

Internet Appendices:
Human Capital Portability and Careers in Finance

Appendix A A simplified model

In the simplified model, we introduce an initial period 0, in which a banker of interest makes a one-time sectoral choice. Specifically, the banker can choose to join a bulge bracket or a boutique firm. Since only portable human capital can be carried over to the new employer, we assume that the banker possesses a portable human capital h in the initial period 0. We also assume that the perceived likelihood of good match quality equals p in the initial period. Starting from period 1 and onward, the model follows our baseline setup as described in Section ???. We make the following additional assumptions to facilitate our analysis in the simplified model:

1. The match quality μ is perfectly revealed one period after the banker joins a firm.
2. The number of deals the banker advises is deterministic and equal to the Poisson arrival rate specified in Equation (??).
3. If the match quality is good, the banker stays with the firm forever; if the match quality is bad, the banker switches to a new firm in the same sector and redraws the match quality as described in Equation (??).

Assumption 1 features the simplest setting for unobservable match quality to influence banker career choices, with all uncertainty being resolved after one period. This assumption retains the banker's incentive to relocate upon a bad match but simplifies his learning process. Recall that we assume deal numbers follow a Poisson process in the full model, which prevents the match quality from being fully revealed. Yet, given that the learning process is degenerated in the simplified model, there is no need to retain randomness in the deal number process—Assumption 2 thus makes the deal number process deterministic. Assumption 3 allows a banker to pick the sector only once (in the initial period $t = 0$), and it rules out the banker's dynamic sectoral choices. Despite that, we can analyze how a banker's choice of sectors varies with his existing level of human capital h and perceived match quality p by examining the comparative statics of the model solution with respect to h and p in period $t = 0$. Additionally, we set $\ell(h) = \ell(\omega) = \ell$ in Equations (??) and (??) and $c = 0$ in Equation (??) to simplify our analysis.

Now consider two possible scenarios after the quality of the initial match is revealed. Let W_s denote the value function of a banker in sector s conditional on a good initial match, in which case the banker stays with the same bank forever:

$$W_s(h) = \sum_{t=1}^{\infty} \beta^{t-1} \lambda_s [a \cdot (h_t + \omega_t) + b] = \lambda_s [A_0 + A_1 h], \quad (\text{A.1})$$

The second equality follows by substituting in the law of motion of human capital h_t and ω_t ; and A_0 and A_1 are both positive coefficients to be solved. Equation (A.1) suggests that the value of an employment pair with a good match quality is proportional to the initial human capital the banker possesses.

To see why the second equality in Equation (A.1) holds and to solve for the constant coefficients A_0 and A_1 , we start with the number of deals that a banker advises (let's also assume that $c = 0$ in Equation ?? for simplicity), we have $n_t = a \cdot H_t + b$, where $H_t = h_t + \omega_t$ is the total human capital.

When the quality is good, the banker stays with the same employer forever. Without future job switches, portable and non-portable human capital play the same role in future deal generation, and therefore we only need to track the total human capital in this case. The banker's value function, with $H_1 = h$, is:

$$W_s(h) = \sum_{t=1}^{\infty} \beta^{t-1} \lambda_s (a \cdot H_t + b), \quad (\text{A.2})$$

and H_t follows the law of motion:

$$\begin{aligned} H_t &= \rho \cdot H_{t-1} + \ell \cdot n_t \\ &= (\rho + a\ell) \cdot H_{t-1} + \ell \cdot b. \end{aligned} \tag{A.3}$$

To make human capital a stationary process, we assume $0 < \rho + a\ell < 1$. We need this condition because we assume constant return-to-scale in human capital accumulation in this simplified model (as opposed to decreasing return-to-scale in the full-blown model). We can rewrite Equation (A.3) as:

$$H_t - \bar{h} = \phi (H_{t-1} - \bar{h}) = \phi^{t-1} (H_1 - \bar{h}), \tag{A.4}$$

where

$$\begin{aligned} \phi &= \rho + a\ell \\ \bar{h} &= \frac{\ell b}{1 - (\rho + a\ell)} \end{aligned}$$

Substituting Equation (A.4) into Equation (A.2), we can solve for W_s , which is the capitalized value of all future deal-advising profits after the banker settles down with a good quality match:

$$\begin{aligned} W_s(h) &= \sum_{t=1}^{\infty} \beta^{t-1} \lambda_s (a \cdot H_t + b) \\ &= \lambda_s (a\bar{h} + b) \sum_{t=1}^{\infty} \beta^{t-1} + \lambda_s a \sum_{t=1}^{\infty} [\beta^{t-1} \phi^{t-1} (H_1 - \bar{h})] \\ &= \frac{\lambda_s (a\bar{h} + b)}{1 - \beta} + \frac{\lambda_s a (H_1 - \bar{h})}{1 - \beta\phi} \\ &= \lambda_s \left[\frac{(a\bar{h} + b)}{1 - \beta} + \frac{a (h - \bar{h})}{1 - \beta(\rho + a\ell)} \right] \\ &= \lambda_s [A_0 + A_1 \cdot h], \end{aligned} \tag{A.5}$$

where

$$\begin{aligned} A_0 &= \frac{(a\bar{h} + b)}{1 - \beta} - \frac{a\bar{h}}{1 - \beta(\rho + a\ell)}, \\ A_1 &= \frac{a}{1 - \beta(\rho + a\ell)} \end{aligned} \tag{A.6}$$

are both positive numbers given that ρ , β , and $\rho + a\ell$ all fall in the interval of $(0, 1)$ and a , b , and \bar{h} are all positive.

If the initial match quality is bad, the banker would work for this newly matched employer for one period and generate a profit of $\lambda_s b$.¹ He then has to switch to another bank in the same sector next period. Following the transition to a new job, he loses any non-portable human capital accumulated within this period, and only the portable human capital, $\rho h + (1 - \delta_s)\ell b$, is carried over to the next employer.² Match

¹In the simplified model, we set $c = 0$, so when the match quality is bad, the number of deals advised is b , and thus the profit is equal to $\lambda_s b$.

²The banker's portable human capital depreciates by $(1 - \rho)h$ after one period, but he accumulates $(1 - \delta_s)\ell b$ units of new portable human capital from advising b deals, where $1 - \delta_s$ measures portability and ℓ is the speed of human capital accumulation per deal. The total portable human capital he brings to the next employer is thus $\rho h + (1 - \delta_s)\ell b$.

quality with the new employer is redrawn, which can be good or bad. We use V_s to denote the value function when the match quality is bad:

$$\begin{aligned} V_s(h) &= \lambda_s b + \beta [q \cdot W_s(\rho h + (1 - \delta_s)\ell b) + (1 - q) \cdot V_s(\rho h + (1 - \delta_s)\ell b)] \\ &= \lambda_s [B_0 + B_1(1 - \delta_s) + B_2 h], \end{aligned} \quad (\text{A.7})$$

where the first term on RHS is the profit generated from the banker's deal advising with the newly matched employer, and the second term captures the expected continuation value conditional on the quality of his next match. Since the banker has decided to switch job at the end of the current period, only his portable human capital, $\rho h + (1 - \delta_s)\ell b$ is carried over to the new employer in the next period. B_0, B_1 , and B_2 are all positive coefficients. Equation (A.7) suggests that the continuation value of $V_s(h)$ is a weighted average of the value from a good match, $W_s(\rho h + (1 - \delta_s)\ell b)$, and the value from a bad match, $V_s(\rho h + (1 - \delta_s)\ell b)$, with $\rho h + (1 - \delta_s)\ell b$ being the initial human capital the banker brings to the new employer.

To solve for the constant coefficients B_0, B_1 , and B_2 , we apply Taylor expansion to V_s around the banker's initial portable human capital level h , we can solve for $V_s(h)$:

$$V_s(h) = \frac{\lambda_s b}{1 - \beta(1 - q)} + \frac{\beta q W_s(\rho h + (1 - \delta_s)\ell b)}{1 - \beta(1 - q)} + \frac{\beta(1 - q)}{1 - \beta(1 - q)} \frac{dV_s(h)}{dh} [(1 - \delta_s)\ell b - (1 - \rho)h], \quad (\text{A.8})$$

In the simplified model, the banker's career path contains two stages: before landing on a good match, he switches employers in each period, and we define this period as his *career transition period*; and upon finding a good match, he stays with the employer forever, and we define this period as his *long-term career period*. The value function in Equation (A.8) contains three components: the first term is the capitalized profits from deal-advising during the career transition period using the existing human capital; the second term represents capitalized profits from deal-advising during the long-term career period; and the third term is the capitalized value arising from changes in human capital before reaching the long-term career period. This third term captures the value added through accumulating more portable human capital from learning-by-doing and the value lost through human capital depreciation, where $\frac{dV_s(h)}{dh}$ is the "price" of portable human capital.

We conjecture a linear functional form: $V_s(h) = C_0 + C_1 h$ and thus $\frac{dV_s(h)}{dh} = C_1$. We substitute them into Equation (A.8) and solve for the coefficients:

$$\begin{aligned} C_1 &= \frac{\beta a \rho q \lambda_s}{(1 - \rho\beta(1 - q))(1 - \beta(\rho + a\ell))} \\ C_0 &= \frac{\lambda_s b + \beta q \lambda_s A_0}{1 - \beta(1 - q)} + \frac{\beta \ell b (q \lambda_s A_1 + (1 - q)C_1)}{1 - \beta(1 - q)} (1 - \delta_s) \end{aligned}$$

To facilitate our analysis of the tradeoff between efficiency and portability, we rewrite $V_s(h)$ as

$$V_s(h) = \lambda_s (B_0 + B_1(1 - \delta_s) + B_2 h) \quad (\text{A.9})$$

where

$$\begin{aligned} B_0 &= \frac{1}{1 - \beta(1 - q)} \left[b + \beta q \left(\frac{a\bar{h} + b}{1 - \beta} - \frac{a\bar{h}}{1 - \beta(\rho + a\ell)} \right) \right] \\ B_1 &= \frac{\beta a \ell b}{1 - \beta(1 - q)} \left[\frac{q + \beta(1 - q)(1 - \rho)}{(1 - \rho\beta(1 - q))(1 - \beta(\rho + a\ell))} \right] \\ B_2 &= \frac{\beta a \rho q}{(1 - \rho\beta(1 - q))(1 - \beta(\rho + a\ell))} \end{aligned} \quad (\text{A.10})$$

Given that ρ, β, q , and $\rho + a\ell$ all fall within the interval of $(0, 1)$ and that a, b, ℓ , and \bar{h} are all positive, it

is easy to verify that $B_1 > 0$ and $B_2 > 0$. For B_0 , because $1 - \beta < 1 - \beta(\rho + a\ell)$,

$$\frac{a\bar{h} + b}{1 - \beta} - \frac{a\bar{h}}{1 - \beta(\rho + a\ell)} > \frac{a\bar{h} + b}{1 - \beta(\rho + a\ell)} - \frac{a\bar{h}}{1 - \beta(\rho + a\ell)} > 0$$

and thus $B_0 > 0$ holds as well.

With Equations (A.1) and (A.7), we can express the banker's period 0 expected value for joining sector s :

$$\begin{aligned} U_s(h, p) &= p \cdot W_s(h) + (1 - p) \cdot V_s(h), \\ &= \lambda_s p [A_0 + A_1 h] + \lambda_s (1 - p) [B_0 + B_1(1 - \delta_s) + B_2 h] \end{aligned} \quad (\text{A.11})$$

Note that, in this simplified model, we allow the likelihood of landing on a good-quality match in the initial period, p , to differ from the prior q . This specification allows us to disturb the perceived match quality (p) when the banker selects the sector without altering the true distribution of match quality in the model (q). Separating p and q is thus necessary for conducting the comparative statics analysis below.

It is easy to verify that:

1. $\frac{\partial U_s}{\partial \lambda_s} > 0$
2. $\frac{\partial U_s}{\partial (1 - \delta_s)} > 0$.

In other words, the value function increases with both the return on human capital λ_s and the portability of human capital $1 - \delta_s$. If each of the two sectors (bulge bracket and boutique) has an advantage along only one dimension, a banker needs to trade off between return and portability when choosing which sector to join. Ultimately, the banker's choice depends on the value function. For example, he chooses the bulge bracket sector ($s = 0$) if $U_0(h, p) > U_1(h, p)$.

Equation (A.11) also helps establish some more intriguing and nuanced relation among return (λ), portability ($1 - \delta$), and perceived match quality (p), which can be demonstrated through two cross-derivatives:

1. $\frac{d^2 U_s}{d\lambda_s dh} > 0$
2. $\frac{d^2 U_s(h, p)}{d(1 - \delta_s) dp} < 0$

The first cross-derivative suggests that the marginal value of λ_s increases with h . That is, the return to human capital and the level of human capital are complementary. This is because high return to human capital increases the gains from each deal, and skilled bankers advise more deals. Therefore, bankers with high human capital value return to human capital more than bankers with low human capital.

The second cross-derivative shows that the perceived match quality and human capital portability are substitutes. If the perceived likelihood of a good match is higher, the banker is less concerned with the non-portability of his human capital because he expects a low likelihood of job switch in the future.

Combining the two implications above, the simplified model, therefore, predicts that, for more seasoned bankers who have accumulated higher levels of human capital and found better quality matches over time, they value return more and thus are more likely to join the sector that features high return to human capital and low portability.

This simplified model helps illustrate the intuition behind workers' tradeoff between the return and portability of human capital when making career choices.

Appendix B Model Solutions

Figure ?? and ?? show how labor mobility and portability premium vary with a banker's perceived match quality and human capital. In this section, we examine how these model implications change under different values of human capital non-portability, δ . In this analysis, we fix the non-portability of the bulge bracket sector (δ_0) and only vary that among boutique banks (δ_1). Fixing δ_1 while varying δ_0 yields symmetric results.

We start with the scenario of $\delta_1 = 0.1 < \delta_0$. In this scenario, bankers in boutique firms accumulate more portable human capital and exhibit higher labor mobility than bankers in bulge bracket firms. As δ_1 increases, labor mobility declines in the boutique sector since it becomes costlier for bankers to switch jobs, leading to similar patterns as shown in Figure 2 of the paper. In addition, if we compare the value associated with each unit of portable and non-portable human capital, the premium associated with former also decreases with δ_1 , as illustrated in Figure B.1. Higher δ_1 means that bankers would change jobs less frequently, so the likelihood that they lose the firm-specific human capital is lower. Similar to the pattern shown in Figure 3, labor mobility declines with δ_1 across all the parameters we explore.

We perform separate comparative statics to illustrate the effect of λ . While δ governs the overall labor mobility, λ shapes the net labor flow from the bulge bracket to the boutique sector, as discussed in Section 3.2. Figure B.3 confirms the intuition and reveals three important takeaways. First, when $\lambda_1 = 1$, the bulge bracket sector dominates by offering the same level of efficiency as the boutique banks but strictly higher human capital portability, in which case, we see net labor flow into the bulge bracket sector. Second, as λ increases, it implies that the boutique sector becomes more attractive, and bankers migrate out of the bulge bracket banks and into the boutique sector across a broader region. Lastly, comparing the net labor flow in different regions, we find that when λ_1 increases, bankers with lower match quality and higher human capital have a higher tendency to transition into boutique banks. High human capital advisors will flow into the boutique banks because the boutique sector offers high returns on each unit of human capital that the advisor has accumulated, making it particularly attractive for those with high human capital stock.

Figure B.1. Mobility with Different δ

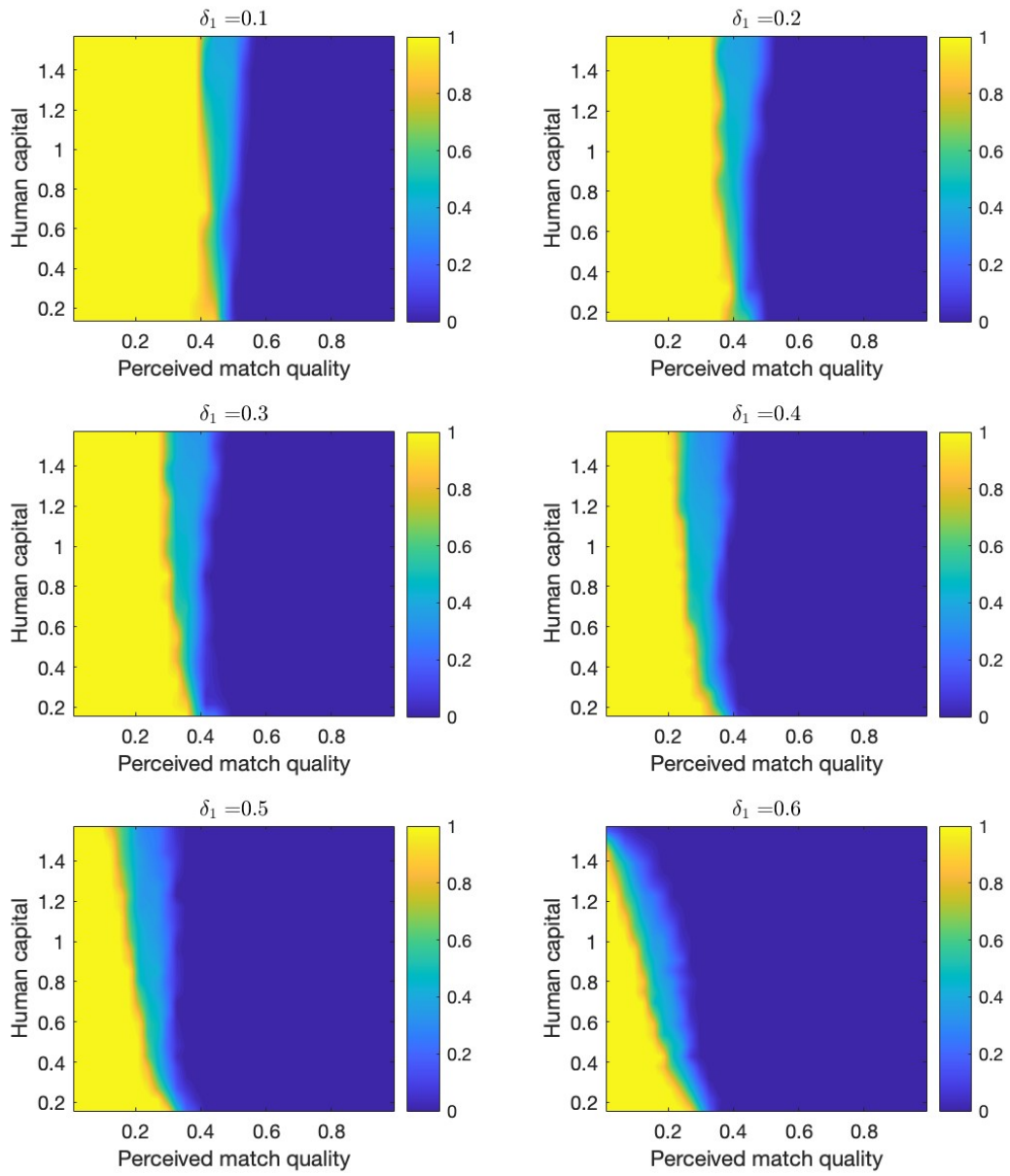


Figure B.2. Portability Premium with Different δ

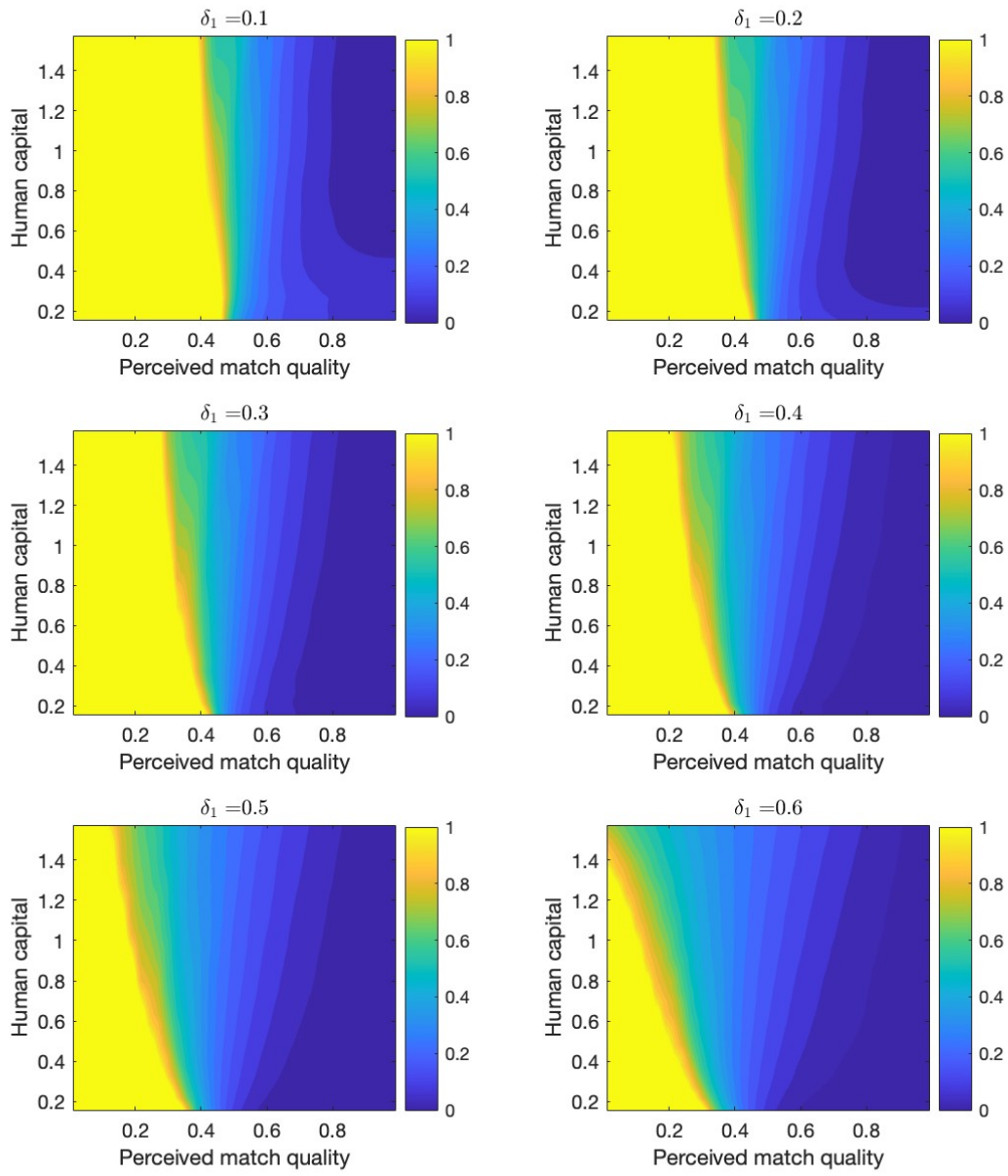
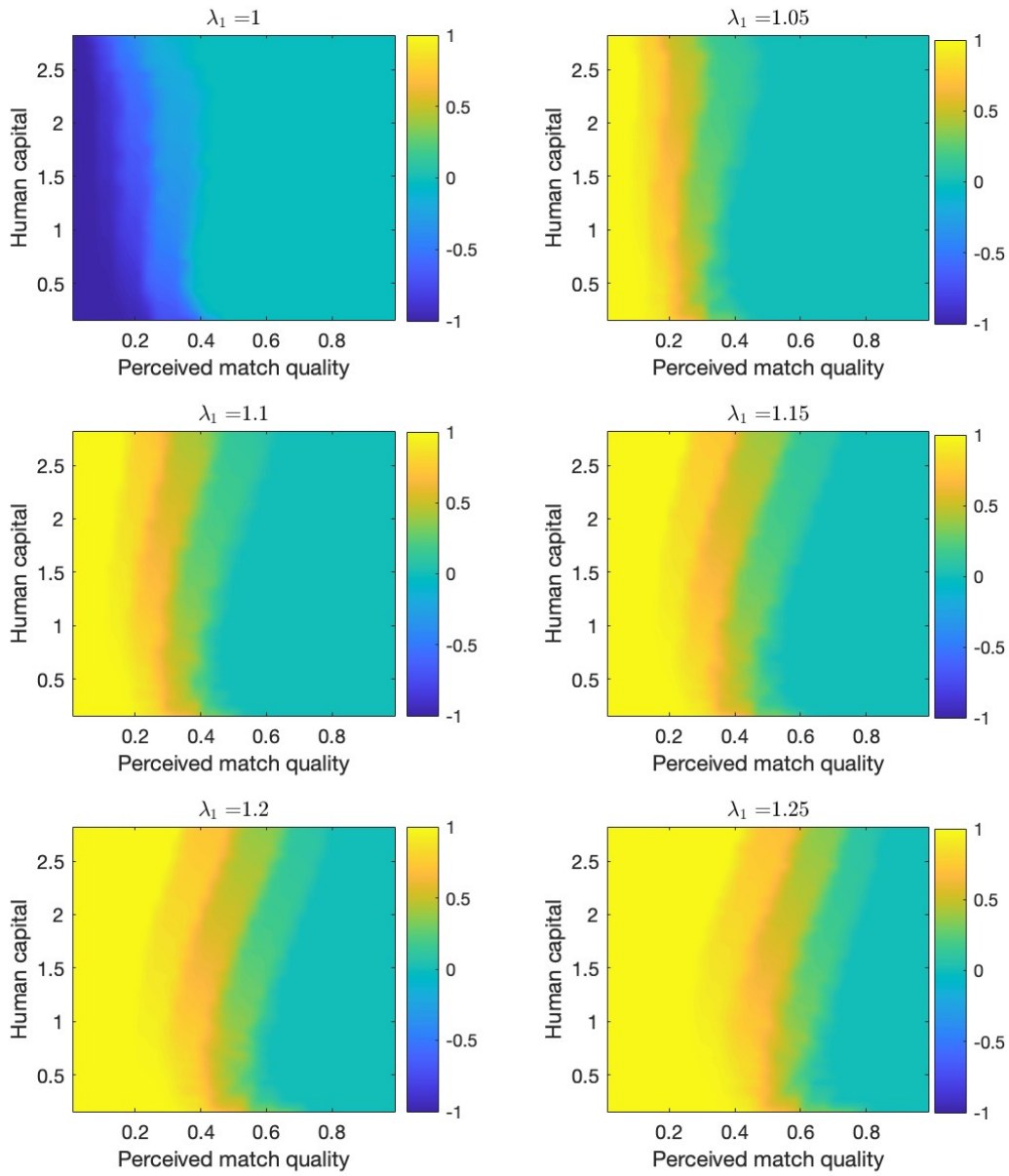


Figure B.3. Net Labor Flow with Different λ



Appendix C Fee-adjusted Deal Number

To construct fee-adjusted deal numbers, we first collect advisory fee data for all M&A deals from 1980 to 2018 from the SDC database. Advisory fees are reported separately for acquirer and target financial advisors with some missing values. We deflate both advisory fees and deal values using the US GDP deflator to convert them into real values. We then create a variable $FeePct = \frac{Fee}{DealVal}$ as the advisory fee as a percentage of a deal value and plot it against the logarithm of the real deal value in Figure C.4. In this figure, we group deals into 15 bins based on deal values and then calculate the average fee percentage and the logarithm of the deal values within each bin. Fee percentages and log deal values exhibit a strong linear relationship with a negative slope.

We then run the following OLS regression using all deals with non-missing observed advisory fee data:

$$FeePct_{m,j} = a_m + b_m \cdot \ln(DealVal_j) + \varepsilon_{m,i} \quad (C.1)$$

where m indicates the fee paid by the acquirer or target and j indicates the deal with non-missing fee data. Using the regression coefficients obtained from equation (C.1) and the deal value observed in deals with missing fee data, we calculate a predicted advisory fee for these deals:

$$\begin{aligned} Fee\hat{P}ct_{m,i} &= a_m + b_m \cdot \ln(DealVal_i) \\ \hat{F}ee_{m,i} &= Fee\hat{P}ct_{m,i} \cdot DealVal_i \end{aligned}$$

where we first calculate the predicted fee percentage and then convert it to dollar value advisory fee. We compute a per-capita advisory fee as:

$$FeePCP_{m,i} = \begin{cases} \frac{Fee_{m,i}}{N_{m,i}} & \text{if Fee available} \\ \frac{\hat{F}ee_{m,i}}{N_{m,i}} & \text{if Fee unavailable} \end{cases}$$

where the observed fee or the predicted fee (when the fee is unavailable in the data) is scaled by the total number of bankers working for the acquirer/target, $N_{m,i}$. $FeePCP$ captures the average advisory fee paid to each banker who worked on the deal.

For deals with missing deal value data, we cannot calculate the predicted fee.

We construct the fee-adjusted deal number following the steps below:

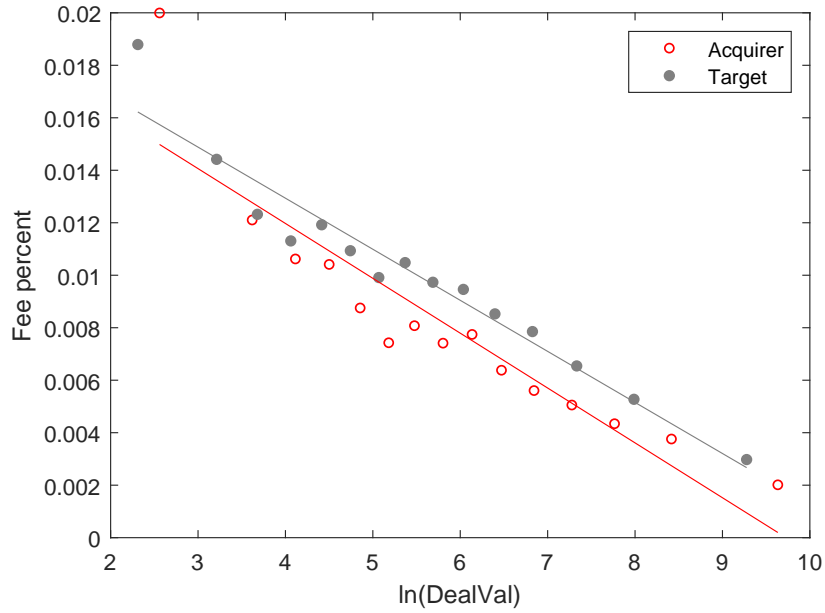
1. We count deals without $FeePCP$ as just one deal;
2. Among deals with $FeePCP$, we obtain the sample median of $FeePCP$ across all observations, denoted as MED_{FeePCP} .
3. For deals whose $FeePCP$ is below MED_{FeePCP} , we count them as one deal;
4. For deals whose $FeePCP$ is above MED_{FeePCP} , we use the following equation to calculate the fee-adjusted deal number $n_{m,j}$ and count the deal as $n_{m,j}$ deals:

$$n_{m,i} = \left[\frac{FeePCP_{m,j}}{MED_{FeePCP}} \right]$$

where the operator $[\cdot]$ means rounding to the nearest integer.

Figure C.4. Advisory Fee and Deal Value

This figure illustrates the relationship between the advisory fees (as percentages of deal values) and the logarithm of the deal values. The x-axis is the logarithm of the deal values and the y-axis is the advisory fees divided by the deal values. We group deals into 15 bins based on the values and calculate the average logarithm of the deal values and the average fee percentage within each bin. Red hollow dots represent the fees paid by acquirers and gray solid dots represent the fees paid by targets. The straight lines are the lines of best fit using OLS regression in equation (C.1).



Appendix D Separations and Wage Determination

In this section, we demonstrate that our model generates the same separation decisions as the sequential auction bargaining models proposed by ? and ? that feature an employed worker's on-the-job search and characterize the value split between the employer and worker explicitly. To see this, let's denote the value function of an employment pair as U , and $U = J + B$ where J is the value captured by the bank, and B is the value captured by the banker. Following ?, we define \underline{U} as the bargaining capital, which represents the component of a worker's wage that is built through repeated sampling of outside offers. In our setting, the bargaining capital is the highest value of the employment pair formed by the banker accepting any outside offer that he has encountered in the past since he started his employment at the current firm.

Now assume that the banker meets with a potential employer with a total pair value of U' . There are three possible scenarios:

(1) $U' > U$: in this case, the new job opportunity breaks the current employment pair. The current employer is unable to retain the banker even if it offers him the whole surplus of U , because $U' > U$. Separation occurs, and J becomes 0 for the current employer as we normalize the job vacancy value to zero. On the new employment, the banker's bargaining capital is equal to $\underline{U} = U$, which is the value of the current employment pair. The banker's compensation is $B = U + \chi(U' - U)$.

(2) $\underline{U} < U' \leq U$: in this case, the current banker-employer pair is maintained, but the outside option gives the banker an opportunity to update his bargaining capital and wage. More specifically, the banker's bargaining capital is updated to $\underline{U} = U'$. The banker will use this new bargaining capital to renegotiate his compensation with the current employer, and the value split is updated to $B = U' + \chi(U - U')$ and $J = (1 - \chi)(U - U')$. That is, the current employer has to offer a larger share of the total surplus to the banker. However, no separation occurs because the current employer is still able to defeat the outside offer by lifting the banker's compensation. The value of the employment pair remains U even though the value split changes.

(3) $U' \leq \underline{U}$: in this case, no separation occurs and the value split between the current pair remains the same (i.e., J and B remain the same, and the current pair value is still equal to U and the bargaining capital is still equal to \underline{U}).

Our analyses above suggest that the separation decisions obtained from the sequential auction models are identical to those implied by equations (??) to (??): separations happen if and only if $U' > U$. Such separation decisions are bilateral efficient: separations occur only when the total value of the new pair dominates the total value of the existing pair. There is no difference between a banker's voluntary departure and mandatory layoff, because the banker and the bank always agree on the separation decisions.

Note that the value split between the employer and the banker depends on the specific bargain parameters, including a banker's bargaining power χ , and his bargaining capital \underline{U} . This value split, however, does not influence the separation decisions once we fix the level of the total surplus. Therefore, it is not necessary to write down the Bellman equation for J and B separately if we are not deriving banker compensation in the model.

Appendix E Estimation using Alternative Models and Samples

In this table we report parameter estimates under alternative model specifications and sample constructions. For Panel A, we allow bulge bracket and boutique banks to have different production functions; for Panel B, we allow match quality for a given firm-banker pair to improve over time; for Panel C, we augment the model by including endogenous promotion and elimination; for Panel D, we exclude observations with long unemployment spells; for Panel E, we re-construct our sample by excluding years 2007–2009; and for Panel F, we reestimate the model with different exogenous exit rates.

Panel A. Sector-Specific Production Function

	σ_ζ	λ_1	α	a_0	a_1	b	ℓ	ρ	δ_1	δ_1
Estimate	8.528	1.035	0.864	0.922	1.087	0.179	0.344	0.878	0.095	0.523
Standard errors	4.823	0.009	0.145	0.344	0.012	0.088	0.112	0.344	0.122	0.244

Panel B. Time-Varying Match Quality

	σ_ζ	λ_1	α	a	b	ℓ	ρ	δ_0	δ_1
Estimate	9.175	1.031	0.852	0.931	0.188	0.366	0.921	0.114	0.463
Standard errors	4.442	0.014	0.202	0.442	0.021	0.039	0.292	0.056	0.192

Panel C. Model Promotion and Elimination

	σ_ζ	λ_1	α	a	b	ℓ	ρ	δ_0	δ_1
Estimate	8.277	1.032	0.809	0.995	0.157	0.335	0.829	0.13	0.464
Standard errors	5.032	0.011	0.242	0.301	0.019	0.045	0.203	0.082	0.144

Panel D. Excluding Long Unemployment Spells

	σ_ζ	λ_1	α	a	b	ℓ	ρ	δ_0	δ_1
Estimate	7.999	1.037	0.779	0.981	0.155	0.32	0.832	0.131	0.456
Standard errors	4.122	0.012	0.132	0.323	0.022	0.064	0.141	0.082	0.221

Panel E. Excluding Crisis Years

	σ_ζ	λ_1	α	a	b	ℓ	ρ	δ_0	δ_1
Estimate	8.115	1.035	0.841	0.981	0.159	0.331	0.798	0.129	0.469
Standard errors	4.332	0.011	0.154	0.387	0.022	0.078	0.132	0.055	0.223

Panel F. Varying Exogenous Exit Rate

	σ_ζ	λ_1	α	a	b	ℓ	ρ	δ_0	δ_1
Estimate ($\eta = 0.07$)	9.421	1.030	0.844	1.003	0.222	0.324	0.894	0.115	0.433
Standard errors	4.274	0.009	0.234	0.345	0.034	0.067	0.132	0.054	0.144
Estimate ($\eta = 0.06$)	9.321	1.029	0.817	0.998	0.213	0.314	0.872	0.115	0.447
Standard errors	4.877	0.010	0.231	0.243	0.030	0.043	0.088	0.052	0.234
Estimate ($\eta = 0.04$)	8.527	1.031	0.761	0.948	0.181	0.293	0.877	0.116	0.465
Standard errors	3.986	0.010	0.223	0.343	0.032	0.034	0.062	0.043	0.134
Estimate ($\eta = 0.03$)	8.285	1.020	0.729	0.933	0.195	0.297	0.877	0.116	0.473
Standard errors	4.433	0.010	0.243	0.437	0.037	0.122	0.092	0.032	0.152