Managerial Overconfidence, Moral Hazard, and Financing and Investment Decisions

Richard Fairchild
University of Bath
School of Management
Working Paper Series
2005.17

This working paper is produced for discussion purposes only. The papers are expected to be published in due course, in revised form and should not be quoted without the author’s permission.
<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005.01</td>
<td>Bruce A. Rayton</td>
<td>Specific Human Capital as an Additional Reason for Profit Sharing</td>
</tr>
<tr>
<td>2005.02</td>
<td>Catherine Pardo, Stephan C. Henneberg, Stefanos Mouzas and Peter Naudé</td>
<td>Unpicking the Meaning of Value in Key Account Management</td>
</tr>
<tr>
<td>2005.03</td>
<td>Andrew Pettigrew and Stephan C. Henneberg (Editors)</td>
<td>Funding Gap or Leadership Gap – A Panel Discussion on Entrepreneurship and Innovation</td>
</tr>
<tr>
<td>2005.05</td>
<td>Juani Swart</td>
<td>Identifying the sub-components of intellectual capital: a literature review and development of measures</td>
</tr>
<tr>
<td>2005.06</td>
<td>Juani Swart, John Purcell and Nick Kinnie</td>
<td>Knowledge work and new organisational forms: the HRM challenge</td>
</tr>
<tr>
<td>2005.07</td>
<td>Niki Panteli, Ioanna Tsiourva and Soy Modelly</td>
<td>Intra-organizational Connectivity and Interactivity with Intranets: The case of a Pharmaceutical Company</td>
</tr>
<tr>
<td>2005.08</td>
<td>Stefanos Mouzas, Stephan Henneberg and Peter Naudé</td>
<td>Amalgamating strategic possibilities</td>
</tr>
<tr>
<td>2005.11</td>
<td>Richard Fairchild</td>
<td>Persuasive advertising and welfare in a Hotelling market.</td>
</tr>
<tr>
<td>2005.12</td>
<td>Stephan C. Henneberg, Catherine Pardo, Stefanos Mouzas and Peter Naudé</td>
<td>Dyadic ‘Key Relationship Programmes’: Value dimensions and strategies.</td>
</tr>
<tr>
<td>2005.13</td>
<td>Felicia Fai and Jing-Lin Duanmu</td>
<td>Knowledge transfers, organizational governance and knowledge utilization: the case of electrical supplier firms in Wuxi, PRC</td>
</tr>
<tr>
<td>Year</td>
<td>Authors</td>
<td>Title</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>2005.15</td>
<td>Mark Ginnever, Andy McKechnie &amp; Niki Panteli</td>
<td>A Model for Sustaining Relationships in IT Outsourcing with Small IT Vendors</td>
</tr>
<tr>
<td>2005.16</td>
<td>John Purcell</td>
<td>Business strategies and human resource management: uneasy bedfellows or strategic partners?</td>
</tr>
<tr>
<td>2005.17</td>
<td>Richard Fairchild</td>
<td>Managerial Overconfidence, Moral Hazard, and Financing and Investment Decisions</td>
</tr>
</tbody>
</table>
Managerial Overconfidence, Moral Hazard, and Financing and Investment Decisions.

Richard Fairchild
E-mail: mnsrf@management.bath.ac.uk
Tel: +44 (0)1225 383456

Abstract

We analyse the effects of managerial overconfidence on financing and investment decisions. Our main results are as follows; a) increasing managerial overconfidence leads to higher debt levels, with managerial effort and firm value unchanged, b) overconfidence and expected financial distress costs are positively related, and therefore, increasing overconfidence is unambiguously welfare-reducing, and c) increasing overconfidence does not affect the project investment decision, but, if the project is taken, is welfare-reducing due to the higher expected financial distress costs.

1. Introduction.

Since the seminal work of Modigliani and Miller (1958), much research effort has been directed at understanding firms’ capital structure and investment decisions and the corresponding effects on firm value. Until recently, the standard approach was to assume rationality of managers and investors. For example, a large body of research exists examining the role of security signalling in the face of informational

Recently, research in corporate finance has begun to recognise that the decisions of managers and investors may be affected by behavioral biases, and in particular managerial overconfidence. For example, studies have analysed the implications of managerial overconfidence in capital structure (Shefrin 1999, Heaton 2002, Hackbarth 2002, Fairchild 2005b) and capital budgeting decisions (Statman and Caldwell1 1987, Shefrin 1999, Gervais et al 2003, Fairchild 2005a).

A debate exists whether such overconfidence is desirable. Managerial overconfidence may be value-destroying. In relation to investment decisions, overconfidence may cause managers to invest in bad (negative NPV) projects that they mistakenly believe to be good (positive NPV) projects (eg Heaton 2002), and refuse to abandon failing projects (eg Statman and Caldwell 1987). In terms of financing decisions, overconfidence may lead to excessive, value-reducing, debt levels (see eg; Shefrin 1999, Hackbarth 2002, Fairchild 2005).

However, managerial overconfidence may have positive effects on firm performance and value. First, it may counteract managerial risk aversion in investment decisions (Gervais et al 2003). Second, overconfidence may increase managerial effort. Fairchild (2005) demonstrates that the effect of overconfidence on firm value is ambiguous. In his model, such overconfidence may lead to higher debt levels, increasing expected financial distress costs, and hence reducing firm value. However,

1 Statman and Caldwell (1987) consider several biases, other than overconfidence, that may affect managerial project investment decisions, such as regret, loss aversion, framing behaviour, prospect theory and emotions.
this may be offset by increased managerial effort, which increases firm value. The author derives the optimal level of overconfidence, which maximises firm value by trading off these two effects.

In this paper, we develop Fairchild’s (2005) overconfidence model in three main ways. First, he considers a stochastic structure in which project income may take two possible states (good or bad), with the probability of the good state being positively related to managerial effort. In contrast, we consider a distribution of possible outcomes, affected by managerial effort. Second, he only allows two possible debt levels (that is, the project can either be financed completely be equity or debt). In contrast, we consider a distribution of possible outcomes, and a continuum of possible debt levels. Third, he considers the effect of managerial overconfidence on the financing decision only (in his model, the investment decision has already been made, and the project has been accepted). In contrast, we consider the effect of managerial overconfidence on the financing and investment decisions.

Our main results are as follows. First, we demonstrate that increasing managerial overconfidence leads to a higher debt level, with managerial effort and firm value unchanged. Second, overconfidence and expected financial distress costs are positively related, and therefore, increasing overconfidence is unambiguously welfare-reducing (note the contrast with Fairchild 2005). Third, increasing overconfidence does not affect the project investment decision, but, if the project is taken, is welfare-reducing due to the higher expected financial distress costs.
2. The Model.

Consider an economy consisting of a firm that is run by a risk-neutral manager, and a capital market consisting of risk-neutral investors. At date 0, the firm requires investment funds $I$ in order to undertake its only project. The firm has no internal finance, and can raise the funds by issuing debt and equity.

If the firm successfully raises the finance at date 0, and takes the project, the manager of the firm then exerts effort $e$ in running the project at date 1. He faces a utility cost $c(e) = \beta e^2$. Furthermore, he receives private benefits $B$ from running the project.

At date 2, the project achieves a risky income $\tilde{x}$, which is uniformly distributed between 0 and $\bar{x} > 0$. Managerial effort affects the distribution of outcomes. We model this as follows; $\bar{x}(e) = \gamma e$. Note that $\gamma$ represents a managerial ability parameter; that is, it measures the effect of effort on the probability distribution of outcomes. Higher effort “stretches” the distribution by shifting the maximum value $\bar{x}(e)$ to the right. The larger is $\gamma$, the greater is the effect of effort on the upper end of the distribution.

We measure managerial overconfidence as follows. The true value of the ability parameter is $\gamma$, but the manager’s perception of his ability is $\hat{\gamma} \geq \gamma$. Hence, the manager perception of the maximum value of the distribution is $\hat{x}(e) = \hat{\gamma} e \geq \bar{x}(e)$. When $\hat{\gamma} > \gamma$, the manager is overconfident in his ability. When $\hat{\gamma} = \gamma$, the manager is rational (well-calibrated).

We now examine the date 0 financing decision facing the manager in more detail. The manager’s debt choice consists of choosing the face value $D$. This determines the ex ante value of debt, given the probability distribution of outcomes. The manager
holds no equity in the firm. Therefore, the ex ante value of outside equity equals the ex ante value of the firm minus the ex ante value of debt.

The capital market is competitive, and so debt and equity holders provide finance at zero NPV. Therefore, the manager receives all of the positive NPV at date 0 in the form of an excess transfer from the debt and equity-holders, over and above the required investment funds $I$.

In addition to the manager’s choice of debt affecting the excess transfer, it also affects the probability of managerial financial distress. If debtholders are not fully paid $(x < D)$ at date 2, the manager faces financial distress costs\(^2\), proportional to the shortfall (that is, the face value of debt minus the realised value $D - x$).

We solve the model by backward induction. That is, we firstly take as given the manager’s date 0 choice of debt level $D$, and we solve for his date 1 effort level. Then we move back to date 0 to solve for his choice of debt level.

\textit{2.1 Date 1: Manager’s effort decision.}

First, take as given that the manager has chosen the date 0 face value of debt $D$.

The value of the firm is

$$V = \int_0^\infty x f(x) dx = \frac{1}{\bar{X}} \int_0^\infty x dx = \frac{\bar{X}}{2} = \frac{\gamma e}{2}. \tag{1}$$

\(^2\) Note that financial distress costs only impact the manager’s payoff, and do not affect firm value. This captures the idea that financial distress may be much more costly for the manager (e.g; lost job, lost reputation etc) than the firm. Note the contrast with Fairchild (2005b). In his model, financial distress costs impact the manager’s payoff and firm value.
Given $D$, the value of debt is

$$V_D = \int_0^D xf(x)dx + D \int_D^\infty f(x)dx - T_D = D - \frac{D^2}{2\bar{x}} - T_D = 0,$$  \hspace{1cm} (2)$$

where $T_D$ represents the transfer from debtholders to the manager. Since the capital market is competitive, the debtholders invest at zero NPV ($V_D = 0$).

The value of equity is

$$V_E = \int_D^\infty (x - D) f(x)dx - T_E = \bar{x} - D + \frac{D^2}{2\bar{x}} - T_E = 0,$$  \hspace{1cm} (3)$$

where $T_E$ represents the transfer from equityholders to the manager. Since the capital market is competitive, the equityholders invest at zero NPV ($V_E = 0$). Note that (2) + (3) provides $V_E + V_D = \frac{\bar{x}}{2} - T_D - T_E = 0$.

The manager’s expected payoff is

$$M = T_D + T_E + B - I - b \int_0^D (D - x) f(x)dx - \beta e^2,$$
which yields

\[ M = T_D + T_e + B - I - \frac{bD^2}{2\bar{x}} - \beta e^2. \]  

(4)

Define total welfare;

\[ W = V_D + V_e + M = \frac{\bar{x}}{2} + B - I - \frac{bD^2}{2\bar{x}} - \beta e^2. \]  

(5)

Therefore, total welfare equals the expected value of the firm plus the manager’s private benefits from running the project minus the required initial investment minus the manager’s expected financial distress costs minus his effort costs.

Note that equation (4) represents the manager’s true expected payoffs (that is, it incorporates his true ability parameter through \( \bar{x} = \gamma e \)). In solving for the manager’s optimal effort level, we incorporate the manager’s perceived ability parameter, \( \hat{x} = \hat{\gamma} e \).

Therefore, the manager’s optimal effort level maximises

\[ \hat{M} = T_D + T_e + B - I - \frac{bD^2}{2\hat{x}} - \beta e^2. \]  

(6)
Substituting for $\hat{x} = \hat{y}e$, and solving $\frac{\partial \hat{M}}{\partial e} = 0$, we obtain the manager’s optimal effort level, given the face value of debt $D$;

$$e^* = \sqrt{\frac{bD^2}{4\beta\hat{\gamma}}}.$$  
(7)

From (7), we obtain the following results;

**Lemma 1:** *The effect of financial distress costs, debt level, marginal cost of effort, and overconfidence parameters on optimal effort level;*

*With all other parameters held constant;*

a) $\frac{\partial e^*}{\partial b} > 0$; *An increase in financial distress costs induces higher managerial effort.*

b) $\frac{\partial e^*}{\partial D} > 0$; *An increase in the face value of debt induces higher managerial effort.*

c) $\frac{\partial e^*}{\partial \beta} < 0$; *An increase in the marginal cost of effort induces lower managerial effort.*

d) $\frac{\partial e^*}{\partial \hat{\gamma}} < 0$; *An increase in overconfidence induces lower managerial effort.*
The result in 1:d) is particularly interesting. According to much of the existing research (Besharov 2002, Fairchild 2005a, Fairchild 2005b), overconfidence and managerial effort are positively related. However, in this model, overconfidence and managerial effort are negatively related\(^3\). The intuition is that, since the manager overestimates the effect of his effort on performance, he believes that does not need to exert so much effort in order to reduce expected financial distress.

2.2 Date 0: Manager’s debt choice.

We now move back to date 0 to solve for the manager’s optimal choice of debt \(D\). At this stage, the manager recognises that the market uses ability parameter \(\gamma\), rather than \(\hat{\gamma}\), in deriving the expected value of debt and equity (the manager believes his own assessment \(\hat{\gamma}\) to be correct, and therefore believes that the market irrationally underestimates his ability). Further, the manager recognises that the market knows that the manager will use \(\hat{\gamma}\) in choosing his effort level at date 1 (that is, the market knows that the manager’s effort level will be given by (7)).

We have already noted that \(T_D + T_E = \frac{\gamma e^*}{2} = V\). Substituting this, and the optimal effort \(e^*\) given by equation (7), into (6), we obtain

\(^3\) This ignores the effect of overconfidence on equilibrium debt. We proceed to demonstrate that increasing overconfidence results in a higher debt level. The effect in lemma 1:b) and 1:d) exactly offset each other, such that the effort level is independent of overconfidence.
\[ M = \frac{\gamma D^3}{2} \left( \frac{b}{4 \beta \gamma} \right)^{\frac{1}{3}} - I - D^3 \frac{4}{\Gamma^2} \frac{2^{\frac{1}{2}}}{16^{\frac{1}{2}}} \beta^3 \gamma^3. \]  

(8)

Finally, solve \( \frac{\partial M}{\partial D} = 0 \) to obtain the manager’s optimal face value of debt \( D^* \);

\[ D^* = \frac{\sqrt[3]{\frac{3}{4} \frac{1}{\beta}}}{\frac{1}{4} \beta b^2}. \]  

(9)

**Lemma 2:** The Effect of overconfidence, marginal cost of effort, and financial distress costs on the manager’s optimal debt level:

a) \( \frac{\partial D}{\partial \gamma} > 0 \); Increasing overconfidence induces the manager to increase debt.

b) \( \frac{\partial D}{\partial \beta} < 0 \); Increasing marginal cost of effort induces the manager to reduce debt.

c) \( \frac{\partial D}{\partial b} < 0 \); Increasing the financial distress costs induces the manager to reduce debt.

Having solved for the manager’s optimal debt level, we now substitute into (7) to obtain the manager’s equilibrium date 1 effort level, given the equilibrium date 0 debt level. We obtain the following;
Note that the manager’s optimal effort level is independent of his overconfidence parameter. The intuition is that, as his overconfidence level increases, he sets a higher debt level (see lemma 2). From equation (7), the higher debt level is exactly offset by the higher overconfidence parameter. Therefore, he does not increase effort. This result contrasts with the result in Fairchild (2005b), where higher overconfidence resulted in both higher debt and higher effort levels. In this paper, overconfidence merely manifests itself in terms of higher debt levels, with effort unchanged.

3. Effect of Overconfidence on Manager’s perceived/true payoff, firm value, and welfare.

The next stage of our analysis is to examine the effects of managerial overconfidence on his perceived and true payoffs, firm value and welfare. Particularly, we demonstrate that since overconfidence increases the debt level without increasing effort, overconfidence increases expected financial distress costs, and is therefore unambiguously welfare-reducing (this contrasts with Fairchild (2005), where the welfare effects of overconfidence were ambiguous, since overconfidence increased both debt and effort levels). The reduction in welfare represents the difference between the overconfident manager’s perceived payoff and his true payoff. The difference is increasing in the manager’s level of overconfidence, since he increasingly underestimates the expected financial distress costs.
First, consider firm value. Substituting (7) into (1), we obtain

$$V = \frac{\beta^2}{8\gamma}. \quad (11)$$

Therefore, firm value is independent of the manager’s overconfidence level. This is because overconfidence does not drive higher effort, but merely increases the debt level. The effect of this is to change the division of total value between debt-holders and equity-holders without changing total value (in effect, we have a type of Modigliani and Miller irrelevance, where overconfidence does not affect total firm value!)

We now substitute (7) and (9), as well as $T_D + T_E = \frac{\bar{\gamma}^*}{2} = \frac{\gamma_e^*}{2} = V$, into (4) and (6) to obtain the manager’s true and perceived payoffs;

The manager’s perceived payoff becomes

$$\tilde{M} = \frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B. \quad (12)$$

His true payoff is

$$M = \frac{\gamma^2}{16\beta} - I - \frac{\gamma\hat{\gamma}}{8\beta} + B. \quad (13)$$
In both equations\(^4\), the first term, \(\frac{\gamma^2}{16\beta}\), represents firm value minus the manager’s effort costs, \(\frac{\gamma^2}{8\beta} - \frac{\gamma^2}{16\beta}\). The third term represents the manager’s perceived and true expected financial distress costs respectively. Since \(\hat{\gamma} > \gamma\), the overconfident manager underestimates his expected financial distress costs (since he overestimates his ability). Indeed, we define the overconfident manager’s overestimation of his payoff relative to the rational benchmark as

\[
\Delta M = \hat{M} - M = \frac{\gamma(\hat{\gamma} - \gamma)}{8\beta},
\]

which, of course, is increasing in overconfidence.

If the manager is rational, such that his perceived ability equals his true ability (\(\hat{\gamma} = \gamma\)), his true payoff (13) equals his perceived payoff (12). Hence, we state the following;

**Lemma 3: The manager’s investment decision:**

The manager chooses to invest if

\[
\frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B \geq 0, \text{ regardless of whether he is overconfident (\(\hat{\gamma} > \gamma\), or rational (\(\hat{\gamma} = \gamma\).}

\(^4\) Examination of (12) reveals that the manager’s expected financial distress costs equal expected firm value. At first glance, this may appear puzzling to the reader; does this imply that the face value of debt exceeds the maximum value of the distribution? We address this in the appendix.
Therefore, the manager’s investment decision is independent of whether he is rational or overconfident. The intuition for this is as follows. The rational manager and the overconfident manager have identical perceived payoffs (in the case of the rational manager, his perceived payoff equals his true payoff). They have identical perceived payoffs for the following reasons. Overconfidence does not affect effort, and so the capital market values the firm identically for both managerial types. Therefore, both managerial types receive the same excess transfer (the first two terms in lemma 3). The overconfident manager realises that the market places a lower assessment on his ability than he does (he mistakenly believes that the market is incorrect in this underestimation; that is, he does not recognise that he is overconfident). Further, both the manager and the market recognise that a higher perceived ability results in lower effort, ceteris paribus. Therefore, the overconfident manager is induced to set a higher debt level in order to commit not to reduce effort. The net result is that the effort levels, firm value and excess transfer are identical for the overconfident and rational manager. Further, the overconfident manager’s perceived financial distress costs are the same as the rational manager’s true financial distress costs (the third term in lemma 3). Therefore, the overconfident manager’s perceived payoff is identical to the rational manager’s true payoff. However, the overconfident manager underestimates the expected financial distress costs. Therefore, his true payoff is lower than his perceived payoff.

Lemma 3 demonstrates that, since the rational manager’s true payoff is identical to the overconfident manager’s perceived payoff, their project acceptance/rejection decisions are identical, and independent of the overconfidence level.
Next, we consider the effect of overconfidence on total welfare. If the manager raises finance and invests in the project, the total welfare, from equation (5), is

$$W = \frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B.$$  \hspace{1cm} (15)

The first term represents project value minus effort costs. The second term is the required initial investment (hence the first two terms together represent the project’s NPV, which goes to the manager, less the manager’s effort costs). The third term represents the manager’s true expected financial distress costs. The last term is the manager’s private benefits from running the project.

Note that equation (15) is exactly the same as equation (13). That is, since the capital market invests at zero NPV, and the manager gains all of the positive NPV of the project, welfare equals the manager’s true expected payoff.

Note that increasing overconfidence is unambiguously welfare-reducing (since increasing overconfidence increases expected financial distress costs without increasing effort).

We now draw together all of the preceding analysis in order to state our first main result.

**Proposition 1:** *The effect of managerial overconfidence on the debt level, managerial effort, firm value, managerial financial distress, and welfare, given that the manager has raised finance and invested in the project:*
Increasing managerial overconfidence induces the manager to increase the debt level without increasing effort. Since financial distress costs are assumed only to affect the manager’s payoff (and not firm value), and since effort is unchanged, firm value is independent of managerial overconfidence. However, increasing overconfidence increases the manager’s true expected financial distress costs, and unambiguously reduces true welfare.

Next, consider the effect of overconfidence on the manager’s investment decision (in other words, we consider the manager’s participation constraint), and total welfare. If the manager does not raise finance to invest in the project, welfare is zero. Further, recall that both managerial types make identical investment decisions (since they have identical perceived payoffs: see lemma 3). Therefore;

Proposition 2: The effect of managerial overconfidence on the investment decision and welfare:

a) If \[
\frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B > \frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B \geq 0,
\]
both types of manager (overconfident and rational) raise finance and take the project. Both types of manager increase welfare with their investment decision, but welfare is maximised if the manager is rational (since he chooses a lower debt level than the overconfident manager).
b) If \( \frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B > 0 > \frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B \), both types raise finance and take the project. However, welfare is increased when the manager is rational, but it is reduced when the manager is overconfident.

c) If \( 0 > \frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B > \frac{\gamma^2}{16\beta} - I - \frac{\gamma^2}{8\beta} + B \), neither manager takes the project. Therefore, welfare is maximised (and equal to zero) under both types of manager.

Therefore, in proposition 2a) and 2b), welfare is maximised when the manager is rational (and in 2b., overconfidence actually reduces welfare relative to non-investment in the project), because the rational manager chooses a lower level of debt than the overconfident manager. Since both types choose the same effort level, expected financial distress costs are higher when the manager is overconfident. In proposition 2c), managerial type is irrelevant, since neither type invests.

**Conclusion**

We have considered the effect of overconfidence on a manager’s decision to invest in a new project, and his debt decision. Our main results are as follows. First, increasing overconfidence induces the manager to increase the debt level, but does not result in an increase in effort. Firm value is unaffected by managerial overconfidence. Second, overconfidence does not affect the investment decision, since the overconfident manager’s perceived payoff is identical to that of a fully rational manager (hence, either both types invest, or neither type invests). However, when both types invest,
financial distress costs are higher, and welfare is lower (and may even be welfare-reducing), when the manager is overconfident. If neither manager invests, managerial type does not affect welfare.

Our model provides a basis for future development. Our result that the equilibrium effort level, firm value, and the managerial investment decision is unaffected by overconfidence is driven by the specification of the model. First, we have assumed a uniform distribution of project outcomes. Second, we have considered a specific, quadratic function for disutility of effort, and a linear function regarding the effect of effort on the probability distribution of outcomes. Third, in our set-up, the manager has no equity in the firm. Fourth, in our model, financial distress costs only affect the manager’s payoff, and not firm value.

We may obtain different results by considering a general probability distribution, combined with alternative functional forms for the effects of effort. These results may be further affected by including financial distress costs in firm value, and by considering an equity-linked compensation contract for the manager. In particular, we may find that both effort and debt are increasing in overconfidence. In this case, we may derive a non-monotonic relationship between overconfidence and firm value (as in Fairchild 2005). Further, we may discover that the rational manager’s true payoff is different from the overconfident manager’s perceived payoff, and therefore, in contrast to our current model, they may not make the same investment decisions.

Finally, there has been an increasing demand for rigorous research into the effects of other behavioral factors, such as regret aversion, loss aversion, framing, and prospect theory, on financing decisions. Our simple model specification may provide a basis for commencing such an important research agenda.

---

5 See, for example, Thaler (1999).
Appendix

Examination of (12) reveals that the manager’s expected financial distress costs equal expected firm value. At first glance, this may appear puzzling to the reader; does this imply that the face value of debt exceeds the maximum value of the distribution? We examine this by recalling that the manager’s perceived expected financial distress costs are \( \frac{bD^2}{2\hat{x}} = \frac{bD^2}{2\hat{y}e} \). Substituting for \( D^* \) and \( e^* \), we note that his perceived expected financial distress costs become

\[
\frac{b \gamma^3 \hat{y}^2}{2\hat{y}} \cdot \frac{4\beta}{16\beta^2 b \gamma} = \frac{\gamma^2}{8\beta}.
\]

The second term represents \( D^2 \) while the third term represents \( \frac{1}{e^*} \). Note that \( b \) appears in both the numerator and denominator, and hence cancel in the final, right-hand-side, term. The higher lost benefits, \( b \), are exactly offset by a decrease in the face value of debt. Hence, the debt level can be constrained to be less than the maximum possible income \( \bar{x} = ye = \frac{\gamma^2}{4\beta} \), depending on the size of \( b \). Therefore, the manager’s expected financial distress costs, as a product of the probability of financial distress, lost benefits due to financial distress, and effort costs, happen to be equal to the expected firm value.
References


<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004.01</td>
<td>Stephan C. M. Henneberg</td>
<td>Political Marketing Theory: Hendiadyoin or Oxymoron</td>
</tr>
<tr>
<td>2004.02</td>
<td>Yi-Ling Chen &amp; Stephan C. Henneberg</td>
<td>Political Pulling Power. Celebrity Political Endorsement and Campaign Management for the Taipei City Councillor Election 2002</td>
</tr>
<tr>
<td>2004.03</td>
<td>Stephan C. Henneberg, Stefanos Mouzas &amp; Pete Naudé</td>
<td>Network Pictures – A Concept of Managers’ Cognitive Maps in Networks</td>
</tr>
<tr>
<td>2004.05</td>
<td>Yvonne Ward &amp; Andrew Graves</td>
<td>A New Cost Management &amp; Accounting Approach For Lean Enterprises</td>
</tr>
<tr>
<td>2004.06</td>
<td>Jing Lin Duanmu &amp; Felicia Fai</td>
<td>Assessing the context, nature, and extent of MNEs’ Backward knowledge transfer to Chinese suppliers</td>
</tr>
<tr>
<td>2004.08</td>
<td>Richard Fairchild</td>
<td>Behavioral Finance in a Principal-agent Model of Capital Budgeting</td>
</tr>
<tr>
<td>2004.10</td>
<td>Stephan C. M. Henneberg</td>
<td>Operationalising a Multi-faceted Concept of Strategic Postures of Political Marketing</td>
</tr>
<tr>
<td>2004.11</td>
<td>Felicia Fai</td>
<td>Technological Diversification, its Relation to Product Diversification and the Organisation of the Firm.</td>
</tr>
<tr>
<td>2004.13</td>
<td>Bruce A. Rayton and Suwina Cheng</td>
<td>Corporate governance in the United Kingdom: changes to the regulatory template and company practice from 1998-2002</td>
</tr>
<tr>
<td>2004.14</td>
<td>Bruce A. Rayton</td>
<td>Examining the interconnection of job satisfaction and organizational commitment: An application of the bivariate probit model</td>
</tr>
</tbody>
</table>