# Team transfers as an adverse selection mitigant in employee poaching

Brian R. L. Coulter

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**Abstract**

Firms that poach employees often hire entire teams, rather than choosing specific individuals to recruit. These team transfers differ significantly in frequency across industries, and are concentrated in those with the greatest employee heterogeneity. In this paper, I present an adverse selection justification for team transfers that accords with these observations. When firms have superior information about their employees, firms that attempt to poach employees and employees that accept poaching offers both face an adverse selection problem. By transferring employees in groups, these adverse selection problem can be mitigated, if not completely eliminated.

## 1 Introduction

In June 2009, investment banker Benjamin Lorello and 35 of his colleagues resigned from UBS to join rival firm Jefferies & Co. Lorello orchestrated the "nearly completed lift-out" of the healthcare division, having negotiated a possible transfer with multiple firms before deciding on Jefferies & Co.[1] The transfer "inflicted enormous reputational, economic, and other harm on UBS":[2] UBS's healthcare division fell six divisions in the league tables in the year following.[3]

Large team transfers of ten or more individuals are common in investment banks; in legal firms team moves are smaller, but even more common. These

Coulter: Saïd Business School, Park End Street, Oxford, United Kingdom, OX1 1PG. Email: brian.coulter@sbs.ox.ac.uk. I am grateful to my supervisors, Alan Morrison and Joel Shapiro, for their support and encouragement. I am also grateful to Colin Mayer, John Thanassoulis, Oren Sussman and to seminar participants in Oxford. All errors are my own.
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[1]Zachary Mider and Ambereen Choudury, 'UBS Sues Jefferies After Losing Lorello, 35 Bankers,' *Bloomberg*, 25 June 2009.

[2]Financial Industry Regulatory Authority Dispute Resolution: UBS Securities LLC, Claimant, against Jefferies & Company, INC, Benjamin D. Lorello and Sage Kelly, Respondents. 22 June 2009.

[3]Cyrus Sanati, 'UBS Accuses Jefferies of Raiding Health Care Group,' *New York Times DealBook*, 25 June 2009.

movements cause significant disruptions to the 'poached' firm, and, as shown above, may even change wider industry dynamics. In more regulated professions, however, team transfers are unusual. Accounting and actuarial firms rarely, if ever, transfer teams of professionals. In this paper, I propose a model that justifies the use of team transfers, explains observed inter-industry differences and provides additional testable implications.

I argue that team transfers are often motivated by labour market information asymmetries. If it is impossible for outsiders to determine the most able individuals in a team, then it may be optimal for these outsiders to 'pool' team members.[4] This mitigates the information asymmetry, and thus the adverse selection problem faced by the outsider. As adverse selection is most severe when there is heterogeneity in employee ability, team transfers, as a mechanism to *overcome* adverse selection, are most prevalent in industries with the most heterogeneous employees. This accords with industry observations.

To formalize my proposed adverse selection justification for team transfers, I create two closely-related models of information asymmetry in employee poaching. Each examines the consequences of a particular form of information asymmetry; both generate qualitatively similar conclusions. In the model of team buying, the manager of the poaching firm sets the terms of the contract. She thus, in effect, 'buys' the team. In the model of team selling, an employee of the poached team sets the terms of the contract. In effect, he 'sells' the team of which he is part.

I first present the model of team buying. Managers' estimates of the total ability of individuals within a group at a rival firm are often more precise than estimates of the ability of specific individuals within the group. Put differently, outside managers know the total ability within another firm's division with greater precision than they know *who* contributes most to the total. This occurs because the achievements of a firm can generally be attributed to specific teams of individuals, but not to specific individuals within these teams. If firms attempt to poach employees, the employees' current employer(s) may match the offer only for the strongest workers. The poaching firm faces the Winner's Curse, and will poach only the weakest workers. If the poaching firm instead makes an offer to the entire group of employees, this adverse selection problem is mitigated, or even eliminated.

The model of team selling reaches similar conclusions. If an employee receives an offer from a firm, he faces an adverse selection in his coworkers-to-be. Firms with employees who are favourable with whom to work (either socially or through an indirect impact on remuneration) will be the least willing to offer a given contract. Therefore, employees may prefer to continue working with their present coworkers at a new firm, to avoid the adverse selection that obtains otherwise.

[4] Jeff Bailey, 'A Run on the Bankers,' *Fast Company,* November 2009.
In November 2009, PrivateBancorp poached a total of 160 bankers from Chicago's LaSalle Bank. Chairman Ralph Mandell specifically cites information asymmetry as a consideration in the design of transfer, and even went so far as to hire a high-ranking human resources executive to mitigate the problem.

With these two related models, I identify conditions under which a poaching firm optimally offers a contract to an entire team, as opposed to particular individuals. When the poaching firm is uncertain of the distribution of ability between the employees, there is a sufficient difference in ability between employees, and the cost of transferring employees is sufficiently low, the poaching firm makes a *joint* take-it-or-leave-it offer. Similarly, if the employee(s) being poached are uncertain of the quality of employees at their future employer, and coworker quality impacts employee utility, then a team transfer may be optimal.

I extend these basic models in two ways. First, I allow managers to exert effort to keep the ability of their employees secret. I find that, in general, managers have an incentive to exert some non-zero effort to obfuscate this ability information. This obfuscation exacerbates the information asymmetry in the labour market, and makes it more difficult for poaching firms to steal employees.[5] This also suggests that endogenizing the information structure would leave my results unchanged. I find a surprising second result, too. If team transfers are frequent, then this incentive may reverse. If poaching firms are able to enact team transfers, then managers may have an incentive to *provide* information to potential raiders. This would encourage raiders to selectively poach employees, rather than executing more damaging team transfers.

Second, I illustrate that accurate, verifiable performance indicators will tend to crowd out team contracts. Verifiable performance indicators facilitate the use of screening contracts, which overcome adverse selection problems more cheaply than team transfers.

I conclude with a discussion of my results, and propose additional testable implications of this research.

The paper is arranged in seven sections. Section 2 describes the existing literature to which this paper contributes. Section 3 describes and solves the model of team buying. Section 4 describes and solves the model of team selling. Section 5 discusses the results of the previous sections. Testable implications are described in Section 6. Section 7 concludes.

## 2 Relevant Literature

While team transfers are rarely the focus of academic study, the importance of teams themselves is well-established. The research most relevant to an analysis of team transfers is that on team human capital, as begun by Mailath and Postlewaite (1990). This paper defines 'network human capital' that exists between the members of a team due to their repeated interaction. The authors emphasize that the knowledge and skills are relevant to the group of people working together, rather than the firm for which they work. Examples of this include "whom to contact about particular problems that may arise and [...] the strengths and weaknesses of [...] coworkers" (Mailath and Postlewaite, 1990, pp. 369-370). This suggests that team transfers may occur to maintain the network

[5] This parallels much of the literature on partnerships. Partnerships work to render ability opaque, such that any poaching firm faces significant adverse selection.

human capital that exists between the different employees. Similar arguments are put forward in Weber and Camerer (2003). This paper suggests the existence of team-specific communication methods that are destroyed when teams cease to work together. While it does not explicitly consider team transfers, maintenance of team-specific communication methods serves as an additional incentive to preserve existing team structures through team transfers.

I consider team transfers as a mitigant of adverse selection in the labour market for professionals. My application of adverse selection is most similar to the work of Gibbons and Katz (1991). In their paper, the authors create a model wherein managers choose which employees to fire during a downturn. As managers optimally fire their least productive employees, being fired is a negative signal about quality. In their paper, the authors show empirically that fired workers spend longer searching and are less successful in finding new jobs than otherwise identical workers who lost their jobs for exogenous reasons. This research is further supported by the more recent empirical work of Doiron (1995). These approaches are predicated on an asymmetry of information between the current employer and other potential employers. In the present paper, I use this information asymmetry, but apply it in a slightly different manner. Rather than managers actively deciding which employees to fire, they reactively decide which wage offers to match. The outcome is similar: managers find it optimal to match offers given to high ability employees and allow low ability employees to be poached away.

This paper also contributes to the existing literature on employee poaching, most specifically to the work of Jovanovic (1979) and Lazear (1986). Jovanovic (1979) creates a model where workers have abilities that match best with certain firms. The longer employees work at a firm, the more precisely their match with the current firm becomes known. The firm either continues to employ the worker, or searches for a replacement who is better suited to the particular firm. This model is expanded with a greater focus on employee poaching in Lazear (1986). In this model, employees' abilities again match better with one employer than another. The employers are not always informed about this optimal match, however, leading to the potential for outside firms to poach employees. In the particular model, successful poaching can take place only when both parties are informed; otherwise the incumbent uses the poaching firm's bid to update its prior and matches the offer.

In the models of this paper, firms have random marginal products of labour. This endogenously creates an incentive for positive assortative matching, allowing for the realistic conclusion that both high and low ability employees are transferred in equilibrium.[6]

In the extensions to the basic model, I consider the ability of a firm manager to obfuscate the ability of her employees. My conclusion (that obfuscation is often optimal) matches the work of Morrison and Wilhelm (2004). Morrison and Wilhelm (2004) show that firms may actively choose an opaque organizational

[6]The model of Lazear (1986) suggests that only high-ability employees are transferred in equilibrium.

structure to exacerbate the adverse selection problem faced by firms that attempt to poach employees. Professional service partnerships, in particular, with their "up-or-out" promotions and largely homogeneous wage structures, make it very difficult for outsiders to differentiate between employees. Employees are the most important asset for professional service firms, and it is therefore not surprising that they lead the way in ability obfuscation. Any firm poaching employees faces adverse selection to some extent; my model and that of Morrison and Wilhelm (2004) suggest that professional service firms often exert costly effort to magnify it.

# 3 Model of Team Buying

To illustrate the adverse selection motivation for team transfers, I create and analyze a two-period model of two profit-maximizing firms. In the first period, the incumbent firm (I) hires an exogenously given number of employees, $n$, where $n \in \{1, 2\}$. Employee $i$'s ability, $a_i$, is high ($a_H$) or low ($a_L$), and is initially hidden from the employee and both firms. Workers are of high ability, $a_H$, with probability, $p < 1/2$. Thus, $\bar{a} = pa_H + (1-p)\, a_L$ is the average ability of employees. Upon the acceptance of a contract, employee ability is revealed to both the employee and his employer. (By convention, workers are male, and firms/managers are female.) Ability is non-verifiable. All employees have an outside option that pays $\bar{u}$.

At the end of the first period, all players receive a costless, perfect signal of the *sum* of the abilities of the employee(s) of the incumbent, $\hat{a} = \sum a_i$. The poaching firm (P) can then offer wage contracts to some or all of the incumbent's employees. Contracts are take-it-or-leave-it offers; they are public and costlessly observable by all players. This contracting approach follows Gibbons and Katz (1991).

After the poaching firm offers contracts, the incumbent can offer contracts to the employees as well. Employees accept the contract that pays the highest wage in expectation. Transferring an employee costs the poaching firm $c_T$.

After transfers have occurred, both firms may hire workers from a (common) labour pool. No firm may ever employ more than $n$ employees. Recruiting and training a new hire costs $c_R$. It is more costly to recruit and train a new hire than to transfer an employee from another firm:

$$c_R > c_T > 0 \tag{3.1}$$

In each period of the game, each firm has available projects of a certain quality. Project quality for firm, $j \in \{I, P\}$, in each period, is $b^j$. The revenue generated by an employee of ability, $a_i$, on a project, $b$, is $a_i b$. Project quality is independently distributed, and redrawn for each period. Project quality is high with probability $g$. Project quality realizations are not observable by the other firm.[7] Revenue is not verifiable.[8]

I make two additional assumptions. First, I assume that all employers (and particularly those with low quality projects) generate positive profit from hiring an average worker from the labour pool, training them, and employing them:

$$\bar{a}b_L > \bar{u} + c_R \tag{3.2}$$

Second, I assume that employers (and particularly those with high quality projects) receive greater profit by continuing to employ trained low ability employees than by hiring replacement employees from the labour pool:[9]

$$b_H a_L > b_H \bar{a} - c_R \tag{3.3}$$

A simplified extensive form of the two-employee model is shown in Figure 3.1. The information set obtains when the employees are of different abilities. The poaching firm is thus unable to differentiate which employee is high ability.

## 3.1 Model Solution

I first define the general equilibria, and then solve the $n = 1$ and $n = 2$ models sequentially.

In identifying the optimal contracts, I apply the Revelation Principle of Myerson (1979) and consider only contracts that incentivize truthful reporting by employees. I follow Laffont and Martimort (2002) and define a contract as a mapping from employees' reports to a transfer (wage), and a quantity (employment). I differ slightly from Laffont and Martimort (2002) in that the 'quantity' for each employee is a binary variable, $e_i \in E \equiv \{0, 1\}$, stipulating whether acceptance of the contract requires employment ($e_i = 1$) or not ($e_i = 0$). In this way, the wage, $w_i$, offered to an employee is either a traditional wage offer (if $e_i = 1$), or a lump-sum payment (if $e_i = 0$).[10] All employees must accept a contract for it to be valid. (For example, a two-employee contract is valid only if both employees accept it: it cannot be 'split'.) I further allow contracts to be redistributable ($d = 1$), if the payment can be allocated between workers, or not ($d = 0$).

The set of all possible reports is $A$, the set of all possible abilities: $A = \{a_H, a_L\}$. The set of all possible wages is $W$. In the basic setup of the model, there are no verifiable performance metrics, and thus wages are scalar: $W \in \mathbb{R}_{\geq 0}$.

Contracts are represented by $\theta$, so $\Theta$ is the set of all possible contracts.

[7]The unobservability (and redrawing) of project quality is for simplicity only, and does not change the results of the model.

[8]While total revenue for a firm is likely verifiable through audited financial statements, the contribution to revenue from a small team within the company is unlikely to be.

[9]These assumptions are largely analogous to a more complex model in which employee ability increases as a function of the time employed.

[10]This setup allows a payment to an employee who is *not* employed. As will be shown, this could potentially be optimal to incentivize the truthful disclosure of low-ability.

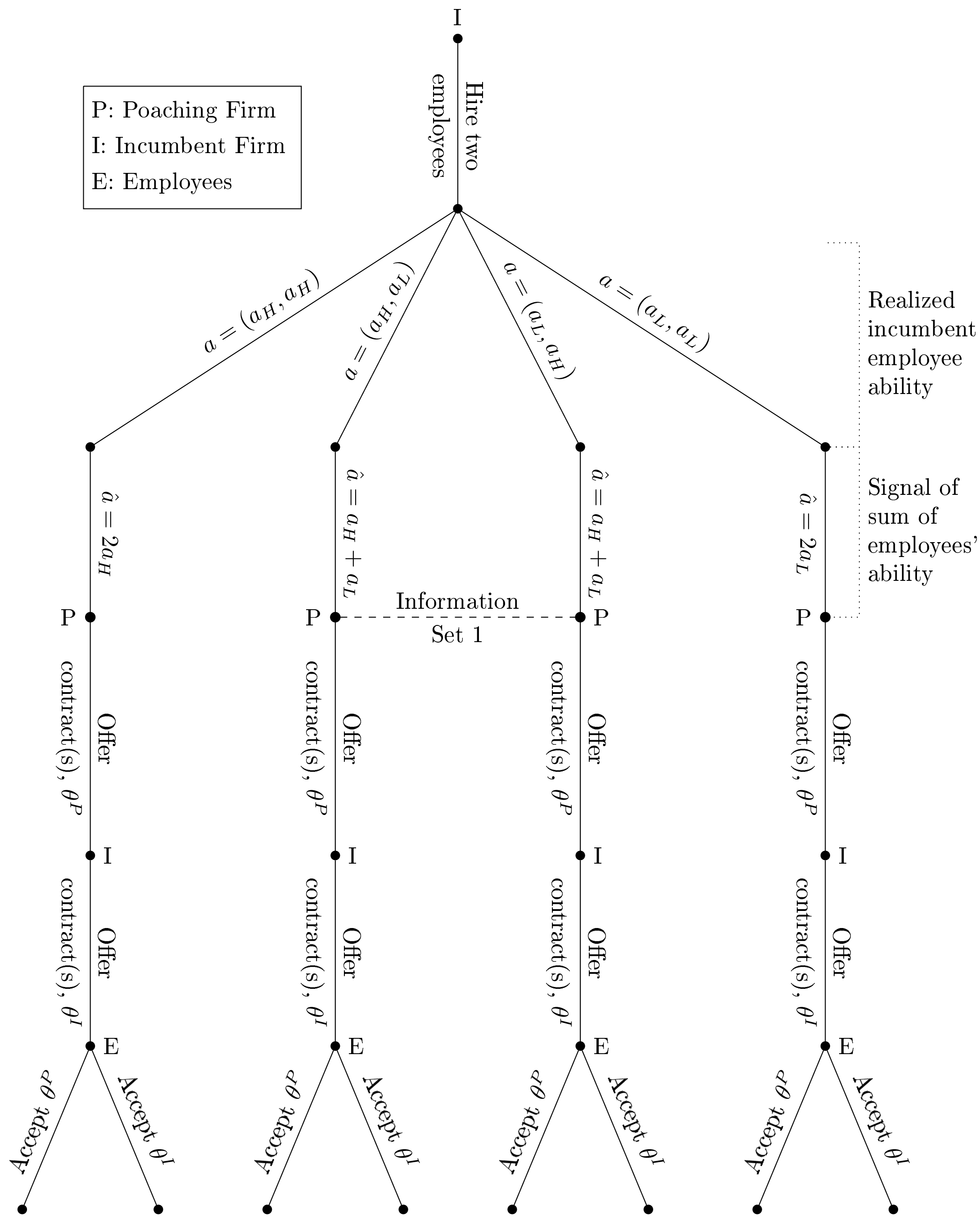


Figure 3.1: Extensive Form of Team Buying Model

**Definition 1.** A contract, $\theta$, maps the report of a set of $n \geq 1$ employees into a set of payments, $w_i$, and employment offers, $e_i$, for each employee. Contracts are redistributable ($d = 1$) or not ($d = 0$).

$$\theta \, : \, A^n \mapsto (W, \, E)^n \times \{0, 1\} \, : \, r^n \mapsto (w_i, \, e_i)^n \times d \tag{3.4}$$

Firm's beliefs are represented by a probability distribution over each of the $n$ employees of the incumbent firm. Workers are of two types: a specific belief, $\xi$, is thus an $n$-dimensional Bernoulli probability distribution. As an example, a belief in the $n = 2$ model is a bivariate Bernoulli distribution corresponding to the probability that each employee of the incumbent is high or low ability. The set of all possible $n$-dimensional Bernoulli probability distributions is the set of all possible beliefs, $\Xi$. The incumbent has full information: her beliefs are trivial.

**Definition 2.** A belief, $\xi$, is an $n$-dimensional Bernoulli probability distribution, within the set of all possible $n$-dimensional Bernoulli distributions, $\Xi$.

The set of all possible realizations for the sum of ability, $\hat{a}$, is $\hat{A}$. Therefore, $\hat{A}$ is the set of possible signals received by both the incumbent and the poaching firm.

**Definition 3.** A poaching firm strategy, $\psi_P$, maps the set of possible realizations of the sum of abilities, $\hat{A}$, into the sets of possible beliefs, $\Xi$, and contracts, $\Theta$.

$$\psi_P \, : \, \hat{A} \mapsto \Xi \times \Theta \, : \, \hat{a} \mapsto \left(\xi, \, \theta^P\right) \tag{3.5}$$

**Definition 4.** A incumbent strategy, $\psi_I$, maps the product of the sets of ability realizations, $A$, and contracts (offered by the poaching firm), $\Theta$, into the set of contracts (offered by the incumbent), $\Theta$.

$$\psi_I \, : \, A \times \Theta \mapsto \Theta \, : \, \left(a, \, \theta^P\right) \mapsto \theta_i^I \;\, \forall \; i \in n \tag{3.6}$$

The poaching firm cannot differentiate between the different employees of the incumbent, and therefore must offer them the same contract. The incumbent, however, can differentiate between them. She can condition her response to the contract(s) offered by the poaching firm on the specific employee. Therefore, while the poaching firm strategy generates a single contract, the incumbent strategy generates a contract for each of the $n$ employees it employs.

As the extensive form of the model contains an information set, I solve for the Perfect Bayesian Equilibria of the game.

**Definition 5.** A *Perfect Bayesian Equilibrium* of the model is an ordered triple, $(\psi_I, \psi_P, \xi)$, of strategies $\psi_I$, $\psi_P$, and poaching firm belief, $\xi$. Each player's strategy maximizes that player's expected profit, subject to the strategy of the other player and the belief (if applicable) of that player. Beliefs are derived from Bayes' Law where possible.

I also define two additional variables that will be useful in my analyses:

- $\Delta_a = a_H - a_L$, the *ability gap* - a measure of the difference in ability between employees.
- $\Delta_b = b_H - b_L$, the *project gap* - a measure of the difference in project qualities (and thereby marginal products of labour).

I now solve the model.

### 3.1.1 Baseline Solution: One Employee

I solve the simplest case first, in which the incumbent hires only one employee. The poaching firm offers a 'simple contract' (within $\Theta$) to this one employee.

**Definition 6.** A *simple contract* offers a flat wage, irrespective of the report of the employee, in exchange for employment ($e_i = 1$).

In the single employee case, all optimal contracts are simple contracts because firms have full information. The report is thus uninformative and there is no reason to offer a payment to incentivize truthful disclosure.

I define $\Phi_i$ to be the probability that a given wage contract (offered to employee $i$) is accepted. The profit function for the poaching firm is as follows:

$$\Pi = \Phi_i \left(\hat{a}b^P - w - c_T\right) + (1 - \Phi_i)\left(\bar{a}b^P - \bar{u} - c_R\right) \tag{3.7}$$

If the contract is rejected, then the poaching firm must hire a random employee from the labour pool. This employee has expected ability, $\bar{a}$, costs $c_R$ to recruit and train, and requires a wage of at least $\bar{u}$. If the contract is accepted, then the poaching firm must pay the employee the agreed-upon wage, $w$, and the costs of transferring the employee, $c_T$. The employee has known ability, $\hat{a}$. The probability, $\Phi_i$ is a function of the wage offered.

The poaching firm selects a contract, $\theta$, paying a wage, $w$, to maximize Equation [3.7]. I derive these contracts.

I first solve the optimal contract offered by a poaching firm of the same quality as the incumbent employee's ability. The poaching firm will bid such that an incumbent of the opposite type is indifferent between matching the offer and hiring a new employee from the labour pool.

Consider, then, a poaching firm with projects $b_x$, and an employee with ability, $a_x$, where $x \in \{L, H\}$. The poaching firm offers a wage, $w$, such that an incumbent with projects $b_y$; $y \neq x$, is indifferent between matching the bid and hiring a new employee from the labour pool.

$$b_y a_x - w = b_y \bar{a} - \bar{u} - c_R \tag{3.8}$$

Thus, for a poaching firm with good projects poaching a high ability employee, the wage offered is:

$$w = b_L \left(a_H - \bar{a}\right) + \bar{u} + c_R \tag{3.9}$$

A poaching firm with bad projects poaching a low ability employee offers a wage:

$$w = b_H\left(a_L - \overline{a}\right) + \overline{u} + c_R \tag{3.10}$$

The opposite situation arises if the incumbent employee's ability is different from the quality of the poaching firm's project(s). The poaching firm bids such that *it* is indifferent between the incumbent matching the offer or allowing the employee to be poached.

Now consider a poaching firm with projects $b_x$, and an employee with ability, $a_y$, where $x \neq y$. The poaching firm offers a wage, $w$, such that it is indifferent between successfully hiring the employee and hiring a new employee from the labour pool. These contracts will not be accepted in equilibrium.

$$b_x a_y - w - c_T = b_x \overline{a} - \overline{u} - c_R \tag{3.11}$$

Thus, for a poaching firm with good projects poaching a low ability employee, the wage offered is:

$$w = b_H\left(a_L - \overline{a}\right) + \overline{u} + c_R - c_T \tag{3.12}$$

A poaching firm with bad projects poaching a high ability employee offers a wage:

$$w = b_L\left(a_H - \overline{a}\right) + \overline{u} + c_R - c_T \tag{3.13}$$

In summary, the poaching firm can only profitably poach an employee of the same ability as its type from an incumbent with a different type. This is derived through an application of positive assortative matching, and the non-zero transaction cost, $c_T > 0$. These results are summarized in Lemma 1.

**Lemma 1.** *The poaching firm optimally offers a simple contract. The wage, $w$, conditioned on realized ability, $\hat{a}$, and the project quality of the poaching firm, $b^P$, is as follows:*

| $\hat{a}$ | $b^P$ | $w$ |
|---|---|---|
| $a_L$ | $b_L$ | $b_H\left(a_L - \overline{a}\right) + \bar{u} + c_R$ |
| $a_L$ | $b_H$ | $b_H\left(a_L - \bar{a}\right) + \bar{u} + c_R - c_T$ |
| $a_H$ | $b_L$ | $b_L\left(a_H - \bar{a}\right) + \bar{u} + c_R - c_T$ |
| $a_H$ | $b_H$ | $b_L\left(a_H - \bar{a}\right) + \bar{u} + c_R$ |

Lemma 1 identifies two types of transfers. First, a firm with high quality projects can poach a high ability worker from an incumbent with low quality projects (bottom row). This is 'classic' employee poaching: a poaching firm with a high marginal product of labour attempts to steal away the best employee(s) from the incumbent. Second, a poaching firm with low quality projects can poach a low ability worker from an incumbent with high quality projects (top row). This occurs because a firm with low quality projects has a comparative advantage in employing low ability employees, relative to a firm with high quality projects. The low-type firm can therefore bid up the wage, $w$, of the low ability employee to a level such that three conditions simultaneously hold:

- The employee weakly prefers to move to the poaching firm: $w \geq \bar{u}$.
- The poaching firm prefers hiring the employee at this wage to hiring a random worker from the labour pool: $b_L a_L - w - c_T > b_L \bar{a} - \bar{u} - c_R$.
- The incumbent firm prefers hiring a random worker from the labour pool to paying the worker the bid-up wage: $b_H \bar{a} - \bar{u} - c_R > b_H a_L - w$.

The above restrictions yield two constraints that must be simultaneously satisfied for a low ability transfer to be effected:

$$w > \bar{u} + c_R - b_H (\bar{a} - a_L) \tag{3.14}$$

$$w < \bar{u} + c_R - c_T - b_L (\bar{a} - a_L) \tag{3.15}$$

A continuum of wages simultaneously satisfies Equations [3.14] and [3.15] whenever $c_T < (b_H - b_L)(\bar{a} - a_L)$. Thus, transfers of low ability employees can occur whenever the cost of transferring employees is low, there is a sufficient difference between good and bad projects, and the average employee is sufficiently more able than the low ability employees.

The poaching firm moves first, and offers the wage that renders high-type incumbents indifferent between matching the offer and hiring a new employee. This wage must also be accepted by the employee. This implies the optimal wage is $w = \min [\bar{u} + c_R + b_H (a_L - \bar{a}), \overline{u}]$.[11]

**Lemma 2.** *Employee transfers occur in one of two ways:*

1. *High ability employee transferred from firm with low quality projects to firm with high quality projects;*
2. *Low ability employee transferred from firm with high quality projects to firm with low quality projects.*

### 3.1.2 General Solution: Two Employees

I now consider the $n = 2$ model, in which the incumbent hires two employees in the first period.

Equation [3.16] depicts the profit that the poaching firm generates. For each of the two projects, the poaching firm either poaches an employee from the incumbent, or hires a random employee from the labour pool. If the poaching firm poaches, her wage offer of $w_i$ is accepted with probably $\Phi_i$. If the offer is

[11] So long as $c_T < (b_H - b_L)(\bar{a} - a_L)$ and $c_R > c_T - b_L (a_L - \bar{a})$, there is an optimal low ability employee transfer contract. I assume $c_R + b_H (a_L - \bar{a}) > 0$ for simplicity. This implies that costs of hiring must outweigh costs of transfer, such that the poaching firm prefers poaching to hiring form the labour pool.

accepted, the expected ability of the poached employee is $E\left[a_i|\hat{a},\, w^P > w^I\right]$. If the offer is rejected, an employee is hired from the labour pool with expected ability, $\overline{a}$.

$$\Pi = \sum_{i=1}^{2}\left(\Phi_i\left[b^I E\left[a_i|\hat{a},\, w^P > w^I\right] - w_i - c_T\right] + (1-\Phi_i)\left[b^I\bar{a} - \bar{u} - c_R\right]\right) \tag{3.16}$$

The optimal contracts maximize profit, $\Pi$, as defined in Equation [3.16].

When the realized sum of abilities is either $\hat{a} = 2a_L$ or $\hat{a} = 2a_H$, there is perfect information. Thus, the optimal contracts follow directly from the solution to the one-employee case, Lemma 1.

**Lemma 3.** *When there is no uncertainty over employee abilities, simple contracts are optimal. The wage offers made to both employees of the incumbent follow.*

| $\hat{a}$ | $b^P$ | $w(a)$ |
|---|---|---|
| $2a_L$ | $b_L$ | $b_H(a_L - \bar{a}) + \bar{u} + c_R$ |
| $2a_L$ | $b_H$ | $b_H(a_L - \bar{a}) + \bar{u} + c_R - c_T$ |
| $2a_H$ | $b_L$ | $b_L(a_H - \bar{a}) + \bar{u} + c_R - c_T$ |
| $2a_H$ | $b_H$ | $b_L(a_H - \bar{a}) + \bar{u} + c_R$ |

I henceforth focus on the cases when $\hat{a} = a_H + a_L$, so that the poaching firm is uncertain which employee is high ability. I refer to the different types of poaching and incumbent firms as low and high ($l$ and $h$, respectively), based on their project quality.

Until this point, all optimal contracts have been simple contracts. When the poaching firm is uncertain of the ability of specific employees, it may be optimal to offer more complex contracts. I define three below.

**Definition 7.** An individual contract offers a wage to a single employee in exchange for employment.

**Definition 8.** A team contract offers wages to two employees, in exchange for the employment of both. Team contracts are redistributable.

**Definition 9.** A selection contract is made to two employees. The employee who reports high ability is offered a wage in exchange for employment, and the employee who reports low ability is paid a lump-sum. Selection contracts are not redistributable.

The simple contract defined earlier is thus a special case of individual contract, in which the wage offer does not vary with the employee's report.

Next, I consider the design of an optimal selection contract, offered by an $h$-type poaching firm.

If the incumbent is type $h$, then the incumbent values the high ability employee as much as the poaching firm, and a transfer cannot profitably be effected. Any privately optimal wage offering of the poaching firm will be outbid by the incumbent. Therefore, the design of the optimal selection contract considers a type $l$ incumbent. To poach the high ability employee requires a wage of $b_L(1-p)\Delta_a+\bar{u}+c_R$. Therefore, to truthfully disclose, the low ability employee must be assured remuneration of at least this much. The low ability employee would otherwise receive an offer from the poaching firm for $-b_H p\Delta_a+\bar{u}+c_R-c_T$. The difference between these two, then, must be paid as a lump-sum to the employee. The difference is $c_T+b_L(1-p)\Delta_a+b_H p\Delta_a$. This allows the creation of the contract that is offered to both employees:

**Lemma 4.** *The optimal selection contract is as follows.*

1. *If the two employees disclose different types:*
   (a) *high ability employee receives wage offer $b_L(1-p)\Delta_a+\bar{u}+c_R$ in exchange for employment ($e_i=1$).*
   (b) *low ability employee receives payment $c_T+b_L(1-p)\Delta_a+b_H p\Delta_a$, conditional only on acceptance of the contract ($e_i=0$).*
2. *If the two employees disclose the same type:*
   (a) employees receive wage offer$-b_H p\Delta_a+\bar{u}+c_R-c_T$ in exchange for employment ($e_i=1$).[12]

I now identify the optimal contracting strategy of a poaching firm of type $h$. If the poaching firm offers the optimal selection contract, as defined in Lemma 4, the contract will be accepted if and only if the incumbent is of type $l$. In this situation, the profit of the poaching firm will be:

$$\Pi^P_{selection}=[b_H(a_H+a_L)-2b_L(a_H-\bar{a})]-2(\bar{u}+c_R+c_T) \tag{3.17}$$

Equation [3.17] includes the revenue generated by the two employees of different abilities, $b_H(a_H+a_L)$, less the wage cost of the poached employee, $b_L(1-p)\Delta_a+\bar{u}+c_R$, the cost of the new hire, $\bar{u}+c_R$, and the lump sum transfer to the incumbent's low ability employee, $c_T+b_L(1-p)\Delta_a+b_H p\Delta_a$.

If, instead, the poaching firm employs the optimal team contract, it selects wages that makes an incumbent firm of type $l$ indifferent between matching the (joint) offer and replacing the workers from the labour pool.

[12]This is an off-equilibrium path. I consider that the poaching firm, faced with off-equilibrium actions by the employees, offers both employees that wage that would be offered if they were low-ability with certainty.

**Lemma 5.** *The optimal team contract is as follows.*

1. *If the two employees disclose different types:*

   (a) *high ability employee receives wage offer* $b_L(1-p)\Delta_a + \bar{u} + c_R$ *in exchange for employment* ($e_i = 1$)*.*

   (b) *low ability employee receives wage offer* $-b_L\Delta_a p + \bar{u} + c_R$*, in exchange for employment* ($e_i = 1$)*.*

2. *If the two employees disclose the same type:*

   (a) employees receive wage offer $-b_H p\Delta_a + \bar{u} + c_R - c_T$ in exchange for employment ($e_i = 1$).

When the team contract defined in Lemma 5 is offered, the profitability of the type $h$ poaching firm, conditional on the contract being accepted and the remaining worker being hired from the common labour pool, is:

$$\Pi^P_{team} = \Delta_b(a_L + a_H) + 2b_L\bar{a} - 2(\bar{u} + c_R + c_T) \tag{3.18}$$

The profit generated by the team contract exceeds the profit generated by the selection contract, both conditional on acceptance, by an amount as below:

$$\Pi_{team} - \Pi_{selection} = b_L\Delta_a > 0 \tag{3.19}$$

I next consider when group transfers generate greater profit than hiring employees directly from the labour pool for type $h$ poaching firms. Group transfers generate greater profit than hiring new employees when:

$$\Delta_a\Delta_b(1-2p) - 2c_T > 0 \tag{3.20}$$

The optimal contracts under uncertainty are summarized in Proposition 1.

**Proposition 1.** *When the poaching firm is uncertain about the ability of specific employees of the incumbent:*

- $l$ *types offer a simple contract paying wage of* $-b_H p\Delta_a + \bar{u} + c_R$*.*
- $h$ *types*
  - *Offer the team contract in Lemma 5 if* $\Delta_b\Delta_a(1-2p) - 2c_T > 0$*.*
  - *Offer a simple contract paying wage* $-b_H p\Delta_a + \bar{u} + c_R - c_T$*, otherwise.*

Proposition 1 describes the strategy used by the poaching firm when it is uncertain of the ability of the incumbent's employees. This occurs when $\hat{a} = a_L + a_H$. Individual poaching of low ability employees is always attempted by $l$ type poaching firms. The type $h$ poaching firm chooses from two contracts the one that will yield the greatest expected profit.

**Corollary 1.** *Selection contracts are not used in equilibrium.*

Corollary 1 obtains because the amount that must be paid to the low ability employee to incentivize truthful disclosure is strictly greater than the cost of hiring the low ability employee, transferring the employee to the poaching firm, and the opportunity cost of not employing a labour pool worker of expected ability, $\bar{a}$. This is shown by Equation [3.19]. The greater the project gap, $\Delta_b$, the *less* that a high-type poaching firm offers to an employee with low-ability. Relative to an average employee, the opportunity cost of employing a low ability employee is increasing in the marginal product of labour, $b_H$, of the high-type poaching firm. Therefore, the better the available projects, the lower a wage offer can be made to the employee, and the *greater* must be the corresponding payment, to incentivize truthful disclosure. This greater required payment exactly offsets the greater 'need' for high ability employees as the project gap widens. Therefore, the cost of incentivizing truthful disclosure outweighs the benefit of hiring *only* the high ability employee.[13]

**Corollary 2.** *High type poaching firms poach teams from low type incumbents when*

1. *The ability gap,* $\Delta_a = a_H - a_L$*, is large.*
2. *The project gap,* $\Delta_b = b_H - b_L$*, is large.*
3. *The cost of transferring employees,* $c_T$*, is small.*
4. *The proportion of high ability employees,* $p$*, is low.*

Corollary 2 illustrates that team contracts are optimal when the ability gap is high, the project gap is high, the cost of transferring an employee is low, and high ability employees are rare. As I have shown, team contracts are the cheapest mechanism through which the poaching firm can acquire the high ability employee. The incentive to use the team contract and acquire the high ability employee is therefore increasing in the value of the employee relative to other employees: the ability gap, $\Delta_a$. Similarly, the greater the project gap, $\Delta_b$, the greater the difference in valuation for a high ability employee between a firm with good projects and a firm with bad projects. This allows a significant enough difference in valuation to overcome the cost of transfer, $c_T$. Similarly, the rarer the high ability employees, the greater the incentive to acquire them.

## 3.2 Extension One: Ability Obfuscation

For the first extension, I modify the above model such that the sum of abilities is revealed with probability $\chi$. With complementary probability $1 - \chi$, the ability of each individual employee is revealed to the poaching firm. The manager of the

[13] Inefficiency of selection contracts relies on an implicit assumption that the wage offer for a low ability employee by a high-type firm is weakly greater than the outside option. Mathematically, this assumes $b_H(a_L - \bar{a}) + c_R - c_T \geq 0$, which is violated for very high project gaps. With a very high project gap, high quality poaching firms do not offer wages to low-type employees, and the labour market breaks down.

incumbent firm can exert effort at a cost, $C(\chi)$, in choosing $\chi$, where $C'(\cdot) > 0$. The manager chooses how much effort to exert *before* witnessing the ability of the employees: therefore, effort choice cannot be used as a signaling device.

The information revealed is significant only when the employees are of different abilities. (When employees have the same ability, the sum of abilities necessarily implies the ability of each specific individual.) I list the optimal contracts in each state in Table 1.

| $b^P$ | Visibility | Optimal Contracts |
|---|---|---|
| $l$ | Visible | Defined as in Lemma 1 |
| $l$ | Hidden | Defined as in Proposition 1 |
| $h$ | Visible | Defined as in Lemma 1 |
| $h$ | Hidden | Defined as in Proposition 1 |

Table 1: Optimal Contracts (Managerial Obfuscation Extension)

Now, I consider the expected profit of an incumbent with employees of different abilities, given a specific poaching firm type. I define a variable, $\Omega_y^x$, to be the *incremental* profit of the incumbent firm when its employees' abilities are obfuscated, relative to ability information being observable. Subscript $y \in \{l, h\}$ is the type of the *poaching* firm, and superscript $x \in \{T, E\}$ is whether team poaching is possible (T), or only individual poaching (E). As an example, $\Omega_h^T$ is the incumbent's incremental profit from having ability information obfuscated when the poaching firm is of type $h$ and team transfers are used. First, I consider the value of obfuscation when the poaching firm poaches employees individually.

$$\Omega_h^E = \Omega_l^E = b_L(a_H - \overline{a}) + b_H(\overline{a} - a_L) - c_T > 0 \tag{3.21}$$

Equations [3.21] illustrates that when poaching firms poach individually, there is a benefit (to profit) of having ability information hidden. Hiding information forces poaching firms to make the same offer to both employees. Thus, the wage that the incumbent ends up paying its high ability employee is lower than it would be if the poaching firm had better information. This presents an incentive for managers to obfuscate information.

Next, I consider the value of obfuscation when the poaching firm is able to execute team transfers. I focus on high type poaching firms, as low-type poaching firms are inherently unable to execute team transfers.

$$\Omega_l^T = -(b_H - b_L)(\overline{a} - a_L) - c_T < 0 \tag{3.22}$$

Equation [3.22] shows that the incremental profit of hiding ability information is *negative* when poaching firms can execute team transfers. This occurs because hiding information causes the use of team transfers; poaching firms would otherwise poach only the stronger employee. As successful team transfers yield the lowest possible profit to the incumbent firm, it may even have an incentive to *provide* information to the poaching firm to prevent them. This is a complete reversal from the outcome when team transfers are impossible.

The insights taken from Equations [3.21] and [3.22] are combined in Proposition 2.

**Proposition 2.** *Managers have an incentive to hide the ability of their employees when firms poach employees individually. When firms poach teams, managers may have an incentive to* provide *information to the poaching firm.*

In this analysis, I have treated the execution of team transfers as binary: they occur or they do not. In reality, the key factor is the *frequency* of team transfers. If team transfers are rare, ability obfuscation may be rational. If, instead, team transfers are very common, it generally will not be (and in extreme cases, it may be optimal to provide information to poaching firms). This accords with the existing literature on professional service partnerships. Consulting firms, as an example, exert significant effort in the obscuring of the ability of their employees. Team transfers do occur in consulting firms, but they occur rarely enough to justify this obfuscation.

## 3.3 Extension Two: Performance Metric

For the second extension, I modify the original model to allow contracting over a verifiable per-employee performance metric, $\gamma_i = a_i + \epsilon_i$, with noise term, $\epsilon_i \sim N\left(0, \sigma_\epsilon^2\right)$. Employees are risk-averse, and have exponential utility, $u(w) = 1 - e^{-\rho w}$, for a given wage, $w$. Applying well-known results for exponential utility, if a given wage pays $w = \alpha + \beta\gamma$, then the certainty equivalent for the employee of this wage is $w = \alpha + \beta a - \frac{1}{2}\rho\beta^2\sigma_\epsilon^2$.

I utilize exponential utility functions, and impose a linear wage contract restriction for simplicity. More general contracts/utility functions would complicate the analysis for no additional insight. As an alternative, in the Appendix, I illustrate the outcome if the performance metric is noisy in a Bernoulli sense. Qualitatively, the same equilibrium outcome arises.

The optimal contract minimizes the expected wage conditional on acceptance, subject to the constraint that only high ability employees accept the contract.

$$\min_{\alpha,\beta} w = E\left[\alpha + \beta\gamma\right] \tag{3.23}$$

Subject to:

$$\alpha + \beta a_H - \frac{1}{2}\rho\beta^2\sigma_\epsilon^2 \quad \geq \quad b_L\left(a_H - \bar{a}\right) + \bar{u} + c_R \tag{3.24}$$

$$\alpha + \beta a_L - \frac{1}{2}\rho\beta^2\sigma_\epsilon^2 \quad \leq \quad b_L\left(a_L - \bar{a}\right) + \bar{u} + c_R \tag{3.25}$$

The optimal contract solves Equation [3.23], subject to the constraints in Equations [3.24] (high ability employees accept contract) and [3.25] (low ability employees do not).

**Lemma 6.** *The optimal contract that integrates performance metrics pays a wage,* $w = \bar{u} + c_R + b_L (\gamma - \bar{a}) + \frac{1}{2}\rho b_L^2 \sigma_\epsilon^2$.

Conditioning wages on performance measures will only be optimal when there is uncertainty about the ability of employees. (There is no need to incentivize effort, and adding randomness to the pay of employees imposes a deadweight cost on them.)[14]

Lemma 6 identifies the best possible screening contract that utilizes performance metrics. Offering this contract is only optimal, however, if it yields greater profit in expectation than offering the team contract. This occurs when:

$$\Delta_a \Delta_b (1-p) > \frac{1}{2}\rho b_L^2 \sigma_\epsilon^2 + c_T \tag{3.26}$$

The greater the ability gap, $\Delta_a$, the project gap, $\Delta_b$, and the rarity of high ability employees, $(1-p)$, the greater the incentive to acquire the high ability employee. This must outweigh the costs of transferring the employee, $c_T$, and the utility cost imposed on the employee through the use of the noisy performance metric, $\frac{1}{2}\rho b_L^2 \sigma_\epsilon^2$. Therefore, for large risk aversion and/or noisy performance metrics, the screening contract cannot profitably be used. The utility cost imposed by the noisy performance metric on the workers is too great to employ them profitably. For nearly risk-neutral employees, though, and precise performance metrics, this contract yields greater expected profit than all other contracts. When performance metrics are precise and/or workers are nearly risk-neutral, the utility cost of screening employees is very low. This contract then overcomes adverse selection without any excess payment to the worker or the incumbent, and thus leads to an efficient allocation of workers in the cheapest manner possible.

**Proposition 3.**

- *When employees are sufficiently risk-neutral, and there exists a sufficiently precise, verifiable performance metric, contracts based on the performance metric crowd out team transfers.*

- *When employees are sufficiently risk-averse, and the performance metric is sufficiently noisy, the contracts offered are identical to those in Section 3.1.2 (the performance metric is ignored).*

# 4 Model of Team Selling

To present the model of team selling, I modify the basic model in three ways. First, I consider that working with a high ability coworker provides employees with a utility benefit of $u_H$. Second, the poaching firm has high quality projects with certainty, and the employees of the incumbent are of the same ability.

[14] Optimal team contracts do not utilize the performance metrics for the same reason: there is never any *aggregate* uncertainty in team ability.

Third, with probability, $\tau$, poaching firms have available a high ability insider to employ at the market wage (defined below). This is unobserved and unverifiable. These poaching firms are considered to be 'talented'; other poaching firms are untalented. Contracting with the insider is transacted last. All other aspects of the model are unchanged.

A time-line is shown in Figure 4.1.

1. Poaching firm offers contract(s) to incumbent employees.
2. Incumbent firm offers contract(s) to incumbent employees.
3. Incumbent employees accept preferred contract(s).
4. Poaching and incumbent firms offer contract(s) to labour pool employees.
5. Labour pool employees accept or reject contract(s).
6. Talented poaching firm offers contract to insider.
7. Insider accepts or rejects contract.

Figure 4.1: Time-line of Team Selling Model

## 4.1 Model Solution

In the team-selling model, definitions of contracts, beliefs, strategies, and equilibria follow analogously from earlier. As the employees of the incumbent are both of the same ability, the public signal of the *sum* of abilities is perfectly informative: there is no uncertainty over employee ability.

**Definition 10.** A contract, $\theta \in \Theta$, maps the report of a set of $n \geq 1$ employees into a set of payments, $w_i$, and employment offers, $e_i$, for each employee. Contracts are either redistributable ($d = 1$), or not ($d = 0$).

$$\theta : A^n \mapsto (W \times E)^n \times \{0, 1\} : r^n \mapsto (w_i, e_i) \times d \tag{4.1}$$

The set of possible abilities is $A = \{a_H, a_L\}$, and the set of possible wages is $w \in W \equiv \mathbb{R}_{\geq 0}$. Employee reports are $r \in A$.

In the model of team-selling, there are no beliefs over *employees* of the incumbent. Instead, beliefs are over *types* of the poaching firm.

**Definition 11.** A belief, $\xi$, is a Bernoulli probability distribution, within the set of all possible Bernoulli distributions, $\Xi$.

Both the incumbent firm and the employees have have beliefs, denoted by $\xi^I$ and $\xi^E$, respectively.

**Definition 12.** A poaching firm strategy, $\psi_P$, maps the set of possible realizations of ability, $A$, into the set of possible contracts, $\Theta$.

$$\psi_P \,:\, \hat{A} \mapsto \Theta \,:\, \hat{a} \mapsto \theta^P \tag{4.2}$$

**Definition 13.** An incumbent strategy, $\psi_I$, maps the product of the sets of ability realizations, $A$, and contracts (offered by the poaching firm), $\Theta$, into the set of beliefs, $\Xi$, and contracts (offered by the incumbent), $\Theta$.

$$\psi_I \,:\, A \times \Theta \mapsto \Xi \times \Theta \,:\, \left(a,\, \theta^P\right) \mapsto \left(\xi^I,\, \theta^I\right) \tag{4.3}$$

**Definition 14.** An employee strategy, $\psi_E$, maps the set of contracts, $\Theta$, into the set of beliefs.

$$\psi_E : \Theta \mapsto \Xi \,:\, \theta^P \mapsto \xi^E \tag{4.4}$$

I again solve for the Perfect Bayesian Equilibria of the game.

**Definition 15.** A *Perfect Bayesian Equilibrium* of the model is an ordered quintuple, $\left(\psi_I, \psi_P, \psi_E, \xi^I, \xi^E\right)$, of strategies $\psi_I$, $\psi_P$, and $\psi_E$ and beliefs, $\xi^I$ and $\xi^E$. Each player's strategy maximizes that player's expected profit, subject to the strategy of the other player and the belief (if applicable) of that player. Beliefs are derived from Bayes' Law where possible.

With the equilibrium and its requisite components defined, I now solve the model. I first describe the 'market wage' (defined above) for the insider of a talented poaching firm. The insider must receive utility, $u$, as defined in Equation [4.5].

$$u = b_L\left(a_H - \overline{a}\right) + c_R + \overline{u} + (1-p)\, u_H \tag{4.5}$$

This is the utility that must be offered to a high ability employee of the incumbent to cause a transfer. (This is shown in Equations [4.10] and [4.11], below.) Therefore, the advantage of the talented firm is not in the *wage* offered to the insider, but in having the a high ability employee available, and in not needing to pay the cost of transfer, $c_T$.

Next, I consider optimal contracting strategies when the employees of the incumbent are both of low ability. For both talented and untalented poaching firms, the optimal simple contract follows directly from Lemma 1. The poaching firm bids up to a point such that it is indifferent between the employees accepting the offer and hiring directly from the labour pool.

$$b_H a_L - w - c_T = b_H \overline{a} - \overline{u} - c_R + p u_H \tag{4.6}$$

The optimal wage offer, which is not accepted in equilibrium, solves Equation [4.6].

$$w = b_H\left(a_L - \overline{a}\right) + \overline{u} + c_R - c_T - p u_H \tag{4.7}$$

This contract is identical to that of Lemma 1, except for the final term. This is the potential benefit to the employee of working with a high ability coworker. I now turn to the wage required to recruit a new employee from the labour pool.

Consider the wage, $w_R^+$, required to recruit a new employee who will be working with a high ability coworker:

$$w_R^+ = \overline{u} - u_H \tag{4.8}$$

The wage, $w_R^-$, required to recruit a new employee who will be working with a coworker of uncertain ability follows analogously:

$$w_R^- = \overline{u} - pu_H \tag{4.9}$$

As the talented firm hires only a single employee from the labour pool, while the untalented firm hires two, employees that accept a wage can differentiate between the types. There is no adverse selection.

I now consider the optimal contract(s) to offer when both employees of the incumbent are of high ability. First, consider the wage, $w^+$, required to transfer an employee from the incumbent to a firm where he will be working with a talented coworker:

$$b_L a_H - w^+ = b_L \overline{a} - \overline{u} - c_R - (1-p)\, u_H + u_H \tag{4.10}$$

Where $\overline{u} - u_G$ is the wage of the new hire (because the new hire knows that his coworker is of high ability), $c_R$ the cost of training, and $(1-p)\, u_H$ the necessary increase in pay of the remaining employee, because his high-ability coworker has left.

Similarly, consider the wage, $w^-$, required to transfer an employee from the incumbent to a firm where he will be working with a coworker of high ability with probability, $p$:

$$b_L a_H - \left(w^- - (1-p)\, u_H\right) = b_L \overline{a} - \overline{u} - c_R - (1-p)\, u_H + u_H \tag{4.11}$$

Solving Equations [4.10] and [4.11] allows derivation of the optimal wage offers:

$$w^+ = b_L\,(a_H - \overline{a}) + \overline{u} + c_R - pu_H \tag{4.12}$$
$$w^- = b_L\,(a_H - \overline{a}) + \overline{u} + c_R + (1-2p)\, u_H \tag{4.13}$$

Note that under both circumstances, the high ability workers transfer only if they are offered a *utility* from the contract of $u = b_L\,(a_H - \overline{a}) + \overline{u} + c_R + (1-p)\, u_H$. This was described in Equation [4.5] as the 'market wage' for the insider of the talented firm.

If *both* employees of the incumbent are hired, then the wage offered is $w^+$. Both employees know that they will continue to work alongside a talented coworker: their current coworker. I next show that under circumstances, group transfers are optimal for both types of poaching firms.

If the importance of coworkers, $u_H$, is high, and the cost of transferring employees, $c_T$, is low, such that Equations [4.14] and [4.15] are simultaneously satisfied, then *only* group transfers are executed in equilibrium.

$$\Delta_b (1-p) \Delta_a - 2c_T \geq 0 \tag{4.14}$$
$$(1+p) u_H - c_T \geq 0 \tag{4.15}$$

**Proposition 4.** *When the importance of coworker ability, $u_H$, and the ability gap between employees, $\Delta_a$, are high, Equations [4.14] and [4.15] are satisfied. Then group transfers are used by* both *types of poaching firm.*

*Proof.* See Appendix. □

The result that untalented poaching firms poach both high ability employees from the incumbent is unsurprising. This is positive assortative matching: the most able employees are allocated within the economy to where they are most productive. As the poaching firm has a higher marginal product of labour than the incumbent, it poaches both high ability employees.

The interesting result of Proposition 4 is that talented poaching firms also poach *both* high ability employees. Talented poaching firms have available an insider to hire. This insider is as able as the poached employees of the incumbent, demands the same wage, and critically, does *not* impose a transfer cost, $c_T$. The talented poaching firm is unable to signal to the poached employees, however, that it has this high ability insider available. Thus, hiring both employees from the incumbent, and paying the transfer cost, $c_T$, is a mechanism through which the poaching firm 'commits' to a given quality of coworker. In team transfers, this is often manifested by the senior member of the team demanding to bring his/her team along to a new employer: in the opening example, Benjamin Lorello made the recruitment of his entire team a necessary condition of his employment.

When coworker quality is very important, group transfers provide certainty to the transferring employees of their upcoming working conditions. This eliminates the adverse selection problem in future coworkers that obtains otherwise. Transferring employees accordingly demand lower wages when they are certain of whom they will be working with.[15] If the reduction in wages demanded is large enough, poaching firms maximize their profitability by poaching entire teams, even if they have equally talented workers already available.

Extensions to the model of team selling follow analogously to those of the model of team buying, and are thus not shown.

[15]The model I have presented assumes risk-neutral employees. It is straightforward to illustrate that risk-aversion would strengthen my results. Keeping employees together would mitigate not only the adverse selection problem, but also the general uncertainty inherent in employee transfers.

## 5 Discussion

Labour markets are often informationally asymmetric. Individuals have better information about the employees with whom they work than others (e.g. Doiron, 1995; Gibbons and Katz, 1991). In investment banking, for example, league tables rank the top divisions of firms alongside their closest competitors, allowing an accurate estimation of the value of the division as a whole. It is less clear, however, which employees are contributing most to this value. In the model of team buying that I present, information asymmetry is manifested by 'outsiders' having a more precise prior over the sum of ability within an team than over the precise distribution *within* that team. Crucially, it also relies on the incumbent employer having better information than the outsider. In the model of team selling, information asymmetry is manifested in a similar way. The incumbent employer has the best information about its current employees, while outsider are uncertain of employee quality. Employees therefore face a similar adverse selection problem in coworker quality when transferring to a new employer.

To overcome these adverse selection problems, team transfers may be used. Poaching firms unable to determine the most talented individuals in a team may transfer entire teams. Employees, unable to determine the quality of their future coworkers, may have a similar incentive to bring their current coworkers with them to a new employer.

Team transfers are a critical factor to understanding professional service firm dynamics. In investment banking, large teams of individuals often move between firms, as a 'rainmaker' and his/her division is uprooted. While team transfers are generally smaller in the legal profession, they occur with even greater frequency. My own research suggests that approximately 20% of partner-level transfers involve teams. Similarly, nearly 40% of partners that move, move in a larger team.[16]

These team transfers often cause sudden shifts in industry dynamics: the opening example of Benjamin Lorello's team is a prime example. After the transfer was completed, UBS accused Jefferies & Co of activity "consistent with predator activity".[17] In addition to accusing Lorello and his team of breach of contract, UBS argued that the action of Jefferies was anti-competitive. This has been largely supported by movements in the league tables. As UBS's healthcare division fell sharply in the investment banking league tables, Jefferies & Co jumped from a previous position of 61st to 24th.

Further investigation into the frequency of team transfers across industries presents more interesting information. While team transfers are common in legal and investment banking professions, they are rare in accounting and actuarial

[16]These statistics generated through a sample of all hiring and poaching notices posted in Legal Week, a legal industry professional publication, in 2011. Of 101 transfers recorded, 21 (21%) are transfers of teams. Of all partners transferred between firms, 48 (39%) are transferred as part of a team, while 75 (61%) are transferred individually.

[17]Financial Industry Regulatory Authority Dispute Resolution: UBS Securities LLC, Claimant, against Jefferies & Company, INC, Benjamin D. Lorello and Sage Kelly, Respondents. 22 June 2009.

sectors. Accounting and actuarial professions are constrained by considerable professional and legal restrictions. Put simply, there is a 'right' and 'wrong' method to use in accounting and actuarial science. Thus, the difference between a talented and a less talented actuary or accountant is generally minimal. The legal and investment banking professions, however, have fewer such rules. A talented investment banker or lawyer is considerably more valuable than one less talented. This suggests that in industries in which employees are more heterogeneous, team transfers should occur with greater frequency.

These across-industry observations accord with the conclusions of this paper. The greater the employee heterogeneity, the more severe the adverse selection. This, in turn, magnifies the incentive to *mitigate* the adverse selection through a team transfer and should therefore be correlated with a greater frequency of team transfers. Therefore, the models I present in this paper suggest that employee heterogeneity should be positively correlated with team transfers. Observed frequencies of team transfers across professional service industries suggest that this is true.

These applications of information asymmetry present a different approach to understanding the practice of team transfers. Conventional wisdom suggests that team transfers are executed to maintain the linkages *between* employees. I argue that an additional motivation may be to influence the information sets *around* employees. When information asymmetries are prevalent in the labour market, it can be optimal for both employees and firms for employees to transfer in teams.

# 6 Testable Implications

My results are consistent with observed industry differences. In this section, I provide further testable implications, described below as a series of hypotheses.

## 6.1 Implications of Both Models

The results of the models of both team buying and team selling lead to a number of testable implications.

**Hypothesis 1.** *Management obfuscation of ability should be negatively correlated with group transfers in an industry.*

Proposition 2 suggests that managers may have an incentive to obfuscate ability information if poaching firms predominantly poach employees individually. If poaching firms instead mostly use team transfers, then managers may even have an incentive to *provide* information, so that they keep at least some of their original employees. An empirical test of this, then, could examine whether or nor management obfuscation of ability is negatively correlated with the frequency of group transfers within the industry (most likely adjusted for the overall prevalence of poaching in the industry). This could be tested with a cross-industry analysis of the effort exerted in hiding the ability of employees. An obvious difficulty is the method with which to measure ability obfuscation.

**Hypothesis 2.** *Accurate performance metrics should crowd out team transfers.*

Hypothesis 2 is an implication of Proposition 3. This result suggests that as performance metrics become increasingly accurate, firms may utilize screening contracts to mitigate their own information asymmetries. Thus, a cross-industry regression comparing performance-based contracting and team transfers should discover a negative relationship.

**Hypothesis 3.** *Team transfers should be positively correlated with the variance of employee ability.*

This is perhaps the most important testable implication of this paper. I have already illustrated this relationship with stylized facts; however, a full econometric analysis comparing variance of employee ability and team transfers would provide better information. A measure of employee heterogeneity would be regressed against the observed quantity of team transfers across industries. Alternatively, a regression could be performed within an industry, across geographies.

Similar testable implications could, in theory, be generated for the rarity of high ability employees. The rarer high ability employees are, the greater the incentive to acquire them, and thus the greater the incentive to execute a team transfer. The rarer high ability employees are, however, the less often there is an opportunity to poach one. Thus, while an increase in the rarity of high ability employees may increase the frequency of team transfers *conditional* on a high ability employee being discovered, it decreases the likelihood of a high ability employee actually being found. For this reason, the overall impact is ambiguous.

## 6.2 Differentiating Between the Models

It is unclear, ex ante, why it is necessary to differentiate between the models of team buying and team selling presented in this paper. Both explain team transfers as an industry reaction to adverse selection in the labour market. Still, it is potentially interesting to determine in which industries each of these two explanations dominate.

**Hypothesis 4.** *The timing of employee layoffs (pre- or post-move) differentiates between the models of team buying and team selling.*

In the model of team buying, teams are moved to mitigate the adverse selection faced by the poaching firm. Once the ability of the transferred employees is revealed to the poaching firm, it is *possible* that some of the less-talented employees will be laid off.[18] If the second explanation is correct, however, the

[18] Employee layoffs are possible, but not necessary. The employees were previously employed by the incumbent, and it is therefore not intuitively clear why they cannot also be employed by the new firm.

timing of the lay-offs will be different. A manager in charge of a large team will instead pick the most talented employees, and bring them to the new firm. The employees left behind will be absorbed into other teams at the firm; or, if being left behind is sufficiently informative about their quality, they will be laid off. Therefore, an examination of when employees are laid off - either before or after a team transfer - should differentiate between which of the two models best applies.[19]

# 7 Conclusions

In this paper, I propose an adverse selection justification for large transfers of employees between firms. When *either* firms or employees have imperfect information, there is a potential incentive to keep groups of employees together. In the extensions to the base model, I make two more conclusions. First, I illustrate that managers will often have an incentive to hide the ability of their employees. This incentive is strongest when poaching firms cannot or do not attempt to poach entire teams. Second, I illustrate that verifiable performance indicators may crowd out team contracts. This suggests that team transfers may be increasingly rare as technological advances improve measurement techniques.

My most important conclusion is that the frequency of team transfers should be positively correlated with the degree of employee heterogeneity in an industry. The greater the employee homogeneity, the greater the adverse selection problem presented by a given information asymmetry: this generates a greater incentive to execute a team transfer. This implication is diametrically opposed to the conclusion of Mailath and Postlewaite (1990), who suggest that employee heterogeneity will *prevent* team transfers. Observed team transfer frequencies across different professional service industries support my proposed relationship: industries with the most heterogeneous employees appear to have the most frequent team transfers.

Team transfers are a significant factor in professional service firm dynamics, and can suddenly shift the balance of power in an industry. In this paper, I present a justification for the use of team transfers that complements existing notions of team human capital and accords with observed cross-industry variation.

# A Appendix

## A.1 Alternate Performance Contract Formulation

I here illustrate that my results on performance metric-based contracts are qualitatively unchanged if I consider Bernoulli uncertainty and a more realistic model of employee risk aversion.

[19]Note that it is not necessary that only one model applies at any particular time.

I consider a performance metric of the following type: with probability, $\eta$, the signal accurately conveys the employee's ability, and with complementary probability, the signal is random. Thus, the probability that the 'correct' signal is sent is $\frac{(1+\eta)}{2}$. As there are only two possible signals, I set $\gamma = 1$ to represent a signal of $a_H$ and $\gamma = 0$ to represent a signal of $a_L$.

I solve for the wage contract that pays the lowest amount in expectation, but still separates the types:

$$\min_{\alpha,\beta} E\left[\alpha + \beta\frac{(1+\eta)}{2}\right] \tag{A.1}$$

Subject to:

$$\frac{(1+\eta)}{2}u(\alpha+\beta) + \frac{(1-\eta)}{2}u(\alpha) \geq u(w_H) \tag{A.2}$$

$$\frac{(1-\eta)}{2}u(\alpha+\beta) + \frac{(1+\eta)}{2}u(\alpha) \leq u(w_L) \tag{A.3}$$

Where

$$w_H = b_L(a_H - \bar{a}) + \bar{u} + c_R \tag{A.4}$$

$$w_L = b_L(a_L - \bar{a}) + \bar{u} + c_R \tag{A.5}$$

The optimal contract is *just* accepted by high ability employees, and *just* rejected by low ability employees. This occurs when both Equations [A.2] and [A.3] bind.

Employees have a generic risk-averse utility function. Thus, $u''(\cdot) \leq 0$. First, I take second-order Taylor expansions for $u(\alpha)$ and $u(\alpha+\beta)$ about the point $u\left(\alpha + \beta\frac{(1+\eta)}{2}\right)$:

$$\begin{aligned} u(\alpha) \approx\ & u\left(\alpha+\beta\frac{(1+\eta)}{2}\right) - u'\left(\alpha+\beta\frac{(1+\eta)}{2}\right)\frac{(1+\eta)}{2}\beta \\ & + \frac{1}{2}u''\left(\alpha+\beta\frac{(1+\eta)}{2}\right)\left(\frac{1+\eta}{2}\beta\right)^2 \end{aligned} \tag{A.6}$$

$$\begin{aligned} u(\alpha+\beta) \approx\ & u\left(\alpha+\beta\frac{(1+\eta)}{2}\right) + u'\left(\alpha+\beta\frac{(1+\eta)}{2}\right)\left(\frac{1-\eta}{2}\right)\beta \\ & + \frac{1}{2}u''\left(\alpha+\beta\frac{(1+\eta)}{2}\right)\left(\frac{1-\eta}{2}\beta\right)^2 \end{aligned} \tag{A.7}$$

I substitute these Taylor expansions into the first constraint, Equation [A.2]. This yields:

$$u\left(\alpha+\beta\frac{(1+\eta)}{2}\right)+\frac{1}{2}u''\left(\alpha+\beta\frac{(1+\eta)}{2}\right)\left(\frac{1-\eta^2}{4}\right)\beta^2=u\left(w_H\right) \tag{A.8}$$

Taking the derivative of $u\left(E\left[w\right]\right)$, then:

$$\frac{\partial u\left(E\left[w\right]\right)}{\partial\eta}=-\frac{\beta^2}{8}\left[u'''\left(E\left[w\right]\right)\frac{\partial E\left[w\right]}{\partial\eta}\left(1-\eta^2\right)-2u''\left(E\left[w\right]\right)\eta\right] \tag{A.9}$$

Then, recognize that, by directly applying the Chain Rule

$$\frac{\partial u\left(E\left[w\right]\right)}{\partial\eta}=u'\left(E\left[w\right]\right)\frac{\partial E\left[w\right]}{\partial\eta} \tag{A.10}$$

Combination of these two equations yields:

$$\frac{\partial E\left[w\right]}{\partial\eta}\left[u'\left(E\left[w\right]\right)+\frac{\beta^2}{8}u'''\left(E\left[w\right]\right)\left(1-\eta^2\right)\right]=\frac{\beta^2}{4}u''\left(E\left[w\right]\right)\eta \tag{A.11}$$

I assume that employees do *not* exhibit increasing absolute risk aversion: $u'''\left(\cdot\right)\geq 0$. Further, by the definition of a risk-averse utility function, $u'\left(\cdot\right)\geq 0$ and $u''\left(\cdot\right)\leq 0$. Thus, the terms in the brackets on the left are positive, while the right-hand side is negative. Therefore:

$$\frac{\partial E\left[w\right]}{\partial\eta}\leq 0 \tag{A.12}$$

This completes the first half of the proof. Next, I turn to the impact of increasing risk-aversion on the expected payment to the workers. I parametrize risk aversion with the variable, $\rho$. I impose minimal conditions on the structure of risk-aversion: I require only that increases in $\rho$ correspond to weak increases in convexity at all points on the utility curve.

As utility functions are now parametrized by $\rho$, the formal definition becomes: $u\left(\cdot\right)\equiv u\left(w,\rho\right)$. Thus, the stipulation that increases in risk-aversion imply increases in convexity is, mathematically,

$$\frac{\partial^3 u\left(w,\rho\right)}{\partial\rho\partial w^2}\leq 0 \tag{A.13}$$

From the above Equation [A.8], two different expressions can be found for the derivative of the utility of the expected wage, with respect to variable $\rho$. I equate these expressions. For simplicity, I substitute $\chi$ for $\frac{\beta\left(1-\eta^2\right)}{8}\geq 0$.

$$\frac{du\left(E\left[w,\rho\right]\right)}{d\rho}=\frac{\partial u\left(E\left[w\right],\rho\right)}{\partial\rho}+\frac{\partial u\left(E\left[w\right],\rho\right)}{\partial w}\frac{dE\left[w\right]}{d\rho} \tag{A.14}$$

$$\frac{du\left(E\left[w\right],\rho\right)}{d\rho} = \frac{\partial u\left(w_H,\rho\right)}{\partial \rho}+\frac{\partial u\left(w_H,\rho\right)}{\partial w}\frac{dw_H}{d\rho} -\chi\left[\frac{\partial^3 u\left(E\left[w\right],\rho\right)}{\partial\rho\partial w^2}+\frac{\partial^3 u\left(E\left[w\right],\rho\right)}{\partial w^3}\frac{dE\left[w\right]}{d\rho}\right] \quad \text{(A.15)}$$

A number of simplifications are possible when combining Equations [A.14] and [A.15]. First, $\frac{dw_H}{d\rho}=0$, as $w_H$ is a constant. Next, as utility functions are invariant to an affine transformation, I transform every possible utility function such that $u\left(w_H\right)$ is some constant, $k$, and the derivative at this point is unity, $\frac{\partial u(w_H,\rho)}{\partial w}=1$. This will increase comparability between utility functions. Also, by an application of Jensen's inequality and the definition of a convex function, it implies that the utility at any point on the utility function will be decreasing in the convexity (and thus the risk-aversion, $\rho$). Therefore, some additional insights are possible:

- $\frac{\partial u(\cdot,\rho)}{\partial w}\geq 0$, by the definition of the utility function (higher wages imply higher utility).
- $\frac{\partial u(\cdot,\rho)}{\partial \rho}\leq 0$, greater (negative) convexity, given a fixed point $u\left(w_H,\rho\right)=k$, results in lower values everywhere.
- $\frac{\partial^3 u(\cdot,\rho)}{\partial^3 w}\geq 0$, workers do not exhibit increasing absolute risk aversion (as earlier).
- $\frac{\partial u(w_H,\rho)}{\partial \rho}=0$, imposed through the transformation.

Then, substitution of the two equations yields the following:

$$-\chi\frac{\partial^3 u\left(E\left[w\right],\rho\right)}{\partial\rho\partial w^2}-\frac{\partial u\left(E\left[w\right],\rho\right)}{\partial\rho}=\frac{\partial E\left[w\right]}{\partial\rho}\left[\frac{\partial u\left(E\left[w\right],\rho\right)}{\partial w}+\chi\frac{\partial^3 u\left(E\left[w\right],\rho\right)}{\partial w^3}\right] \quad \text{(A.16)}$$

In Equation [A.16], the left-hand side is weakly positive, as both terms are weakly positive. The first derivative term, $\frac{\partial^3 u(E[w],\rho)}{\partial\rho\partial w^2}$, is weakly negative because of the definition of risk-aversion, while the second, $\frac{\partial u(E[w],\rho)}{\partial\rho}$, is weakly negative by the imposed affine transform. The term in brackets on the right-hand side is also weakly positive, as all included terms are weakly positive. The first derivative term, $\frac{\partial u(E[w],\rho)}{\partial w}$, is weakly positive by the definition of a utility function, while the second, $\frac{\partial^3 u(E[w],\rho)}{\partial w^3}$, must be weakly positive to avoid increasing absolute risk aversion. As both the LHS and the RHS term in brackets are weakly positive, so too must be the final term, $\frac{\partial E[w]}{\partial\rho}$. Thus, in conclusion,

$$\frac{\partial E\left[w\right]}{\partial\rho}\geq 0 \quad \text{(A.17)}$$

Therefore, both increases in risk aversion and decreases in the precision of the performance metric lead to increases in the expected pay to the worker. This is qualitatively identical to the situation described in the body of the text.

## A.2 Proof of Proposition 4

Here I prove Proposition 4, the PBE when both employees of the incumbent are of high ability. First, I stipulate beliefs of the labour pool. Second, I show that both types of poaching firm hiring *both* employees is the only optimal response to these beliefs. Third, I illustrate that these beliefs are accurate.

Employee beliefs:

- Firms poaching two employees are talented with probability, $\tau$.
- Firms poaching zero employees and hiring only one from labour pool are talented with probability 1.
- All other firms are assigned probability 0 of being talented.

Given these beliefs, each firm type plays the strategy that generates the greatest profitability. I derive profitabilities below.

The expected profit for a firm poaching zero employees, and hiring two from the labour pool is $\Pi_0^U$. The expected profit for a firm poaching zero employees, hiring an insider, and one from the labour pool is $\Pi_0^T$.

$$\Pi_0^U = 2b_H\left(\overline{a}\right) - 2\left(\overline{u} + c_R - pu_H\right) \tag{A.18}$$

$$\Pi_0^T = b_H\left(a_H + \overline{a}\right) - b_L\left(a_H - \overline{a}\right) - 2\left(\overline{u} + c_R - pu_H\right) \tag{A.19}$$

The profit generated by poaching a single employee, given the beliefs above, for a firm of type, $x$, is $\Pi_1^x$.

$$\Pi_1^T = 2b_H a_H - 2b_L\left(a_H - \overline{a}\right) - 2\left(\overline{u} + c_R\right) - (1-p)\, u_H - c_T \tag{A.20}$$

$$\Pi_1^U = b_H\left(a_H + \overline{a}\right) - b_L\left(a_H - \overline{a}\right) - 2\left(\overline{u} + c_R - pu_H\right) - c_T \tag{A.21}$$

The profit generated by poaching both employees, given the beliefs above, follows.

$$\Pi_2 = 2b_H\left(a_H\right) - 2b_L\left(a_H - \overline{a}\right) - 2\left(\overline{u} + c_R + c_T - pu_H\right) \tag{A.22}$$

Both talented and untalented poaching firms hire two employees when the following constraints hold:

$$\Pi_2 - \Pi_1^U = \Delta_b\left(1-p\right)\Delta_a - c_T \geq 0 \tag{A.23}$$

$$\Pi_2 - \Pi_0^U = 2\left(\Delta_b\left(1-p\right)\Delta_a - c_T\right) \geq 0 \tag{A.24}$$

$$\Pi_2 - \Pi_1^T = \left(1+p\right) u_H - c_T \geq 0 \tag{A.25}$$

$$\Pi_2 - \Pi_0^T = \Delta_b \left(1-p\right) \Delta_a - 2c_T \geq 0 \qquad \text{(A.26)}$$

Satisfaction of Equations [4.14] and [4.15], in the body of the paper, necessarily implies satisfaction of these four constraints.

As poaching firms of both types optimally offer the group contract, beliefs are accurate. This proves that this is a PBE.

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