Economics Bulletin

Volume 35, Issue 1

Investment and Managerial Preferences

Jaideep Chowdhury
James Madison University

Gokhan Sonaer
Duquesne University

Abstract

We develop a theoretical model of managerial myopia based on the Q theory of investment. In this model, the manager chooses both investment quantity and the investment horizon. The manager may be myopic, causing an excess weight to be placed by the manager on short term profits, relative to firm-value maximizing behavior. In such a case, investments may be expected to be of a shorter time horizon, even if there are advantages to longer term investing. Our model yields a new important testable implication. The sensitivity of investment to growth opportunities is lower for myopic managers.

Citation: Jaideep Chowdhury and Gokhan Sonaer, (2015) "Investment and Managerial Preferences", *Economics Bulletin*, Volume 35, Issue 1, pages 392-399
Contact: Jaideep Chowdhury - chowdhjx@jmu.edu, Gokhan Sonaer - gsonaer@gmail.com.
Submitted: May 13, 2014. **Published:** March 11, 2015.

1. Introduction

Managerial myopia in several potential forms have been reported in the literature. Financial constraints, executive bonuses, executive stock holdings, and takeover threats are all sources of managerial myopia documented in the literature. Despite the evidence of managerial myopia in various forms that exists in the literature, robust tests of its presence are difficult. We appeal to theory to provide the foundation for a simple test of a particular form of managerial myopia. Specifically, we demonstrate theoretically that when the manager of a firm has an excessively high discount rate, a crucial manifestation of this agency issue is a decreased sensitivity of firm investment to growth opportunities.

Certainly if markets are perfectly efficient and transparent, managers should not be able to systematically deceive the market. Early arguments made by Jensen (1986) maintain that short-term behavior by corporate executives is not a significant problem. Myopic managers lead to less valuable firms, and the market will remove them.

However, more recent literature demonstrates the potentially significant investment distortions that managerial myopia induces. Early models in this strain of the literature are found in Narayanan (1985, 1987) and Stein (1988, 1989). Lundstrom (2002) uses CEO age as a proxy for myopia, and finds that it is negatively related to research and development (R&D) expenditures of the firm between 1991 and 1993. Dechow and Sloan (1991) find in an older sample (1974 to 1988) that CEOs reduce R&D spending in their final years in office. Graham *et al.* (2005) provide the results of a fascinating survey in which almost 80% of managers suggest they would sacrifice positive net present value projects if adopting them resulted in a firm missing quarterly earnings expectations. Edmans (2009) demonstrates theoretically that large blockholders may engage in behavior to mitigate the effects of managerial myopia, while Bolton *et al.* (2006) suggest that managers may have an overly short-term focus as a result of the speculative behavior of investors. Chakravarty and Grewal (2011) find that past stock returns and volatility can induce managers to behave myopically.

We develop a theoretical model of managerial myopia in this paper. In this model, the manager chooses both investment quantity and the investment horizon. The manager may be myopic, causing an excess weight to be placed by the manager on short term profits, relative to firm-value maximizing behavior. In such a case, investments may be expected to be of a shorter time horizon, even if there are advantages to longer term investing.

Our model yields a new important testable implication. The sensitivity of investment to growth opportunities is lower for myopic managers. This result suggests that empirical tests that include only levels of firm investment regressed on proxies for myopia, such as Lundstrom (2002), may not be effectively modeling the nature of myopic behavior. For example, Lundstrom estimates a regression of firm investment on CEO age and Tobin's q, finding a negative coefficient on CEO age. However, there is a positive relationship between a firm's age and the CEO's age, and a negative correlation between a firm's age and its growth opportunities. The negative coefficient on CEO age of Lundstrum (2002), while consistent with managerial myopia, may simply be reflective of lower growth opportunities available to older CEOs, who are disproportionately represented at older firms. What is necessary to confidently detect the presence of managerial myopia is to test whether the myopic behavior directly influences the link between firm investment and growth opportunities. Our model provides this testable hypothesis. A myopic manager will invest less than a non-myopic manager when faced with the same marginal increase in growth opportunities.

In our model, myopic managers discount the future cash flow(s) more than non-myopic managers do. Previous literature has established directly the link between age and a greater discounting of the future. Read and Read (2004) find that older people (an age group they define roughly as over sixty years of age) discount the future more than younger ones (aged 20 to 35 years). This makes CEO age a natural proxy for myopia. The findings of Read and Read (2004) are in line with the finding of Trostel and Taylor (2001), who find that discounting increases over the life cycle. Further, Harrison et al (2002) find that retired individuals discount the future more heavily than others (though they use a binary indicator for retirement not directly related to age). In the biology literature, Sozou and Seymour (2003) construct a model in which the time-preference rate increases with old age.

2. Managerial Myopia and the Neoclassical Model

Our model uses the framework of neoclassical model of Hubbard (1998), which provides a discrete time formulation of the model in Hayashi (1982). This model posits the value of the firm to be the maximization of the present value of firm profits, by choosing a dynamic investment path. This maximization is subject to a capital accumulation constraint, where the level of investment, along with the degree of depreciation, dictates capital accumulation. In our model, however, we provide a slightly different specification for the capital accumulation constraint that more appropriately reflects the flexibility of managers in temporally allocating the investments made by the firm.

In our model, the value of a firm is given by

$$V_t(K_t, I_t) = \max E\left[\sum_{s=0}^{\infty} \beta^s \left(\pi(K_{t+s}) - C(I_{t+s}, K_{t+s}, \gamma_{t+s}) - r_{t+s} I_{t+s}\right)\right] \quad (1)$$

where K_t and I_t are the capital and investment levels at time *t*, respectively. β is the discount factor, π is the profit function and *C* is the cost of adjustment function (we discuss this function in detail below). γ_t is an exogenous shock to the cost of adjustment function at time *t*. r_t is the cost of capital goods, while *s* provides an index of future time periods.

Following Hubbard (1998), we assume a functional form for the cost of adjustment that is linearly homogenous in investment and capital. Tobin's neoclassical framework posits investment as a function of marginal *q*. When we make the assumption that the cost of adjustment is linearly homogenous in investment and capital, marginal *q* and average *q* are the same. This assumption is equivalent to assuming that the firm is a price taking firm with constant returns to scale in both production and capital installation. This is an important assumption for any empirical exercise, as average *q* is observable (and even this quantity is measured with caveats), while marginal *q* is not. Specifically, our cost of adjustment function is

$$C(I_t, K_t, \gamma_t) = \frac{\alpha}{2}\left(\frac{I_t}{K_{t-1}} - \gamma_t\right)^2 K_{t-1} \quad (2)$$

where α is a functional parameter.

We introduce myopia into the model in the form of a simple principal-agent problem between the manager and investors. The utility function of the manager is

$$U_t = a_t[\pi(K_t) - C(I_t, K_t, \gamma_t) - r_t I_t] + (1 - a_t) E_t \sum_{s=1}^{\infty} \beta^s [\pi(K_{t+s}) - C(I_{t+s}, K_{t+s}, \gamma_{t+s}) - r_{t+s} I_{t+s}] \quad (3)$$

This utility function consists of a fraction a_t of the current earnings of the firm, and fraction (1-a_t) of the future earnings of the firm. a_t is the managerial preference parameter which is known only to the manager.[1]The utility maximization problem will coincide with the firm value-maximization problem when a_t is 0.5 in which case the manager is indifferent between current earnings of the firm and discounted value of future earnings of the firm. The higher the value of a_t relative to 0.5, the greater the manager's preference for current earnings of the firm over the future earnings of the firm. Values of a_t less than .5 indicate a hyperopic manager.

The literature has identified several sources of myopic behavior on the part of managers. For example, Schleifer and Vishney (1990) suggest that the source of myopia is takeover threats to the firm, while managerial reputation motivates myopic behavior in Narayanan (1985). By introducing myopia through the utility function as we have done in equation 3, we take a stand on the particular source of myopia – a higher weight placed on present earning of the firm by its CEO. Myopic managers have higher discount rates. These managers prefer more of current earnings of the firm which get manifested through their utility function in terms of higher a_t. These managers with higher discount rates put more emphasis on current earnings of the firm and have a higher a_t.

The relationship between the manager and the investors is that of a principle agent problem. In our model, the investor does not take decisions. In line with Cleary, Povel and Raith (2007) and Povel and Raith (2004), the investor is an outsider and does not decide the amount of investment, which is decided by the manager of the firm. The manager decides on two things. First, the manager chooses the total investments to be made in a period. Second, he also decides what fraction of the investments will be allocated to projects that create capital immediately in the current period (short term projects) and what fraction of the investments will be allocated to projects that create capital in the next period (long term projects). The manager maximizes his own utility, given by equation (3). Myopic managers put more weight to the current earnings of the firm, compared to the future earnings of the firms and hence invest more in the short term projects than in the long term projects. Managerial myopia persists because investors do not have perfect information. First, they are not able to observe the managerial utility function – specifically the a_t parameter. This parameter is also time-varying, further complicating investor oversight. We denote the firm value-maximizing investment choice to be $\tilde{I}_t^*$. We also assume investors do not have enough information to determine $\tilde{I}_t^*$. Let $\tilde{I}_t$ be the level which maximizes U_t. Unless a_t is exactly .5, $\tilde{I}_t^* \neq \tilde{I}_t$, and investors do not have enough information to determine the extent of the suboptimal choice by the manager.

Our assumptions concerning the limited information available to investors are reasonable. While many tangible investments made by the firm may be relatively easy to observe, similar quality observations of intangible investments may not be available (Edmans 2011). A manager may be able to divert investments from hard-to-measure assets, for example investments that generate customer satisfaction, to short-term projects in order to boost the current earnings of the firm. In this environment, $\tilde{I}_t^*$ is quite difficult to observe.[2]

Our capital accumulation equation is given by

$$K_t = (1-\delta)K_{t-1} + \lambda_t I_t + (1-\lambda_{t-1})\theta\, I_{t-1} \quad . \tag{4}$$

---

[1] The firm's earnings are included the managerial utility function because of the following reason. A significant portion of managerial compensation consist of restricted stocks and stock options which, in turn, depends on firm's current and future earnings (See Murphy 2013, Hays *et al.* 2012).
[2] Stein (1989) demonstrates that even if the market is efficient, incentives exist for managers to behave myopically, given information asymmetry between managers and investors.

In equation (4), δ is the rate of depreciation. In our model, we allow for investment that creates capital in the next time period. So, while the manager makes total investment I_t, λ_t is the fraction of the investment at time *t* allocated to projects that create capital immediately. $(1-\lambda_t)$ is the fraction of investment is long-term investment – investment allocated to projects that create capital in the next period. So $(1-\lambda_{t-1})$ fraction of investment I_{t-1} made last year creates capital K_t this year. An underlying assumption in our model is that the long term investments create more capital as compared to short term investments. θ is a parameter that multiplies the effect of investment intended to pay off next period (we refer to it as the long term investment multiplier). We generally expect that this multiplier is greater than one. When it is, long-term investments will produce more capital than investment put into place in the current time period.[3] R&D investments have higher uncertainty but likely to generate higher returns to the firm compared to current investments with more certainty but with lower returns. Therefore we assume that long term investments, say for example R&D investments, will generate greater returns. Our assumption seems reasonable given that several papers have reported future benefits from R&D investments. Grabowski and Mueller (1978) find that firms earn above-average returns on their R&D investment. Eberhart (2004) reports that the firm who increase R&D investment exhibit higher future operating performance. Ali *et al.* (2012), Lev and Sougiannis (1996), Lev and Sarath (2005), Guo *et al.* (2006) report a positive association between R&D investment and subsequent abnormal returns.

The manager chooses both the level of investment I_t and the fraction of investment designated for immediate capital generation, λ_t. These two decision variables give the manager control over the investment horizon as well as the quantity of investment. By contrast in Hubbard (1998), $\lambda=1$, and all investment creates current capital by assumption.

Allowance for the creation of capital in the future at an advantageous rate relative to current capital production is a key component of our model. Managerial myopia is the temporal distortion of firm investment for greater profitability in the current period, at the expense of subsequent periods. In order to capture this possibility in the model, there must be some profit benefit to deferred capital formation. In our model, the fraction of investments that is deferred for the next period generates greater capital than it would have generated had the investment not been deferred. We introduced a parameter θ in equation (4) which refers to the long term investment multiplier. Greater capital formation next period guarantees higher return in the next period. A manager has a choice to make. He chooses the fraction of investment to be deferred for the next period's capital formation, represented by the parameter λ_t in the model. A myopic manager's preference for the current earnings of the firm over the future earnings of the firm will result in the myopic manager allocating a greater fraction of the total investment to capital formation in the current period compared to a non-myopic manager.

Many investments do not create usable capital in the current period - for example, investment in human capital or research and development. Interestingly, these investments overlap to some extent with intangible investments which are hard to measure (see for example Edmans 2011 and Lev and Sougiannis 1996). These important investments are not handled adequately in the setup of Hubbard (1998). Our generalization is important to appropriately model the flexibility the managers have in temporally allocating the investments made by the firm.

---

[3] θ may be generalized to be time-varying without any substantive change in the model. We restrict it to be a constant for ease of exposition.

We assume firm wealth from last period, W_{t-1}, to be exogenous when making the investment decision in current period, which is period t. Total investment is funded by this internal wealth, and by borrowing B_t. The borrowing constraint is given by

$$I_t = W_{t-1} + B_t \ . \tag{5}$$

The manager maximizes utility U_t by choosing λ_t and I_t subject to the capital accumulation and borrowing constraints given in equations 4 and 5.

The first order condition of managerial utility maximization with respect to I_t is

$$\lambda_t a_t[\pi_k(K_t) - C_k(K_t, I_t, \gamma_t)] + (1-a_t)[\lambda_t + \frac{(1-\lambda_t)\theta}{1-\delta}]q_{t+1} = a_t(r_t + C_I(K_t, I_t, \gamma_t)) \tag{6}$$

where we define $q_{t+1} \equiv E_t \sum_{s=1}^{\infty} \beta^s (1-\delta)^s [\pi_k(K_{t+s}) - C_k(K_{t+s}, I_{t+s}, \gamma_{t+s})]$ as marginal Tobin's q following Hubbard (1998). Several prominent papers in the literature including Hayashi (1982), Hubbard (1998), Abel and Eberly (1994, 1996, 1998) and Eberly, Rebelo and Vincent (2008) have used q as a proxy for growth opportunities. Q is defined as the present discounted value of future profits from new fixed capital investment. In other words, q measures the valuation of an additional unit of capital invested in the firm, which in the finance literature is closely linked to the notion of growth options. Higher are the growth opportunities of a firm, higher will be the marginal valuation of a unit of invested capital and higher will be the value of q. Following these papers mentioned above, we refer to q as a proxy for growth opportunities and thereby include growth opportunities in our model. We note that our definition of q here is for the time $t+1$ period. The sum in our definition indexes time periods 1 to infinity, whereas in Hubbard (1998), this index runs from 0 to infinity. This notational change is made for mathematical and expositional simplicity. Our references to q_{t+1} therefore refer exclusively to *future* growth opportunities. The first order condition of managerial utility maximization with respect to λ_t is

$$a_t[\pi_k(K_t) - C_k(K_t, I_t, \gamma_t)] = \frac{1-a_t}{1-\delta}(\theta + \delta - 1)q_{t+1} \ . \tag{7}$$

Simplifying equations 6 and 7, and using the functional form of cost of adjustment function $C(K_t, I_t, \gamma_t)$, we have

$$\begin{aligned} \frac{I_t}{K_{t-1}} &= \frac{1-a_t}{a_t} \frac{\theta}{1-\delta} \frac{1}{\alpha} q_{t+1} + \gamma_t - \frac{r_t}{\alpha} \\ &= A q_{t+1} + B \end{aligned} \tag{8}$$

where $A = \frac{1-a_t}{a_t} \frac{\theta}{1-\delta} \frac{1}{\alpha}$, $B = \gamma_t - \frac{r_t}{\alpha}$. Equation 8 provides us with a solid theoretical grounding for our testable hypothesis. We find the well-known relationship that (scaled) investment is directly related to q. Further, the sensitivity of investment to q is directly related to the degree of managerial myopia, as given by a_t. Specifically, we see that

$$\frac{\partial A}{\partial a_t} = -\frac{\theta}{1-\delta} \frac{1}{\alpha} \frac{1}{a_t^2} < 0 \, . \tag{9}$$

So, the coefficient on q_{t+1} decreases as the parameter a_t increases. Sensitivity of investment to future growth opportunities is lower for myopic managers. Further, we note the nonlinearity of A in a_t. As a_t approaches 0, the sensitivity of investment to Tobin's q increases to infinity. However, when a_t is equal to 1, the sensitivity of investment to Tobin's q falls to zero. The future profits of the firm are completely discounted, and so the manager invests exclusively for the short term.

Intuitively, why does myopia due to excess discounting of the future on the part of the manager cause a lower sensitivity of investment to q? It is natural to see the positive association of investment with marginal q, which is the expected marginal discounted future profitability of the firm. If a manager's utility function is such that less weight is placed on the future profitability of the firm, then, when faced with a one unit increase in future growth opportunities, the manager will initiate less than optimal investment today. Thus, managerial myopia distorts the relationship between investment and q.

We can also see in equation (8) important implications for empirical tests. A regression in levels of investment on Tobin's q, a measure of myopia, and other control variables misses the crucial component of the model. Optimal investment relates directly to Tobin's q, and managerial myopia disrupts this relationship. Robust tests for myopia motivated by high managerial discount rates must be conducted on the *interaction* between Tobin's q and the proxy for managerial myopia. Such tests do not currently exist in the literature.

3. Conclusion

In this paper, we develop a model of managerial myopia based on Q theory of investment. A manager is a myopic manager when he prefers short term profits more than the long term value of the firm. Our model offers a new testable hypothesis of managerial myopia. The sensitivity of investment to growth opportunities is lower for firms managed by myopic firms. We hypothesize that the myopic managers will invest less, compared to a non-myopic manager, when faced with the same incremental growth opportunities. In future work, we will further develop this model to a more general form of managerial myopia. Additional empirical work will involve identifying a proper proxy for managerial myopia. We will test our model's testable hypothesis utilizing this measure of managerial myopia. It needs to be tested if the well-known relationship between investment and growth opportunities is disrupted by a suitable proxy for managerial myopia.

References

Abel, A. B. and J.C. Eberly (1994) "A unified model of investment under uncertainty" *American Economic Review* **84(5)**, 1369–84.

Abel, A. B. and J.C. Eberly (1996) "Optimal investment with costly reversibility" *Review of Economic Studies* **63(4)**, 581–93.

Abel, A. B. and J.C. Eberly (1998) "The mix and scale of factors with irreversibility and fixed costs of investment" *Carnegie-Rochester Conference Series on Public Policy* **48**, 101–135.

Ali, A., Ciftci, M. and W.M. Cready (2012) "Market Underestimation of the Implications of R&D Increases for Future Earnings: The U.S. Evidence" *Journal of Business Finance and Accounting* **39**, 289 – 314.

Bolton, P., Scheinkman, J. and W. Xiong (2006) "Executive Compensation and Short-Termist Behavior in Speculative Markets" *Review of Economic Studies* **73**, 577 – 610.

Chakravarty, A. and R. Grewal (2011) "The Stock Market in the Driver's Seat! Implications for R&D and Marketing" *Management Science* **57**, 1594 – 1609.

Cleary, S., Povel, P. and M. Raith, (2007). "The U shaped investment curve: Theory and Evidence." *Journal of Quantitative and Financial Analysis,* **42 (1)**, 1-40.

Dechow, P. and R. Sloan (1991)" Executive Incentives and the Time Horizon Problem" *Journal of Accounting and Economics* **14**, 51 – 89.

Eberly, J., Rebelo, S. and N. Vincent, N. (2008) "Investment and value: A neoclassical benchmark" NBER Working Papers 13866, National Bureau of Economic Research, Inc.

Eberhart, A. C., Maxwell, W. F., and A. R. Siddique (2004) "An Examination of Long-Term Abnormal Stock Returns and Operating Performance Following R&D Increases" *Journal of Finance* **59**, 623–651.

Edmans, A (2009) "Block holder Trading, Market Efficiency, and Managerial Myopia" *Journal of Finance* **64**, 2481 – 2513.

Edmans, A (2011) "Does the Stock Market Fully Value Intangibles? Employee Satisfaction and Equity Prices" *Journal of Financial Economics* 101(3), 621-640.

Edmans, A., Gabaix, X., Sadzik, T. and Y. Sannikov (2012) "Dynamic CEO Compensation" *Journal of Finance* **67(5)**, 1603-1647.

Grabowski, H.G. and D.C. Mueller (1978) "Industrial Research and Development, Intangible Capital Stocks, and Firm Profit Rates" *Bell Journal of Economics* **9**, 328 – 343.

Graham, J.R., C.R. Harvey and S. Rajgopal (2005) "The Economic Implications of Corporate Financial Reporting" Duke University Working Paper.

Guo, R.-J., Lev, B. and C. Shi (2006) "Explaining the Short- and Long-Term IPO Anomalies in the US by R&D" *Journal of Business Finance & Accounting*, **33**, 550–579

Harrison, G.W., Lau, M.I. and M.B. Williams (2002) "Estimating Individual Discount Rates in Denmark: A Field Experiment" *American Economic Review* **92,** 1606 – 1617.

Hayashi, F (1982) "Tobin's Marginal q and Average q: A Neoclassical Interpretation" Econometrica **50**, 213 – 224.

Hays, R., Lemmon M, and M. Qiu (2012). "Stock option and managerial incentives for risk-taking: Evidence from FAS 123R." *Journal of Financial Economics* **105**, 174 – 190.

Hubbard, R (1998) "Capital-Market Imperfections and Investment" *American Economic Review* 36, 193 – 225.

Jensen, M (1986) "The Take-Over Controversy: Theory and Evidence" *Midland Corporate Finance Journal* 4, 6 – 32.

Lev, B. and T. Sarath (2005) “R&D reporting bias and their consequence” *Contemporary Accounting Research* **22**, 9777 – 1026.

Lev, B. and B. Sougiannis (1996) “The Capitalization, Amortization, and Value-Relevance of R&D” *Journal of Accounting and Economics* **21**, 107 – 138.

Lundstrom, L (2002) “Corporate Investment Myopia: A Horserace of the Theories” *Journal of Corporate Finance* **8**, 353 – 371.

Murphy, K., (2013) "Executive Compensation: Where we are, and how we got there," in Handbook of the Economics of Finance by George Constantinides, Milton Harris, and René Stulz, Eds., Elsevier Science: North Holland, Chapter 4, 211-356.

Naranyan, M (1985) “Managerial Incentives for Short-Term Results” *Journal of Finance* **40**, 1469 – 1484.

Naranyan, M (1987) “Managerial Incentives for Short-Term Results: A Reply” *Journal of Finance* **42**, 1103 – 1104.

Noe, T. and M. Rebello (1997) “Renegotiation, Investment Horizons, and Managerial Discretion” *Journal of Business* **70**, 385 – 407.

Povel, P., and M. Raith (2004) “Optimal Debt with Unobservable Investments” *Rand Journal of Economics* **35**, 599–616.

Read, D. and N.L. Read (2002) “Time Discounting over the Lifespan.” *Organizational Behavior and Human Decision Processes 94*, 22 – 32.

Shliefer, A. and R.W. Vishney (1989) “Management Entrenchment – The Case of Manager-Specific Investments” *Journal of Financial Economics* **25**, 123 – 139.

Shliefer, A. and R. Vishney (1990) “Equilibrium Short Horizons of Investors and Firms” *American Economic Review Papers and Proceedings* **80**, 148 – 153.

Sozou, P.D. and R.M. Seymour (2003). “Augmented Discounting: Interaction Between Ageing and Time-Preference Behaviour.” *Proceedings of the Royal Society of London B* 270: 1047 – 1053.

Stein, J (1988) “Takeover Threats and Managerial Myopia” *Journal of Political Economy* **96**, 61 – 80.

Stein, J (1989) “Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior” *Quarterly Journal of Economics* **104**, 655 – 669.

Trostel, P.A. and G.A. Taylor (2001) “A Theory of Time Preference.” *Economic Inquiry* **39**, 379 – 395.