FALLING STARS: SIMULATION OF THE EFFECT OF FIRM CULTURE ON EMPLOYEE PERFORMANCE

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ABSTRACT
Many modern firms follow the strategy of recruiting talented employees from outside the firm in the hope of improving firm performance. This strategy is not confined to business alone, but can be found in such industries as sports, the arts and higher education. In order to gain a deeper insight into when this strategy would be successful, we designed an agent based model, featuring competition amongst firms requiring expertise along one or more dimensions. Firms can meet these expertise requirements through the formation of networks within the firm. These networks may make the recruitment of a star less successful than it might appear, as shown by Groysberg in a recent book on financial analysts.

Keywords: employee performance, firm performance, firm culture, simulation

1. INTRODUCTION

A common statement in human resource management research is that a firm's success depends on the talent of its employees, whether in production, sales or management. It is argued that a crucial decision for any firm is the choice to develop the skills of its employees or to acquire talented individuals from outside the firm (Lepak and Snell 1999, 2002). This decision has been likened to a "make or buy" decision (Miles and Snow 1984).

The perception is then that an advantageous corporate strategy may be to recruit external stars - highly productive employees outside the firm - in order to boost firm performance. There have been many occasions on which the market value of firms has soared upon the announcement of the hiring of a new senior manager, however bringing external stars into firms has been highly successful in some notable cases and highly disastrous in others (Groysberg, McLean and Nohria 2006). The importance of talented employees was highlighted by a group of McKinsey consultants (Michaels, Handfield-Jones and Axelrod 2001) who coined the term "the war for talent" arguing that firms are engaged in a war to recruit, develop and to retain their talented employees against competing firms.

Popular media has highlighted examples of industries which seem to be dominated by stars and in which star employee transfer is common. In contrast *The Economist* (Economist 2011) discussed the case of the Barcelona soccer club. In a sport that is dominated by clubs which recruit globally, the Barcelona club retained a developmental approach to acquiring talent, and at the time of the European Champions League final in 2011 - which Barcelona won - the majority of the players and the coach were from Catalan. What then determines whether an industry will be one in which talent is acquired or developed? Are there key features of industries which determine whether the industry will be dominated by stars?

2. THE STRATEGY OF HIRING STARS

One of the assumptions of this "hiring stars" strategy is that star employees of other firms can bring the key features of their performance over to the new firm (Groysberg, McLean and Nohria 2006). This "portability" of skills has been questioned in research on star security analysts on Wall Street (Groysberg, Lee and Nanda 2008, Groysberg and Lee 2009, Groysberg 2012). These analysts comment on and predict the performance of firms in various sectors of the US economy. Despite the seemingly generalized nature of the skills of these analysts, it was found that third party ranking of an analyst fell significantly for up to five years after transferring from one Wall Street firm to another. This research found that the star analyst's productivity was not immediately transferable across firms in the financial services sector.

In explaining what determined employee performance, Becker set out two forms of human capital – "general human capital" and "specific human capital" (Becker 1962, 1964). General human capital was those skills that are easily transferred between workplaces while specific human capital was not. Groysberg et al (2008) set out a typology of forms of human capital that differed according to their transferability between jobs.

The relative importance of these different forms of human capital in the new workplace will then determine how portable the new employee's skills are.

Firm culture and employee behavior are interdependent. In order to develop employee skills, firms have to transfer resources from more productive employees to less productive employees. Stars may refuse to do this and demand the entire value of their performance as salary. Becker pointed out that we would not expect firms to invest in employee skills that are highly portable, as the employee may simply leave the organization after training or demand an immediate increase in salary after becoming more productive. In industries dominated by stars, we would expect to see less emphasis on employee development, greater salary inequality across the firm and higher mobility of employees between firms. We call industries in which this thinking is dominant the "star" culture.

Firms may invest in employee skills that are firm-specific, which are of value to the firm but are not of value in the labour market outside the firm. In an industry that is not dominated by stars, we would expect to see more emphasis on employee development, less inequality in salary structure across the firm and lower mobility of employees between firms. Following the recent literature, we call this corporate culture "pro-social".

Yet there are industries in which we see a mix of firms with star structures and firms without star structures, such as the European soccer league. In those industries, firm culture and employee behavior support both a star equilibrium and a pro-social equilibrium. In this paper we produce a simulation of employee performance and firm culture to highlight the key features of industries in which we see labor markets with stars, without stars and with a mix of strategies.

3. THE SIMULATION MODEL

The model works on the basis that almost all firm based phenomena are emergent from the behavior of the individuals (agents), indexed by *i*, who make up the firm.

3.1. Agents

Agents have a single behavioral characteristic "pro-sociality" denoted by β, where $0< \beta <1$, which measures the extent to which agents are willing to share resources and help others. Agents with high prosociality are more willing to sacrifice their own salaries to develop other agents in the same firm. Agents with high prosociality are also less likely to change firms when offered a recruitment package by a competing firm.

Agents contribute to the income of the firm in which they are located directly through the agent's expertise, e_i, as well as indirectly through a "network effect" which depends on the strength of the ties between that agent and another agent in the firm and the expertise of both agents. The strength of these network effects is one of the parameters of interest in our model. Do network effects within firms in certain industries determine whether star systems can be successful, as has been suggested by Groysberg's research?

3.2. Industry

The industry in which the firms operate has two characteristics which are common across all firms. The first industry characteristic is the strength of network effects in firm income is represented by ρ, where $0<\rho<1$. The second industry characteristic is the fraction of firm profits taken by the owners of the firms. We assume that firms are owned by partners who take a fraction, 1-γ, of firm profits, where γ is common across all firms and is determined by industry standards. The fraction γ is set at 0.33 for these simulations.

3.3. Firms and Firm Income

Firms are essentially networks of agents. Firms compete for jobs against other firms through networks of agents in each firm. The value of a job if won by agent *i*, J_i, is determined by the expertise of the agent *i* and the network relationships that agent i possesses within the firm, W_{ij}, moderated by the strength of network effects in the industry, ρ

$$J_i = \underline{e_i} W(\rho) \underline{e_i'} = e_i^2 + \frac{1}{2}\rho \sum_{\substack{j \in f \\ j \neq i}} e_i W_{ij} e_j . \qquad (1)$$

where f is the set of agents within the firm. These network relationships, W_{ij}, are either on or off depending on whether the agents have established a working relationship prior to the job being undertaken. Firm profits are the firm's share, γ, of the sum of the jobs won by agents in the firm less the sum of the salary costs of the agents in the firm.

As with agents there is a single behavioral characteristic for firms, prosociality. The value of prosociality for a firm, β, is derived from a random agent in the firm, who might be considered the founding agent of the firm. The level of prosociality for a firm determines the level of investment of the profits of the firm which is used for developmental and mentoring activities within the firm.

3.4. Agent Remuneration

The salary for each agent, s_i, is given by a base salary and a bonus salary component. Following practice in the finance industry (Groysberg 2012, p. 275), the base salary is comparatively low and uniform across agents, while the bonus is highly dependent on agent performance and varies greatly across agents.

For simplicity, the base salary is set to zero, while the agent's bonus depends on the job value which the worker generates for the firm, J_i, less the share γ taken as profits by the firm as well as the share of job value taken by the other agents in the firm networked to the winning agent.

Within firms, however, there are internal transfers to fund employee development and mentoring, so agents pay an internal "tax" to fund these activities based on the firm's prosociality. These internal transfers within

the firm are reflected in the sharing rule which splits up the value of a winning job according to the expertise of the agents within the winning network and the prosociality of the firm in which they work. The share of the job value accruing to each agent in the winning network, *n*, net of the share taken by the firm is:

$$Share_i = \frac{e_i^{2(1-\beta)}}{\sum_{j \epsilon n} e_j^{2(1-\beta)}}. \quad (2)$$

The effect of this sharing rule is to make the split of the job value between agents more even when firm prosociality, β, is higher. For β equal to one, each agent in the winning network receives the same share of the job value. For β equal to zero, agents receive a share proportionate to the square of their expertise over the sum of the square of the expertise of all other agents in the network.

3.5. Network Growth

The network weights between agents within a firm, W_{ij}, grow at a rate which is dependent on the developmental spending within the firm – the prosociality of the firm - and the expertise of the other agents to which the agent is linked within the firm.

3.6. Recruitment

Firms with low pro-sociality values may opt to hire a star agent from a different firm. If the prosociality parameter, β, of the hiring firm is greater than that of the star's current firm the star moves, thus a star knows that he/she will get a higher salary – net of internal transfers within the firm to fund employee development - by moving.

When a star moves into a new firm, the star's network weights to agents in the new firm are set to a low number. The star is assumed to commence in the new firm without strong relationships to other agents in the new firm. The cost of a star's movement between firms is the loss of the network relationships the star possessed in the old firm.

4. RESULTS OF THE SIMULATION MODEL

The simulations were conducted in Netlogo (Wilenky 1999). The simulations involved 2048 agents and 64 firms. As a comparison the Groysberg research on star security analysts involved 1500 agent in each of several sectors of the US economy.

In the Netlogo simulation, we implemented a visual representation of the model. Firms were represented by solid patches, and agents in firms by individual workers. Jobs to compete for are the patches between firms. Figure 1 shows a portion of the firms and agents in one of the simulations. The networks between agents are shown by the lines linking agents together.

Workers migrate to the outside of firm patches and compete for jobs against neighboring firms. In this simplified version of the model, agents only draw a salary based on the contribution of their expertise to the firm through jobs won, e_i^2, so bonuses are set to zero.

Investment in development and mentoring by firms is represented by faster development of network relationships between agents, which can only happen when agents encounter each other. Agents with higher levels of expertise are allowed to move each time step with greater probability and so can both reach the edge to compete for jobs faster than low expertise agents and also encounter other agents within the firm and form networks more quickly.

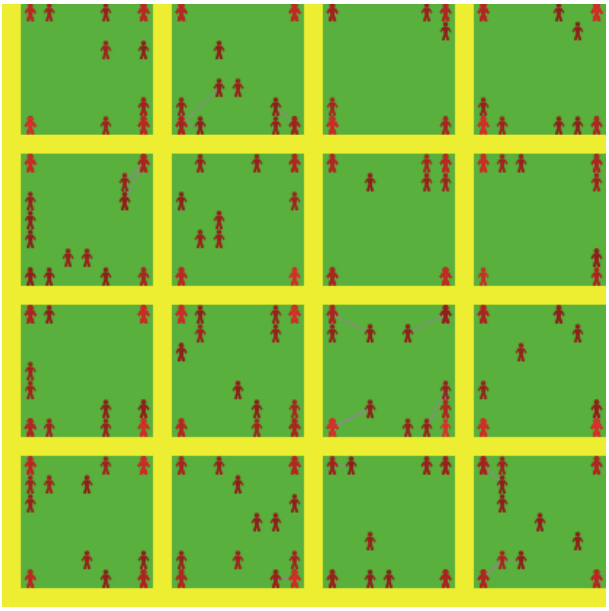

Figure 1: Portion of Netlogo Simulation of Firm Model.

Recruitment of stars is done locally. If an employee loses a competition for a job to the employee of another firm, the losing employee may opt to shift to the winning firm. Employees will only shift to winning firms if the firm offers higher salaries net of internal firm transfers and if the worker's own level of prosociality is low. The winning firm, however, will only recruit the losing employee if that employee has higher expertise than the average agent in the winning firm – only stars get recruited.

Simulations are run for 100 time steps to allow sufficient time for agents to generate network relationships within the firms, for agents to compete between firms for jobs and for agents to shift from less successful firms to more successful firms. The results for two typical simulations with different levels of network effects are presented.

Groysberg's research has suggested that network strength between agents and infrastructure within a firm are the key factors which explain why star systems may not boost firm performance. We would expect then that this would be reflected in the simulation by high prosociality firms performing better when the network effects within the firm, ρ, are strong. In that case, the presence of strong network effects means that internal staff development matters greatly. Conversely we would expect that when network effects are weak, low prosociality firms would out-perform high prosociality

firms as the advantage of recruiting stars for low prosocial firms outweighs the small network effects.

Figure 2 shows the relationship between firm prosociality and firm profitability when network effects are strong. The developmental investments by highly prosocial firms mean that employees in those firms form strong relationship networks so that those employees remain successful in job competitions.

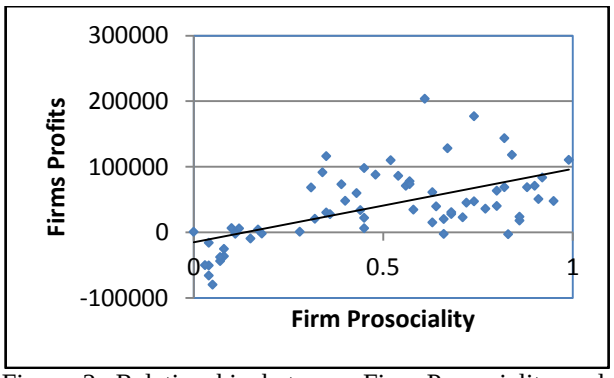

Figure 2: Relationship between Firm Prosociality and Firm Profitability under Strong Network Effects.

Figure 3 shows the relationship between firm prosociality and firm profitability when network effects are weak. When network effects are weak, the ability of the lower prosociality firms to steal stars from the high prosociality firms outweighs the faster development of relationship networks within the high prosocial firms. The number of agents in the high prosocial firms falls, and the profits of those firms falls as well.

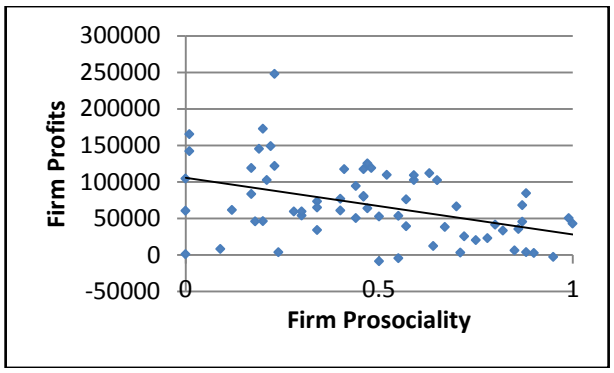

Figure 3: Relationship between Firm Prosociality and Firm Profitability under Weak Network Effects.

Groysberg (2012) indicated that the financial analyst industry was an industry with high network effects, given that stars who moved often took many years to regain the productivity they had in their original firms. In such a highly networked industry, Groysberg found that star analysts were less mobile than non-star analysts (Groysberg 2012, Table 10.1). This result matches the mobility of stars in Figures 4 and 5, where more agents remain in the higher prosocial firms in the simulation with strong network effects.

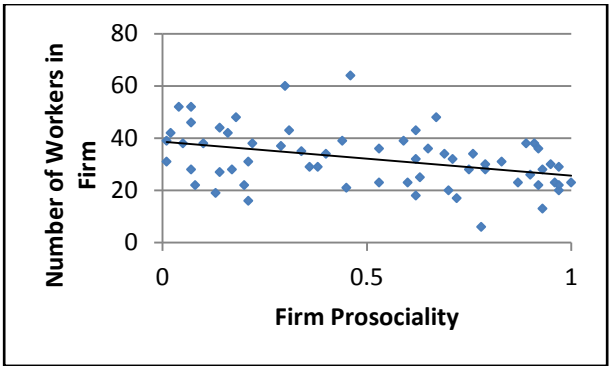

Figure 4: Relationship between Firm Prosociality and Number of Workers under Strong Network Effects.

As can be seen in Figure 4, with strong network effects the high prosocial firms can generate networks within their firm to prevent their star workers from being recruited away by low prosocial firms. However in Figure 5, with weak network effects, the high prosocial firms lose more of their star workers to recruiting efforts of the low prosocial firms.

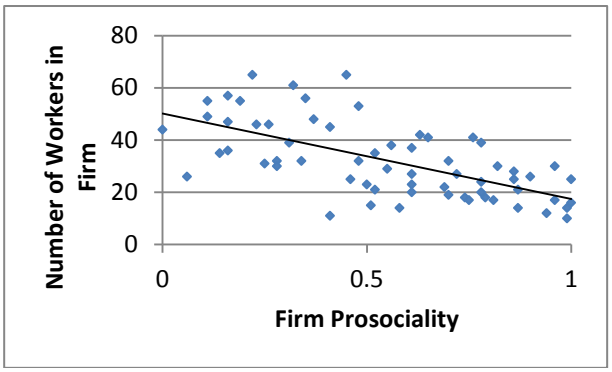

Figure 5: Relationship between Firm Prosociality and Number of Workers under Weak Network Effects.

These results suggest that a star system can work in an industry with low network strength. In that case, while recruiting stars does have the cost of losing the networks the star has in the former firm, the effect of the lost networks is low enough that hiring highly productive star workers pays off for the recruiting firm. However we also see that, in an industry with strong network effects, hiring stars might be counterproductive as the loss of the networks in the former firm can be costly to recover. A better strategy in the case of an industry with strong network effects may be to spend resources to develop their own workers.

5. CONCLUSIONS

It is common practice in many industries to seek performance improvements in organizations by recruiting talented outsiders rather than developing workers internally. Recent research by Groysberg and others has questioned whether this practice is effective in all industries, as Groysberg and co-authors have found evidence that hiring stars is not effective for Wall Street investment banks.

Groysberg (2012) has suggested that the star analysts are not as successful in the finance industry as would be expected, because the industry has strong network effects within firms. Stars transferring firms lose the network relationships those stars had in their former firm and developing new relationship in the new firm which hired them takes time – years, he suggests. The new firms who hire the stars will find that those stars who transfer with high salaries take a considerable time to get back to the levels of productivity they enjoyed at their former firm. Firms in industries with large network effects then may be better off developing their own employees, even though such development is costly.

We find that a simple agent based simulation, with just two parameters accounts for Groysberg's findings, when network effects are strong. This was hypothesized by Goldberg and our simulation provides a demonstration of the validity of this hypothesis. We compare the performance of firms which rely on hiring stars and spend less on employee development against firms which hire rarely and spend more on employee development. In an industry with strong network effects, firms which rely on hiring stars do less well than firms which concentrate on staff development. We find the opposite in industries with weak network effects.

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