UNIVERSITY OF TECHNOLOGY SYDNEY

SCHOOL OF FINANCE AND ECONOMICS

UTS:BUSINESS

WORKING PAPER NO. 101 **JANUARY, 2000**

An Economic Analysis of the Peter and Dilbert Principles

Joao Ricardo Faria

ISSN: 1036-7373
http://www.business.uts.edu.au/finance/

AN ECONOMIC ANALYSIS OF THE PETER AND DILBERT PRINCIPLES

João Ricardo Faria

School of Finance and Economics, University of Technology, Sydney, Australia

Abstract: The paper discusses how the Peter and Dilbert Principles can occur and what are the consequences for a profit maximizing firm. A competence frontier is constructed as a linear combination of the maximum levels of technical and social skills that are difficult to measure and evaluate. The Peter Principle holds when managers are chosen from workers that are in the competence frontier and the Dilbert Principle when they are below the competence frontier. It is shown that the profitability under the Dilbert Principle is less than under the Peter Principle. The introduction of new technologies is one form to avoid the Dilbert Principle.

Keywords: Personnel Management; Incentives; Managers.
JEL Classification Numbers: M12, L22, D23.

Acknowledgements: I would like to thank, without implicating, Chris Bajada, Arthur Goldsmith, Silvana Musti, and especially Miguel Leon-Ledesma, for useful comments.

Address for Correspondence: School of Finance and Economics, University of Technology, Sydney, PO Box 123, Broadway, Australia. Phone: +61-2-9514 7782; Fax: +61-2-9514 7711. E-mail: Joao.Faria@uts.edu.au.

AN ECONOMIC ANALYSIS OF THE PETER AND DILBERT PRINCIPLES

Abstract: The paper discusses how the Peter and Dilbert Principles can occur and what are the consequences for a profit maximizing firm. A competence frontier is constructed as a linear combination of the maximum levels of technical and social skills that are difficult to measure and evaluate. The Peter Principle holds when managers are chosen from workers that are in the competence frontier and the Dilbert Principle when they are below the competence frontier. It is shown that the profitability under the Dilbert Principle is less than under the Peter Principle. The introduction of new technologies is one form to avoid the Dilbert Principle.

I. Introduction

Lifetime jobs are a common feature of developed economies. A great part of the work force experiences a long-term employment relationship with their current employers[1]. Workers in such lifetime jobs expect to make a career within the firms that are currently employing them. Workers try to rise through the ranks in their firms via promotions. As their employers share these expectations, firms set some rules to encourage workers to maximize their effort and, as a result, firms' profits.

The seminal study of Doeringer and Piore (1971) have identified several key regularities - long-term employment relationships among them - that shaped the concept of internal labor market. An internal labor market operates with limited ports of entry for hiring, career paths within the firm and promotions[2]. These characteristics make it

difficult to apply the competitive model of labor market, mainly based on the human capital theory, to understand the workings of the internal labor market (Lazear, 1995). Some of the outcomes of the internal labor market are explained through models of agency theory. Using a mix of uncertainty, asymmetric information and opportunism, these models show that some of the main features of the internal labor market can be construed as second best solutions to contracting problems under incomplete information (e.g., Milgrom and Roberts, 1992; Gibbons, 1998; and Lazear, 1998).

The issue tackled in this paper concerns the role of promotions to managers and its impacts on the firm behavior[3], assuming an internal labor market structure. Efficient incentives aim to extract the maximum effort from workers [4]. One of the tools to achieve it is the use of promotions to higher ranks of the firm, such as managerial positions. Some firms try to avoid rent-seeking workers, the ones that spend so much time advertising themselves and politicking to get promoted [5], by imposing simple rules of promotions, based on seniority and past performance. One shortcoming of this selection process is that people can be placed in important jobs for which they are ill qualified. That is, the Peter Principle[6] can be an outcome of this process, where people are promoted to their levels of incompetence. A slightly different restatement of the Peter Principle is that people are promoted out of jobs for which they are overqualified until they reach ones where the job demands are suited to maximum individual ability levels. That is, they are on the edge of their competence, so they cannot achieve anything more than what they had already achieved.

Another serious possible outcome of the promotion system occurs when incompetents are promoted to management. This is the Dilbert Principle. The Dilbert Principle stands

that "the incompetent workers are promoted directly to management without ever passing through the temporary competence stage" (Adams, 1996, P.12). That is, the Dilbert Principle is a sub-optimal version of the Peter Principle.

This paper develops a unified model that shows how the Peter and Dilbert Principles can occur and explores their implication for the behavior of a profit maximizing firm. The paper is structured as follows. Next section presents the concept of competence frontier. The basic model appears in section three, and has two possible outcomes, the Peter and the Dilbert Principles. Section four discusses the implications of the Peter and Dilbert Principles, showing that the Dilbert Principle is a sub-optimal version of the Peter Principle. Section five examines two alternative incentive schemes to avoid the Dilbert Principle and, finally, the concluding remarks appear in section six.

II. Managerial Skills: Idiots and Jerks.

It is assumed, along the lines of Mehta (1998) and Faria (2000), that the manager performs two basic functions: monitoring and coordination. In order to monitor, the manager has to have some technical skills. In the same vein, to coordinate, the manager has to have some communication or social skills. Both skills can be acquired through on-the-job training, however, this is not vital to our analysis[7]. What is essential to assume is that a manager is promoted out of a set of relatively homogeneous workers. That is, the worker promoted to a managerial position comes from a set of workers with similar qualities. It is well known that returns to the time spent on tasks are usually greater to workers who concentrate on a narrower range of skills (e.g. Becker and Murphy, 1995).

In the present case we deal with two types of skills: technical and social. The workers' productivity is bounded by a combination of these skills. Naturally the workers can differ in the amount of these skills. Some are endowed with better technical skills, while others have more social skills.

Figure 1 shows how technical (*T*), and social (*H*) skills bound workers productivity. It is assumed that technical and social skills have a maximum level [$\overline{T}$, and $\overline{H}$]. The productivity boundary is given by a linear combination of maximum skill levels and is called the competence frontier.

[INSERT FIGURE 1 HERE]

The rationale for the existence of the competence frontier is simple. There is an implicit trade off between the skills. A worker that spends most of his time developing his technical skills don't have too much time to spend in acquiring and developing social skills, and vice-versa. As managers are chosen from workers, the managerial performance will also be limited by the maximum competence levels that managers have as workers.

The firm can choose a worker to be a manager from two different positions. The firm can choose a worker that is on the competence frontier or below it. Imagine that the firm chooses a worker on the competence frontier, specifically, it chooses the best technician to be the manager. If he is the best technician, he has no social skills at all. As a manager he is able to be an excellent monitor, but will be an appalling coordinator. If the firm chooses the worker that has the better social skills and no technical knowledge, he will be a good coordinator and a dreadful monitor. Finally, if the firm chooses a worker that has some technical and social skills [and is on the competence frontier], he will not be a good

monitor as the first, neither a good coordinator as the latter. This first case illustrates the Peter Principle, where the workers are on the limit of their competence.

The firm can choose a worker that is not on the maximum level of competence, that is, he is not on the competence frontier, actually he is below it. No matter how close he is from the competence frontier, his performance as a manager will be worse than the ones on the frontier. This second situation illustrates the Dilbert Principle.

An interesting feature of the competence frontier as displayed above is that every worker is an idiot [8]. In this two dimensional world, if the worker has the highest amount of technical skills, he has no social skills. So he is an idiot from the social skill viewpoint. Now, considering the worker with the best social skills, as he has no technical ability, he is an idiot from the technical point of view. Looking from the viewpoint of technical skills one can say: "Well, he can't write code, he can't design a network, and he doesn't have any sales skill. But he has *very* good hair…" (Adams, 1996, p. 14). This is true whatever the workers' skills. In the end of the day, the model precludes the manager to have excellency in both traits. The manager, even when the Peter Principle holds, is an idiot. In the case of the Dilbert Principle, he is more than an idiot, he is a jerk [9].

How and why a profit maximizing firm would choose a worker that is not at the maximum competence level? There are many possible stories that can explain this possibility [10]. One of them is that workers and firms do not know exactly the amount of skills workers have. Technical skills can be a type of knowledge difficult to measure[11]. Social skills are even more complicated to quantify. Characteristics such as honesty, communication, sympathy, loyalty, good manners, etc, despite being easy to observe, are hard to measure [12]. Firms try to extract this information by observing the worker and

using some proxies to measure his abilities. However, the proxies can be imperfect and drive workers to put more emphasis in the proxies than in the skills, and the selection process can lead to a choice of a worker that is not at the frontier of competence.

III. The Model

From the discussion in the past section, the productivity of a manager (*M*) is an increasing function of technical skills (*T*), and social skills (*H*): $M = M(T,H),\ M_T > 0,\ M_H > 0.$ Managerial productivity is bounded from above by the maximum skills one worker can have, given by the competence frontier:

$$M(T,H) \le \lambda M(\bar{T},0) + (1-\lambda) M(0,\bar{H}), \quad \lambda \in [0,1] \qquad (1)$$

The representative firm is a monopolistic competitor in the goods market. The firm chooses the structure of promotions (*x*), workers' wage (*w*), manager's wage (*W*), the number of workers (*n*), technical (*T*) and social skills (*H*) to maximize the discounted profit over an infinite horizon:

$$\underset{x.w,n,W,H,T}{Max} \int_0^{\infty} [P(y)\,y - wn - c(H) - t(T) - \Omega(x,W)] \exp(-rt)\,dt \quad (2)$$

Where *y* is the firm's output, it depends on the managers' productivity, workers' effort (*e*), and the number of workers: $y = y(M(T,H), e, n)$. The term in the brackets captures total revenue less total costs. *c(H)* stands for the coordination costs, $t(T)$ represents the monitoring costs, and $\Omega(x,W)$ are the promotion costs, *r* is the interest rate.

The firm faces the following constraint, which accounts for the evolution of workers' effort:

$$\dot{e} = f\ (T, H, w - \overline{w}, W - w, x, e)\ \ (3)$$

This dynamic restriction describes how workers' effort reacts to the incentives set by the firm. There are wage incentives, such as the wage differential between actual wage and the reservation wage $(w - \overline{w})$, and the wage differential between the prospective manager's wage and actual wage $(W - w)$. Promotions (*x*) also have a positive role in stimulating workers' effort. Finally, as discussed above, workers effort depends on the workers' skills. Equation (3) captures elements of an optimal contract, such as the reservation utility and incentive compatibility constraints. One can think of it as workers' response to wage and careers incentives.

The representative firm maximizes (2) subject to equations (1) and (3) [13]. The steady state equilibrium is given by the following system of equations:

$$\Omega_x = q\ f_x \qquad (4)$$

$$\Omega_W = q\ f_{W-w} \qquad (5)$$

$$q\,[\,f_{W-w} - f_{w-\overline{w}}\,] = n \qquad (6)$$

$$y_n\,[1+e] = w \qquad (7)$$

$$y_M\ M_H\,[1+e] + q\ f_H = c_H + m\,M_H \qquad (8)$$

$$y_M\ M_T\,[1+e] + q\ f_T = t_H + m\,M_T \qquad (9)$$

$$q\,[r - f_e] = y_e\,[1+e] \qquad (10)$$

$$e = e(T, H, w - \overline{w}, W - w, x) \qquad (11)$$

$$m\ [\ l\,M(\overline{T}, 0) + (1-\ l)\,M(0, \overline{H})] = 0 \qquad (12)$$

Where q is the co-state variable associated with e, m is the lagrange multiplier associated with the inequality (1), and $e = \frac{P'(y)\,y}{P(y)}$ is the inverse of price elasticity of demand.

Equations (4) and (5) balance the marginal cost of setting a career structure [with promotions and wages to managerial positions] with the value of its effects on workers' effort. Equations (6) and (7) concern the employment of *n* workers with a wage *w*. Given the number of workers, the firm sets the wage according to their marginal productivity [eq. (7)]. Notice, however, that the marginal productivity of workers' is affected by managerial productivity and workers' effort. These are characteristics of an efficiency wage. On the other hand, given the workers' wage, the firm decides to employ a number of workers attracted by the wages differentials structure [eq. (6)]. Equations (8) and (9) balance the benefits of skills in terms of output and effort with their costs, taking into account the position of these skills relative to the competence frontier. Equation (10) is the steady state Euler equation for workers' effort, and equates the interest rate with the marginal revenue of effort in terms of output and effort incentives. Equation (11) is the steady state equilibrium for labor effort. It shows that in the steady state, workers' effort is positively related to workers' skills, wage differentials and career incentives. Finally equation (12) are the bounded controls conditions for *H* and *T* to be maximizing.

From equation (12) one can analyze the two principles: i) The Peter Principle: when $m > 0$; and ii) the Dilbert Principle: when $m = 0$.

IV. The Dilbert and Peter Principles

When $m > 0$, the Peter Principle holds. From equations (1) and (12), we have: $M(T,H) = \lambda M(\overline{T},0)+(1-\lambda)M(0,\overline{H})$. Depending on the value of λ, the equilibrium values of *T* and *H* can be determined. There are basically three interesting cases: 1) When $\lambda=0$, we have: $M(T,H) = M(0,\overline{H})$, so $T = 0$ and $H=\overline{H}$; 2) When $\lambda=1$, we have: $M(T,H) = M(\overline{T},0)$, so $T=\overline{T}$ and $H=0$; and 3) When $\lambda\in(0,1)$, we have: $M(T,H) = \lambda M(\overline{T},0)+(1-\lambda)M(0,\overline{H})$. A further mathematical assumption is useful here. Let us assume that function *M* is a linear function such that: $M(T,H) = M_1(T)+M_2(H)$, and $M_1(0)=M_2(0)=0$. Therefore, this third case yields:

$$M(T,H) = M(\lambda\overline{T},0)+M(0,(1-\lambda)\overline{H})=M_1(\lambda\overline{T})+M_2((1-\lambda)\overline{H})=M(\lambda\overline{T},(1-\lambda)\overline{H}),$$

so: $T = \lambda\overline{T}$ and $H=(1-\lambda)\overline{H}$.

Given the equilibrium values of *T* and *H* are determined as above, two equations out of the system of equations (4)-(11) become redundant. The system (4)-(9) determines simultaneously the optimal values of *x*, *w*, *W*, *e*, *n*, and q. The workings of this optimal solution are very simple. When the Peter Principle holds, the firm chooses a combination of maximum skills available from the competence frontier it wants its manager to have. Then it sets the wage and career incentives in order to extract the workers' effort and maximize profits.

By considering the Dilbert Principle case, that happens when $m = 0$, we have, from equations (1) and (12): $M(T,H) < \lambda M(\overline{T},0)+(1-\lambda)M(0,\overline{H})$ which implies,

$M(T,H) < M(\lambda\bar{T},0)+M(0,(1-\lambda)\bar{H})=M(\lambda\bar{T},(1-\lambda)\bar{H})$. An important implication is that the optimal values of T and H are below the maximum competence levels. $T^D < \lambda\bar{T}$, and $H^D < (1-\lambda)\bar{H}$, for any value of $\lambda \in [0,1]$[14].

Furthermore, equations (8) and (9) become:

$$y_M M_H[1+e]+q f_H = c_H \qquad (8')$$

$$y_M M_T[1+e]+q f_T = t_{HT} \qquad (9')$$

The system of equations (4), (5), (6), (7), (8'), (9'), (10) and (11) determines simultaneously the equilibrium values of *x*, *w*, *W*, *e*, *H*, *T* , *n*, and q . Therefore, when the Dilbert Principle holds, firms cannot choose clearly the amount of skills of their managers from the competence frontier. So they set the career incentives, wage differentials and the levels of skills simultaneously, hoping for the best outcome possible.

In order to compare the effects of both Principles on firms behavior, notice that managerial productivity and workers' effort are increasing functions of workers' skills. As the skills under the Peter Principle are higher than under the Dilbert principle, so managerial productivity and workers' effort are higher under the Peter Principle than under the Dilbert Principle. Higher managerial productivity, and workers' effort imply higher output, and other things constant, imply higher profits. In this sense, the Dilbert Principle is in fact a sub-optimal solution relative to the Peter Principle. The problem, then, is how to avoid the Dilbert Principle and to achieve the Peter Principle. Two alternative incentive schemes are discussed in the next section.

V. Alternative designs

One can think of different ways to avoid the Dilbert Principle, here I discuss just two alternative designs. Firstly, the firm can divide the number of workers in *N* teams, with a span of control of size *s* . By controlling *N* and *s* the firm wants to select the skill levels of its managers. The manager has to monitor a span of *s* workers and keep their work in line with the remaining (*N-1*) teams by coordination. The firm assumes that *T* is a function of *s* and *H* is a function of *N*. The objective of the firm is to identify if the prospective manager is a worker that is in the competence frontier. However, this new incentive devise is plagued with the old problems. Basically, the trade off between skills remains, because there is a trade off between the number of teams and the span of control. More workers to monitor allow less time to coordinate, and more teams to coordinate with allow less time to monitor. For that reason, the identification of workers as idiots or jerks remains a problem.

The second alternative design of incentives is the introduction of technological innovations. Imagine that new technologies demand more on-the-job training from workers. This can push the competence frontier forwards. If new technologies demand more time for on-the-job training and a further development to acquire skills, it becomes costly for workers that are not in the initial competence frontier. Then, initial small differences in skills among workers can be widened through the introduction of new technologies, making it easier to separate workers on the edge of the competence frontier from the ones behind it.

VI. Concluding Remarks

The paper has discussed how the Peter and Dilbert Principles can occur and what are the consequences for a profit maximizing firm. The departure point is the competence frontier, which is constructed assuming that prospective managers are chosen out of a set of relatively homogeneous workers. Workers have two different characteristics, technical and social skills, that are difficult to measure and evaluate. The competence frontier is the linear combination of the maximum levels of skills. It implicitly assumes that there is a trade off between the skills. So if a worker is good in one skill he is bad in the other. Therefore, every worker on the competence frontier is an idiot. Workers below the competence frontier are jerks.

The Peter Principle holds when managers are chosen from workers that are on the competence frontier. The Dilbert Principle applies to the cases in which the manager is chosen from workers that are below the competence frontier. The Dilbert Principle is clearly a sub-optimal version of the Peter Principle. Under the Peter Principle the best policy followed by the firm, given that its managers are on the competence frontier, is to set the wages and career incentives in order to extract the workers' effort and maximize profits. Under the Dilbert Principle, the firm cannot choose clearly the amount of skills of its managers from the competence frontier. So the firm sets the career incentives, wages differentials and the levels of skills simultaneously, hoping for the best outcome possible. Nevertheless, the profitability under the Dilbert Principle is less than under the Peter Principle. The problem, then, is how to achieve the Peter Principle and to avoid the Dilbert Principle

Finally two different incentive schemes to avoid the Dilbert Principle are discussed. If the firm, by controlling the number of teams and the span of control of its workers, aims to select and maximize the ability of its managers, it will find the same sort of problems as before. Basically this design will not work because the trade-off between skills are reinforced by the implicit trade-off one manager has between monitor *s* workers and coordinate its team with other *N-1* teams. Another alternative design examined was the introduction of new technologies. New technologies push forward the competence frontier and make it easy to identify and separate workers that were initially close to the competence frontier but that are left behind after the introduction of new technologies.

References:

Adams, S. (1996) The Dilbert Principle, Harper, New York.

Baker, G.; M. Gibbs, and B. Holmstrom (1994) The internal economics of the firm: Evidence from personnel data, Quarterly Journal of Economics 109, 881-919.

Becker, G. S. and K. M. Murphy (1995) The division of labor, coordination costs, and knowledge, In R. Febrero and P.S. Schwartz (Eds.) The Essence of Becker, Hoover Institution Press, Stanford, 608-630.

Burgess, S. and H. Rees (1997) Transient jobs and lifetime jobs: Dualism in the British labour market, Oxford Bulletin of Economics and Statistics 59, 309-328.

Doeringer, P. and M. Piore (1971) Internal Labor Markets and Manpower Analysis, Heath, Massachussets.

Demougin, D. and A. Siow (1994) Careers in ongoing hierarchies, American Economic Review 84, 1261-1277.

Farber, H.S. (1995) Are lifetime jobs disappearing ? Job duration in the United States: 1973-1993, Princenton University, Industrial Relations Section, Working Paper: 341, January.

Faria, J.R. (1998) The economics of witchcraft and the big eye effect, Kyklos 51, 537-546.

Faria, J.R. (2000) Supervision and effort in an intertemporal efficiency wage model: The role of the Solow condition, Economics Letters, forthcoming.

Gibbons, R. (1998) Incentives in organizations, Journal of Economic Perspectives 12, 115-132.

Goldsmith, A.H., J. R. Veum and W. Darity Jr. (1999) Motivation and labor market outcomes, Research in Labor Economics, Forthcoming.

Gordon, D.M. (1990) Who bosses whom ? The intensity of supervision and the discipline of labor, American Economic Review 80, 28-32.

Hall, Robert (1982) The importance of lifetime jobs in the U.S. economy, American Economic Review 72, 716-724.

Kessler, A. S. (1998) The value of ignorance, Rand Journal of Economics 29, 339-354.

Landers, R.M.; J.B. Rebitzer and L.J. Taylor (1996) Rat race redux: Adverse selection in the determination of work hours in law firms, American Economic Review 86, 329-348.

Mehta, S. R. (1998) The law of one price and a theory of the firm: A Ricardian perspective on interindustry wages, Rand Journal of Economics 29, 137-156.

Milgrom, P. (1988) Employment contracts, influence activities and efficient organization design, Journal of Political Economy 96, 42-60.

Milgrom, P. and J. Roberts (1992) Economics, Organization and Management, Prentice Hall, New Jersey.

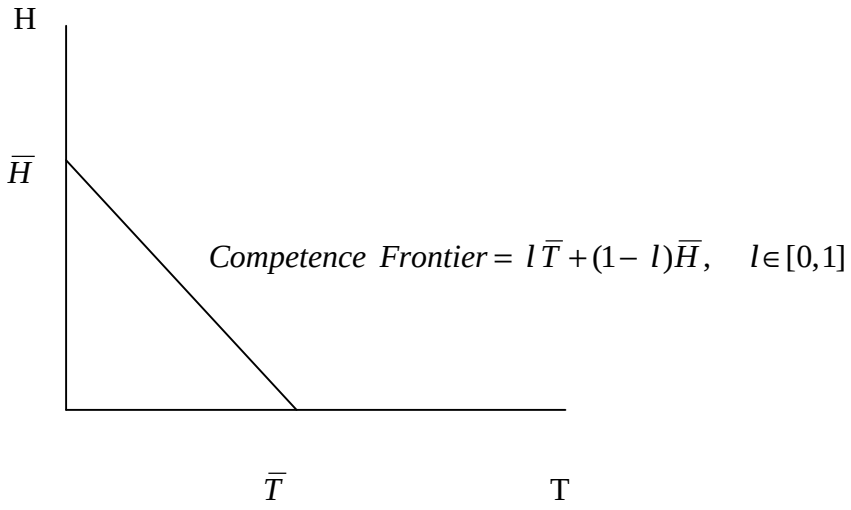
Lazear, E. P. (1995) A jobs-based analysis of labor markets, American Economic Review 85, 260-265.

Lazear, E.P. (1998) Personnel Economics for Managers, John Wiley & Sons, New York.

Prendergast, C. (1993) A theory of "yes men", American Economic Review 83, 757-770.

Ureta, M. (1992) The importance of lifetime jobs in the U.S. economy, revisited, American Economic Review 82, 322-335.

FIGURE 1: The Competence Frontier



NOTES:

[1] For empirical evidence, see Hall (1982), Ureta (1992) and Farber (1995) for USA , and Burgess and Hedley (1997) for the UK.

[2] See Baker, Gibbs and Holmstrom (1994) for more recent evidence on internal labor market.

[3] Gordon (1990) shows that the ratio within the firm's hierarchy of supervisors to production-workers inputs has increased from 1960 to 1990 for the major economies in the world.

[4] See Goldsmith et al. (1999) for a study of motivation in a human capital model.

[5] See Milgrom (1988).

[6] See Milgrom and Roberts (1992).

[7] For a general model of on-the-job training, see Demougin and Siow (1994).

[8] This is in line with the general principle of Adams (1996, p. 2): "I have developed a sophisticated theory to explain the existence of this bizarre workplace behavior: People are idiots".

[9] If the politically corrected reader find those designations offensive, I suggest them to think of idiots as limited people and jerks as limited and ignorant people.

[10] See, for example, Landers et al. (1996) and Kessler (1998).

[11] If you are an economist, try to answer the following question: how can you compare two leading economists and say that one *knows* more economics than the other ? You are going to use some proxies as publications, citations, etc, but you will never be sure that these proxies actually give you a correct answer.

[12] Prendergast (1993) shows that firms may optimally eschew the use of incentive contracts to retain workers' incentives for honesty. See Faria (1998) for an analysis of envy on team work.

[13] An important caveat should be done here. One can ask if the managers are themselves idiots and they are in control of the firm, then why are they going to maximize profits under such scheme ? The point here is that the higher control of the firm is safe from the sort of problems analysed here. That is, the higher hierarchy of the firms is idiot-free. It would be an interesting exercise to explore the implications of the Peter and Dilbert principles when the control of the firm is on the hands of limited people. But it is left for further research.

[14] One can raise the question that what would happen in the model if $l \in [a, b]$, where $0 < a < b < 1$. That is, if there are further constraints on the amount of skills, firms wish to select. The qualitative results of the model are not altered by it.