  $\gamma > \gamma^*$ , and they observe the firm undertaking the short-term project, as specified by the equilibrium; similarly, they set this probability equal to  $\theta_L$  if  $\gamma \leq \gamma^*$ , and they observe the firm choosing the long-term project, as required by the equilibrium. Further, the time 1 market values of the firm along the equilibrium path are given by Eqs. (4) to (7), depending on whether the signal observed by outsiders at time 1 is good or bad, and the horizon of the project that the firm is

<sup>20</sup> The Cho–Kreps argument was originally developed in the context of signaling games (see Cho and Kreps, 1987) and later extended to apply, with modifications, to extensive form games in general (see Cho, 1987). In our context, applying such a test consists of checking whether the good firm can make an out-of-equilibrium move, accompanied by the following speech (in essence) to outsiders: "You have to believe that I am a good firm, because you know that a bad firm could not possibly benefit from making such an out-of-equilibrium move (regardless of what you infer about my type from my making this move); only a truly good firm could possibly benefit from doing this." If there are out-of-equilibrium moves for which the above speech would be valid (and which would therefore allow the good firm to reveal its type credibly), the equilibrium fails this test of robustness, since the good firm may destabilize the equilibrium by attempting such a move.

supposed to undertake in equilibrium. However, if  $\gamma > \gamma^*$ , but outsiders observe that the firm has nevertheless chosen a long-term project (an out-of-equilibrium action), then they infer with probability 1 that the firm is bad; similarly, they infer with probability 1 that the firm is bad if  $\gamma \leq \gamma^*$ , and the project horizon chosen is short-term (again an out-of-equilibrium action).<sup>21</sup>

One policy prescription that has been suggested as a way of inducing firms to lengthen their investment horizon is an across-the-board capital gains tax cut, regardless of the length of time for which they hold equity. Result (c) demonstrates that such a tax cut will not eliminate corporate myopia if the firm has enough short-term projects available to it, as in our model. Such a tax cut increases the attractiveness of short-term as well as long-term projects, and since  $\gamma^*$  is independent of the capital gains tax rate, corporate myopia will persist even at the lower capital gains tax rate as long as  $\gamma > \gamma^*$ .<sup>22</sup> Another widely discussed policy prescription is to cut the tax rate only on investors who hold equity in the firm for longer periods of time, i.e., till time 2 in our model. This is examined in the next proposition.

**PROPOSITION 2 (Optimal Long-Term Capital Gains Tax Rate).** *Assume that  $\gamma > \gamma^*$ , such that if  $t_S = t_L$ , only the short-term project would be undertaken. Then*

(a) *A differential tax rate for long-term capital gains,  $t_L < t_L^*$ , given by*

$$t_L^* \equiv 1 - \frac{\gamma(1 - t_S)[\{\delta_{GS} V_S(g) + (1 - \delta_{GS}) V_S(b) - I_S\} - \{\delta_{GL} V_L(g) + (1 - \delta_{GL}) V_L(b) - I_L\}]}{(1 - \gamma)\{(C_{GL} - I_L) - (C_{GS} - I_S)\}}, \quad (13)$$

*would induce both types of managers to choose the long-term project.*

(b)  $t_L^* < t_S$ .

(c) *The optimal long-term capital gains tax rate is decreasing in the extent of short-term investors in the firm,  $\gamma$  (i.e.,  $dt_L^*/d\gamma < 0$ ).*

<sup>21</sup> The myopic equilibrium here is similar in spirit to that in Stein (1988), where managers of good firms, under takeover pressure, engage in myopic investment behavior due to a concern for the short-term stock price. It is also similar to the equilibrium in Hirshleifer and Chordia (1993) (who assume that firm managers, with private information about their ability, can advance or delay the resolution of their firm's cash flows), where high-ability managers incur the additional cost of advancing the resolution of their firm's project cash flows in order to convey their superior ability to outsiders.

<sup>22</sup> Of course, an across-the-board capital gains tax cut will lower the cost of capital and may perhaps transform a long-term project which was previously a negative-NPV project into a positive-NPV project. Thus, such a tax cut would cause the firm to undertake more such long-term projects and is therefore favored by those who argue that the cost of capital in the United States is somehow too high. However, this raises a question as to the "right" level of the cost of capital. Rather than enter into such a discussion, here we define myopia as a situation in which long-term projects and short-term projects compete with each other for scarce capital, and long-term projects which have a higher NPV at the prevailing discounting rate are rejected in favor of lower NPV short-term projects.

If the extent of short-horizon investors in the firm is larger than  $\gamma^*$ , only an added benefit to the long-term project in the form of a cut in the long-term capital gains tax rate will induce the firm to choose the long-term project instead of the short-term project. Here  $t_L^*$  is the greatest value of the tax rate on long-term capital gains at which the firm will undertake the long-term project in this setting. Equation (13) states that this critical tax rate on long-term capital gains,  $t_L^*$ , is that rate which would equalize the after-tax value of the difference between the case when the firm undertakes the short-term project and the case when it undertakes the long-term project in capital gains on the equity sold by insiders at time 1, and the same difference in capital gains on equity held till time 2. Further, the greater the proportion of short-term traders among the firm's time 0 equity holders, the lower the long-term capital gains tax rate  $t_L^*$  has to be to induce the firm to undertake the long-term project.<sup>23</sup>

**NUMERICAL EXAMPLE 1.** Table I presents a set of numerical examples which give us further insight into Propositions 1 and 2. Keeping other parameters constant, the table presents equilibrium values corresponding to a variation in  $NPV_{GS}$ , the net present value of the short-term project, and  $\delta_{GL}$ , the probability of obtaining a good time 1 signal from the long-term project. That is, we vary the difference in NPVs between the short-term and the long-term projects, and the difference in the pace of the resolution of information asymmetry across the two project horizons. The table presents the values of  $\gamma^*$ , the minimum level of short-term trading required to induce myopic project selection by firms. Further, assuming specific values of the extent of short-term trading  $\gamma$ , it also specifies the optimal level of the long-term capital gains tax rate required to induce firm managers to select the long-term project in preference to the short-term project (the table presents  $\text{Min}\{t_L^*, t_S\}$ , the lower of  $t_L^*$  and  $t_S$ , assuming that  $t_S = 35\%$ ). Whenever this tax rate is given as 35%, it means that no cut in the long-term capital gains tax rate is necessary, since, in this case, the myopia problem does not arise. On the other hand, whenever this value is given as negative, the myopia problem is so severe that it can be eliminated only for negative values of  $t_L$ .

From Table I, we can see that the extent of the corporate myopia problem depends on three important factors. First, it depends on the relative magnitudes of

<sup>23</sup> It is useful to consider how a long-term capital gains tax cut would affect corporate myopia induced by hidden action (as in Bebchuk and Stole (1993) or Stein (1989)) rather than by hidden information, as in this model. In the myopic equilibrium studied by Bebchuk and Stole (1993), project quality is observable, but the fraction of total investment allocated to the long-term versus the short-term project is unobservable. This creates an incentive for insiders to underinvest in the long-term project in order to increase the short-term stock price at the expense of the long-term stock price. Assuming an objective function similar to the one we have assumed here (where the relative weights assigned to the short-term versus the long-term stock price are functions of the short-term and the long-term capital gains tax rates), reducing the long-term capital gains tax rate would mitigate corporate myopia even in the hidden-action case by increasing the relative weight assigned to the long-term stock price in the firm's objective.

TABLE I

Variation in the Equilibrium Long-Term Capital Gains Tax Rate with Changes in the NPV of the Short-Term Project and the Pace of the Resolution of Information Asymmetry about the Long-Term Project

$\delta_{GL}$	NPV <sub>GS</sub> = 60		NPV <sub>GS</sub> = 65		NPV <sub>GS</sub> = 70	
	$\gamma^*$ %	Min $\{t_L^*, t_S\}$ %	$\gamma^*$ %	Min $\{t_L^*, t_S\}$ %	$\gamma^*$ %	Min $\{t_L^*, t_S\}$ %
$\gamma = 0.40$						
0.25	44.37	35.00	32.06	8.17	18.42	Negative
0.30	46.94	35.00	34.02	15.96	19.62	Negative
0.35	50.11	35.00	36.45	24.46	21.10	Negative
0.40	54.03	35.00	39.48	33.56	22.98	Negative
0.45	58.89	35.00	43.27	35.00	25.35	Negative
0.50	65.00	35.00	48.13	35.00	28.43	Negative
0.55	72.97	35.00	54.52	35.00	32.56	10.25
0.60	83.58	35.00	63.24	35.00	38.36	30.36
0.65	98.42	35.00	75.82	35.00	47.03	35.00
$\gamma = 0.50$						
0.25	44.37	18.50	32.06	Negative	18.42	Negative
0.30	46.94	26.53	34.02	Negative	19.62	Negative
0.35	50.11	35.00	36.45	Negative	21.10	Negative
0.40	54.03	35.00	39.48	00.35	22.98	Negative
0.45	58.89	35.00	43.27	14.80	25.35	Negative
0.50	65.03	35.00	48.13	29.95	28.43	Negative
0.55	72.97	35.00	54.52	35.00	32.56	Negative
0.60	83.58	35.00	63.24	35.00	38.36	Negative
0.65	98.42	35.00	75.82	35.00	47.03	26.80

*Note.* This table illustrates Propositions 1 and 2. Set  $\theta_L = \theta_S = 0.2$ ,  $\delta_B = 0.05$ ,  $\delta_{GS} = 0.8$ ,  $t_S = 35\%$ ,  $C_B = 25$ ,  $I_B = 20$ ,  $I_S = 20$ ,  $I_L = 24$ , and  $C_{GL} = 100$  (so that  $NPV_{GL} = 76$ ). Then, assuming two different values of the extent of short-term trading  $\gamma$ , the table presents the equilibrium values of the long-term capital gains tax rate (Min $\{t_L^*, t_S\}$ ), corresponding to several different values of NPV<sub>GS</sub> and  $\delta_{GL}$  (which measures the pace of the resolution of information asymmetry about the long-term project). The table also depicts the variation in  $\gamma^*$ , the minimum level of short-term trading required to induce myopic project selection by firms, with these model parameters. Whenever Min $\{t_L^*, t_S\}$  is given as 35%, no cut in the long-term capital gains tax rate is necessary (in these cases,  $\gamma < \gamma^*$ , and the myopia problem does not arise). On the other hand, whenever this value is given as negative, the myopia problem is so severe that it can be eliminated only for negative values of  $t_L$ .

the net present values of the short-term and the long-term projects, becoming less severe as the difference between the net present values of the two kinds of projects increases. Second, the myopia problem becomes more severe as the difference in the pace of the resolution of information asymmetry between the short-term and the long-term projects increases. Third, for any given level of the other parameters, the myopia problem becomes more severe as the proportion  $\gamma$  of short-term equity holders becomes larger. Thus, we can see from the table that if the

short-term project is much less valuable than the long-term project, but the pace of the resolution in information asymmetry between the two kinds of projects is not very different, there is no need for a cut in the capital gains tax rate, since, despite the impact of information asymmetry and short-term trading by investors, the firm would choose the long-term project. For example, this is the case when  $\gamma = 0.5$ ,  $NPV_{GS} = 76$ ,  $NPV_{GL} = 60$ , and  $\delta_{GL} = 0.65$  in Table I. However, if  $NPV_{GS}$  is close to  $NPV_{GL}$ , corporate myopia is significant even when  $\delta_{GL}$  is relatively close to  $\delta_{GS}$ , e.g.,  $\gamma = 0.5$ ,  $NPV_{GS} = 76$ ,  $NPV_{GL} = 70$ , and  $\delta_{GL} = 0.65$ . On the other hand, if  $NPV_{GS}$  is close to  $NPV_{GL}$ , while  $\delta_{GL}$  is significantly smaller than  $\delta_{GS}$ , the myopia problem is very severe (e.g.,  $\gamma = 0.5$ ,  $NPV_{GS} = 76$ ,  $NPV_{GL} = 70$ , and  $\delta_{GL} = 0.25$ ), and there is no positive long-term capital gains tax rate which can induce the firm to undertake the long-term project. Finally, when corporate myopia is present, the long-term capital gains tax cut required to "cure" the myopia problem is larger when  $\gamma$  is larger. For example, for  $\gamma = 0.40$ ,  $NPV_{GS} = 76$ ,  $NPV_{GL} = 65$ , and  $\delta_{GL} = 0.40$ , a long-term capital gains tax cut of only 1.44% is required to induce the firm to switch to the long-term project; notice that, other parameters remaining the same, a much larger tax cut is required to achieve the same effect if  $\gamma = 0.5$ .

A natural question that now arises is whether a long-term capital gains tax cut, aimed at combating corporate myopia, may in fact create a bias toward *inefficient* long-term projects if the assumption that long-term projects are intrinsically more valuable than short-term projects is incorrect. The next proposition demonstrates that, even in this case, no distortions are generated by a cut in long-term capital gains tax rates.

**PROPOSITION 3 (Absence of Distortions).** *Let  $\gamma > \gamma^*$ , and let the long-term capital gains tax rate be reduced to  $t_L^*$  (as specified under Proposition 2) in order to cure corporate myopia. Assume now that the magnitude of project cash flows from good short-term projects available to some firms is in fact equal to  $C'_{GS}$ , while the magnitude of cash flows from good long-term as well as those from bad projects remain unchanged, such that*

$$C'_{GS} - I_S > C_{GL} - I_L > C_B - I_B \quad (14)$$

(i.e., the short-term projects available to good firms now have greater net present values than the long-term projects available). Such firms will then undertake short-term projects in equilibrium.<sup>24</sup>

<sup>24</sup> This proposition is particularly helpful when we think of how such a tax cut can be structured in practice. Clearly, in our formal model all firms are homogeneous, so that the government can simply use the values of  $C_{GS}$  and  $C_{GL}$  in Eq. (13) to calculate  $t_L^*$ . However, in a real-world economy with heterogeneous firms, one can think of  $C_{GL}$  and  $C_{GS}$  as averages (which the government uses to compute  $t_L^*$ ), with some firms having short-term projects which are intrinsically more valuable than their long-term projects. Proposition 3 assures us that such a long-term capital gains tax cut will not motivate the shareholders of such firms to (inefficiently) undertake long-term projects.

This proposition demonstrates an important advantage of a long-term capital gains tax cut over alternative ways of correcting myopic corporate behavior that provide incentives to behave in the “right” manner at the firm level (for instance, tax credits for longer term projects). A long-term capital gains tax cut does not necessarily reward firms for undertaking long-term projects; instead, it motivates shareholders to assign more weight to maximizing long-term rather than short-term value. Therefore, in a situation where assumption (1) is violated, and it is undertaking the short-term project that maximizes long-term value, firm insiders will do so, and the cut in long-term capital gains tax rates does not produce any distortions in shareholder incentives toward inefficient long-term projects.

Often, providing a direct financial incentive to firms undertaking long-term projects (for example, by giving a corporate investment tax credit to such firms) has been suggested as a policy prescription for mitigating corporate myopia. We now briefly explore this alternative to a differential capital gains tax cut. A tax credit for firms undertaking the long-term project can be implemented in several different ways. One simple way to implement this is for the government to effectively bear a fraction of the investment amount required to implement the long-term project, as in the case of the investment tax credit. Denote by  $s^* \in [0, 1]$  the smallest fraction of the investment amount that has to be provided to firms undertaking the long-term project in order to induce them to undertake that project rather than the short-term project. This fraction  $s^*$  is given by that value of  $s$  which satisfies

$$\begin{aligned} & \gamma[\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b) - I_L(1 - s)] + (1 - \gamma)\{C_{GL} - I_L(1 - s)\} \\ & = \gamma[\delta_{GS}V_S(g) + (1 - \delta_{GS})V_S(b) - I_S] + (1 - \gamma)\{C_{GS} - I_S\}. \end{aligned} \quad (15)$$

Equation (15) equates the equilibrium value of the objective of the management of type G firms if they adopt the long-term project (including the value provided by the long-term project tax credit) compared to its value when they adopt the short-term project. The capital gains tax rate does not appear in (15), since the assumption here is that all shareholders, regardless of the length of time they hold equity, are now taxed at the uniform capital gains tax rate  $t_S$ . Providing such a long-term project tax credit can therefore eliminate corporate myopia if the assumption (1) is satisfied, so that it is indeed the long-term project that is intrinsically more valuable. However, unlike a differential capital gains tax cut, such a tax credit will also generate investment distortions in situations where the above assumption is incorrect; i.e., (14) is satisfied rather than (1). This is demonstrated below.

**PROPOSITION 4 (Tax Credit for Long-Term Projects).** *Let  $\gamma > \gamma^*$ , and let the relationship between the net present values of the long-term and the short-term projects be such that (14) is satisfied. Then providing a tax credit  $s^*$  leads to inefficient investment in the long-term project for parameter values satisfying*

$$\begin{aligned} & \gamma[\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b) - I_L(1 - s^*)] + (1 - \gamma)\{C_{GL} - I_L(1 - s^*)\} \\ & > \gamma[\delta_{GS}V'_S(g) + (1 - \delta_{GS})V'_S(b) - I_S] + (1 - \gamma)\{C'_{GS} - I_S\}, \end{aligned} \quad (16)$$

where  $V'_S(g)$  and  $V'_S(b)$  represent the time 1 market values, conditional on a good signal or a bad signal, respectively, of a short-term project satisfying (14).

While the above proposition assumes a particular implementation of the investment tax credit for long-term projects, the intuition behind this result carries through for alternative implementations.<sup>25</sup> The idea here is that, unlike a differential capital gains tax cut, a long-term project tax credit rewards firms explicitly for undertaking long-term projects and can therefore lead to investment distortions in situations where it is the short-term project which is intrinsically more valuable.<sup>26</sup>

The cost to the government from any cut in the capital gains tax rate in order to cure corporate myopia is the potential loss in tax revenues. We now study the effect of a differential capital gains tax cut on government tax revenues.

**PROPOSITION 5 (Government Tax Revenues).** *Assume that  $\gamma > \gamma^*$ , so that a cut in the long-term capital gains tax rate from the current rate  $t_S$  to  $t_L^*$  is required to induce managers to undertake the long-term project. Such a tax cut will increase government tax revenue if the model parameters satisfy the restriction (A7).*

When the government cuts the tax rate on long-term capital gains, it will take in only a smaller share of the cash flows generated net of investment in the economy. However, since the tax cut induces firms to undertake the long-term project (which has larger cash flows net of investment) instead of the short-term project, the total cash flows generated net of investment becomes larger, so that the government is getting a smaller share of a larger pie. If (A7) is satisfied, the loss in tax revenues arising from reducing the long-term capital gains tax rate is compensated by the increase in taxable income generated by firms switching from less valuable short-term projects to more valuable long-term projects, so that the amount of tax revenue collected by the government will be larger after the tax cut.<sup>27</sup>

<sup>25</sup> Another way to implement such a direct incentive to firms undertaking long-term projects would be for the government to lower the capital gains tax for investors in such firms (so that they pay a rate lower than  $t_S$  regardless of the duration of their equity holding in the firm). It can be shown that this implementation will also lead to inefficient investment in the long-term project in situations where assumption (1) is violated, and it is in fact the short-term project that is intrinsically more valuable.

<sup>26</sup> However, if the short-term project is so much better than the long-term project that the inequality (16) is reversed, then the firm will not inefficiently undertake the long-term project despite the incentive provided by the tax credit to do so.

<sup>27</sup> **NUMERICAL EXAMPLE 2.** Assume the same model parameters as those used in Table I, so that  $NPV_{GL} = 76$ , and  $t_S = 35\%$ . From Table I, for  $\gamma = 0.5$ ,  $NPV_{GS} = 60$ , and  $\delta_{GL} = 0.3$ , a cut in the capital gains tax rate to  $t_L^* = 26.53\%$  is required to induce firms to pick the long-term project, thus eliminating corporate myopia. In this case, it is easy to verify that (A7) is satisfied, so that the capital gains tax revenues of the government will go up from 5.60 to 5.91 if the above long-term capital gains tax cut is implemented.

#### 4. SHORT-TERM TRADING AS A FUNCTION OF THE DIFFERENCE BETWEEN LONG-TERM AND SHORT-TERM TAX RATES

So far, we have assumed that the extent of short-term trading in the firm's equity,  $\gamma$ , is independent of the difference between the tax rates on short-term and long-term capital gains and remains constant even after such a tax differential is introduced. However, it is reasonable to expect that a differential capital gains tax rate would reduce the proportion of short-term trading (i.e., reduce  $\gamma$ ); this might occur, for instance, because investors may try to confine their liquidity-related sales of shares (as much as possible) to shares held for a period long enough to qualify for the favorable tax treatment. In this section, we will briefly examine how our results are modified if we allow for  $\gamma$  to fall as the long-term capital gains tax rate  $t_L$  is reduced below the short-term rate,  $t_S$ .

**PROPOSITION 6.** *Denote by  $\gamma_0$  the value of  $\gamma$  for  $t_L = t_S$  (with  $\gamma_0 > \gamma^*$ ). Assume now that  $\gamma$  falls from this level  $\gamma_0$  with any decline in  $t_L$ , so that  $\partial\gamma/\partial\tau < 0$  (where  $\tau \equiv t_S - t_L$ ), for all  $\tau > 0$ . The cut in the long-term capital gains tax rate required to eliminate corporate myopia will now be smaller than in the case where  $\gamma$  remains constant at  $\gamma_0$  (i.e., if we denote by  $\hat{t}_L$  the level to which the long-term capital gains rate has to be reduced to eliminate corporate myopia under the assumption that  $\gamma$  falls with  $t_L$ , then  $\hat{t}_L > t_L^*$ ).*

If the extent of short-term trading falls with the difference in long-term and short-term capital gains tax rates, there are now *two* ways in which such a long-term capital gains tax cut affects the firm's project choice. Recall that the advantage to the firm from undertaking the long-term project rather than the short-term project arises from the higher after-tax value of the time 2 cash flow from the long-term project, while the disadvantage of doing so arises from the greater after-tax expected loss to selling shareholders from the greater short-term mispricing of the firm's shares. As before, the reduction in the long-term rate increases the magnitude of this advantage to the firm from undertaking the long-term project, thus tilting the firm toward the long-term project. If, in addition, the proportion of short-term trading falls with a long-term capital gains tax cut, then the number of shareholders who care about the short-term mispricing of the firm's equity also falls. This means that only a smaller cut in the long-term capital gains tax rate is required to induce the firm to undertake the long-term project, compared to the case in which  $\gamma$  remains constant regardless of a tax cut.

It should be noted that all the results we derived earlier under the assumption of a constant  $\gamma$  go through even when  $\gamma$  is allowed to be a function of the difference between short-term and long-term capital gains tax rates, though the specifics of various functions and parametric restrictions will of course be altered. Thus, part (c) of Proposition 1, which demonstrates that an across-the-board tax cut will not eliminate corporate myopia, remains true even under the assumptions of this section; similarly, Proposition 3, which shows that a tax cut aimed at mitigating

corporate short-termism will not generate a value-dissipating bias against short-term projects, will also hold here, since neither of these results depend on any assumption that  $\gamma$  is independent of the difference between short-term and long-term capital gains tax rates.<sup>28</sup>

## 5. CONCLUSION

We have developed a simple model to examine the argument that the prevalence of short-horizon investors among a firm's shareholders induces myopia among firm managers and thereby induces firms to choose short-term projects over long-term projects that are intrinsically more valuable. We used this simple model to examine the desirability and efficacy of a capital gains tax cut in order to lengthen corporate investment horizons. We demonstrated that a differential capital gains tax cut indeed has the effect of lengthening corporate investment horizons, and characterized the optimal long-term capital gains tax rate. We then compared this suggested myopia cure to other policy prescriptions such as an across-the-board capital gains tax cut and a tax credit for long-term projects and demonstrated that a long-term capital gains tax cut, if appropriately designed, can be revenue-neutral or even revenue-enhancing for the government.

One interesting question that arises from our model is how, as a practical matter, the government should go about designing such a long-term capital gains tax cut to combat corporate myopia. Obvious obstacles to the proper design of such a tax cut include difficulties the government faces in obtaining accurate data on the net present values of long-term and short-term projects in various companies in a large economy like that of the United States. However, our paper provides considerable guidance in this matter. Assuming that, on average, long-term projects are more valuable than short-term projects, one can use these *average* values (even if they are only approximate) in determining the extent of such a long-term capital gains tax cut (using (13)). Then, Proposition 3 assures us that even if short-term projects in some companies turn out to be intrinsically more valuable than long-term projects, such a long-term capital gains tax cut would not introduce a long-term bias in

<sup>28</sup> NUMERICAL EXAMPLE 3. Assume again the same model parameters as in Table I, so that  $NPV_{GL} = 76$ , and  $t_S = 35\%$ . From Table I, for  $NPV_{GS} = 60$ ,  $\delta_{GL} = 0.3$ , and for  $\gamma = \gamma_0 = 0.5$  (i.e., under the assumption that  $\gamma$  remains constant, independent of  $(t_L - t_S)$ ), a cut in the capital gains tax rate to  $t_L^* = 26.53\%$  is required to induce firms to pick the long-term project. Assume now that  $\gamma$  falls with  $t_L$ , according to the linear relationship  $\gamma = \gamma_0 - 0.1(t_S - t_L)$ ; in other words, for every 1% drop in the long-term capital gains tax rate below  $t_S$ , the proportion of shares liquidated at time 1 is assumed to fall by 10%. In this case (keeping  $\gamma_0 = 0.5$  as before), the long-term capital gains tax rate needs to be cut only to  $\hat{t}_L = 28.44\%$ , so that the difference between long-term and short-term capital gains tax rates required to eliminate corporate myopia is smaller in this case. Further, the tax revenue to the government now goes up from 5.60 before the tax cut to 6.08 after the tax cut. (Comparing these values to those in Numerical Example 2, we see that, while other parameters remain the same, the post-tax-cut revenue to the government is greater in this example, since only a smaller reduction in  $t_L$  is required in this case to induce firms to undertake the long-term project.)

these firms. Further, in order to ensure revenue neutrality, the government should, if necessary, limit such a long-term capital gains tax cut only to firms operating in industries where the myopia problem is known to be severe.

Our model can be extended in various directions, to address some of the limitations of our analysis.<sup>29</sup> One such limitation deals with the effect of a tax cut on the riskiness of corporate securities. Since investors are subject only to the variability of the after-tax portion of security returns, the riskiness of all securities is lower in an economy with a greater tax rate; in the limit, securities become risk-free if the tax rate is 100%. Thus, if we assume that investors are risk-averse, rather than risk-neutral, as in our model, a capital gains tax cut can affect the riskiness of corporate securities, and hence the cost of capital. While such effects seem to be small for the range of tax cuts discussed in this paper, they can be significant if the tax cuts involved are very large. Second, capital gains tax revenues can be substituted by the government for revenues from other taxes if a change in the capital gains tax rates leads to an increase in capital gains tax revenues. Therefore, another direction in which our analysis can be extended is to incorporate the effects of such alternative uses of any additional capital gains tax revenues by the government on the investment policies of firms, though such issues do not arise if a long-term capital gains tax cut is designed to be revenue-neutral, as would be possible under Proposition 5.

## APPENDIX

*Proof of Proposition 1.* (a) Given the equilibrium beliefs specified, it is always optimal for the entrepreneurs with bad projects to mimic those who have good projects, so that  $V_L(g)$ ,  $V_L(b)$ ,  $V_S(g)$ , and  $V_S(b)$  are given by (4), (5), (6), and (7), respectively, consistent with pooling beliefs by investors. This means that the long-term project is to be undertaken if  $J_{GL} > J_{GS}$ . Similarly, the short-term project will be taken if  $J_{GS} > J_{GL}$ . Thus, the critical value of  $\gamma$ , above which the short-term project dominates, is given by equating (8) and (9). If, in addition, we set  $t_L = t_S$ , this critical value,  $\gamma^*$ , is given by expression (12).

(b) As a prelude to demonstrating that the equilibrium satisfies the Cho–Kreps refinement, we first show that the above equilibrium is sequential. To do this, we need to show that it satisfies the consistency requirement for a sequential equilibrium (Kreps and Wilson, 1982). First consider the case  $\gamma > \gamma^*$ . In this case, the equilibrium involves both types of firms choosing the short-term project (S) with probability 1 (we denote this equilibrium probability by  $\pi(S)$ ) and the long-term project (L) with probability 0 (we denote this probability by  $\pi(L)$ ). Consistent with this equilibrium strategy, outsiders infer that any firm choosing a long-term project is of type G with probability 0 (we denote the probability of the firm being of type G inferred by outsiders in response to observing a project choice of L by  $\mu(L)$  and

<sup>29</sup> We thank an anonymous referee for pointing out these two limitations of our analysis.

a project choice of S by  $\mu(S)$ ). We refer to the pair  $(\pi, \mu)$  consisting of the equilibrium strategy profile  $\pi$  and the equilibrium belief system  $\mu$  as the equilibrium assessment (in general, all such pairs of strategy profiles and belief systems will be referred to as “assessments”). Now, to demonstrate that the consistency condition is satisfied, we only need to demonstrate that there is a sequence  $(\pi_n, \mu_n)_{n=1}^{\infty}$  of assessments that converges to  $(\pi, \mu)$  in Euclidean space and has the properties that each strategy profile  $\pi_n$  is completely mixed and that each belief system  $\mu_n$  is derived from  $\pi_n$  using Bayes’ rule. This is demonstrated by considering the sequence of strategies  $\pi_n(L) = 1/n$ ,  $\pi_n(S) = 1 - 1/n$ , for  $n = 1, 2, 3, \dots$ . Then, using Bayes’ rule  $\mu_n(L) = (1/n)\theta_L / \{(1/n)\theta_L + (1/n)(1 - \theta_L)\} = \theta_L$ , which yields  $J_{GS} > J_{GL}$  and  $J_{BS} > J_{BL}$  (using (4) to (7)), so that this sequence of assessments converges trivially to  $(\pi, \mu)$ . Since it is obvious that this equilibrium assessment  $(\pi, \mu)$  is also sequentially rational (given that there is only one subgame here), it constitutes a sequential equilibrium.

The proof that the equilibrium for the case where  $\gamma \leq \gamma^*$ , given by  $\{\pi(S) = 0, \mu(S) = 0\}$ , also satisfies the consistency condition and is therefore a sequential equilibrium is analogous (the sequence of assessments supporting the equilibrium is now given by  $\pi_n(S) = 1/n$ ,  $\pi_n(L) = 1 - 1/n$ , for  $n = 1, 2, 3, \dots$ ).

We now demonstrate that the above equilibrium satisfies the Cho–Kreps refinement. To accomplish this, we only need to demonstrate that there is no out-of-equilibrium move that either type of firm can make which *simultaneously* satisfies the following two conditions (Cho, 1987): (i) If player I (the firm) is of type G, and if his or her making the move convinces player II (outside investors) that he or she is of type G, player I will be better off. (ii) If player I (the firm) is of type B, then irrespective of what player II (outside investors) is led to believe by player I’s making that move, then player I (the firm) is worse off. In this game, the only out-of-equilibrium move available to firms involves choosing the project horizon opposite from that implied by the equilibrium. Further, neither firm type can be ruled out as the defector in the face of such an out-of-equilibrium move. Consequently, every sequential equilibrium satisfies the Cho–Kreps criterion.

(c) From (12),  $\gamma^*$  is independent of the tax rate for  $t_L = t_S$ . Therefore, changing the tax rate will have no impact on project selection when the short-term and the long-term capital gains tax rates are equal.

*Proof of Proposition 2.* (a) For  $\gamma > \gamma^*$ , if  $t_L = t_S$ , then  $J_{GL} < J_{GS}$ . If firms are to take long-term projects then  $t_L$  must be reduced. To obtain the critical rate for which  $J_{GL} \geq J_{GS}$ , we equate (8) and (9) and solve for  $t_L^*$ , yielding  $t_L^*$ , given by (13).

(b) To show that  $t_L^* < t_S$ , we compute the difference  $(t_S - t_L^*)$ , which is

$$(1 - t_S) \times \left[ \frac{\gamma \{ (\delta_{GS} V_S(g) + (1 - \delta_{GS}) V_S(b)) - I_S \} - \{ \delta_{GL} V_L(g) + (1 - \delta_{GL}) V_L(b) - I_L \}}{(1 - \gamma) \{ (C_{GL} - I_L) - (C_{GS} - I_S) \}} - 1 \right]. \quad (A1)$$

Since the denominator of the factor in square brackets is positive by (1), (A1) is positive if and only if

$$(1 - \gamma)C_{GL} + \gamma[\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b)] - I_L < (1 - \gamma)C_{GS} + \gamma[\delta_{GS}V_S(g) + (1 - \delta_{GS})V_S(b)] - I_S. \quad (A2)$$

The above inequality can be shown to hold for  $\gamma > \gamma^*$ , which is the case here. (c) Differentiating (13) w.r.t.  $\gamma$ , we obtain

$$\frac{dt_L^*}{d\gamma} = \frac{(1 - t_S)[\{\delta_{GS}V_S(g) + (1 - \delta_{GS})V_S(b) - I_S\} - \{\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b) - I_L\}]}{\{(C_{GL} - I_L) - (C_{GS} - I_S)\}(1 - \gamma)^2}. \quad (A3)$$

Here  $(1 - t_S) > 0$ , and the denominator of (A3) is positive (since, by (1), the long-term project has a larger net present value than does the short-term project). Therefore, (A3) will be negative if and only if

$$\{\delta_{GS}V_S(g) + (1 - \delta_{GS})V_S(b) - I_S\} - \{\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b) - I_L\} > 0. \quad (A4)$$

Equation (A4) can be shown to hold using (12) and the fact that  $\gamma^* < 1$  (recall that  $\gamma > \gamma^*$  in this case, and  $0 \leq \gamma \leq 1$ ), proving that  $dt_L^*/d\gamma < 0$ .

*Proof of Proposition 3.* For the short-term project to be undertaken in this case,  $J'_{GS}$  should be greater than  $J_{GL}$  (we denote all values related to the short-term project under the new assumption (14) with a prime attached to the original notation, to indicate that we are using the altered values for the cash flows from short-term projects). In other words, we need the inequality

$$\gamma(1 - t_S)[\delta_{GS}V'_S(g) + (1 - \delta_{GS})V'_S(b) - I_S] + (1 - \gamma)(1 - t_L^*)(C'_{GS} - I_S) > \gamma(1 - t_S)[\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b) - I_L] + (1 - \gamma)(1 - t_L^*)(C_{GL} - I_L). \quad (A5)$$

Now, the first term on the left-hand side of the inequality (A5) is greater than the first term on the right-hand side, since

$$\{\delta_{GS}V'_L(g) + (1 - \delta_{GS})V'_S(b) - I_S\} > \{\delta_{GL}V_L(g) + (1 - \delta_{GL})V_L(b) - I_L\}. \quad (A6)$$

(Equation (A6) can be shown to hold using (A4) and the fact that, given (14),  $V'_S(g) > V_S(g)$  and  $V'_S(b) > V_S(b)$ .) The second term on the left-hand side of (A5) is greater than the second term on the right-hand side, using the assumption (14).

Therefore the inequality (A5) holds, so that firms undertake short-term projects in equilibrium.

*Proof of Proposition 4.* The proof consists in noting that, when (16) is satisfied, the value of the objective of type G (good) firm management when they undertake the long-term project (as given by the replacement of  $I_L$  by  $I_L(1 - s^*)$  in (8)) is greater than its value if they undertake the short-term project (given by the replacement of  $V_S(g)$ ,  $V_S(b)$ , and  $C_{GS}$  by  $V'_S(g)$ ,  $V'_S(b)$ , and  $C'_{GS}$ , respectively, in (9)). Since the objective of type B firm management is maximized by their mimicking the type G firm, that type also undertakes the long-term project. Thus, the equilibrium involves both types undertaking the long-term project even though the short-term project is intrinsically more valuable in this case.

*Proof of Proposition 5.* For  $\gamma > \gamma^*$ , the tax revenue collected by the government when  $t_L = t_S$  (so that the short-term project is implemented) is given by  $t_S\{\theta_S(C_{GS} - I_S) + (1 - \theta_S)(C_{BS} - I_B)\}$ ; on the other hand, if the tax rate is cut to  $t_L^*$  (so that the long-term project is implemented), the government collects  $\{\gamma t_S + (1 - \gamma)t_L^*\}\{\theta_L C_{GL} + (1 - \theta_L)(C_B - I_L)\}$ . The government collects more revenue after the tax cut if the latter amount is greater than the former. Substituting for  $t_L^*$  from (13), this translates into the restriction (A7) on model parameters, given by

$$\{\theta_L \text{NPV}_{GL} + (1 - \theta_L) \text{NPV}_B\} \{(1 - \gamma)(\text{NPV}_{GL} - \text{NPV}_{GS}) + \gamma X\} + K t_S < 0,$$

where

$$X \equiv \{\delta_{GS} V_S(g) + (1 - \delta_{GS}) V_S(b) - I_S\} - \{\delta_{GL} V_L(g) + (1 - \delta_{GL}) V_L(b) - I_L\}. \quad (\text{A7})$$

and

$$K \equiv \text{NPV}_{GL} \{(\theta_S + \gamma \theta_L) \text{NPV}_{GS} - \gamma X \theta_L\} + \text{NPV}_B \{[(1 - \theta_S) - \gamma(1 - \theta_L)] \\ \times (\text{NPV}_{GL} - \text{NPV}_{GS}) - \gamma X(1 - \theta_L)\} - \theta_S \text{NPV}_{GS}^2 - \gamma \theta_L \text{NPV}_{GL}^2. \quad (\text{A8})$$

*Proof of Proposition 6.* Even when  $\gamma$  is allowed to decline with the capital gains tax differential, the value of  $t_L$  which eliminates corporate myopia is given by (13), with the difference that  $\gamma$  is now a function of  $(t_S - t_L)$  (since (13) simply gives the value of  $t_L$  which equates  $J_{GL}$  and  $J_{GS}$ ). Thus, if we set  $\gamma = \gamma_0$  in (13), we get  $t_L^*$  (by definition); if, however, we set any value for  $\gamma$  lower than  $\gamma_0$  in (13), we get a value greater than  $t_L^*$ , since (13) is decreasing in  $\gamma$ . This implies that  $\hat{t}_L > t_L^*$ , since, by the assumptions on the  $\gamma$  function made in Proposition 6,  $\gamma < \gamma_0$  for any  $t_L < t_S$ .

## REFERENCES

- Bebchuk, L. A., and Stole, L. A. (1993). Do short-term objectives lead to under- or over-investment in long-term projects? *J. Finance* **48**, 719–729.

- Cho, I. K. (1987). A refinement of sequential equilibrium, *Econometrica* **55**, 1367–1389.
- Cho, I. K., and Kreps, D. (1987). Signaling games and stable equilibria, *Quart. J. Econ.* **102**, 179–222.
- Diamond, D. W., and Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity, *J. Polit. Econ.* **91**, 401–419.
- Donald, F. (1986, July 7). *Fortune*.
- Dybvig, P., and Zender, J. (1991). Capital structure and dividend irrelevance under asymmetric information, *Rev. Finan. Stud.* **4**, 201–219.
- Edwards, F. (1993). “Financial Markets and Managerial Myopia: Making America More Competitive,” mimeo, Columbia University, New York.
- Hagerty, K., Ofer, A., and Siegel, D. (1991). “Managerial Compensation and Incentives to Engage in Far-Sighted Behavior,” working paper, Northwestern University, Evanston, IL.
- Hayes, R. H., and Abernathy, W. J. (1980). Managing our way to economic decline, *Harvard Bus. Rev.* (July–August 1980), 67–77.
- Hayes, R. H., and Garvin, D. A. (1982). Managing as if tomorrow mattered, *Harvard Bus. Rev.* (May–June 1982).
- Hirshleifer, D., and Chordia, T. (1993). “Resolution Preference and Project Choice,” working paper, Anderson Graduate School of Management, University of California, Los Angeles.
- Jacobs M. (1991). “Short-Term America,” Harvard Business School Press, Boston.
- Jacobson, R., and Aaker, D. (1993). Myopic management behavior with efficient, but imperfect, financial markets: A comparison of information asymmetries in the U.S. and Japan, *J. Acc. Econ.* **16**, 383–405.
- Kreps, D., and Wilson, R. (1982). Sequential equilibria, *Econometrica* **50**, 863–894.
- Miller, M. H., and Rock, K. (1985). Dividend policy under asymmetric information, *J. Finance* **40**, 1031–1051.
- Morita, A., Reingold, E., and Shimonura, M. (1986). “Made in Japan,” Dutton, New York.
- Narayanan, M. P. (1985). Managerial incentives for short term results, *J. Finance* **40**, 1469–1484.
- Paul, J. M. (1992). “Managerial Myopia and the Observability of Future Cash Flows,” working paper, University of Michigan, Ann Arbor.
- Persons, J. C. (1994). Renegotiation and the impossibility of optimal investment, *Rev. Finan. Stud.* **7**, 419–449.
- Poterba, J. H., and Summers, L. H. (1995). A CEO survey of U.S. companies’ time horizons and hurdle rates, *Sloan Manage. Rev.* (Fall), 43–53.
- Stein, J. C. (1988). Takeover threats and managerial myopia, *J. Polit. Econ.* **96**, 61–80.
- Stein, J. C. (1989). Efficient capital markets, inefficient firms: A model of myopic corporate behavior, *Quart. J. Econ.* **104**, 655–669.
- Stiglitz, J. E. (1989). Using tax policy to curb speculative short-term trading, *J. Finan. Serv.* **3**, 101–116.
- Summers, L. H., and Summers, V. P. (1989). When financial markets work too well: A cautious case for a securities transactions tax, *J. Finan. Serv.* **3**, 261–286.
- Thakor, A. V. (1990). Investment myopia and the internal organization of capital allocation decisions, *J. Law Econ. Organization* **6**, 129–154.
- Thakor, A. V. (1993). Information, investment horizon and price reactions, *J. Finan. Quant. Anal.* **28**, 459–482.