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Welcome Back Former Employees with Open Arms: A Theory of Boomerang Employees*

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Abstract

Boomerang employees—workers who left a company and later returned to it—are important compositions of workforce in the labor market but received limited attentions in the literature. Under the hypothesis of asymmetric employer learning, this article studies a market force which is often *hidden*. That is, we show that the *possibility* of boomerang employees—if a separated employee may return to a former employer—enhances market competition, which forces employers to make more efficient personnel decisions (e.g., job assignments, firm-sponsored training, and work arrangements) and, in turn, increases social welfare. The theory explains why firms use various HR practices to engage boomerang employees (e.g., welcoming cultures, exit interviews, and corporate alumni networks), and captures evidence on the incumbents-new hires-returnees comparison. Moreover, the theory sheds new light on labor-market regulations concerning worker turnover.

Keywords: boomerang employees; asymmetric employer learning; competitive force

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1 Introduction

Boomerang employees—workers who left a company and later returned to it—are valuable staffing resources for their previous employers, and undeniably important compositions of workforce in the labor market. Steve Jobs, rehired 12 years after being let go from Apple, is perhaps the most famous boomerang employee of all time. There is a growing number of companies now tapping their alumni networks to bring back "talented people they know are reliable." In fact, among all new hires of companies on LinkedIn, 4.5% were boomerang workers in 2021, compared to 3.9% in 2019; each year around 15% of external hires at Ernst & Young are from its alumni community; among all CEO appointments by S&P 500 firms between 1993 and 2012, 8.4% are either former workers or former board members. Given the forthcoming ban of noncompetes by the Federal Trade Commission which aims to ensure that workers "have the freedom to pursue a new job," a spike in worker turnover is expected, which is likely to give rise to a boom of boomerang employees in the near future.[1]

Research questions

Despite evidence discussed above concerning boomerang employees, economic research regarding this type of employees is largely absent. This article explores how the possibility of boomerang employees (i.e., if a separated employee may return to a former employer) can impact on an organization's internal management as well as the entire labor market. In particular, we offer a formal theory of boomerang employees to explain why it is of firms' interests to use various HR practices to encourage and facilitate the return of boomerang employees, e.g., foster welcoming cultures, take HR initiatives, and set up formal alumni network programs, especially for those in professional-service and high-tech industries where skills are highly portable across firms.

One can brainstorm various benefits that boomerang employees can bring to companies (Laker, 2022; Klotz et al., 2023). For instance, compared with a formal job search process, rehiring a former employee requires **less time** and **fewer resources**. By keeping the door open to former employees, organizations can also get access to a larger talent pool with **proven capabilities**. Moreover, returning workers typically mean **higher productivities** than matched new hires, because of returns to tenure and knowledge spillovers. That is, returnees' familiarity with the organization's culture and operations reduces socialization and training compared to new onboarding employees, and their external experience and additional knowledge gained from other work environments sometimes generate valuable external perspectives, competitor insights, and networking opportunities.

Note that benefits discussed above just mean that firms have incentives to rehire former employees from an *ex post* perspective (i.e., after a worker has quitted), but from an an *ex ante* perspective (i.e., before a worker quits) whether or not these *ex post* benefits warrant an employer enough incentives to re-engage former employees remains unclear. First and foremost, to embrace these *ex post* benefits, rather than rehire boomerang employees, firms can **retain** reliable incumbent employees, e.g., they can commit not to rehire a separated worker in the future (i.e., quitters permanently burn their bridges with former employers) to deter turnover and, in turn, avoid the associated loss of returns to tenure and the costly process of filling vacancies.[2] Second, HR practices that re-engage former employees (e.g., conduct exit interviews and run alumni network programs) by themselves are **costly** for firms. Third, there are many **risks** of re-engaging former employees. For instance,

[1]See https://www.wsj.com/articles/the-new-job-offer-you-want-could-come-from-your-old-boss-11639564205 for the trend of rehiring via alumni networks, https://www.linkedin.com/news/story/hello-its-your-old-boss-calling-5205836/ for the LinkedIn survey, https://www.ey.com/en_us/alumni/how-alumni-networks-help-recruit-talent-and-grow-careers for the EY report, Cziraki and Jenter (2022) for boomerang CEOs, and https://www.ftc.gov/news-events/news/press-releases/2024/04/ftc-announces-rule-banning-noncompetes for the ban on noncompetes.

[2]Similarly, if a firm hires back former employees because the associated recruitment process is efficient and effective, then the firm can also resort to employee referrals, which solicit current employees to recommend reliable candidates (Dustmann et al., 2016; Ekinci, 2016).

if a firm welcomes back former employee, employees will have more freedom to switch firms, which induces more frequent opportunistic firm-switching behavior when worker turnover is associated with a pay increase. Also, welcoming back former employees with open arms can raise concerns about perceptions, harm corporate cultures, and damper morale among other team members, especially for those organizations requiring internal coordination and in contexts characterized by internal resistance to disloyalty.

Overview

That said, this article is the first to offer a formal theory of boomerang employees. Under the hypothesis of *asymmetric* employer learning—an employer that has hired a worker obtains more accurate information concerning the worker's actual ability than a prospective employer which has never employed the worker, this article studies a market force which is often *hidden*. That is, we show that the *possibility* of boomerang employees (i.e., if a separated employee may return to a former employer) enhances market competition among firms, which forces employers to make more efficient personnel decisions (e.g., job assignments, firm-sponsored training, and work arrangements) and, in turn, increase an employment relationship's surplus.

Based upon this insight, our theory explains why firms (particularly those in professional-service and high-tech industries) have incentives to welcome back former employees, e.g., foster welcoming cultures, take HR initiatives, and set up formal alumni network programs to encourage and facilitate the return of boomerang employees. Besides that, the theory is shown to capture evidence concerning the pay, promotion prospect, and performance comparisons of different types of workers, including incumbents, new hires, and returnees. In addition, the theory sheds new light on labor-market regulations concerning worker turnover.

The model

To formalize the above argument, we propose a simple three-period model, in which the labor market consists of multiple homogeneous firms and a continuum of workers with heterogeneous ability levels. In the first period, a worker is hired by a firm; in the second period and/or the third period, the worker may leave for a different firm in the labor market. As described above, employer learning is asymmetric across firms. That is, each worker's ability level is initially unknown at the beginning of the first period; but at the end of each period, the worker and the firm that hires the worker (a.k.a. the worker's current employer) can observe the worker's ability level, whereas outsiders not previously hired the worker (a.k.a. prospective employers) cannot. Each firm offers two different types of job positions: one $l$abor and the other $m$anagerial, where job m better leverages a worker's ability than job l; in each period, each firm captures a return to tenure from a worker who has been previously employed by the firm (and acquired some firm-specific human capital via on-the-job learning). At the beginning of each period, the worker's current employer decides whether to promote the worker—assign the worker from job l to job m—based on the worker's observed ability, and prospective employers actively compete for the worker's service based upon their observations of whether the worker is promoted. In other words, due to asymmetric employer learning, the current employer's job assignment serves to signal the worker's ability to prospective employers in the labor market à la Waldman (1984a).

In contrast to previous analyses where a worker cannot return to a former employer, we consider the *possibility* of boomerang employees. Given a worker who has switched employers in the second period, if we call the first-period employer as *Employer 1* and the second-period employer as *Employer 2*, then the worker can return from Employer 2 to Employer 1 in the third period, which is impossible in previous analyses. As a consequence of the movement across firms, there will be more competition for the worker's service in the third period by firms informed of the worker's ability, meaning that the possibility of boomerang employees enhances market competition.

The equilibrium

We start by analyzing the equilibrium *without* the possibility of boomerang employees. Given asymmetric employer learning, as a worker *cannot* return to a former employer, the worker's current employer is effectively the only firm that has observed the worker's ability. In this case, an uninformed outsider faces a *winner's curse* when attempting to poach away a worker from the worker's current employer, because the current employer not only observes the worker's ability but also captures a return to tenure when retaining the worker. As a consequence, there is no worker turnover in equilibrium; moreover, as the current employer's job assignment serves as a signal of the worker's ability, the wage is equal to the productivity of a worker with the lowest possible ability assigned to that job. In other words, due to the winner's curse, a worker receives a wage that is attached to the assigned job position in equilibrium. In turn, we find a *distorted* promotion decision, i.e., the current employer promotes a worker only if the worker's ability level exceeds a threshold, where the threshold level is higher than the efficient level.

This result is a reminiscent of the seminal contribution of Waldman (1984a), where promotion decisions are distorted given asymmetric employer learning. The logic is that, when a current employer's promotion decision sends a positive signal of the worker's ability to the market, prospective employers offer a higher wage to a promoted worker than to a non-promoted worker. In equilibrium, a current employer promotes a worker whenever the associated productivity increase outweighs the corresponding wage increase. Thus, if a worker's productivity is just marginally higher following a promotion, the worker is not promoted; instead, the worker receives a promotion only if the productivity increase given a promotion exceeds the ensued wage increase due to a promotion.

Next, we study the equilibrium *with* the possibility of boomerang employees. Consider a worker who has previously changed employers. As a worker *can* return to a former employer, the worker's ability is observed by both the current employer as well as the former employer. Then, by the virtue of competition between these two informed employers who both enjoy a return to tenure when hiring the worker, the wage is aligned with the worker's productivity. As a consequence, the worker can threaten to move, which forces the firm to raise the wage to a level that is also aligned with his productivity. Despite this threat, due to the return to tenure, there is still no worker turnover in equilibrium, but the wage is now commensurate with a worker's actual productivity. In turn, the aforementioned logic for a distorted promotion decision à la Waldman (1984a) breaks down. That is, as the wage is now aligned with the worker's actual productivity, there is no wage increase following a promotion. Therefore, although a promotion decision still signals high worker ability, the promotion decision is fully *efficient*, i.e., a worker receives a promotion whenever his productivity is just marginally higher following a promotion, which means that the threshold ability level for a promotion decision coincides with the efficient level.

The key argument

With equilibrium results described above in hand, we then argue that an employer has incentives to welcome back former employees. The logic is that the possibility of boomerang employees enhances market competition among firms, which forces the worker's current employer to improve its promotion efficiency and, in turn, increase an employment relationship's surplus; the resulting higher surplus then creates incentives for firms to welcome back former employees. Despite our focus on job assignments, this logic can be extended to other ability-based personnel decisions that increase a worker's productivity but send a positive signal of the worker's ability to the market, e.g., firm-sponsored training, work arrangements, etc.

One interesting aspect of the baseline analysis is that there is no worker turnover across firms in equilibrium, suggesting that the argument concerning the virtue of boomerang employees does not rely on the exact number of or even the actual presence of boomerang employees. In this sense, this article unveils an important market force for the labor market: the possibility of boomerang employees, which is *hidden* when there is no actual presence of boomerang employees.

Extensions

We then consider three model extensions. In the first extension, we show that the argument discussed above concerning the virtue of boomerang employees and its underlying logic are robust to various modifications of the baseline model, including a prolonged career span (as opposed to a three-period career span), wages and job assignments both observable to outsiders (as opposed to just job assignments observable to outsiders), and ability non-observable to workers (as opposed to ability observable to workers).

In the second extension, we modify the baseline analysis with firm-specific human capital such that a worker's acquired skills at a firm (through on-the-job learning) are now partially transferable to a new firm. In equilibrium, we find that an employer has stronger incentives to welcome back former employees when skills become more portable across firms. This result explains why firms in professional-service and high-tech industries are particularly likely to use various HR practices to engage boomerang employees. The logic behind this result is that, when skills become more portable across firms, the wage increase following a promotion is higher; in turn, a current employer's promotion decision becomes more distorted, which suggests more opportunities for improving promotion efficiency through the possibility of boomerang employees.

Note that none of the analyses above features worker turnover in equilibrium. In the third extension, we thus enrich the baseline model with a worker-firm specific match component, which can trigger job-to-job mobility across firms. In equilibrium, we still find that the possibility of boomerang employees enhances firm competition and, in turn, forces more efficient job-assignment decisions. Moreover, the extended model is shown to capture documented evidence concerning the wage, promotion prospect, and performance comparisons of different types of workers, including incumbents, new hires, and returnees.

Implications

Our theory demonstrates that the possibility of boomerang employees impacts on an organization's internal management as well as the entire labor market. Based upon this insight, we then connect our theory to specific HR practices that encourage and facilitate the return of former employees, observations that organizations actively adopting these practices tend to offer their employees with more generous career-development opportunities and more flexible work arrangements, and anecdotal evidence of the common use of these practices among companies from professional-service and high-tech industries. Note that these model implications are incompatible with aforementioned *ex post* benefits of boomerang employees, i.e., cost/time savings, returns to tenure, and knowledge spillovers. Furthermore, as the possibility of boomerang employees provides workers with more freedom to pursue a new job, we relate our theory to labor-market regulations concerning worker turnover, e.g., noncompetes, buyout payments, etc.

The rest of this article is structured as follows. After a review of related literature, Section 2 outlines the baseline model, which is analyzed in Section 3. Section 4 presents three enriched analyses. Section 5 discusses model implications. Section 6 concludes. Technical details can be found in the appendix.

1.1 Related literature

This article mainly contributes to the theoretical literature on worker turnover by introducing the possibility of boomerang employees. As noted above, boomerang employees are undeniably important compositions of workforce in the labor market but have received limited attentions in the literature. For instance, labor research on job-to-job mobility often takes separations as a terminal state that permanently severs an employment relationship, which overlooks the possibility of boomerang employees.[3,4] Take search-and-matching frameworks for example, rather than return to a previous employer, it is typically optimal for an infinitely-lived worker to switch to a new employer when departing from the current employer. Thus, boomerang employees are taken to be unimportant, because they either represent a negligibly small sample or have no effect on equilibrium outcomes.[5] In contrast to these conventional views, we demonstrate that the possibility of boomerang employees can impact on an organization's internal management as well as the entire labor market.

More specifically, this article connects to an extensive literature developed on the basis of the asymmetric-employer-learning hypothesis, which is first studied in Waldman (1984a) and Greenwald (1986).[6] Most studies therein focus on a two-period framework, where turnover can only happen once (which is between the two periods); clearly, boomerang employees can never arise in this type of frameworks. One exception is Bernhardt (1995) that allows workers to be in the labor market for multiple periods; however, workers are not allowed to return to their previous employers in Bernhardt's analysis.[7] As just discussed, this article contributes to this part of the literature by introducing the possibility of boomerang employees, and establishing its impacts on an organization's internal management as well as the entire labor market.[8]

This article also relates to many studies that specifically focus on the inefficient allocation of workers to different job positions that arises due to asymmetric employer learning. Since the seminal work of Waldman (1984a), a number of studies (e.g., Bernhardt 1995; Gibbs 1995; Zábojník and Bernhardt 2001; Ghosh and Waldman 2010; Ekinci, Kauhanen, and Waldman 2019; Friedrich 2023; Yin 2024) find a distorted promotion rule within a firm, when a current employer's promotion decision sends a positive signal of a worker's ability to prospective employers.[9] More recently, there emerge a few studies that investigate various mitigation of this

[3]See Farber (1999) for an overview of the job-mobility literature, as well as Mortensen and Pissarides (1999), Rogerson and Shimer (2011), and Wright et al. (2021) for surveys specifically on search-and-matching frameworks.

[4]To be precise, the type of boomerang employees we focus on are those who switch to a different employer but later return. In the real world, a worker can return to a former employee after a jobless spell. See, for instance, Katz and Meyer (1990), Mavromaras and Rudolph (1997), Nekoei and Weber (2015), and Fujita and Moscarini (2017) for studies on recall of unemployed workers.

[5]Likewise, researchers have so far paid limited attentions to returning customers when studying the product market. In the inter-temporal pricing literature with behavior-based price discrimination (Chen, 1997; Fudenberg and Tirole, 2000), it is well-known that dynamic contracts are generally time inconsistent, whereas spot-contracting analyses are difficult given $T > 2$ periods. For instance, consider a seller, and a consumer who can either purchase or refrain from buying in each period. Then, there are 2^{T-1} possible cases concerning a consumer's purchase history in period T. Thus, research on this topic abstracts away from returning customers largely for tractability reasons, e.g., Tirole (2016) assumes absorbing exits where a consumer cannot make a purchase once terminating a relationship with a seller.

[6]Other earlier studies include Lazear (1986), Milgrom and Oster (1987), Ricart-i Costa (1988), Waldman (1990), Katz and Ziderman (1990), Gibbons and Katz (1991), Bernhardt and Scoones (1993), Laing (1994), Bernhardt (1995), Gibbs (1995), Chang and Wang (1996), Acemoglu and Pischke (1998), and Zábojník and Bernhardt (2001); more recent works include Ferreira and Nikolowa (2023), Friedrich (2023), DeVaro et al. (2024), and Waldman and Yin (Forthcoming). See Schönberg (2007), Pinkston (2009), Kahn (2013), and Bates (2020) for empirical tests supporting the hypothesis.

[7]Specifically, Bernhardt assumes that an employer enjoys no *ex post* benefits from hiring a returning worker, i.e., a previous worker's ability is forgotten and a returning worker's firm-specific human capital cannot be recovered. See Yin (2024) for a related analysis which also rules out boomerang employees.

[8]In contrast to this article's focus on whether to welcome back boomerang employees, there is an extent literature on whether a firm favors an internal worker or an external new hire when staffing an opening position. See, for instance, Chan (1996), Murphy and Zábojník (2004, 2007), Ke, Li, and Powell (2018), and Frydman (2019).

[9]For empirical studies that support this prediction, see Lluis (2005), DeVaro and Waldman (2012), and Bognanno and Melero

distortion. For instance, Mukherjee and Vasconcelos (2018) establish that breakup fees can be used to reduce that distortion; Waldman and Zax (2020) show that human capital accumulations self-funded by workers can increase a worker's probability of being promoted, which reduces the promotion distortion. This article adds a novel perspective to that literature by establishing that the possibility of boomerang employees enhances market competition, which improves allocation efficiency of workers to job positions.

Last but not least, this article contributes to a growing literature on a firm's strategic choice of information disclosure in a labor market setting characterized by adverse selection. In his seminal contribution, Greenwald (1986) establishes that asymmetric employer learning leads to adverse selection which limits worker turnover across firms. Recently, several studies find that employers have incentives to provide ability information to prospective employers. Using an information design approach, Bar-Isaac, Jewitt, and Leaver (2021) and Bar-Isaac and Leaver (2022) focus on adverse selection and job matching, and show that a firm fully discloses ability information to prospective employers concerning a departing worker who has a bad match (see also Bar-Isaac and Lévy, 2022). In a similar vein, Harstad (2007) finds that employing a multi-divisional organizational structure is another way to increase the ability information available to prospective employers. In a related study, Waldman and Yin (Forthcoming) argue that companies pair up-or-out contracts with various practices that reveal ability information concerning a worker not being promoted, including task assignments characterized by high levels of client interactions and introductions to potential recruiters (e.g., outplacement services, reference letters, etc.), which improve sorting of these workers into job positions at other firms.[10]

Related to studies discussed above, our analysis suggests that, due to the possibility of boomerang employees, employer learning is effectively *symmetric* for a worker who has previously switched employers but *asymmetric* concerning a worker who has remained staying. In this regard, whether or not firms welcome back former employees can be envisaged as a strategic choice concerning information disclosure, which also serves to reduce the degree of information asymmetry in the labor market.

2 The Baseline Model

In this section, we present a simple three-period model, under the asymmetric-employer-learning hypothesis.

2.1 The environment

The labor market consists of a fixed number of homogeneous firms, and a continuum of workers of heterogeneous ability levels whose mass is normalized to one. Each worker's career spans for three periods. In the first period, a worker is employed by a firm; in the second period and/or the third period, a worker may leave for a different firm in the labor market. As detailed below, we introduce the possibility of boomerang employees, i.e., a worker may leave his first-period employer in the second period and return to it in the third period.

Heterogeneous worker ability, job assignments, and productivity

Consider an arbitrary worker i. The worker's ability level θ_i is a random draw from distribution $F(\cdot)$ on a compact support $[\underline{\theta}, \overline{\theta}]$ with mean value $\mathbb{E}\theta$. Each firm offers two different types of job positions: one $l$abor and the other $m$anagerial, where we say that i gets promoted if i is assigned from job l to job m. For a given

(2016).

[10] See, also, Mukherjee (2008a,b) and Mukherjee (2010) for related analyses, where firms use information disclosure to elicit efforts from workers with career concerns.

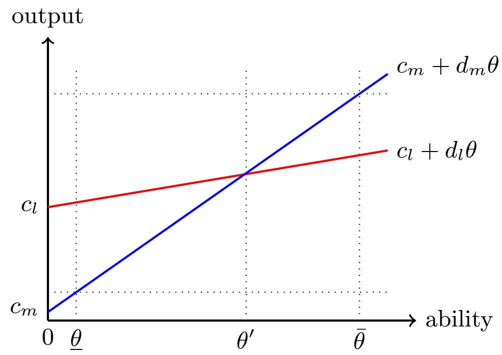

Figure 1: The sensitivity of output to ability.

firm, the period t output of worker i on job $j \in \{l, m\}$ is given by

$$y_{it}^{j}(\theta_i) = (1 + k_{it})\,(c_j + d_j\theta_i)\,, \tag{1}$$

where $k_{it} = k > 0$ captures the return to tenure if the worker has been previously employed by the firm (and acquired some firm-specific human capital via on-the-job learning), and $k_{it} = 0$ otherwise. Following the economics of organizations literature (Rosen, 1982; Lucas, 1978; Waldman, 1984b), as depicted in Figure 1, we assume $c_l > c_m > 0$, $d_m > d_l > 0$, and $c_l + d_l\theta' = c_m + d_m\theta'$ for $\theta' \in (\underline{\theta}, \bar{\theta})$, i.e., the output on job m is more sensitive to a worker's ability than the output on job l, and there exists a threshold ability level θ' such that a worker with ability $\theta > \theta'$ (resp. $\theta \leq \theta'$) is more productive on job m (resp. job l). Moreover, we assume $\mathbb{E}\theta \leq \theta'$, i.e., it is efficient to place a worker with unknown ability on job l.[11]

Asymmetric employer learning

Our model builds on the asymmetric-employer-learning hypothesis. That is, each worker's ability level is initially unknown at the beginning of the first period; at the end of each period, a worker and his current employer can *privately* observe the worker's ability level; in contrast, prospective employers (i.e., outsiders not previously hired the worker) cannot observe the worker's ability level, but they can observe which job position the worker is assigned to by his current employer. In turn, the current employer's job assignment transmits ability information, or serves as a labor-market signal of a worker's ability to prospective employers à la Waldman (1984a).

The possibility of boomerang employees

In contrast to previous analyses (discussed in Section 1.1) where a worker cannot return to a former employer, we introduce the *possibility* of boomerang employees. Given a worker who has switched employers, if we call the first-period employer as *Employer 1* and the second-period employer as *Employer 2*, then the worker can return from Employer 2 to Employer 1 in the third period, which is impossible in previous analyses. As a consequence of the movement across firms, there will be more competition for the worker's service in the third period by firms informed of the worker's ability, meaning that the possibility of boomerang employees enhances market competition.

[11] Through the analysis, we abstract away from positional constraints, i.e., each firm can freely assign a worker to either position. See Waldman and Zax (2016), Friedrich (2023), Zax and Farja (2024), and Waldman and Yin (Forthcoming) for related analyses with positional constraints (but no boomerang employees).

The goal of this article is to rationalize market observations that firms use various HR practices to engage boomerang employees or welcome back former employees with open arms. These practices, as detailed in Section 6, are often costly. Take running a company-supported alumni program for instance, associated costs include hiring personnel to staff it, establishing a platform, exclusive benefits/perks to entice alumni participation, hosting networking events, etc. For ease of exposition, we assume that each firm incurs a cost $C > 0$ to have an employee possibly return after a departure.

The game

We assume that long-term contracts on wages are not feasible. As a worker's ability is typically a non-contractible element (which is neither observable nor verifiable to a third party), firms cannot commit to a job-assignment or promotion policy which is contingent on a worker's ability. In turn, we confine our analysis to spot contracting. The timing of the game is as follows.

1. At the beginning of the first period, each firm offers a first-period wage to a worker with unknown ability. If the worker accepts an offer, then the firm that employs the worker observes the worker's ability level and pays the first-period wage at the end of the period; otherwise, the worker is self-employed, which gives the worker a reservation (expected) lifetime wage $\bar{W} \geq 0$.[12]
2. At the beginning of the second period, the worker's first-period employer assigns the worker to a job position. After observing the first-period employer's job assignment, each prospective employer makes a wage poaching offer, followed by the first-period employer's wage counteroffer.[13] The worker then chooses a firm to work for. At the end of the period, the employer which hires the worker observes his ability level and pays the second-period wage.
3. The sequence of events for the third period repeats that for the second period.[14]

Our solution concept is perfect Bayesian equilibrium. To ensure that this article's result that firms welcome back former employers is not cost-driven, we assume that the hiring process by itself is costless. That is, each worker (resp. firm) incurs no cost during the process of switching to a different firm (resp. recruiting a new worker). All players are rational, risk-neutral, and do not discount the future. The tie-breaking rule is that: i) a worker chooses to stay when the current employer's counteroffer results in the same lifetime wage as the poaching offer from an prospective employer; ii) a worker chooses an offer randomly given multiple tied offers from prospective employers; and iii) the current employer does not promote a worker when the profit of assigning the worker to job m is equal to that of assigning the worker to job l.

2.2 A benchmark analysis with symmetric learning

As a benchmark, we first study what happens given symmetric learning, i.e., a worker's ability is *publicly* observed at the end of period 1. In this case, we show that firms have no incentive to welcome back former employees.

Notice that the employer's wage and job assignment in period 1 will have no subsequent impact on any firm's decision in periods 2 and 3, because a worker's ability is initially unknown at the beginning of period 1. In each

[12] As the worker's innate ability is initially unknown, $\bar{W}$ is ability-independent. We discuss the role of $\bar{W}$ at the end of Section 3.

[13] See Greenwald (1986) and Milgrom and Oster (1987) for earlier studies with counteroffers in wage bidding, and Barron, Berger, and Black (2006) for evidence on the common use of counteroffers. As discussed in footnote 20 below, counter-offering is not the driving force for the key argument of our theory.

[14] In the baseline analysis, we assume that a worker can observe his own ability level at the end of the first period, and prospective employers can observe the current employer's job assignment but not the wage offer in each period. In Section 4.1, we show that the key argument of our theory continues to hold when relaxing these assumptions.

analysis below, we thus skip the description of equilibrium behavior in period 1. To develop model intuitions, we also begin with a preliminary analysis for the one-job case, where a worker is always assigned to the same job, say job j; we then consider the two-job case, where a worker can be assigned to either job l or job m.

Boomerang employees

We first study equilibrium behavior with the possibility of boomerang employees. For the one-job case where a worker is always assigned to job j, we solve the game from backward. In the third period, if worker i has previously changed employers, i.e., he was hired by Employer 1 in the first period and by Employer 2 in the second period, the worker remains with Employer 2 and receives $(1+k)(c_j + d_j\theta_i)$, because he has acquired firm-specific human capital for both employers; in contrast, if worker i has not previously changed employers, i.e., he was employed by Employer 1 in the first two periods, the worker remains with Employer 1 and receives $c_j + d_j\theta_i$. In the second period, if worker i moves to a new employer, the worker receives $c_j + d_j\theta_i$, resulting in a lifetime wage $c_j + d_j\theta_i + (1+k)(c_j + d_j\theta_i)$. To retain the worker, Employer 1 just matches this lifetime wage, which yields the second-period wage $c_j + d_j\theta_i + (1+k)(c_j + d_j\theta_i) - (c_j + d_j\theta_i) = (1+k)(c_j + d_j\theta_i)$.

Below, we summarize equilibrium behavior with the possibility of boomerang employees for the one-job case.

Lemma 1. *If a worker can return to a previous employer and ability is publicly observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1 and receives wage* $(1+k)(c_j + d_j\theta_i)$.
2. *In period 3, the worker remains with Employer 1 and receives wage* $c_j + d_j\theta_i$.

We then consider the equilibrium for the two-job case where a worker can be assigned to job l or job m. In this case, as employer learning is symmetric across firms, the current employer's promotion decision does not send a positive signal to outsiders; in turn, there is no reason for a current employer to distort the job-assignment decision. Then, symmetric learning yields an efficient outcome. That is, concerning the allocation of workers across firms, no worker switches employers which avoids the loss of firm-specific human capital; as for the allocation of workers within firms, each worker is assigned to job m (resp. job l) whenever his ability level satisfies $\theta_i > \theta'$ (resp. $\theta_i \leq \theta'$).

The result below describes equilibrium behavior with the possibility of boomerang employees for the two-job case.

Proposition 1. *If a worker can return to a previous employer and ability is publicly observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage* $(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}$, *i.e.,*

$$\begin{cases} (1+k)(c_l + d_l\theta_i) \ \ \textit{on job } l & \forall \theta_i \leq \theta', \\ (1+k)(c_m + d_m\theta_i) \ \ \textit{on job } m & \forall \theta_i > \theta'. \end{cases}$$

2. *In period 3, the worker remains with Employer 1, and receives wage* $\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}$, *i.e.,*

$$\begin{cases} c_l + d_l\theta_i \ \ \textit{on job } l & \forall \theta_i \leq \theta', \\ c_m + d_m\theta_i \ \ \textit{on job } m & \forall \theta_i > \theta'. \end{cases}$$

No boomerang employees

Next, we consider equilibrium behavior without the possibility of boomerang employees. For the one-job case, the equilibrium outcome given no boomerang employees coincides with that given boomerang employees, i.e., no worker switch jobs across firms.[15] In turn, the employment relationship's surplus remains the same whether or not boomerang employees are possible. Thus, given that HR practices that welcome back former employees are costly, there is no rationale for firms to welcome back former employees given symmetric learning.

As for the two-job case, similarly to the one-job case described above, the equilibrium outcome given no boomerang employees also coincides with that given boomerang employees. That is, we find no worker turnover across firms and fully efficient job assignments within firms. Hence, as HR practices that welcome back former employees are costly but do not imply a surplus gain, there is again no rationale for firms to welcome back former employees given symmetric learning.

Corollary 1. *If a worker's ability is publicly observed, then firms have no incentives to welcome back former employees.*

In the next section where we focus on equilibrium behavior given asymmetric learning, we establish that firms, however, have incentives to welcome back former employees.

3 The Equilibrium

In this section, we provide the equilibrium analysis given asymmetric learning. Like for the benchmark analysis, we start with the one-job case which develops model intuitions, and show for the two-job case that job-assignment decisions are inefficient without the possibility of boomerang employees but fully efficient with the possibility of boomerang employees. The surplus gain due to increased promotion efficiency then creates incentives for firms to welcome back former employees.

3.1 The analysis with asymmetric learning

3.1.1 No boomerang employees

We begin with an analysis for equilibrium behavior without the possibility of boomerang employees.

The one-job case

We first consider the one-job case. Given asymmetric employer learning, as a worker cannot return to a former employer, the worker's current employer is effectively the *only* firm that has observed the worker's ability. In this case, an uninformed outsider faces a *winner's curse* when attempting to poach away a worker from the worker's current employer, because the current employer not only observes the worker's ability but also captures a return to tenure when retaining the worker. As a consequence, there is no worker turnover in equilibrium; moreover, due to the winner's curse, the wage is equal to the productivity of a worker with the lowest possible ability.

The details are as follow. In the third period, worker i remains with the current employer and receives $c_j + d_j\underline{\theta}$ whether or not the worker has previously changed employers, because of the winner's curse discussed

[15] There are, however, differences in equilibrium wages. In the third period, as a worker cannot return to a previous employer, the wage equals $c_j + d_j\theta_i$ whether or not worker i has previously changed employers. In the second period, if worker i moves to a new employer, the worker receives $c_j + d_j\theta_i + k\,(c_j + d_j\theta_i) = (1 + k)\,(c_j + d_j\theta_i)$ (which incorporates the third period's profit). To retain the worker, Employer 1 just matches this second-period wage by also offering $(1 + k)\,(c_j + d_j\theta_i)$.

above.[16] In the second period, if an uninformed outsider holds the belief that worker i is of ability $\hat{\theta}_i$, the worker receives $c_j + d_j\hat{\theta}_i + (1+k)\left(c_j + d_j\hat{\theta}_i\right) - (c_j + d_j\underline{\theta})$ which incorporates the third-period profit, resulting in a lifetime wage

$$c_j + d_j\hat{\theta}_i + (1+k)\left(c_j + d_j\hat{\theta}_i\right) - (c_j + d_j\underline{\theta}) + c_j + d_j\underline{\theta} = c_j + d_j\hat{\theta}_i + (1+k)\left(c_j + d_j\hat{\theta}_i\right)$$

for worker i to separate with Employer 1. To retain the worker, Employer 1 can (counter)offer as high as $(1+k)(c_j + d_j\theta_i) + (1+k)(c_j + d_j\theta_i) - (c_j + d_j\underline{\theta})$, which results in a lifetime wage as high as

$$(1+k)(c_j + d_j\theta_i) + (1+k)(c_j + d_j\theta_i) - (c_j + d_j\underline{\theta}) + c_j + d_j\underline{\theta} = 2(1+k)(c_j + d_j\theta_i)$$

for worker i to stay with Employer 1. Comparing lifetime wages above yields that Employer 1 can always outbid an uninformed outsider who holds the correct belief concerning the worker's ability, i.e., $\hat{\theta}_i = \theta_i$. Consequently, due to the return to tenure, there is a winner's curse for an uninformed outsider to poach away a worker from the current employer. In turn, an uninformed outsider offer $c_j + d_j\underline{\theta} + k(c_j + d_j\underline{\theta}) = (1+k)(c_j + d_j\underline{\theta})$ (which incorporates the third period's profit). To retain the worker, Employer 1 just matches this second-period wage by also offering $(1+k)(c_j + d_j\underline{\theta})$.

Below, we summarize equilibrium behavior without the possibility of boomerang employees for the one-job case.

Lemma 2. *If a worker cannot return to a previous employer and ability is privately observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage* $(1+k)(c_j + d_j\underline{\theta})$.
2. *In period 3, the worker remains with Employer 1, and receives wage* $c_j + d_j\underline{\theta}$.

This result is driven by the winner's curse discussed above. In particular, there is no turnover, while the equilibrium wage is attached to job positions, i.e., each worker on the same job position receives the same wage regardless of his actual ability level.

The two-job case

We then turn to the two-job case. Define $\theta_N^{t+} \in \left(\underline{\theta}, \bar{\theta}\right)$ for $t \in \{2, 3\}$ as the threshold ability level (given no boomerang employees), where the current employer promotes worker i in period t whenever $\theta_i > \theta_N^{t+}$. Once informed of a worker's ability, the current employer's promotion decision is solely based on the worker's ability (which is fixed over time); thus, a worker being promoted will not subsequently be demoted, i.e., $\theta_N^{2+} \geq \theta_N^{3+}$.[17]

When a worker cannot return to a previous employer, due to the return to tenure, we show below that there is no worker turnover, and the current employer's promotion decision is inefficient, i.e., $\theta_N^{2+} \geq \theta_N^{3+} > \theta'$. This result is a reminiscent of Waldman (1984a) and Bernhardt (1995), where the current employer's promotion is *distorted* given asymmetric employer learning. The logic is that asymmetric employer learning suggests

[16] Specifically, if an uninformed outsider offers worker i a wage $c_j + d_j\theta$ and successfully hires the worker, then it must be the case that the worker's ability level satisfies $\theta_i \leq \theta$. The logic is that if $\theta_i > \theta$, then the return to tenure (i.e., $k > 0$ in (1)) suggests that the current employer who knows the worker's ability would have made a counteroffer that is sufficiently high to retain the worker. Thus, there is a winner's curse for an uninformed outsider to poach away a worker from the current employer; in turn, an uniformed outsider will not bid above the productivity of a worker with the lowest possible ability, i.e., $c_j + d_j\underline{\theta}$.

[17] Specifically, if worker i's ability level satisfies $\theta_i > \theta_N^{2+}$, then he is assigned to job m in periods 2 and 3; if worker i's ability level satisfies $\theta_N^{3+} < \theta_i \leq \theta_N^{2+}$, then he is assigned to job l in period 2 and job m in period 3; if worker i's ability level satisfies $\theta_i \leq \theta_N^{3+}$, then he is assigned to job l in periods 2 and 3;

that the current employer's promotion decision sends prospective employers a positive signal of the worker's ability; as a consequence, a worker assigned to job m receives a poaching wage higher than a worker assigned to job l, meaning that the current employer faces a wage increase when it promotes a worker. In equilibrium, the current employer promotes worker i only if the associated output gain $(1+k)\left[(c_m + d_m\theta_i) - (c_l + d_l\theta_i)\right]$ outweighs the corresponding wage increase. As the output gain equals zero when promoting a worker with the threshold ability level θ', i.e., $(1+k)\left[(c_m + d_m\theta') - (c_l + d_l\theta')\right] = 0$, the current employer's promotion decision is distorted, because a worker's ability level must be sufficiently higher than the efficient level θ' to warrant a promotion.

Specifically, the current employer promotes worker i in period 3 if $\theta_i > \theta_N^{3+}$, where θ_N^{3+} is determined by

$$(1+k)\left[\left(c_m + d_m\theta_N^{3+}\right) - \left(c_l + d_l\theta_N^{3+}\right)\right] = c_m + d_m\theta_N^{3+} - \left(c_l + d_l\underline{\theta}\right), \tag{2}$$

where $c_m + d_m\theta_N^{3+}$ (resp. $c_l + d_l\underline{\theta}$) is the period 3 wage to a worker assigned to job m (resp. job l).[18] Then, as the period 3 wage increase due to promotion $c_m + d_m\theta_N^{3+} - (c_l + d_l\underline{\theta})$ is strictly positive, (2) suggests a distorted promotion decision, i.e., $\theta_N^{3+} > \theta'$; in particular, if $k \to 0$, there exists no $\theta_N^{3+} \in \left(\underline{\theta}, \bar{\theta}\right)$ satisfying (2), indicating a fully inefficient promotion decision where no worker receives a promotion, i.e., $\lim_{k\to 0}\theta_N^{3+} = \bar{\theta}$. Likewise, the current employer promotes worker i in period 2 if $\theta_i > \theta_N^{2+}$, where θ_N^{2+} is determined by

$$(1+k)\left[\left(c_m + d_m\theta_N^{2+}\right) - \left(c_l + d_l\theta_N^{2+}\right)\right] = (1+k)\left(c_m + d_m\theta_N^{2+}\right) - (1+k)\left(c_l + d_l\underline{\theta}\right), \tag{3}$$

where $(1+k)\left(c_m + d_m\theta_N^{2+}\right)$ (resp. $(1+k)\left(c_l + d_l\underline{\theta}\right)$) is the period 2 wage to a worker assigned to job m (resp. job l). Then, as there exists no $\theta_N^{2+} \in \left(\underline{\theta}, \bar{\theta}\right)$ satisfying (3), we obtain a fully inefficient promotion decision where no worker receives a promotion, i.e., $\theta_N^{2+} = \bar{\theta}$. Moreover, the promotion decision is more distorted in period 2 than in period 3, i.e., $\bar{\theta} = \theta_N^{2+} \geq \theta_N^{3+} > \theta'$. The logic is that, as suggested by (2) and (3), the wage increase associated with a promotion is higher in period 2 than in period 3, i.e., $k > 0$ and $\theta_N^{2+} \geq \theta_N^{3+}$ suggest that

$$(1+k)\left(c_m + d_m\theta_N^{2+}\right) - (1+k)\left(c_l + d_l\underline{\theta}\right) > c_m + d_m\theta_N^{3+} - \left(c_l + d_l\underline{\theta}\right).$$

So, a promotion decision in period 2 requires the worker to be higher ability than that in period 3.

The result below manifests equilibrium behavior without the possibility of boomerang employees for the two-job case.

Proposition 2. *If a worker cannot return to a previous employer and ability is privately observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage* $(1+k)\left(c_l + d_l\underline{\theta}\right)$ *on job* l *for* $\forall\theta_i$, *i.e.,* $\theta_N^{2+} = \bar{\theta}$.
2. *In period 3, the worker remains with Employer 1, and receives wage*

$$\begin{cases} c_l + d_l\underline{\theta} \text{ on job } l & \forall\theta_i \leq \theta_N^{3+}, \\ c_m + d_m\theta_N^{3+} \text{ on job } m & \forall\theta_i > \theta_N^{3+}, \end{cases}$$

where $\theta_N^{3+} > \theta'$, *with* $\lim_{k\to 0}\theta_N^{3+} = \bar{\theta}$.

[18] By a logic similar to that for the one-job case, there is a winner's curse for an uninformed outsider to poach away worker i from the current employer. Thus, an uninformed outsider will not bid above the productivity of a worker with the lowest possible ability given the current employer's job assignment, i.e., $c_m + d_m\theta_N^{3+}$ (resp. $c_l + d_l\underline{\theta}$) for a worker assigned to job m (resp. job l).

3.1.2 Boomerang employees

We then study equilibrium behavior with the possibility of boomerang employees

The one-job case

Again, we begin with the one-job case. Given asymmetric employer learning, an uninformed outsider still faces a *winner's curse* when attempting to poach away a worker from the worker's current employer, because the current employer not only observes the worker's ability but also captures a return to tenure when retaining the worker. However, if the worker has switched from Employer 1 to Employer 2 in the second period, then there will be more competition for the worker's service in the third period, i.e., by Employer 1 and Employer 2 who are both informed of the worker's ability.

Consider the third-period wages. If worker i has previously changed employers, then i's ability is observed by both Employer 1 and Employer 2. In turn, the worker's third-period wage equals $(1+k)(c_j + d_j\theta_i)$ because he has acquired firm-specific human capital for both employers. In contrast, if worker i has not previously changed employers, then i's ability is only observed by Employer 1. Then, there is a winner's curse, indicating that the worker's third-period wage equals $c_j + d_j\underline{\theta}$.

We then turn to second-period wages. Provided that a worker moves to Employer 2, Employer 2 will make a zero third-period profit due to the Bertrand competition between Employer 1 and Employer 2. Thus, if Employer 2 holds the belief that worker i is of ability $\hat{\theta}_i$, she offers $c_j + d_j\hat{\theta}_i$, resulting in a lifetime wage of

$$c_j + d_j\hat{\theta}_i + (1+k)(c_j + d_j\theta_i)$$

for worker i to separate with Employer 1. To retain the worker, Employer 1 can (counter)offer as high as $(1+k)(c_j + d_j\theta_i) + (1+k)(c_j + d_j\theta_i) - (c_j + d_j\underline{\theta})$ which incorporates the third-period profit. This results in a lifetime wage as high as

$$(1+k)(c_j + d_j\theta_i) + (1+k)(c_j + d_j\theta_i) - (c_j + d_j\underline{\theta}) + c_j + d_j\underline{\theta} = 2(1+k)(c_j + d_j\theta_i)$$

for worker i to stay with Employer 1. Comparing lifetime wages above yields that Employer 1 can always outbid an uninformed outsider who holds the correct belief concerning the worker's ability, i.e., $\hat{\theta}_i = \theta_i$. Consequently, due to the return to tenure, there is a winner's curse, so an uninformed outsider offers $c_j + d_j\underline{\theta}$, meaning that the lifetime wage for worker i to separate with Employer 1 equals

$$c_j + d_j\underline{\theta} + (1+k)(c_j + d_j\theta_i).$$

To retain the worker, Employer 1 just matches the above lifetime wage with a second-period wage

$$c_j + d_j\underline{\theta} + (1+k)(c_j + d_j\theta_i) - (c_j + d_j\underline{\theta}) = (1+k)(c_j + d_j\theta_i).$$

Below, we summarize equilibrium behavior with the possibility of boomerang employees for the one-job case.

Lemma 3. *If a worker can return to a previous employer and ability is privately observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage* $(1+k)(c_j + d_j\theta_i)$.
2. *In period 3, the worker remains with Employer 1, and receive wage* $c_j + d_j\underline{\theta}$.

When a worker can return from Employer 2 to Employer 1, despite asymmetric employer learning, both Employer 1 and Employer 2 are informed of the worker's ability in the third period. So, if the worker separates with Employer 1 in the second period, there will be more firm competition in the third period for the worker's service, which increases the worker's third period wage; in turn, the worker's *threat* to move is enlarged, which forces the current employer to raise the second period wage.[19] Despite the worker's enlarged threat to move, due to the return to tenure, there is still a winner's curse in periods 2 and 3. Consequently, there is still no turnover; moreover, the period 3 wage is given by $c_j + d_j\underline{\theta}$, while the period 2 wage $(1+k)(c_j + d_j\theta_i)$ is perfectly aligned with the worker's actual productivity.[20] This sets contrast to Lemma 2, where the period 2 wage $(1+k)(c_j + d_j\underline{\theta})$ is attached to job positions (and thus invariant to the worker's actual productivity) when a worker cannot return to a previous employer.

The two-job case

As for the two-job case, we define $\theta_B^{t+} \in \left(\underline{\theta}, \bar{\theta}\right)$ for $t \in \{2,3\}$ as the threshold ability level (given boomerang employees), with $\theta_B^{2+} \geq \theta_B^{3+}$, where a current employer promotes worker i in period t whenever $\theta_i > \theta_B^{t+}$. The result below describes equilibrium behavior with the possibility of boomerang employees for the two-job case.

Proposition 3. *If a worker can return to a previous employer and ability is privately observed, 1) and 2) describe equilibrium behavior concerning a worker with ability θ_i.*

1. *In period 2, the worker remains with Employer 1, and receives wage $(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}$ or*

$$\begin{cases} (1+k)(c_l + d_l\theta_i) \ \ \textit{on job } l & \forall\theta_i \leq \theta_B^{2+}, \\ (1+k)(c_m + d_m\theta_i) \ \ \textit{on job } m & \forall\theta_i > \theta_B^{2+}, \end{cases}$$

   where $\theta_B^{2+} = \theta'$.

2. *In period 3, the worker remains with Employer 1, and receives wage*

$$\begin{cases} c_l + d_l\underline{\theta} \ \ \textit{on job } l & \forall\theta_i \leq \theta_B^{3+}, \\ c_m + d_m\theta_B^{3+} \ \ \textit{on job } m & \forall\theta_i > \theta_B^{3+}, \end{cases}$$

   where $\theta_B^{3+} = \theta'$.

The above result suggests a fully efficient promotion decision given boomerang employees, i.e., $\theta_B^{2+} = \theta_B^{3+} = \theta'$. This sets contrast to the distorted promotion decision found in Proposition 2. As established in Lemma 3, when a worker can return to a previous employer, the period 2 wage is no longer attached to job positions, but perfectly aligned with the worker's productivity, i.e.,

$$(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}.$$

[19] Intuitively, the possibility of boomerang employees increases the attractiveness of a worker's outside option in the third period, which improves the worker's bargaining position vis-a-vis the current employer when the worker threatens to move in the second period.

[20] The driving force for this result is *not* the winner's curse or the assumption that a current employer can counteroffer in each period. In particular, if a current employer makes a job assignment which is followed by simultaneous wage offers by itself and prospective employers, then the winner's curse type of argument breaks down. Yet, the underlying logic continues to hold. That is, as a worker's threat to move is enlarged given boomerang employees (because of the higher third-period wage), Employer 1 is forced to offer a second-period wage that is more aligned with the worker's actual productivity.

This means that the current employer's promotion decision, though sends a positive signal of the worker's ability to prospective employers, does not result in a wage increase in period 2. Specifically, the current employer promotes worker i in period 2 if $\theta_i > \theta_B^{2+}$, where θ_B^{2+} is determined by

$$(1+k)\left(c_m + d_m\theta_B^{2+}\right) - (1+k)\left(c_l + d_l\theta_B^{2+}\right) \\ = (1+k)\max\left\{c_l + d_l\theta_i, c_m + d_m\theta_i\right\} - (1+k)\max\left\{c_l + d_l\theta_i, c_m + d_m\theta_i\right\} = 0,$$

where there is no wage increase following a promotion. Thus, we obtain a fully efficient promotion decision for the second period, i.e., $\theta_B^{2+} = \theta'$; in turn, as $\theta_B^{2+} \geq \theta_B^{3+}$, we also obtain a fully efficient promotion decision for the third period, i.e., $\theta_B^{3+} = \theta'$.

Moreover, due to the return to tenure, there is again no worker turnover in the two-job case. Thus, despite the absence of boomerang employees in equilibrium, the above result tells us that the possibility of boomerang employers, which enlarges a worker's threat to move, can force a fully efficient promotion decision. The intuition is that the possibility of boomerang employers enhances the third-period market competition, which serves as a competitive force for firms to improve the second-period promotion efficiency.

3.1.3 Whether to welcome back former employees

To investigate whether firms have incentives to welcome back former employees, we now compare the firm profit with and without the possibility of boomerang employees.

For the one-job case, given no worker turnover in equilibrium, the surplus from the employment relationship between a worker and the current employer remains the same whether or not a worker can return to a previous employer. In this case, the current employer has no incentives to welcome back former employees. As for the two-job case, comparing the inefficient job-assignment decision in Proposition 2 against the fully efficient job-assignment decision in Proposition 3, the surplus is higher given boomerang employees than given no boomerang employee. In other words, the possibility of boomerang employees improves promotion efficiency and, in turn, the surplus. Thus, while maintaining the reservation lifetime wage $\bar{W} > 0$ to the worker, the current employer can achieve a higher firm profit and, in turn, has incentives to welcome back former employees.[21]

In what follows, we formalize this argument.

Corollary 2. *If a worker's ability is privately observed, then there exists a unique cutoff $C' > 0$ such that firms welcome back former employees whenever the cost of doing so satisfies $C < C'$.*

3.2 The key argument

Our analysis above shows the importance of boomerang employees in shaping an organization's internal management. That is, the possibility of boomerang employees enhances market competition for a worker's service, which forces the worker's current employer to make more efficient job assignments and, in turn, increases the worker's productivity. Thus, the possibility of boomerang employees is welfare improving. In this section, we establish that this argument can be extended to various other personnel decisions, and stress that the argument does not hinge on the exact number of or even the actual presence of boomerang employees.

[21] In this article, we assume a fixed number of firms, where each firm can offer the contract and thus enjoy all the increased surplus while leaving the reservation lifetime wage $\bar{W} > 0$ to the worker. If the firm and the worker can, instead, bargain, then the possibility of boomerang employees is mutually beneficial, i.e., the firm achieves a higher profit while the worker earns a higher income. Similarly, if there is free entry of firms or market competition is perfect, then all the increased surplus goes to workers while each firm earns a zero expected profit.

3.2.1 Implications to other personnel decisions

It is noteworthy that the argument that the possibility of boomerang employees improves job-assignment efficiency extends to various alternative ability-based personnel decisions that increase a worker's productivity but send a positive signal of the worker's ability to outsiders, e.g., firm-sponsored training, work arrangements, etc.

As detailed in the appendix, when a worker receives firm-sponsored training from the current employer, the worker's productivity increases, but outsiders in the labor market can infer that the current employer finds it worthwhile to make training investments in the worker, which signals that the worker is higher ability than others not receiving training. Likewise, as also detailed in the appendix, providing a worker with more flexible work arrangements (e.g., telecommuting, flexible hours, or compressed workweeks) enhances the worker's productivity but indicates to the labor market that the company trusts the employee to manage time effectively, which signals the worker's superior self-discipline ability.

3.2.2 The possibility of boomerang employees: a hidden market force

Another thing worth noting is that there is no worker turnover across firms throughout this section's analysis, suggesting that the argument concerning the virtue of boomerang employees does not depend on the exact number of or even the actual presence of boomerang employees. That is, even if boomerang employees represent a small sample of workforce or are completely absent at an organization, the possibility of boomerang employees, which enlarges a worker's threat to move, can still force more efficient personnel decisions within the entire organization.

As discussed in Section 1.1, most labor research on job-to-job mobility takes separations as a terminal state that permanently severs an employment relationship or overlooks the possibility of boomerang employees, because boomerang employees either represent a negligibly small sample or have no impact on equilibrium outcomes. To this end, this article identifies an important market force for the labor market: the possibility of boomerang employees, which is *hidden* when there is no actual presence of boomerang employees.

3.3 Closing remarks

To close this section, given a firm that engages former employees, we consider whether or not the firm can commit to rehire previous employees. Also, we elaborate on the period 1 wage, a.k.a. the starting salary, which we omit in the above analysis.

3.3.1 Commitment

In Corollary 2, we find that firms have incentives to welcome back former employees given a low cost of doing so. In particular, the firm tells a worker intending to move that the worker can return to the firm in the future, which is vital for the competitive force that improves the firm's internal management. But the question is whether the firm will actually commit to let a former employee to be rehired. To be precise, using our three-period analysis, commitment means that in the third period Employer 1 will compete to hire back a former employee who has switched to Employer 2. In this case, we argue that there is no commitment issue, because Employer 1 has incentives to hire back a former employee because of the worker's known ability and return to tenure.

When firms do not welcome back former employees because of the high cost of doing so, there will, however, be a commitment issue. That is, to deter turnover in the second period, Employer 1 tells a worker intending to move that the worker cannot return to the firm in the third period, but Employer 1 cannot refrain from hiring back the worker due to the worker's known ability and return to tenure. Hence, as assumed in Tirole (2016), one method to mitigate this time-inconsistency problem is to charge a sufficiently high re-entering fee (either on the rehiring firm or a returning worker), then no returnee will arise in equilibrium.

3.3.2 Implementation

Denote $w_B^t(\theta)$ (resp. $w_N^t(\theta)$) as the period t wage for a worker of ability θ, with (resp. without) the possibility of boomerang employees. For illustration purpose, we now focus on the wage profile when $k > 0$ is infinitesimal. According to Proposition 2 and Proposition 3, the possibility of boomerang employers indicates improved promotion efficiency as well as a *wage increase* in periods 2 and 3, i.e., $w_B^2(\theta) > w_N^2(\theta) > 0$ and $w_B^3(\theta) > w_N^3(\theta) > 0$ for $\forall\theta$. Thus, to maintain the reservation lifetime wage $\bar{W} > 0$ to each worker, the possibility of boomerang employers must entail a *wage decrease* in period 1, i.e.,

$$w_B^1 = \bar{W} - \int_{\underline{\theta}}^{\bar{\theta}} w_B^2(\theta) + w_B^3(\theta) dF(\theta) < \bar{W} - \int_{\underline{\theta}}^{\bar{\theta}} w_N^2(\theta) + w_N^3(\theta) dF(\theta) = w_N^1.$$

In other words, a worker receives a *wage cut* in period 1 whenever the firm welcomes back former employees.

The reservation lifetime wage

Suppose that the period 1 wage is non-negative given no boomerang employees, i.e., $w_N^1 \geq 0$. The question is whether the wage cut due to boomerang employees will result in a negative wage in period 1, i.e., $w_B^1 < 0$. The answer depends on the reservation lifetime wage $\bar{W} > 0$, i.e., an exogenous parameter whose value, in essence, depends on the labor market. In particular, if the labor market is tight or there is a scarcity of workers relative to job positions, then $\bar{W} > 0$ is high valued, where a sufficiently large $\bar{W}$ yields a non-negative period 1 wage, i.e., $w_B^1 \geq 0$; if the labor market is loose or there is an excess of workers relative to job positions, then $\bar{W} > 0$ is low valued, where a sufficiently small $\bar{W}$ can entail a negative period 1 wage, i.e., $w_B^1 < 0$.

Buyout payments

Continued with the above discussion where the period 1 wage is non-negative given no boomerang employees, i.e., $w_N^1 \geq 0$, we now assume a sufficiently small $\bar{W}$ which results in a negative period 1 wage given boomerang employees, i.e., $w_B^1 < 0$. Then, given the negative starting salary, the question is how can an employer implement the equilibrium outcome in Proposition 3 when workers are credit constrained, i.e., they cannot accept a negative wage in period 1. One method is to use a buyout payment—a breakup fee incurred by a worker for separating with the firm. For instance, let $\{l^2, l^3\}$ be non-negative payments satisfying $l^2 + l^3 = w_N^1 - w_B^1$, $w_B^2(\theta) - l^2 \geq 0$, and $w_B^3(\theta) - l^3 \geq 0$. Then, a wage schedule which implements the equilibrium outcome in Proposition 3 is to offer a worker of ability θ with w_N^1 in period 1, $w_B^2(\theta) - l^2$ in period 2, and $w_B^3(\theta) - l^3$ in period 3, along with a buyout payment equal to l^2 in period 2 and l^3 in period 3.

Specifically, due to these buyout payments, there is no worker turnover in periods 2 and 3, where each period's buyout payment only serves to retain the worker but is not actually paid by the worker.[22] Moreover,

[22]In period $t \in \{2, 3\}$, a worker receives $w_B^t(\theta) - l^t$ for staying with Employer 1, and the poaching offer $w_B^t(\theta)$ less the buyout pay l^t for separating with Employer 1; consequently, the worker remains with Employer 1, and does not incur any buyout payment.

it can be readily checked that the worker still obtains an expected lifetime wage of $\bar{W}$, i.e.,

$$w_N^1 + \int_{\underline{\theta}}^{\bar{\theta}} w_B^2(\theta) - l^2 dF(\theta) + \int_{\underline{\theta}}^{\bar{\theta}} w_B^3(\theta) - l^3 dF(\theta) = w_N^1 + \int_{\underline{\theta}}^{\bar{\theta}} w_B^2(\theta) + w_B^3(\theta) dF(\theta) - \left(w_N^1 - w_B^1\right)$$
$$= w_B^1 + \int_{\underline{\theta}}^{\bar{\theta}} w_B^2(\theta) + w_B^3(\theta) dF(\theta) = \bar{W}.$$

In Section 5, we revisit this result, which sheds new light on labor-market regulations concerning worker turnover.

4 Extensions

In this section, we consider three model enrichments.

4.1 Extension 1: Robustness of the key argument

In the first extension, as noted in footnote 14, we show that the argument discussed above concerning the virtue of boomerang employees and the logic behind are robust to various modifications of the baseline model, including a prolonged career span (as opposed to a three-period career span), wages and job assignments both observable to outsiders (as opposed to just job assignments observable to outsiders), and ability non-observable to workers (as opposed to ability observable to workers). To save space, we only describe the modified model and the main result, and relegate the details to the appendix.

4.1.1 A prolonged career span

We first investigate whether the argument carries forwards given a prolonged career span of workers. Similar to the baseline analysis, we still assume that the worker's ability is initially unknown, but revealed to the worker and the current employer after a period of employment; the difference is that each worker's career now lasts for $T \geq 4$ periods. In this case, due to the return to tenure, there is no worker turnover in equilibrium. As T increases, we find a rising importance of engaging boomerang employees to improve job-assignment efficiency. The logic is that, analogous to the baseline analysis, the firm's promotion decision is fully efficient given boomerang employees, but inefficient given no boomerang employees. Consequently, when a worker's career spans for more periods, there is an increased efficiency loss due to inefficient promotion decisions, which suggests more opportunities for surplus gains when the firm welcomes back former employees.

4.1.2 Wages and job assignments both observable to outsiders

In the baseline analysis, we assume that outsiders can observe the job assignment but not the wage offered by a worker's current employer. In this subsection, we study whether the argument continues to hold given the additional channel of wage signaling, i.e., the current employer's wage and job assignment are now both publicly observed and thus serve as signals of a worker's ability to outsiders.[23] In this modified case, we find that the efficiency gain due to the possibility of boomerang employees is lower than that from the baseline analysis.

[23] As a current employer just makes a promotion decision at the beginning of each period (which is followed by outsiders' poaching offers and its own counteroffer), there is a *delayed* effect of wage signaling, where the wage offered by a current employer only impacts on an uninformed outsider's poaching wage in the following period. In fact, if we modify the model such that at the beginning of each period, a current employer makes both a promotion decision and a wage offer, then the equilibrium analysis should remain unchanged because, thanks to the ability to counteroffer, a current employer can strategically offer a zero wage which does not reveal any ability information to outsiders.

No boomerang employees

First consider equilibrium behavior given no boomerang employees, where the equilibrium with wage signaling is exactly the same as that without wage signaling. That is, as described by Lemma 2 for the one-job case and by Proposition 2 for the two-job case, there is no worker turnover and the promotion decision is inefficient. The logic is as follows. Even though outsiders can observe the wage offered by the current employer, due to the return to tenure, there is still a winner's curse for an uninformed outsider. As a consequence, there is no turnover in equilibrium, and each worker receives a wage that is attached to his assigned job position and thus invariant to the worker's productivity. Given this pooling outcome, there is effectively no wage signaling, where the current employer's wage, though observable to outsiders, does not reveal any ability information.

Boomerang employees

Next consider equilibrium behavior given boomerang employees, where we first study the one-job case. Despite wage signaling, due to the return to tenure, there is still a winner's curse for an uninformed outsider. Thus, there is no turnover in equilibrium. However, whenever the period 2 wage signals a worker's ability (i.e., if the period 2 wage varies with a worker's productivity), the period 3 wage $c_j + d_j\theta_i$ is now aligned with the worker's productivity (as opposed to its counterpart $c_j + d_j\underline{\theta}$ in Lemma 3 which is invariant to a worker's productivity due to the winner's curse). In turn, the period 2 wage $c_j + d_j\underline{\theta} + k\,(c_j + d_j\theta_i)$ now becomes less aligned with the worker's productivity (than its counterpart $(1+k)\,(c_j + d_j\theta_i)$ in Lemma 3). As for the two-job case, as the period 3 wage is now aligned with the worker's productivity, the period 3 promotion decision is fully efficient; in contrast, as the period 2 wage is now less aligned with the worker's productivity, there is a wage increase following a promotion, which suggests that the period 2 promotion decision is inefficient but less distorted than that given no boomerang employees. Consequently, there is an efficiency gain due to the possibility of boomerang employees, where the gain is lower than that from the baseline analysis.

4.1.3 Ability non-observable to workers

In the baseline analysis, we assume that both the current employer and the worker can observe the worker's ability after a period. In this subsection, following much of the asymmetric-employer-learning literature, we examine equilibrium behavior when only the current employer can observe the worker's ability, where we find that the efficiency gain due to the possibility of boomerang employees is lower than that from the baseline analysis.[24]

No boomerang employees

First consider equilibrium behavior given no boomerang employees. Even though the worker cannot observe his own ability, due to the return to tenure, there is still a winner's curse for an uninformed outsider. Thus, analogous to the modified analysis in the previous subsection, we obtain a pooling outcome, where each worker receives a wage that is attached to his assigned job position and thus invariant to the worker's productivity. Consequently, the equilibrium is exactly the same as that described by Lemma 2 for the one-job case and by Proposition 2 for the two-job case, where there is no worker turnover and the promotion decision is inefficient.

[24] Similar to our analysis, many studies find that equilibrium outcomes are, in nature, independent of whether or not the worker observes his own ability. For instance, Ricart-i Costa (1988) and Wettstein and Zax (2018) show that the equilibrium outcome of promotion distortions persists even if workers can observe their own ability.

Boomerang employees

Next consider equilibrium behavior given boomerang employees, where we first study the one-job case. Even though the worker cannot observe his own ability, due to the return to tenure, there is still a winner's curse for an uninformed outsider. Thus, there is no turnover in equilibrium. In turn, the period 3 wage is still $c_j + d_j\underline{\theta}$ (which is the same as its counterpart in Lemma 3), while the period 2 wage is now given by $(1+k)(c_j + d_j\mathbb{E}\theta)$ because the worker cannot observe his own ability (as opposed to its counterpart $(1+k)(c_j + d_j\theta_i)$ in Lemma 3 which is aligned with a worker's productivity). As for the two-job case, there is a wage increase following a promotion, which suggests that the period 2 promotion decision is inefficient but less distorted than that given no boomerang employees. Consequently, there is an efficiency gain due to the possibility of boomerang employees, where the gain is lower than that from the baseline analysis.

4.2 Extension 2: Portable skills

In the baseline model, when an employer hires a worker that has previously served the firm, there is a return to tenure because the worker has acquired some human capital or skills via on-the-job learning. In particular, these skills are firm-specific or non-portable across firms in the sense that a worker will lose all his acquired skills if she switches to a new employer. Thus, a worker's productivity is $(1+k)(c_j + d_j\theta_i)$ as an incumbent, and $c_j + d_j\theta_i$ as a new hire. To capture real-world scenarios where a worker's acquired skills are partially portable across firms, we now assume that a worker's productivity as a new hire is, instead, given by

$$(1+k')(c_j + d_j\theta_i),$$

where $k' \in (0,k)$ captures the degree of skill transferability when a worker moves to a different firm. In particular, $k' \to 0$ (resp. $k' \to k$) means that acquired skills are purely firm-specific (resp. general) human capital, and an increase in k' suggests a higher degree of skill portability.

Basically, this section's analysis enriches the baseline analysis with a new variable $k' \in (0,k)$ that measures the degree of skill portability à la Gathmann and Schönberg (2010). As skills become more transferable across firms, i.e., k' increases, we show below that promotion distortions become more severe, because a higher degree of skill portability indicates a larger wage increase following a promotion. In turn, there are more opportunities for the possibility of boomerang employers to improve promotion efficiency, which create more incentives for firms to welcome back former employees.

No boomerang employees

First consider the case without the possibility of boomerang employees. For the one-job case, though skills are now partially portable across firms, $k' \in (0,k)$ suggests that a worker's current employer still captures an output higher than that for a new employer. Thus, analogous to Lemma 2, there is still a winner's curse for an uninformed outsider, which suggests no turnover in equilibrium. Moreover, due to transferable skills, the worker now earns $(1+k)(c_j + d_j\underline{\theta})$ in period 2 and $(1+k')(c_j + d_j\underline{\theta})$ in period 3, both of which are attached to job positions. For the two-job case, we define $\theta^{t+}_{N,P}$ as the threshold ability level (given no boomerang employees and portable skills) for the period t's promotion decision. Similar to Proposition 2, there is no worker turnover, and the current employer's promotion decision is inefficient in periods 2 and 3.

Specifically, the current employer promotes worker i in period 3 if $\theta_i > \theta^{3+}_{N,P}$, where $\theta^{3+}_{N,P}$ is determined by

$$(1+k)\left[\left(c_m + d_m\theta^{3+}_{N,P}\right) - \left(c_l + d_l\theta^{3+}_{N,P}\right)\right] = (1+k')\left[c_m + d_m\theta^{3+}_{N,P} - (c_l + d_l\underline{\theta})\right], \tag{4}$$

which suggests an inefficient promotion decision, i.e., $\theta^{3+}_{N,P} > \theta'$; moreover, as the wage increase associated with a promotion grows with k', the promotion decision becomes more distorted when k' increases, i.e., $\partial\theta^{3+}_{N,P}/\partial k' > 0$. Likewise, the current employer promotes worker i in period 2 if $\theta_i > \theta^{2+}_{N,P}$, where $\theta^{2+}_{N,P}$ is determined by

$$(1+k)\left[\left(c_m + d_m\theta^{2+}_{N,P}\right) - \left(c_l + d_l\theta^{2+}_{N,P}\right)\right] = (1+k)\left[\left(c_m + d_m\theta^{2+}_{N,P}\right) - \left(c_l + d_l\underline{\theta}\right)\right], \tag{5}$$

which yields a fully inefficient promotion decision, i.e., $\theta^{2+}_{N,P} = \bar{\theta}$.

Boomerang employees

Next consider the case with the possibility of boomerang employees. For the one-job case, analogous to Lemma 3, $k' \in (0,k)$ again suggests a winner's curse for an uninformed outsider and, in turn, no turnover in equilibrium. Moreover, due to transferable skills, the worker now earns $(1+k)(c_j + d_j\theta_i)$ in period 2 and $(1+k')(c_j + d_j\underline{\theta})$ in period 3, where the period 2 wage is aligned with the worker's actual productivity. As for the two-job case, we define $\theta^{t+}_{B,P}$ as the threshold ability level (given boomerang employees and portable skills) for the period t's promotion decision. Similar to Proposition 3, there is no turnover, and the current employer's promotion decision is fully efficient in periods 2 and 3, i.e., $\theta^{2+}_{B,P} = \theta^{3+}_{B,P} = \theta'$.

Whether to welcome back former employees

The above analysis tells us that the surplus gain due to the possibility of boomerang employees increases with k', because the promotion decision without the possibility of boomerang employees becomes more distorted given a higher k'. Thus, using the logic for Corollary 2, firms will have more incentives to welcome back former employees given a higher degree of skill portability.

Corollary 3. *Holding the return to tenure or $k > 0$ constant. If a worker's ability is privately observed, then there exists a unique cutoff $C' > 0$, with $\partial C'/\partial k' > 0$, such that firms welcome back former employees whenever the cost of doing so satisfies $C < C'$.*

4.3 Extension 3: Job matching

In the baseline analysis, a worker never switches employers, which means that equilibrium results above are obtained by only using the worker's enlarged threat to move to another firm due to the possibility of boomerang employees. Below, we enrich the baseline analysis with job matching, where the equilibrium can feature actual worker turnover. The enriched model is shown to capture evidence concerning the pay, promotion prospect, and performance comparisons of different types of workers, including incumbents, new hires, and returnees (i.e., boomerang employees).

Specifically, we enrich the baseline model with a worker-firm specific match component, where nature determines the match quality—which is publicly observable and productivity related—at the beginning of each period. In particular, the match quality between each worker and each firm is a random draw from a Bernoulli distribution, i.e., Good with probability p and Bad with probability $1-p$. The match component enters the production function in a multiplicative fashion. That is, worker i's period t output on job j is $y^j_{it}(\theta_i)$ (as described by (1) above) given a bad match, and $\alpha y^j_{it}(\theta_i)$ given a good match, where $\alpha > 1$.

For ease of exposition, we assume that $\alpha > 1$ is sufficiently large such that a worker always separates with the current employer when there is a bad match. Moreover, we assume that at the beginning of each period, the match quality is determined after a worker's current employer has made the job-assignment decision, but before wage offerings.[25]

We now describe equilibrium behavior with the possibility of boomerang employers. Notice that when $p = 1$ or $\alpha = 1$, equilibrium behavior detailed below nests that from the baseline analysis, where there is no turnover; when $p \in (0, 1)$ and $\alpha > 1$, the enriched analysis features turnover in equilibrium.

4.3.1 The equilibrium with turnover

We first study the one-job case given job matching.

Lemma 4. *Given job matching, if a worker can return to a previous employer and ability is privately observed, 1) and 2) describe equilibrium behavior concerning a worker with ability θ_i.*

1. *In period 2, if the match with Employer 1 is good, the worker remains with Employer 1 and receives wage*

$$\left[1 - p^2 + p(1-p)k\right] \alpha \left(c_j + d_j \underline{\theta}\right) + p^2 (1+k) \alpha \left(c_j + d_j \theta_i\right); \tag{6}$$

   if the match with Employer 1 is bad, the worker switches to a new employer with a good match and receives wage

$$\alpha \left(c_j + d_j \mathbb{E}\theta\right) + p(1-p) \left[(1+k)\alpha \left(c_j + d_j \mathbb{E}\theta\right) - \alpha \left(c_j + d_j \underline{\theta}\right)\right].$$

2. *In period 3, equilibrium behavior depends on whether the worker has moved or stayed in period 2.*
   (a) *Suppose that the worker has moved to Employer 2.*
      i. *If the match with Employer 2 is good, the worker remains with Employer 2 and receives wage $\alpha \left(c_j + d_j \underline{\theta}\right)$ when the match with Employer 1 is bad, or $(1+k)\alpha \left(c_j + d_j \theta_i\right)$ when the match with Employer 1 is good.*
      ii. *If the match with Employer 2 is bad, the worker switches to a new employer with a good match when the match with Employer 1 is bad, or returns to Employer 1 when the match with Employer 1 is good; in both cases, the worker receives wage $\alpha \left(c_j + d_j \mathbb{E}\theta\right)$.*
   (b) *Suppose that the worker has stayed with Employer 1.*
      i. *If the match with Employer 1 is good, the worker remains with Employer 1 and receives wage $\alpha \left(c_j + d_j \underline{\theta}\right)$.*
      ii. *If the match with Employer 1 is bad, the worker switches to a new employer with a good match and receives wage $\alpha \left(c_j + d_j \mathbb{E}\theta\right)$.*

In the baseline analysis, despite no turnover, the worker can use the enlarged threat to move to force the current employer to offer a period 2 wage aligned with his actual productivity. The above result extends this logic to an enriched setting with firm-switching behavior across firms. That is, if a worker moved to Employer 2 in period 2, the worker's actual ability θ_i is observed by both Employer 1 and Employer 2, and thus the period 3 wage is $(1+k)\alpha \left(c_j + d_j \theta_i\right)$ if the match with both employers is good; in contrast, the period 3 wage is $\alpha \left(c_j + d_j \underline{\theta}\right)$ when Employer 1 is the only firm with a good match that knows the worker's ability.[26] To retain

[25] As a consequence, though the equilibrium now features job matching and turnover, job-assignment decisions will not vary with the match quality or a worker's mobility history. That is, the decision for a current employer with a good match coincides with that for a current employer with a bad match; also, the period 3 decision concerning a worker moved in period 2 coincides with that for a worker stayed in period 2.

[26] In this case, an uninformed outsider with a good match faces a winner's curse when poaching the worker. In turn, the worker's period 3 wage is $\alpha \left(c_j + d_j \underline{\theta}\right)$.

the worker in period 2, the current employer needs to raise the wage to $\left[1-p^2+p(1-p)k\right]\alpha\left(c_j+d_j\underline{\theta}\right)+p^2(1+k)\alpha\left(c_j+d_j\theta_i\right)$ in (6), which is more aligned with the worker's actual productivity than the counterpart wage $\left[1+p(1-p)k\right]\alpha\left(c_j+d_j\underline{\theta}\right)$ that the worker would receive when the worker cannot return to a previous employer.[27]

We then turn to the two-job case given job matching, where $\theta_{B,M}^{t+}\in\left(\underline{\theta},\bar{\theta}\right)$ characterizes the threshold ability level (given boomerang employees and job matching) for the period t's promotion decision.

Proposition 4. *Given job matching, if a worker can return to a previous employer and ability is privately observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i, *where* $\theta_{B,M}^{2+}\geq\theta_{B,M}^{3+}>\theta'$.

1. *In period 2, if the match with Employer 1 is good, the worker remains with Employer 1 and receives wage*

$$\begin{cases}\left[1-p^2+p(1-p)k\right]\alpha\left(c_l+d_l\underline{\theta}\right)+p^2(1+k)\alpha\max\left\{c_l+d_l\theta_i,c_m+d_m\theta_i\right\} \text{ on job } l & \forall\theta_i\leq\theta_{B,M}^{3+},\\ \left[1+p(1-p)k\right]\alpha\left(c_m+d_m\underline{\theta}\right)-p^2\alpha\left(c_m+d_m\theta_{B,M}^{3+}\right)+p^2(1+k)\alpha\left(c_m+d_m\theta_i\right) \text{ on job } m & \forall\theta_{B,M}^{3+}<\theta_i\leq\theta_{B,M}^{2+},\\ \left[1-p^2+p(1-p)k\right]\alpha\left(c_m+d_m\theta_{B,M}^{2+}\right)+p^2(1+k)\alpha\left(c_m+d_m\theta_i\right) \text{ on job } m & \forall\theta_i>\theta_{B,M}^{2+};\end{cases} \tag{7}$$

   if the match with Employer 1 is bad, the worker switches to a new employer with a good match and receives wage

$$\begin{cases}\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta\leq\theta_{B,M}^{2+}\right)\right)+p(1-p)\left[(1+k)\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta\leq\theta_{B,M}^{2+}\right)\right)-\alpha\left(c_l+d_l\underline{\theta}\right)\right] & \forall\theta_i\leq\theta_{B,M}^{2+},\\ \alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta>\theta_{B,M}^{2+}\right)\right)+p(1-p)\left[(1+k)\alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta>\theta_{B,M}^{2+}\right)\right)-\alpha\left(c_m+d_m\theta_{B,M}^{2+}\right)\right] & \forall\theta_i>\theta_{B,M}^{2+}.\end{cases}$$

2. *In period 3, equilibrium behavior depends on whether the worker has moved or stayed in period 2.*
   (a) *Suppose that the worker has moved to Employer 2.*
      i. *If the match with Employer 2 is good, the worker remains with Employer 2 and receives wage*

$$\begin{cases}\alpha\left(c_l+d_l\underline{\theta}\right) \text{ on job } l & \forall\theta_i\leq\theta_{B,M}^{3+},\\ \alpha\left(c_m+d_m\theta_{B,M}^{3+}\right) \text{ on job } m & \forall\theta_{B,M}^{3+}<\theta_i\leq\theta_{B,M}^{2+},\\ \alpha\left(c_m+d_m\theta_{B,M}^{2+}\right) \text{ on job } m & \forall\theta_i>\theta_{B,M}^{2+},\end{cases} \tag{8}$$

      when the match with Employer 1 is bad, or

$$\begin{cases}(1+k)\alpha\left(c_l+d_l\theta_i\right) \text{ on job } l & \forall\theta_i\leq\theta',\\ (1+k)\alpha\left(c_m+d_m\theta_i\right) \text{ on job } m & \forall\theta_i>\theta',\end{cases} \tag{9}$$

      when the match with Employer 1 is good.

      ii. *If the match with Employer 2 is bad, the worker switches to a new employer with a good match when the match with Employer 1 is bad, or returns to Employer 1 when the match with Employer*

[27] Notice that the wage in (6) increases with p^2, which is the probability of the event that the match with both Employer 1 and Employer 2 is good in period 3. In particular, we have

$$\lim_{p\to1}\left[1-p^2+p(1-p)k\right]\alpha\left(c_j+d_j\underline{\theta}\right)+p^2(1+k)\alpha\left(c_j+d_j\theta_i\right)=(1+k)\alpha\left(c_j+d_j\theta_i\right),$$

where $(1+k)\alpha\left(c_j+d_j\theta_i\right)$ is the wage for the event that the match with both Employer 1 and Employer 2 is good in period 3. In other words, the higher likelihood that the match with both employers is good in period 3, the higher wage Employer 1 has to offer to retain the worker in period 2.

1 is good; in both cases, the worker receives wage

$$\begin{cases} \alpha\left(c_l + d_l \mathbb{E}\left(\theta | \theta \leq \theta^{3+}_{B,M}\right)\right) & \forall \theta_i \leq \theta^{3+}_{B,M}, \\ \alpha\left(c_m + d_m \mathbb{E}\left(\theta | \theta^{3+}_{B,M} < \theta \leq \theta^{2+}_{B,M}\right)\right) & \forall \theta^{3+}_{B,M} < \theta_i \leq \theta^{2+}_{B,M}, \\ \alpha\left(c_m + d_m \mathbb{E}\left(\theta | \theta > \theta^{2+}_{B,M}\right)\right) & \forall \theta_i > \theta^{2+}_{B,M}. \end{cases} \tag{10}$$

(b) *Suppose that the worker has stayed with Employer 1.*

i. *If the match with Employer 1 is good, the worker remains with Employer 1 and receives wage as described in* (8)*.*

ii. *If the match with Employer 1 is bad, the worker switches to a new employer with a good match and receives wage as described in* (10)*.*

First, wages described above for the two-job case are just analogs of those in Lemma 4 for the one-job case. In particular, if the worker has switched to Employer 2 in period 2, the period 3 wage is characterized by (9) when the match with both Employer 1 and Employer 2 is good; in contrast, the worker's period 3 wage is given by (8) when Employer 1 is the only firm with a good match that knows his ability.

Next, we discuss the promotion decision given boomerang employees. When there are two informed employers with a good match, as described by (9), the period 3 promotion decision is fully efficient. In other cases, using (8), worker i receives a promotion in period 3 if $\theta_i > \theta^{3+}_{B,M}$, where $\theta^{3+}_{B,M}$ is determined by

$$(1+k)\left[\alpha\left(c_m + d_m \theta^{3+}_{B,M}\right) - \alpha\left(c_l + d_l \theta^{3+}_{B,M}\right)\right] = \alpha\left(c_m + d_m \theta^{3+}_{B,M}\right) - \alpha\left(c_l + d_l \underline{\theta}\right), \tag{11}$$

which yields a distorted promotion decision, i.e., $\theta^{3+}_{B,M} > \theta'$. Likewise, using (7), worker i receives a promotion in period 2 if $\theta_i > \theta^{2+}_{B,M}$, where $\theta^{2+}_{B,M}$ is determined by

$$\begin{aligned} (1+k)\left[\alpha\left(c_m + d_m \theta^{2+}_{B,M}\right) - \alpha\left(c_l + d_l \theta^{2+}_{B,M}\right)\right] &= \left\{\left[1 - p^2 + p(1-p)k\right]\alpha\left(c_m + d_m \theta^{2+}_{B,M}\right) + p^2(1+k)\alpha\left(c_m + d_m \theta_i\right)\right\} \\ &\quad - \left\{\left[1 + p(1-p)k\right]\alpha\left(c_m + d_m \underline{\theta}\right) - p^2 \alpha\left(c_m + d_m \theta^{3+}_{B,M}\right) + p^2(1+k)\alpha\left(c_m + d_m \theta_i\right)\right\} \\ &= \left[1 - p^2 + p(1-p)k\right]\left[\alpha\left(c_m + d_m \theta^{2+}_{B,M}\right) - \alpha\left(c_l + d_l \underline{\theta}\right)\right] + p^2\left[\alpha\left(c_m + d_m \theta^{3+}_{B,M}\right) - \alpha\left(c_m + d_m \underline{\theta}\right)\right], \end{aligned} \tag{12}$$

which also yields a distorted promotion decision, i.e., $\theta^{2+}_{B,M} > \theta'$. Moreover, $\theta^{2+}_{B,M} \geq \theta^{3+}_{B,M}$ because the wage increase in (12) is greater than that in (11).

Note that the distorted promotion decision described above is more efficient than its counterpart given no boomerang employees. Define $\theta^{t+}_{N,M}$ as the threshold ability level (given no boomerang employees and job matching) for the period t's promotion decision. Then, worker i receives a promotion in period 3 if $\theta_i > \theta^{3+}_{N,M}$, where $\theta^{3+}_{N,M}$ is determined by

$$(1+k)\left[\alpha\left(c_m + d_m \theta^{3+}_{N,M}\right) - \alpha\left(c_l + d_l \theta^{3+}_{N,M}\right)\right] = \alpha\left(c_m + d_m \theta^{3+}_{N,M}\right) - \alpha\left(c_l + d_l \underline{\theta}\right), \tag{13}$$

which yields a distorted promotion decision, i.e., $\theta^{3+}_{N,M} > \theta'$. Likewise, worker i receives a promotion in period 2 if $\theta_i > \theta^{2+}_{N,M}$, where $\theta^{2+}_{N,M}$ is determined by

$$(1+k)\left[\alpha\left(c_m + d_m \theta^{2+}_{N,M}\right) - \alpha\left(c_l + d_l \theta^{2+}_{N,M}\right)\right] = \left[1 + p(1-p)k\right]\left[\alpha\left(c_m + d_m \theta^{2+}_{N,M}\right) - \alpha\left(c_l + d_l \underline{\theta}\right)\right], \tag{14}$$

which again yields a distorted promotion decision, i.e., $\theta^{2+}_{N,M} > \theta'$. Moreover, $\theta^{2+}_{N,M} \geq \theta^{3+}_{N,M}$ because the wage increase in (14) is greater than that in (13). Furthermore, comparing wage increases in (11) and (13) as well

variables of interests	facts about the comparison	explanations
pay	returnees > incumbents	a winner's curse
promotion prospect	returnees > incumbents	signaling concerns
performance	returnees = incumbents > new hires	returns to tenure

Table 1: The incumbent-new hire-returnee comparison.

as wage increases in (12) and (14) yields improved promotion efficiency due to boomerang employees. Thus, as was true for the baseline analysis, there is a surplus gain which creates incentives for firms to welcome back former employees.

4.3.2 Relevance to empirical findings

To close this section, we relate the above analysis to empirical findings concerning the pay, promotion prospect, and performance comparisons of different types of workers, including incumbents, new hires, and returnees. In recent years, due to the rising popularity of rehiring former workers in the labor market, researchers started to pay attention to boomerang employees. As summarized in Table 1, concerning the pay and performance comparisons, Snyder, Stewart, and Shea (2021) document that returnees receive better compensations than matched incumbents (i.e., internal workers who have never separated with the firm), though the former's performances are on par with the latter's. Relatedly, Keller et al. (2021) and Arnold et al. (2021) report that returnees outperform new hires in their initial job spell and that this performance advantage is larger in jobs requiring greater internal coordination and in contexts characterized by greater internal resistance to new hires. As for promotion prospects, Klotz et al. (2023) find that boomerang workers are more likely to receive promotions than incumbents.

Recall that a worker remains (resp. separates) with the current employer whenever the associated match is good (resp. bad), while a separated worker returns to the previous employer when there is a good match. To establish that our enriched analysis with job matching is consistent with evidences described above, we now center on equilibrium behavior in the third period, which is the period that features presences of three different types of workers: incumbents, new hires, and returnees. That is, incumbents correspond to those who have kept remaining with their first-period employers, new hires refer to those switching to new employers, and returnees are those returning to their first-period employers.

First consider the pay. To have a worker return from the second-period employer to the first-period employer, it must be the case that the match is good with the first-period employer but bad with the second-period employer. In this case, to hire back the worker, the first-period employer simply needs to match the poaching offer from an uninformed outsider with a good match, i.e., a returnee receives a wage as described in (10). In contrast, a worker remains with the first-period employer whenever the associated match is good, and due to the winner's curse the first-period employer just needs to offer a wage as described in (8) to an incumbent. By inspection of (10) and (8), we find that a returnee receives a wage higher than that to an incumbent.

Next consider the promotion prospect. As established above, returnees are more likely to be promoted than incumbents, because there is a signaling concern when a current employer promotes an incumbent (because its promotion decision, as a signal of worker ability, raises the poaching wage offered by uninformed outsiders), but not so when a previous employer hires back a former employee (because its promotion decision concerning a returnee does not serve as a signal). In turn, the promotion prospect is better for a returnee than for an incumbent.

As for the performance, our analysis suggests no difference between incumbents and returnees, who both outperform new hires. The logic is that when hiring a returning worker, the employer can enjoy a return to tenure because of the returnee's previously acquired firm-specific human capital, which an incumbent also has already obtained but a new hire takes time to accumulate.

5 Implications

We hope that our analysis above has demonstrated the importance of boomerang employees in shaping an organization's internal management as well as the entire labor market. In this section, we elaborate on the impact of boomerang employees on an organization's internal management, where we argue that our theory is unique for explaining these facts. We also relate boomerang employees to labor-market regulations concerning worker turnover.

5.1 Impact on an organization's internal management

The essence of our argument is that the possibility of boomerang employees enhances market competition, which forces an employer to make more efficient personnel decisions (e.g., job assignments, firm-sponsored training, and work arrangements). The resulting surplus gain then creates incentives for firms to welcome back former employees.

5.1.1 HR practices related to boomerang employees

The question is what are the specific HR practices that engage boomerang employees? The answer is that there are plenty of these practices which nowadays play increasingly vital roles in talent management. For instance, firms can foster *welcoming cultures* towards boomerang employees; companies with extensive resources and structured HR departments may take *HR initiatives* or even set up *formal programs* to encourage and facilitate the return of former staffs. Following Dachner and Makarius (2021), according to different stages of a working relationship, we classify related HR practices as follows.

Ahead of exits. Rehiring former employees used to be relatively rare. It was thought that should workers seek employment elsewhere, they would permanently burn their bridges with former employers. For instance, leaving the workplace was once looked upon as a sign of disloyalty, particularly if an employee had spent years working for a company. At the extreme, departees may even be treated as traitors by their former colleagues. But times are changing. Nowadays, rehiring former employees becomes increasingly common. Some departures are done out of necessity (e.g., layoffs and pandemics) or motivated by non-pecuniary factors that were once important but not anymore (e.g., hours and locations). Accordingly, an employer can establish receptivity to departures by shifting the mindset of existing workforce that returning to the firm in the future is not a stigma, but instead welcome former employees with open arms. In turn, an amiable atmosphere can be established to overcome a returnee's psychological costs caused by the departure in the past.[28]

Offboarding. When an employment relationship becomes less attractive and an employee does choose to leave, an employer wants to shed goodwill to ensure an amicable exit process. Traditionally, the end of an employment relationship has been marked by a "thanks for your service." But now, firms are reframing the exit process as an opportunity to extend the relationship to a long-term connection, rather than terminate it. For instance, firms use exit interviews for feedback and mutual learning; during these conversations, as employees

[28] According to the Workforce Institute, survey results suggest that "nearly 50% of HR professionals claim their organization previously had a policy against rehiring former employees—even if the employee left in good standing—but 76% say they are more accepting of hiring boomerang employees today than in the past," and that "nearly two-thirds managers said they are more accepting of hiring back former colleagues." [Source: https://workplacetrends.com/the-corporate-culture-and-boomerang-employee-study/.]

now tend to leave on good terms, they often provide their latest contact information, and stay in touch on professional networking platforms like LinkedIn. Apart from exit interviews, many companies now also offer the so-called offboarding programs or outplacement services to offboarding employees, who can access various resources and training (e.g., job-search coaching) to assist their transitions to new job positions.[29]

Post departures. Concerning workers who have already departed, firms can establish a platform, or create and maintain corporate alumni networks to keep former employees connected with the organization.[30,31] In particular, one strategy to entice alumni participation is to offer extended access to employee perks like discount and assistance programs. Another strategy is to constantly engage alumni, e.g., organize regular networking sessions for reunions, keep alumni posted concerning open positions at the company, etc. If an outstanding team member has been gone for a while and then reaches out to talk about a potential return to the company, it may be worth for the company to initiate a conversation. When a former employee's return is likely, the company must avoid any unnecessary re-entry cost on the worker side to ensure a smooth process when bringing back agents.[32]

Synergy between engaging boomerang employees and more efficient internal management

One prediction of our theory is that an employer that actively engages boomerang employees is associated with more efficient internal management (e.g., job assignments, firm-sponsored training, and work arrangements), which increases a worker's productivity but signals his ability. In the real world, there are abundant market observations that organizations that welcome back former staffs with open arms tend to provide their employees with not only more generous career-development opportunities but also more efficient work arrangements. For instance, in line with our analysis, their employees typically face more fair promotion rules (or more clearly-defined career paths), receive more amount of firm-sponsored training, and are subject to more flexible work arrangements.[33]

According to our analysis, these employee-friendly personnel policies do not arise because an employer is benevolent. Instead, the contributing reason is the *synergy* (or complementarity) between these policies and the possibility of boomerang employees, which *jointly* entail increased efficiency concerning a company's internal management and, in turn, a surplus gain from an employment relationship.[34]

[29] According to our theory, these programs/services are *vital* for enhancing the third-period market competition (because otherwise there will be only one informed employer bidding for the worker's service in the third if the worker cannot find a new job in the second period), which serves as a competitive force for firms to improve the efficiency concerning their second-period internal management.

[30] See `https://corporatealumniprograms.com/` and `https://enterprisealumni.com/blog/10-best-alumni-networks` for a list of featured corporate alumni programs, most of which belong to Fortune Global 500 companies (e.g., Coca-Cola, Google, Microsoft, and P&G) and professional service firms (e.g., Accenture, BCG, Deloitte, EY, McKinsey, and PwC).

[31] Although we focus on boomerang employees (for recruiting), corporate alumni networks can bring about other benefits, e.g., ex-employees can become valuable clients or suppliers (for sales), mentors to current workers (for business development), and firm ambassadors (for brand advocacy).

[32] To avoid the associated risks of boomerang employees (as noted in the Introduction), despite the welcoming culture and smooth returning process, employers should still assess each returning employee's situation individually, and consider factors such as the very reason for initial departure and the fit with the current team dynamics when making a rehiring decision.

[33] Consistent with our argument, Dachner and Makarius (2021) document that many firms "share details of their offboarding program with prospective hires and incoming associates—just as they share information about training, development, and rewards programs." One example is McKinsey, whose employees are "enrolled in the alumni network as soon as they join the firm, rather than when they leave."

[34] Although we do not explore it formally, a related prediction made by our argument is that an employer that actively engages boomerang employees can attract a better workforce in the labor market, which can also contribute to more efficient internal management. The logic is that an employer is more capable to offer a higher lifetime wage to a worker given the higher surplus due to the possibility of boomerang employees. See footnote 21 for a related argument.

Professional-service and high-tech industries

Another prediction of our theory is that an employer is more inclined to engage boomerang employees given highly portable skills across firms. This result is consistent with anecdotal evidence of the common use of aforementioned practices concerning boomerang employees among companies in professional-service (e.g., accounting and consulting) and high-tech industries (e.g., biotechnology and IT), where skills are highly portable across firms or firm-specific skills are of limited importance; in contrast, aforementioned practices are found to be less common in industries where firm-specific skills and/or experience are highly valued, i.e., manufacture sectors and traditional services (e.g., hospitality and retail).[35]

5.1.2 Alternative explanations for boomerang employees

In the Introduction, we mention several *ex post* benefits of boomerang employees, including cost savings, proven capabilities, returns to tenure, and knowledge spillovers. As our theory builds upon the proven-capability aspect of boomerang employees, we now argue that the two main predictions discussed above cannot be explained by the other three competing explanations for boomerang employees.

We first argue that the prediction concerning professional-service and high-tech industries is incompatible with returns to tenure and cost savings. Consider companies in these industries where skills are highly portable. As there is not much productivity difference between a new hire and a returnee, the advantage of rehiring a former employee is relatively small. In turn, if boomerang employees arise because of their returns to tenure, then (in contrary to our prediction) these companies would have weaker incentives to welcome back former employees when skills become more portable across firms. As for cost savings, if an employer engages boomerang employees to avoid the high cost of filling an opening, then the employer should perhaps inhibit the possibility of boomerang employees in the first place to deter the induced opportunistic firm-switching behavior. As for the synergy between engaging boomerang employees and more efficient internal management, it is obvious that this prediction cannot be driven by knowledge spillovers (i.e., external experience and knowledge gained from serving for a different firm), because there is no turnover (which is vital for knowledge spillovers) in our analysis.

5.2 Labor-market regulations concerning worker turnover

To protect workers' freedom to change jobs, on April 23, 2024 the Federal Trade Commission (FTC) issued a final rule to promote competition by banning noncompetes nationwide. According to the FTC Chair Lina M. Khan, the goal is to "ensure Americans have the freedom to pursue a new job, start a new business, or bring a new idea to market" because "noncompete clauses keep wages low, suppress new ideas, and rob the American economy of dynamism.[36]" According to Starr, Prescott, and Bishara (2021), almost 20% of American workers are bound by noncompetes, which are prevalent in high-skill, high-paying jobs but also common in low-skill, low-paying jobs. Hence, as discussed in the Introduction, this ban is expected to encourage more turnover, which will contribute to a boom of boomerang employees in the near future.

[35] A related prediction made by our argument is that aforementioned practices concerning boomerang employees are more common for industries with a higher rate of churn. The logic is that highly portable skills or limited importance of firm-specific skills suggest both a high mobility rate and a high tendency of employing these practices.

[36] In the same spirit, the US Department of Justice took an antitrust action in 2010 against collusive dealings among several Silicon Valley high-tech companies, a.k.a. "no cold call" or "no-poaching" agreements, which restrained the recruitment of each other's employees. See, for instance, https://www.nytimes.com/2014/08/09/technology/settlement-rejected-in-silicon-valley-hiring-case.html.

5.2.1 Noncompetes vs. boomerang employees

The first question is how noncompetes are related to boomerang employees? The answer is that they are like two *polar extremes* concerning a worker's freedom to move across firms, but generate analogous implications to the health of a labor market.

Noncompetes are exploitative practice imposing contractual conditions that *limit* the ability of a worker to take a new job (or start a new business). As a result, workers signed noncompete are forced to either stay in a job they want to leave, or bear other significant harms and costs, such as being forced to switch to a lower-paying field, to relocate, or being forced to defend against expensive litigation.[37] In contrast to noncompetes which limit turnover, the possibility of boomerang employees gives workers the *freedom* to move across firms. Despite this sharp contrast, our theory—in the same spirit as the FTC's motive to ban noncompetes—suggests a positive effect of worker turnover on the labor market's health. That is, the possibility of boomerang employers means more freedom to move across firms, which promotes firm competition and, in turn, forces more efficient internal management. Thus, the possibility of boomerang employees is good for the health of a labor market, because it improves social welfare.

5.2.2 Enforcement of buyout payments

Though the FTC's ban on noncompetes will give workers the freedom to move, a movement can be not free at all. For instance, in many contexts a worker is subject to pay to the current employer a buyout payment for moving to a new firm.[38,39] So, the second question is whether these buyout payments are good for the labor market's health? As established below, the answer to this question depends on the details of a labor market.

Consider a labor market with a *scarcity* of workers or a high $\bar{W}$, e.g., professional-service and high-tech industries where there is a shortage of high-skilled labor. Given credit-constrained workers, as our analysis in Section 3.3 suggests, a buyout payment is not necessary for the possibility of boomerang employees. Then, whether or not a firm welcomes back former employees, a buyout payment just serves to limit turnover, which harms the labor market's health. In this case, whenever a company attempts to charge a buyout payment on a separated worker, the court should not enforce it.

Next, consider a labor market with an *excess* of workers or a low $\bar{W}$, e.g., manufacture sectors and traditional services where there is an over-supply of low-skilled labor. Given credit-constrained workers, as our analysis in Section 3.3 suggests, engaging boomerang employees sometimes requires an employer to charge a buyout payment on job quitters, especially for those industries with an extreme excess of workers or a sufficiently low $\bar{W}$. Then, a buyout payment might be welfare improving, because it is necessary for the possibility of boomerang employees which is good for the labor market's health. In this case, it requires further investigations for a court to determine whether to enforce a buyout payment.

[37] Though noncompetes erode workers' future bargaining position by limiting their outside options, they solve hold-up problems, allowing firms to make mutually beneficial investments in workers, e.g., training for general human capital. See McAdams (2019) for a survey of noncompetes.

[38] The buyout payment is an alternative to noncompetes. That is, without having to enforce a noncompete, it enables employers to protect their within-relationship investments (e.g., firm-sponsored training) against a separated workers, which gives employers more incentives to invest. See Shi (2023) for an analysis of noncompetes with buyout payments for departing workers.

[39] Other alternatives to noncompetes include trade secret laws and non-disclosure agreements (NDAs), both providing employers with well-established means to protect proprietary and other sensitive information.

6 Conclusion

To wrap up, this article offers a formal theory of boomerang employees. Under the hypothesis of asymmetric employer learning, this article studies a market force which is often hidden. That is, we show that the possibility of boomerang employees—if a separated employee may return to a former employer—enhances market competition, which forces an employer to make more efficient personnel decisions (e.g., promotions, firm-sponsored training, and work arrangements) and, in turn, increases social welfare. The theory explains why firms use various HR practices to engage boomerang employees (e.g., welcoming cultures, exit interviews, and corporate alumni networks), and captures evidence on the incumbents–new hires–returnees comparison. Moreover, the theory sheds new light on labor-market regulations concerning worker turnover.

Our theory establishes the importance of boomerang employees in shaping an organization's internal management as well as the entire labor market. Given very limited attentions paid to this type of employees in the economics literature, we hope to see more empirical research on this topic. Moreover, there are several avenues for future theoretical research. One direction is take positional constraints of the managerial job into consideration, because in many contexts a firm can only promote a limited number of workers. Another direction is to further enrich this article's analysis to incorporate alternative benefits due to boomerang employees. For instance, as discussed in the Introduction, boomerang employees—thanks to their external experience—can generate valuable external perspectives, competitor insights, and networking opportunities. Thus, there can be knowledge-spillover type of surplus gains, which mean extra incentives for companies to engage boomerang employees. In a similar vein, in an enriched analysis with job matching, the possibility of boomerang employees can suggest more opportunities to improve matching efficiency. When the labor market is loose (i.e., the market consists of a small number of firms), the return of boomerang employees may even signal to incumbent employees that "the grass is not greener on the other side" and, in turn, increase employee loyalty. Another interesting direction is to explore strategic responses of external recruiters. Currently, our theory predicts that a worker can earn a higher wage when bouncing back to their previous employers. If external recruiters are proactive, to avoid being used as a "revolving door" by boomerang employees, they can fend off new hires from switching back. For instance, an employer can urge a new hire to make relationship-specific investments to hinder potential reintegration. Last but not least, this article rationalizes why companies engage returning employees in the labor market, but this type of practice is not uncommon in other markets, e.g., customers return to vendors they dropped in a product market, spouses remarry their divorced partners in the marriage market, etc. So, it will be interesting for researchers to unpack the very reason why a relationship breaks up, and to investigate whether it is of some party's interest to reach an agreement or formulate a rule/social norm that encourages re-establishment of a severed relationship.

References

Acemoglu, Daron and Jörn-Steffen Pischke. 1998. "Why do firms train: Theory and evidence." *Quarterly Journal of Economics* 113:79–119.

———. 1999. "The structure of wages and investment in general training." *Journal of Political Economy* 107:539–572.

Arnold, John, Chad Van Iddekinge, Michael Campion, Talya Bauer, and Michael Campion. 2021. "Welcome back? Job performance and turnover of boomerang employees compared to internal and external hires." *Journal of Management* 47 (8):2198–2225.

Bar-Isaac, Heski, Ian Jewitt, and Clare Leaver. 2021. "Adverse selection, efficiency, and the structure of information." *Economic Theory* 72:579–614.

Bar-Isaac, Heski and Clare Leaver. 2022. "Training, recruitment, and outplacement as endogenous asymmetric information." *Economica* 89:849–861.

Bar-Isaac, Heski and Raphaël Lévy. 2022. "Motivating employees through career paths." *Journal of Labor Economics* 40:95–131.

Barron, John, Mark Berger, and Dan Black. 2006. "Selective counteroffers." *Journal of Labor Economics* 24:385–409.

Bates, Michael. 2020. "Public and private employer learning: Evidence from the adoption of teacher value added." *Journal of Labor Economics* 38:375–420.

Bernhardt, Dan. 1995. "Strategic promotion and compensation." *Review of Economic Studies* 62:315–339.

Bernhardt, Dan and David Scoones. 1993. "Promotion, turnover, and preemptive wage offers." *American Economic Review* 83:771–791.

Bognanno, Michael and Eduardo Melero. 2016. "Promotion signals, experience, and education." *Journal of Economics and Management Strategy* 25:111–132.

Chan, William. 1996. "External recruitment versus internal promotion." *Journal of Labor Economics* 14:555–570.

Chang, Chun and Yijiang Wang. 1996. "Human capital investment under asymmetric information: The Pigovian conjecture revisited." *Journal of Labor Economics* 14:505–519.

Chen, Yongmin. 1997. "Paying customers to switch." *Journal of Economics & Management Strategy* 6 (4):877–897.

Cziraki, Peter and Dirk Jenter. 2022. "The market for CEOs." Working Paper, University of Toronto.

Dachner, Alison and Erin Makarius. 2021. *Turn departing employees into loyal alumni.* Harvard Business Review.

DeVaro, Jed, Oliver Gürtler, Marc Gürtler, and Christian Deutscher. 2024. "Big fish in small (and big) ponds: A study of careers." *Journal of Law, Economics, and Organization* 40:76–107.

DeVaro, Jed and Michael Waldman. 2012. "The signaling role of promotions: Further theory and empirical evidence." *Journal of Labor Economics* 30:91–147.

Dustmann, Christian, Albrecht Glitz, Uta Schönberg, and Herbert Brücker. 2016. "Referral-based job search networks." *Review of Economic Studies* 83:514–546.

Dustmann, Christian and Uta Schönberg. 2012. "What makes firm-based vocational training schemes successful? The role of commitment." *American Economic Journal: Applied Economics* 4 (2):36–61.

Ekinci, Emre. 2016. "Employee referrals as a screening device." *RAND Journal of Economics* 47:688–708.

Ekinci, Emre, Antti Kauhanen, and Michael Waldman. 2019. "Bonuses and promotion tournaments: Theory and evidence." *Economic Journal* 129 (622):2342–2389.

Farber, Henry. 1999. *Mobility and stability: the dynamics of job change in labor markets*, chap. 37. Handbook of Labor Economics, 2439–2483.

Ferreira, Daniel and Radoslawa Nikolowa. 2023. "Talent discovery and poaching under asymmetric information." *Economic Journal* 133:201–234.

Friedrich, Benjamin. 2023. "Information frictions in the market for managerial talent: Theory and evidence." Working Paper, Northwestern University.

Frydman, Carola. 2019. "Rising through the ranks: The evolution of the market for corporate executives, 1936-2003." *Management Science* 65 (11):4951–4979.

Fudenberg, Drew and Jean Tirole. 2000. "Customer poaching and brand switching." *RAND Journal of Economics* 31:634–657.

Fujita, Shigeru and Giuseppe Moscarini. 2017. "Recall and unemployment." *American Economic Review* 107:3875–3916.

Gathmann, Christina and Uta Schönberg. 2010. "How general is human capital? A task-based approach." *Journal of Labor Economics* 28 (1):1–49.

Ghosh, Suman and Michael Waldman. 2010. "Standard promotion practices versus up-or-out contracts." *RAND Journal of Economics* 41:301–325.

Gibbons, Robert and Lawrence Katz. 1991. "Layoffs and lemons." *Journal of Labor Economics* 9:351–380.

Gibbs, Michael. 1995. "Incentive compensation in a corporate hierarchy." *Journal of Accounting and Economics* 19:247–277.

Greenwald, Bruce. 1986. "Adverse selection in the labour market." *Review of Economic Studies* 53:325–347.

Harstad, Bård. 2007. "Organizational form and the market for talent." *Journal of Labor Economics* 25 (3):581–611.

Kahn, Lisa. 2013. "Asymmetric information between employers." *American Economic Journal: Applied Economics* 5:165–205.

Katz, Eliakim and Adrian Ziderman. 1990. "Investment in general training: the role of information and labour mobility." *Economic Journal* 100:1147–1158.

Katz, Lawrence and Bruce Meyer. 1990. "Unemployment insurance, recall expectations, and unemployment outcomes." *Quarterly Journal of Economics* 105:973–1002.

Ke, Rongzhu, Jin Li, and Michael Powell. 2018. "Managing careers in organizations." *Journal of Labor Economics* 36:197–252.

Keller, JR, Rebecca Kehoe, Matthew Bidwell, David Collings, and Adam Myer. 2021. "In with the old? Examining when boomerang employees outperform new hires." *Academy of Management Journal* 64:1654–1684.

Klotz, Anthony, Andrea Derler, Carlina Kim, and Manda Winlaw. 2023. *The promise (and risk) of boomerang employees.* Harvard Business Review.

Laing, Derek. 1994. "Involuntary layoffs in a model with asymmetric information concerning worker ability." *Review of Economic Studies* 61:375–392.

Laker, Ben. 2022. *The benefits and risks of rehiring a boomerang employee.* MIT Sloan Management Review.

Lazear, Edward. 1986. *Raids and offer matching*, chap. 35. Research in Labor Economics, 141–165.

Lluis, Stephanie. 2005. "The role of comparative advantage and learning in wage dynamics and intrafirm mobility: Evidence from Germany." *Journal of Labor Economics* 23:725–767.

Lucas, Robert. 1978. "On the size distribution of business firms." *Bell Journal of Economics* 9:508–523.

Mavromaras, Kostas and Helmut Rudolph. 1997. "Wage discrimination in the reemployment process." *Journal of Human Resources* 32:812–860.

McAdams, John M. 2019. "Non-compete agreements: A review of the literature." Tech. rep., Federal Trade Commission.

Milgrom, Paul and Sharon Oster. 1987. "Job discrimination, market forces, and the invisibility hypothesis." *Quarterly Journal of Economics* 102:453–476.

Mortensen, Dale and Christopher Pissarides. 1999. *New developments in models of search in the labor market*, vol. 3, chap. 39. Handbook of Labor Economics, 2567–2627.

Mukherjee, Arijit. 2008a. "Career concerns, matching, and optimal disclosure policy." *International Economic Review* 49:1211–1250.

———. 2008b. "Sustaining implicit contracts when agents have career concerns: The role of information disclosure." *RAND Journal of Economics* 39:469–490.

———. 2010. "The optimal disclosure policy when firms offer implicit contracts." *RAND Journal of Economics* 41:549–573.

Mukherjee, Arijit and Luís Vasconcelos. 2018. "On the trade-off between efficiency in job assignment and turnover: The role of breakup fees." *Journal of Law, Economics, and Organization* 34:230–271.

Murphy, Kevin J. and Ján Zábojník. 2004. "CEO pay and appointments: A market-based explanation for recent trends." *American Economic Review (Papers and Proceedings)* 94:192–196.

———. 2007. "Managerial capital and the market for CEOs." Working Paper, University of Southern California.

Nekoei, Arash and Andrea Weber. 2015. "Recall expectations and duration dependence." *American Economic Review* 105:142–146.

Pinkston, Joshua. 2009. "A model of asymmetric employer learning with testable implications." *Review of Economic Studies* 76:367–394.

Ricart-i Costa, Joan. 1988. "Managerial task assignment and promotions." *Econometrica* 56:449–466.

Rogerson, Richard and Robert Shimer. 2011. *Search in macroeconomic models of the labor market*, vol. 4a, chap. 7. Handbook of Labor Economics, 619–700.

Rosen, Sherwin. 1982. "Authority, control, and the distribution of earnings." *Bell Journal of Economics* 13:311–323.

Schönberg, Uta. 2007. "Testing for asymmetric employer learning." *Journal of Labor Economics* 25:651–691.

Shi, Liyan. 2023. "Optimal regulation of noncompete contracts." *Econometrica* 91:425–463.

Snyder, Deirdre, Virginia Stewart, and Catherine Shea. 2021. "Hello again: Managing talent with boomerang employees." *Human Resource Management* 60:295–312.

Starr, Evan, James Prescott, and Norman Bishara. 2021. "Noncompete agreements in the US labor force." *Journal of Law and Economics* 64:53–84.

Tirole, Jean. 2016. "From bottom of the barrel to cream of the crop: Sequential screening with positive selection." *Econometrica* 84:1291–1343.

Waldman, Michael. 1984a. "Job assignments, signalling, and efficiency." *RAND Journal of Economics* 15:255–267.

———. 1984b. "Worker allocation, hierarchies, and the wage distribution." *Review of Economic Studies* 51:95–109.

———. 1990. "Up-or-out contracts: A signaling perspective." *Journal of Labor Economics* 8:230–250.

Waldman, Michael and Zhenda Yin. 2023. "Deferred training." Working Paper, Cornell University.

———. Forthcoming. "Promotions, adverse selection, and efficiency." *Journal of Labor Economics*.

Waldman, Michael and Ori Zax. 2016. "An exploration of the promotion signaling distortion." *Journal of Law, Economics, and Organization* 32:119–149.

———. 2020. "Promotion signaling and human capital investments." *American Economic Journal: Microeconomics* 12:125–155.

Wettstein, David and Ori Zax. 2018. "Promotion policies of workers who observe their ability." *Economics Bulletin* 38:2509–14.

Wright, Randall, Philipp Kircher, Benoît Julien, and Veronica Guerrieri. 2021. "Directed search and competitive search equilibrium: A guided tour." *Journal of Economic Literature* 59:90–148.

Yin, Zhenda. 2024. "Positive selections of employees." Working Paper.

Zábojník, Ján and Dan Bernhardt. 2001. "Corporate tournaments, human capital acquisition, and the firm size-wage relation." *Review of Economic Studies* 68:693–716.

Zax, Ori and Yanay Farja. 2024. "Equilibrium poaching in labor markets." *CESifo Economic Studies* 70:17–33.

A Appendix

Proof of Proposition 3. In the third period, if worker i has previously changed employers, then i's ability is observed by both Employer 1 and Employer 2. In turn, i's third-period wage equals

$$(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}.$$

In contrast, if worker i has not previously changed employers, then i's ability is only observed by Employer 1. Due to the winner's curse, prospective employers will not bid above the productivity of a worker with the lowest possible ability, i.e.,

$$W(\theta_i) = \begin{cases} c_l + d_l\underline{\theta} & \text{if } \theta_i \leq \theta_B^{3+}, \\ c_m + d_m\theta_B^{3+} & \text{if } \theta_B^{3+} < \theta_i \leq \theta_B^{2+}, \\ c_m + d_m\theta_B^{2+} & \text{if } \theta_i > \theta_B^{2+}. \end{cases}$$

In turn, Employer 1 captures a third-period profit

$$\Pi(\theta_i) = \begin{cases} (1+k)(c_l + d_l\theta_i) - (c_l + d_l\underline{\theta}) & \text{if } \theta_i \leq \theta_B^{3+}; \\ (1+k)(c_m + d_m\theta_i) - \left(c_m + d_m\theta_B^{3+}\right) & \text{if } \theta_B^{3+} < \theta_i \leq \theta_B^{2+}. \\ (1+k)(c_m + d_m\theta_i) - \left(c_m + d_m\theta_B^{2+}\right) & \text{if } \theta_i > \theta_B^{2+} \end{cases}$$

In the second period, if an uninformed outsider holds the belief that worker i is of ability $\hat{\theta}_i$, she offers $\max\left\{c_l + d_l\hat{\theta}_i, c_m + d_m\hat{\theta}_i\right\}$ to the worker, resulting in a lifetime wage

$$\max\left\{c_l + d_l\hat{\theta}_i, c_m + d_m\hat{\theta}_i\right\} + (1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}$$

for worker i to separate with Employer 1. To retain the worker, Employer 1 can (counter)offer as high as

$$(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} + \Pi(\theta_i),$$

resulting in a lifetime wage as high as

$$(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} + \Pi(\theta_i) + W(\theta_i) = 2(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}$$

for worker i to stay with Employer 1. Comparing lifetime wages above yields that Employer 1 can always outbid an uninformed outsider who holds the correct belief concerning the worker's ability, i.e., $\hat{\theta}_i = \theta_i$. Consequently, due to the return to tenure, there is a winner's curse, so an uninformed outsider offers

$$\begin{cases} c_l + d_l\underline{\theta} & \text{if } \theta_i \leq \theta_B^{2+}, \\ c_m + d_m\theta_B^{2+} & \text{if } \theta_i > \theta_B^{2+}. \end{cases}$$

Then, the lifetime wage for worker i to separate with Employer 1 equals

$$\begin{cases} c_l + d_l\underline{\theta} + (1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} & \text{if } \theta_i \leq \theta_B^{2+}, \\ c_m + d_m\theta_B^{2+} + (1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} & \text{if } \theta_i > \theta_B^{2+}. \end{cases}$$

To retain the worker, Employer 1 just matches the above lifetime wage by offering

$$\begin{cases} c_l + d_l\underline{\theta} + (1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} - (c_l + d_l\underline{\theta}) & \text{if } \theta_i \le \theta_B^{2+}, \\ c_m + d_m\theta_B^{2+} + (1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} - \left(c_m + d_m\theta_B^{2+}\right) & \text{if } \theta_i > \theta_B^{2+}. \end{cases}$$

which reduces to

$$(1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\}.$$

Next, we pin down threshold ability levels θ_B^{2+} and θ_B^{3+} for promotion decisions. In particular, Employer 1 promotes worker i in period 2 whenever $\theta_i > \theta_B^{2+}$, where θ_B^{2+} is determined by

$$\begin{aligned} &(1+k)\left(c_m + d_m\theta_B^{2+}\right) - (1+k)\left(c_l + d_l\theta_B^{2+}\right) \\ &\qquad = (1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} - (1+k)\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} = 0, \end{aligned}$$

which yields $\theta_B^{2+} = \theta'$. In turn, $\theta_B^{2+} \ge \theta_B^{3+}$ suggests that $\theta_B^{3+} = \theta'$. □

Proof of Corollary 2. From Proposition 2 and Proposition 3, there is increased promotion efficiency given boomerang employees, i.e., $\theta_N^{2+} \ge \theta_N^{3+} > \theta'$ and $\theta_B^{2+} = \theta_B^{3+} = \theta'$. In turn, the expected surplus gain is equal to the sum of

$$\Delta S_2 = \int_{\theta'}^{\theta_N^{2+}} c_m + d_m\theta dF(\theta) - \int_{\theta'}^{\theta_N^{2+}} c_l + d_l\theta dF(\theta) > 0$$
$$\Delta S_3 = \int_{\theta'}^{\theta_N^{3+}} c_m + d_m\theta dF(\theta) - \int_{\theta'}^{\theta_N^{3+}} c_l + d_l\theta dF(\theta) > 0$$

where ΔS_2 increases in θ_N^{2+} and ΔS_3 increases in θ_N^{3+}. Define $\Delta S = \Delta S_2 + \Delta S_3$. In equilibrium, firms welcome back former employees whenever $C < C' = \Delta S$. □

Proof of Corollary 3. Regarding equilibrium behavior given no boomerang employees, we begin with the one-job case. In the third period, whether or not worker i has previously changed employers, the worker receives $(1+k')(c_j + d_j\underline{\theta})$ due to the winner's curse. In the second period, if an uninformed outsider holds the belief that worker i is of ability $\hat{\theta}_i$, she offers $(1+k')\left(c_j + d_j\hat{\theta}_i\right) + (1+k)\left(c_j + d_j\hat{\theta}_i\right) - (1+k')(c_j + d_j\underline{\theta})$ to the worker, resulting in a lifetime wage of

$$(1+k')\left(c_j + d_j\hat{\theta}_i\right) + (1+k)\left(c_j + d_j\hat{\theta}_i\right)$$

for worker i to separate with Employer 1. To retain the worker, Employer 1 can (counter)offer as high as $(1+k)(c_j + d_j\theta_i) + (1+k)(c_j + d_j\theta_i) - (1+k')(c_j + d_j\underline{\theta})$, resulting in a lifetime wage as high as

$$(1+k)(c_j + d_j\theta_i) + (1+k)(c_j + d_j\theta_i) - (1+k')(c_j + d_j\underline{\theta}) + (1+k')(c_j + d_j\underline{\theta}) = 2(1+k)(c_j + d_j\theta_i)$$

for worker i to stay with Employer 1. Given $0 < k' < k$, comparing lifetime wages above yields that Employer 1 can always outbid an uninformed outsider who holds the correct belief concerning the worker's ability, i.e., $\hat{\theta}_i = \theta_i$. Consequently, there is a winner's curse, so an uninformed outsider offers $(1+k')(c_j + d_j\underline{\theta})$. In turn, the lifetime wage for worker i to separate with Employer 1 equals $(1+k')(c_j + d_j\underline{\theta}) + (1+k)(c_j + d_j\underline{\theta})$. To retain the worker, Employer 1 just matches the above lifetime wage by offering

$$(1+k')(c_j+d_j\underline{\theta})+(1+k)(c_j+d_j\underline{\theta})-(1+k')(c_j+d_j\underline{\theta})=(1+k)(c_j+d_j\underline{\theta}).$$

Thus, there is no worker turnover, and the wage is attached to job positions for the one-job case. As for the two-job case, similar to Proposition 2, there is no worker turnover, and the promotion decision is inefficient, i.e., $\theta^{2+}_{N,P}=\theta^{2+}_{N}=\bar{\theta}$ and $\theta^{3+}_{N,P}>\theta^{3+}_{N}>\theta'$.

Concerning equilibrium behavior given boomerang employees, again we begin with the one-job case. In the third period, if worker i has previously changed employers, the third-period wage equals $(1+k)(c_j+d_j\theta_i)$. In contrast, if worker i has not previously changed employers, the third-period wage equals $(1+k')(c_j+d_j\underline{\theta})$ and, in turn, Employer 1 captures profit $(1+k)(c_j+d_j\theta_i)-(1+k')(c_j+d_j\underline{\theta})$. In the second period, if an uninformed outsider holds the belief that worker i is of ability $\hat{\theta}_i$, she offers $(1+k')\left(c_j+d_j\hat{\theta}_i\right)$ to the worker, resulting in a lifetime wage of

$$(1+k')\left(c_j+d_j\hat{\theta}_i\right)+(1+k)(c_j+d_j\theta_i)$$

for worker i to separate with Employer 1. To retain the worker, Employer 1 can (counter)offer as high as $(1+k)(c_j+d_j\theta_i)+(1+k)(c_j+d_j\theta_i)-(1+k')(c_j+d_j\underline{\theta})$, resulting in a lifetime wage as high as

$$(1+k)(c_j+d_j\theta_i)+(1+k)(c_j+d_j\theta_i)-(1+k')(c_j+d_j\underline{\theta})+(1+k')(c_j+d_j\underline{\theta})=2(1+k)(c_j+d_j\theta_i)$$

for worker i to stay with Employer 1. Given $0<k'<k$, comparing lifetime wages above yields that Employer 1 can always outbid an uninformed outsider who holds the correct belief concerning the worker's ability, i.e., $\hat{\theta}_i=\theta_i$. Consequently, there is a winner's curse, so an uninformed outsider offers $(1+k')(c_j+d_j\underline{\theta})$. In turn, the lifetime wage for worker i to separate with Employer 1 equals $(1+k')(c_j+d_j\underline{\theta})+(1+k)(c_j+d_j\theta_i)$. To retain the worker, Employer 1 just matches this lifetime wage by offering

$$(1+k')(c_j+d_j\underline{\theta})+(1+k)(c_j+d_j\theta_i)-(1+k')(c_j+d_j\theta_L)=(1+k)(c_j+d_j\theta_i).$$

Thus, there is no worker turnover, and the wage is perfectly aligned with the worker's productivity for the one-job case. As for the two-job case, similar to Proposition 3, there is no worker turnover, and the promotion decision is fully efficient, i.e., $\theta^{2+}_{B,P}=\theta^{3+}_{B,P}=\theta'$.

Taken together, the possibility of boomerang employees suggests a surplus gain due to increased promotion efficiency, which creates incentives for firms to welcome back former employees. Moreover, the amount of incentives satisfies $\partial C'/\partial k'>0$, because $\partial\theta^{2+}_{N,P}/\partial k'=0$ and $\partial\theta^{3+}_{N,P}/\partial k'>0$. □

B Web Appendix (Not Intended for Publication)

In this document, we provide details for analyses discussed in the article, including implications to other personnel decisions, robustness of the key argument, and equilibrium behavior with job matching.

B.1 Implications to other personnel decisions

In Section 3, we obtain a key argument concerning the virtue of boomerang employees. That is, the possibility of boomerang employees enhances firm competition, which forces firms to make more efficient job-assignment decisions. As mentioned at the end of Section 3, we now establish that the argument also applies to work arrangements and firm-sponsored training, which increase a worker's productivity but send a positive signal of the worker's ability to the market.

B.1.1 Work arrangements

For ease of exposition, we abstract away from job assignments and the return to tenure from the baseline model. In each period, an employer decides whether to provide $f$lexible work arrangements or $r$egular work arrangements to a worker. For a given firm, the period t output of worker i with work arrangements $a \in \{f, r\}$ is given by

$$y_{it}^{a}(\theta_i) = c_a + d_a\theta_i,$$

where θ_i reflects i's self-discipline ability. Analogous to the baseline analysis of job-assignment decisions, we assume $c_r > c_f > 0$, $d_f > d_r > 0$, and $c_r + d_r\theta' = c_f + d_f\theta'$ for $\theta' \in \left(\underline{\theta}, \bar{\theta}\right)$. That is, compared with regular arrangements, flexible arrangements better leverage a worker's self-discipline ability, and there exists a threshold ability level θ' such that a worker with self-discipline ability $\theta > \theta'$ (resp. $\theta \leq \theta'$) is more productive given flexible arrangements (resp. regular arrangements). Moreover, we also assume $\mathbb{E}\theta \leq \theta'$, meaning that it is efficient to provide regular arrangements to a worker with unknown self-discipline ability.

As the above output specification with worker arrangements is in essence equivalent to that with job assignments, the equilibrium outcome is just an analog of that described in the baseline analysis, from where we also obtain the key argument concerning the virtue of boomerang employees.

B.1.2 Firm-sponsored training

Similar to the analysis above, we again abstract away from job assignments and the return to tenure from the baseline model. Although the return to firm-sponsored training depends on a worker's ability, dislike job assignments and work arrangements, firm-sponsored training involves direct investments by firms and is, in turn, costly by itself. Thus, the model setup described below will be quite different than that for job assignments and work arrangements.

At the beginning of period $t \in \{2, 3\}$, we assume that the current employer can promise to sponsor worker i with training $g_t \in \{0, 1\}$ for period t, which costs the firm $G > 0$ (resp. zero) if $g_t = 1$ (resp. $g_t = 0$);[1,2] in

[1] We assume that firms can commit to the level of training investments. See Acemoglu and Pischke (1999) and Dustmann and Schönberg (2012) for related analyses with this type of commitment.

[2] It is without loss of much generality to focus on a binary choice of training investments. Practically speaking, though in theory an employer can customize the training investment to each individual's ability level, training is often provided by a third party on a group, non-personalized basis. See Waldman and Yin (2023) for a related analysis with signaling jamming, where each worker either receives no training or a fixed level of training.

turn, the worker's period t productivity is given by

$$y_{it}(\theta_i; g_t) = \begin{cases} \gamma\theta_i & g_t = 1, \\ \theta_i & g_t = 0, \end{cases}$$

where $\gamma > 1$ reflects the worker's increased productivity due to training. For ease of exposition, we further assume that each firm can enjoy the return to training for just one period. Thus, if the firm provides training $g_2 = 1$ for period 2, there is a return to training in period 2; but to capture a return to training in period 3, the firm has to provide training $g_3 = 1$ again for period 3.

Under the hypothesis of asymmetric employer learning, we assume that the current employer's training decision $g_t \in \{0, 1\}$ at the beginning of each period t is publicly observable and, in turn, serves as a signal to outsiders. The timing of the game is changed as follows.

1. At the beginning of the first period, each firm offers a first-period wage to a worker with unknown ability. If the worker accepts an offer, then the firm that hires the worker observes the worker's ability level and pays the first-period wage at the end of the period; otherwise, the worker is self-employed, which gives the worker a reservation (expected) lifetime wage $\bar{W} \geq 0$.
2. At the beginning of the second period, the worker's first-period employer decides to whether to provide training for the period. After observing the first-period employer's training decision, each prospective employer makes a wage poaching offer, followed by the first-period employer's wage counteroffer. The worker then chooses a firm to work for. Then, the worker receives training and conducts production; the employer which hires the worker incurs the training cost. At the end of the second period, the employer which hires the worker observes his ability level and pays the second-period wage.
3. The sequence of events for the third period repeats that for the second period.

From an efficiency perspective, worker i receives training $g_t = 1$ for period t whenever the productivity increase exceeds the cost, i.e.,

$$\gamma\theta_i - G > \theta_i \iff \theta_i > \theta' = \frac{G}{\gamma - 1} \in \left(\underline{\theta}, \bar{\theta}\right),$$

where θ' is the efficient threshold ability level, i.e., $g_t = 1$ (resp. $g_t = 0$) if $\theta_i > \theta'$ (resp. $\theta_i \leq \theta'$). Analogous to the output specification with job assignments or flexible worker arrangements, once being trained, $\gamma > 1$ means that a worker's output becomes more sensitive to the worker's ability, but there exists a threshold ability level θ' for training due to the associated cost $G > 0$.

Below, we describe equilibrium behavior with and without the possibility of boomerang employees, where there is no turnover in both cases. We begin with the case given boomerang employees. As the worker can threaten to move in period 2 and thus earn a higher wage in period 3, the period 2 wage equals

$$\max\left\{\gamma\theta_i - G, \theta_i\right\},$$

which is aligned with the worker's productivity taking the training decision into consideration. Recall from the main text that a current employer promotes a worker whenever the associated productivity increase outweighs the corresponding wage increase. Employing this logic, when the training decision $g_t \in \{0, 1\}$ serves as a signal to outsiders, training is provided in period t whenever the productivity increase netting out the training cost outweighs the ensued wage increase. Define θ_B^{t++} as the period t threshold ability level (given boomerang employees), where worker i receives training $g_t = 1$ (resp. $g_t = 0$) for period t if $\theta_i > \theta_B^{t++}$ (resp. $\theta_i \leq \theta_B^{t++}$).

Like the baseline analysis, it must hold that $\theta_B^{2++} \geq \theta_B^{3++}$. As the wage given the possibility of boomerang employees (described above) is aligned with a worker's productivity, there is no wage increase given a training decision. In turn, the current employer provides training in period 2 whenever the productivity increase netting out the training cost satisfies

$$\gamma\theta_i - G - \theta_i > 0,$$

which suggests a fully efficient training decision for period 2, i.e., $\theta_B^{2++} = \theta'$. Given $\theta_B^{2++} \geq \theta_B^{3++}$, the training decision is also fully efficient for period 3, i.e., $\theta_B^{3++} = \theta'$.

Next consider the case given no boomerang employees. Define θ_N^{t++} as the period t threshold ability level (given no boomerang employees), where worker i receives training $g_t = 1$ (resp. $g_t = 0$) for period t if $\theta_i > \theta_N^{t++}$ (resp. $\theta_i \leq \theta_N^{t++}$). In this case, the current employer decides to provide training in period t whenever the productivity increase netting out the training cost outweighs the ensued wage increase, i.e.,

$$\gamma\theta_i - G - \theta_i > \gamma\theta_N^{t++} - G - \underline{\theta},$$

where $\gamma\theta_N^{t++} - G$ (resp. $\underline{\theta}$) is the period t wage to a worker who is supposed to receiving training $g_t = 1$ (resp. $g_t = 0$) for period t. Then, we obtain a distorted training decision, i.e., $\theta_N^{2++} = \theta_N^{3++} > \theta'$, because of the wage increase following a training decision $g_t = 1$ for period t, i.e., $\gamma\theta_N^{t++} - G - \underline{\theta} > \gamma\theta' - G - \theta' = 0$ where $\theta_N^{t++} \geq \theta' > \underline{\theta}$.

Taken together, the possibility of boomerang employees yields increased efficiency concerning training decisions, from where we also obtain the key argument concerning the virtue of boomerang employees.

B.2 Extension 1: Robustness of the key argument

B.2.1 A prolonged career span

Regarding the equilibrium given no boomerang employees, we first consider the one-job case. Similar to the baseline analysis where $T = 3$, due to the return to tenure, there is a winner's curse for an uninformed outsider. As a consequence, there is no turnover in equilibrium, and the worker receives $(1 + k)(c_j + d_j\underline{\theta})$ in periods 2 through $T - 1$, and $c_j + d_j\underline{\theta}$ in period T. As for the two-job case, the current employer's promotion decision is inefficient, i.e., $\theta_N^{t+} = \bar{\theta}$ for $t \in \{2, \cdots, T - 1\}$ and $\theta_N^{T+} > \theta'$ is determined by $(1 + k)\left[\left(c_m + d_m\theta_N^{T+}\right) - \left(c_l + d_l\theta_N^{T+}\right)\right] = c_m + d_m\theta_N^{T+} - (c_l + d_l\underline{\theta})$.

Concerning the equilibrium given boomerang employees, again we begin with the one-job case. Analogous to the baseline analysis where $T = 3$, due to the return to tenure, there is a winner's curse for an uninformed outsider. As a consequence, there is no turnover in equilibrium, and the worker receives wage $(1+k)(c_j + d_j\theta_i)$ in periods 2 through $T-1$, and $c_j + d_j\underline{\theta}$ in period T.[3] As for the two-job case, the current employer's promotion decision is fully efficient, i.e., $\theta_B^{t+} = \theta'$ for $t \in \{2, \cdots, T\}$.

[3]This result can be obtained by backward inductions. That is, consider what happens in period $T - 1$ for a worker who has not previously switched employers: if the worker stays in period $T - 1$, he receives $c_j + d_j\underline{\theta}$ in period T; if, instead, the workers switches employers in period $T - 1$, he receives $(1 + k)(c_j + d_j\theta_i)$ in period T. In turn, a winner's curse type of argument yields that the period $T - 1$ wage is $c_j + d_j\underline{\theta} + (1 + k)(c_j + d_j\theta_i) - (c_j + d_j\underline{\theta}) = (1 + k)(c_j + d_j\theta_i)$. Then, consider what happens in period $T - 2$ for a worker who has not previously switched employers: if the worker stays in period $T - 2$, he receives $c_j + d_j\underline{\theta} + (1 + k)(c_j + d_j\theta_i)$ in period $T - 1$ and onwards; if, instead, the workers switches employers in period $T - 2$, he receives $2(1 + k)(c_j + d_j\theta_i)$ in period $T - 1$ and onwards. In turn, a winner's curse type of argument yields that the period $T - 2$ wage is $c_j + d_j\underline{\theta} + 2(1 + k)(c_j + d_j\theta_i) - [c_j + d_j\underline{\theta} + (1 + k)(c_j + d_j\theta_i)] = (1 + k)(c_j + d_j\theta_i)$. Moving forward, we find that the period t wage is given by $(1 + k)(c_j + d_j\theta_i)$ for any $t \in \{2, \cdots, T - 1\}$.

Taken together, firms have incentives to welcome back former employees due to increased promotion efficiency, where the amount of incentives increases with T.

B.2.2 Wages and job assignments both observable to outsiders

Concerning the one-job case, due to the winner's curse, there is still a winner's curse for an uninformed outsider.[4] Thus, an uninformed outsider offers a period 2 wage $c_j + d_j\underline{\theta}$, resulting in a lifetime wage $c_j + d_j\underline{\theta} + (1 + k)(c_j + d_j\theta_i)$ for worker i to separate with Employer 1. To retain the worker, Employer 1 just matches this lifetime wage by a period 2 wage $c_j + d_j\underline{\theta} + (1 + k)(c_j + d_j\theta_i) - (c_j + d_j\theta_i) = c_j + d_j\underline{\theta} + k(c_j + d_j\theta_i)$.

Lemma 1. *If a worker can return to a previous employer, ability is privately observed, and the current employer's wage is publicly observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage* $c_j + d_j\underline{\theta} + k(c_j + d_j\theta_i)$.
2. *In period 3, the worker remains with Employer 1, and receives wage* $c_j + d_j\theta_i$.

As for the two-job case, we define $\theta^{t+}_{B,S}$ as the threshold ability level (given boomerang employees and wage signaling) for the period t's promotion decision.

Proposition 1. *If a worker can return to a previous employer, ability is privately observed, and the current employer's wage is publicly observed, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage*

$$\begin{cases} c_l + d_l\underline{\theta} + k\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} \text{ on job } l & \forall\theta_i \leq \theta^{2+}_{B,S}, \\ c_m + d_m\theta^{2+}_{B,S} + k\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} \text{ on job } m & \forall\theta_i > \theta^{2+}_{B,S}, \end{cases}$$

   where $\theta^{2+}_{B,S} > \theta'$.

2. *In period 3, the worker remains with Employer 1, and receives wage*

$$\begin{cases} c_l + d_l\theta_i \text{ on job } l & \forall\theta_i \leq \theta^{3+}_{B,S}, \\ c_m + d_m\theta_i \text{ on job } m & \forall\theta_i > \theta^{3+}_{B,S}, \end{cases}$$

   where $\theta^{3+}_{B,S} = \theta'$.

When the period 2 wage signals a worker's ability, the promotion decision is fully efficient in period 3, i.e., $\theta^{3+}_{B,S} = \theta'$. Moreover, the current employer promotes worker i in period 2 if $\theta_i > \theta^{2+}_{B,S}$, where $\theta^{2+}_{B,S}$ is determined

[4] The details for establishing the winner's curse is as follows. In the third period, if worker i has previously changed employers, the third-period wage equals $(1 + k)(c_j + d_j\theta_i)$. In contrast, if worker i has not previously changed employers, the third-period wage equals $c_j + d_j\tilde{\theta}_i$ when uninformed outsiders hold beliefs that the worker is of ability $\tilde{\theta}_i$ after observing the second-period wage. In the second period, if an uninformed outsider holds the belief that worker i is of ability $\hat{\theta}_i$, she offers $c_j + d_j\hat{\theta}_i$ to the worker, resulting in a lifetime wage of $c_j + d_j\hat{\theta}_i + (1+k)(c_j + d_j\theta_i)$ for worker i to separate with Employer 1. To retain the worker, Employer 1 can (counter)offer as high as $(1 + k)(c_j + d_j\theta_i) + (1 + k)(c_j + d_j\theta_i) - \left(c_j + d_j\tilde{\theta}_i\right)$, so the lifetime wage for worker i to stay with Employer 1 is as high as $(1 + k)(c_j + d_j\theta_i) + \left[(1 + k)(c_j + d_j\theta_i) - \left(c_j + d_j\tilde{\theta}_i\right)\right] + c_j + d_j\tilde{\theta}_i = 2(1 + k)(c_j + d_j\theta_i)$. Comparing lifetime wages above yields that Employer 1 can always outbid Employer 2 whenever Employer 2 holds the correct belief concerning the worker's ability, i.e., $\hat{\theta}_i = \theta_i$.

by

$$(1+k)\left[\left(c_m+d_m\theta^{2+}_{B,S}\right)-\left(c_l+d_l\theta^{2+}_{B,S}\right)\right]=c_m+d_m\theta^{2+}_{B,S}-\left(c+d_l\underline{\theta}\right),$$

which yields an inefficient promotion decision in period 2, i.e., $\theta^{2+}_{B,S}>\theta'$. In particular, the promotion decision given boomerang employees, though inefficient, is less distorted than that given no boomerang employees, i.e., $\bar{\theta}=\theta^{2+}_{N,S}\geq\theta^{2+}_{B,S}>\theta'$. Hence, as was true for the baseline analysis, the possibility of boomerang employees indicates a surplus gain due to improved promotion efficiency.

B.2.3 Ability non-observable to workers

Concerning the one-job case, due to the winner's curse, there is still a winner's curse for an uninformed outsider. Thus, an uninformed outsider offers a period 2 wage $c_j+d_j\underline{\theta}$. As the worker cannot observe his own ability, the expected lifetime wage is $c_j+d_j\underline{\theta}+(1+k)\left(c_j+d_j\mathbb{E}\theta\right)$ for worker i to separate with Employer 1. To retain the worker, Employer 1 just matches this lifetime wage by a period 2 wage $c_j+d_j\underline{\theta}+(1+k)\left(c_j+d_j\mathbb{E}\theta\right)-\left(c_j+d_j\underline{\theta}\right)=(1+k)\left(c_j+d_j\mathbb{E}\theta\right)$.

Lemma 2. *If a worker can return to a previous employer, ability is privately observed, and a worker cannot observe his own ability, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage* $(1+k)\left(c_j+d_j\mathbb{E}\theta\right)$.
2. *In period 3, the worker remains with Employer 1, and receives wage* $c_j+d_j\underline{\theta}$.

As for the two-job case, we define $\theta^{t+}_{B,O}$ as the threshold ability level (given boomerang employees and ability non-observable to workers) for the period t's promotion decision.

Proposition 2. *If a worker can return to a previous employer, ability is privately observed, and a worker cannot observe his own ability, 1) and 2) describe equilibrium behavior concerning a worker with ability* θ_i.

1. *In period 2, the worker remains with Employer 1, and receives wage*

$$\begin{cases}(1+k)\left(c_l+d_l\mathbb{E}\left(\theta|\underline{\theta}\leq\theta\leq\theta^{2+}_{B,O}\right)\right) \text{ on job } l & \forall\theta_i\leq\theta^{2+}_{B,O},\\ (1+k)\left(c_m+d_m\mathbb{E}\left(\theta|\theta^{2+}_{B,O}<\theta\leq\bar{\theta}\right)\right) \text{ on job } m & \forall\theta_i>\theta^{2+}_{B,O},\end{cases}$$

   where $\theta^{2+}_{B,O}>\theta'$.
2. *In period 3, the worker remains with Employer 1, and receives wage*

$$\begin{cases}c_l+d_l\underline{\theta} \text{ on job } l & \forall\theta_i\leq\theta^{3+}_{B,O},\\ c_m+d_m\theta^{3+}_{B,O} \text{ on job } m & \forall\theta_i>\theta^{3+}_{B,O},\end{cases}$$

   where $\theta^{3+}_{B,O}>\theta'$, *with* $\lim_{k\to 0}\theta^{3+}_{B,O}=\bar{\theta}$.

When the worker cannot observe his own ability, the current employer promotes worker i in period 3 if $\theta_i>\theta^{3+}_{B,O}$, where $\theta^{3+}_{B,O}$ is determined by

$$(1+k)\left[\left(c_m+d_m\theta^{3+}_{B,O}\right)-\left(c_l+d_l\theta^{3+}_{B,O}\right)\right]=c_m+d_m\theta^{3+}_{B,O}-\left(c_l+d_l\underline{\theta}\right),$$

which suggests a distorted promotion decision, i.e., $\theta^{3+}_{B,O} > \theta'$ with $\lim_{k\to 0} \theta^{3+}_{B,O} = \bar{\theta}$. Likewise, the current employer promotes worker i in period 2 if $\theta_i > \theta^{2+}_{B,O}$, where $\theta^{2+}_{B,O}$ is determined by

$$(1+k)\left[\left(c_m + d_m\theta^{2+}_{B,O}\right) - \left(c_l + d_l\theta^{2+}_{B,O}\right)\right] \\ = (1+k)\left(c_m + d_m\mathbb{E}\left(\theta|\theta^{2+}_{B,O} < \theta \le \bar{\theta}\right)\right) - (1+k)\left(c_l + d_l\mathbb{E}\left(\theta|\underline{\theta} \le \theta \le \theta^{2+}_{B,O}\right)\right),$$

where the wage increase following a promotion is strictly positive and, in turn, yields a distorted promotion decision, i.e., $\theta^{2+}_{B,O} > \bar{\theta}$. In particular, the promotion decision given boomerang employees, though not fully efficient, is less distorted than that given no boomerang employees, i.e., $\bar{\theta} = \theta^{2+}_{N,O} \ge \theta^{2+}_{B,O} > \theta'$.[5] Hence, as was true for the baseline analysis, the possibility of boomerang employees indicates a surplus gain due to improved promotion efficiency.

B.3 Extension 3: Job matching

B.3.1 The parametric restriction

To have a worker switch from the current employer with a bad match to a new employer with a good match, we assume for $j \in \{l, m\}$ that

$$[1 + k + p(1+k)\alpha]\left(c_j + d_j\bar{\theta}\right) < [1 + p(1+k)]\,\alpha\left(c_j + d_j\underline{\theta}\right),$$

which indicates $(1+k)\left(c_j + d_j\bar{\theta}\right) < \alpha\left(c_j + d_j\underline{\theta}\right)$.[6]

B.3.2 The one-job case

Solving the game from backward, we begin with equilibrium behavior in the third period. In particular, we first consider a worker moved in period 2, for which there are four possible cases in period 3.

1. If the match with Employer 2 is good and the match with Employer 1 is bad, the worker remains with Employer 2, and receives wage $\alpha\left(c_j + d_j\underline{\theta}\right)$.[7]
2. If the match with both Employer 2 and Employer 1 is good, the worker remains with Employer 2, and receives wage $(1+k)\alpha\left(c_j + d_j\theta_i\right)$.
3. If the match with both Employer 2 and Employer 1 is bad, the worker is poached away by an uninformed outsider with a good match, and receives wage $\alpha\left(c_j + d_j\mathbb{E}\theta\right)$.
4. If the match with Employer 2 is bad and the match with Employer 1 is good, the worker returns to Employer 1, and receives wage $\alpha\left(c_j + d_j\mathbb{E}\theta\right)$.[8]

[5] Specifically, if $\theta^{2+}_{B,O} = \bar{\theta}$, then the wage increase is equal to $(1+k)\left(c_m + d_m\bar{\theta}\right) - (1+k)\left(c_l + d_l\mathbb{E}\theta\right)$ given boomerang employees, which is less than the wage increase $(1+k)\left(c_m + d_m\bar{\theta}\right) - (1+k)\left(c_l + d_l\underline{\theta}\right)$ given no boomerang employees.

[6] This assumption indicates that the equilibrium with the possibility of boomerang employees features the same amount of worker turnover as the equilibrium without the possibility of boomerang employees. Without this assumption, there will be a threshold ability level $\theta^*_t \in \left(\underline{\theta}, \bar{\theta}\right)$ for period t such that, given a bad match with the current employer, a worker stays (resp. separates) with the current employer if his ability is higher (resp. lower) than the threshold. In this case, although we do not show it formally, our conjecture is that the equilibrium with the possibility of boomerang employees will feature more worker turnover than the equilibrium without the possibility of boomerang employees, because of the worker's intention to improve the match.

[7] In this case, Employer 1 with a bad match cannot outbid Employer 2 with a good match. So, there is a winner's curse for an uninformed outsider with a good match, who offers the wage equal to the productivity of a worker with the lowest possible ability, i.e., $\alpha\left(c_j + d_j\underline{\theta}\right)$.

[8] In this case, Employer 1 with a good match can outbid Employer 2 with a bad match. As Employer 1 (i.e., an informed outsider) cannot counteroffer in period 3, à la the market-Nash equilibrium in Waldman (1984a), we obtain: i) the worker returns to Employer

Putting together, Employer 2 earns expected profit $p(1-p)\left[(1+k)\alpha\left(c_j+d_j\theta_i\right)-\alpha\left(c_j+d_j\underline{\theta}\right)\right]$ in period 3.

We then consider a worker stayed in period 2, for which there are two possible cases in period 3.

1. If the match with Employer 1 is bad, the worker is poached away by an uninformed outsider with a good match, and receives wage $\alpha\left(c_j+d_j\mathbb{E}\theta\right)$.
2. If the match with Employer 1 is good, the worker remains with Employer 1, and receives wage $\alpha\left(c_j+d_j\underline{\theta}\right)$.

Putting together, Employer 1 earns expected profit $p\left[(1+k)\alpha\left(c_j+d_j\theta_i\right)-\alpha\left(c_j+d_j\underline{\theta}\right)\right]$ in period 3.

Next, we study equilibrium behavior in the second period. Suppose that an uninformed outsider with a good match thinks that worker i's ability is $\hat{\theta}_i$. Then, using the period 3 wage for a worker moved in period 2, the worker's expected lifetime wage for moving is given by

$$\alpha\left(c_j+d_j\hat{\theta}_i\right)+p(1-p)\left[(1+k)\alpha\left(c_j+d_j\hat{\theta}_i\right)-\alpha\left(c_j+d_j\underline{\theta}\right)\right]+\left[\begin{array}{c} p(1-p)\alpha\left(c_j+d_j\underline{\theta}\right)+p^2(1+k)\alpha\left(c_j+d_j\theta_i\right) \\ +(1-p)\,\alpha\left(c_j+d_j\mathbb{E}\theta\right) \end{array}\right].$$

If $\hat{\theta}_i=\hat{\theta}$, it simplifies to

$$\boxed{[1+p(1+k)]\,\alpha\left(c_j+d_j\theta_i\right)+(1-p)\alpha\left(c_j+d_j\mathbb{E}\theta\right).}$$

As for the worker's expected lifetime wage of staying, using the period 3 wage for a worker stayed in period 2, there are two possible cases.

1. If the match with Employer 1 is good, the worker's expected lifetime wage of staying is as high as

$$(1+k)\alpha\left(c_j+d_j\theta_i\right)+p\left[(1+k)\alpha\left(c_j+d_j\theta_i\right)-\alpha\left(c_j+d_j\underline{\theta}\right)\right]+\left[p\alpha\left(c_j+d_j\underline{\theta}\right)+(1-p)\,\alpha\left(c_j+d_j\mathbb{E}\theta\right)\right]$$

which simplifies to

$$\boxed{(1+p)(1+k)\alpha\left(c_j+d_j\theta_i\right)+(1-p)\alpha\left(c_j+d_j\mathbb{E}\theta\right),}$$

which is no less than the expected lifetime wage of moving. Thus, there is a winner's curse for poaching, where the worker remains with Employer 1, and the period 2 poaching offer by an uninformed outsider with a good match is

$$\alpha\left(c_j+d_j\underline{\theta}\right)+p(1-p)\left[(1+k)\alpha\left(c_j+d_j\underline{\theta}\right)-\alpha\left(c_j+d_j\underline{\theta}\right)\right]=\left[1+p(1-p)k\right]\alpha\left(c_j+d_j\underline{\theta}\right).$$

In turn, the worker's expected lifetime wage of moving equals

$$\left[1+p(1-p)k\right]\alpha\left(c_j+d_j\underline{\theta}\right)+\left[\begin{array}{c} p(1-p)\alpha\left(c_j+d_j\underline{\theta}\right)+p^2(1+k)\alpha\left(c_j+d_j\theta_i\right) \\ +(1-p)\,\alpha\left(c_j+d_j\mathbb{E}\theta\right) \end{array}\right],$$

and Employer 1 simply matches this value by offering wage

$$\begin{aligned} &\left[1+p(1-p)k\right]\alpha\left(c_j+d_j\underline{\theta}\right)+\left[\begin{array}{c} p(1-p)\alpha\left(c_j+d_j\underline{\theta}\right)+p^2(1+k)\alpha\left(c_j+d_j\theta_i\right) \\ +(1-p)\,\alpha\left(c_j+d_j\mathbb{E}\theta\right) \end{array}\right] \\ &-\left[p\alpha\left(c_j+d_j\underline{\theta}\right)+(1-p)\,\alpha\left(c_j+d_j\mathbb{E}\theta\right)\right]=\boxed{\boxed{\left[1-p^2+p(1-p)k\right]\alpha\left(c_j+d_j\underline{\theta}\right)+p^2(1+k)\alpha\left(c_j+d_j\theta_i\right).}} \end{aligned}$$

1; ii) the wage equals the worker's expected productivity at an uninformed outsider with a good match, i.e., $\alpha\left(c_j+d_j\mathbb{E}\theta\right)$.

2. If the match with Employer 1 is bad, the worker's expected lifetime wage of staying is as high as

$$(1+k)\left(c_j+d_j\theta_i\right)+p\left[(1+k)\alpha\left(c_j+d_j\theta_i\right)-\alpha\left(c_j+d_j\underline{\theta}\right)\right]+\left[p\alpha\left(c_j+d_j\underline{\theta}\right)+(1-p)\,\alpha\left(c_j+d_j\mathbb{E}\theta\right)\right]$$

which simplifies to

$$\boxed{\left[1+k+p(1+k)\alpha\right]\left(c_j+d_j\theta_i\right)+(1-p)\alpha\left(c_j+d_j\mathbb{E}\theta\right),}$$

which is less than the expected lifetime wage of moving. In this case, the worker is poached away by an outsider with a good match who offers wage

$$\boxed{\boxed{\alpha\left(c_j+d_j\mathbb{E}\theta\right)+p(1-p)\left[(1+k)\alpha\left(c_j+d_j\mathbb{E}\theta\right)-\alpha\left(c_j+d_j\underline{\theta}\right)\right].}}$$

B.3.3 The two-job case

Solving the game from backward, we begin with equilibrium behavior in the third period. In particular, we first consider a worker moved in period 2, for which there are four possible cases in period 3.

1. If the match with Employer 2 is good and the match with Employer 1 is bad, the worker remains with Employer 2, and receives wage

$$\begin{cases}\alpha\left(c_l+d_l\underline{\theta}\right)\text{ on job }l & \forall\theta_i\leq\theta^{3+}_{B,M},\\ \alpha\left(c_m+d_m\theta^{3+}_{B,M}\right)\text{ on job }m & \forall\theta^{3+}_{B,M}<\theta_i\leq\theta^{2+}_{B,M},\\ \alpha\left(c_m+d_m\theta^{2+}_{B,M}\right)\text{ on job }m & \forall\theta_i>\theta^{2+}_{B,M}.\end{cases}$$

   In this case, Employer 2's promotion decision is inefficient, because there is a signaling concern when promoting an incumbent worker.

2. If the match with both Employer 2 and Employer 1 is good, the worker remains with Employer 2, and receives wage

$$\begin{cases}(1+k)\alpha\left(c_l+d_l\theta_i\right)\text{ on job }l & \forall\theta_i\leq\theta',\\ (1+k)\alpha\left(c_m+d_m\theta_i\right)\text{ on job }m & \forall\theta_i>\theta'.\end{cases}$$

   In this case, Employer 2's promotion decision is fully efficient by the virtue of Bertrand competition.

3. If the match with both Employer 2 and Employer 1 is bad, the worker is poached away by an uninformed outsider with a good match, and receives wage

$$\begin{cases}\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta\leq\theta^{3+}_{B,M}\right)\right)\text{ on job }l & \forall\theta_i\leq\theta^{3+}_{B,M},\\ \alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M}<\theta\leq\theta^{2+}_{B,M}\right)\right)\text{ on job }m & \forall\theta^{3+}_{B,M}<\theta_i\leq\theta^{2+}_{B,M},\\ \alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta>\theta^{2+}_{B,M}\right)\right)\text{ on job }m & \forall\theta_i>\theta^{2+}_{B,M}.\end{cases}$$

   In this case, Employer 2's promotion decision is inefficient, because there is a signaling concern when promoting an incumbent worker; the new employer's promotion decision is inefficient because $\mathbb{E}\left(\theta|\theta\leq\theta^{3+}_{B,M}\right)<\mathbb{E}\theta<\theta'$.

4. If the match with Employer 2 is bad and the match with Employer 1 is good, the worker returns to

Employer 1, and receives wage

$$\begin{cases} \alpha\left(c_l + d_l \mathbb{E}\left(\theta | \theta \leq \theta^{3+}_{B,M}\right)\right) \text{ on job } l & \forall \theta_i \leq \theta', \\ \alpha\left(c_l + d_l \mathbb{E}\left(\theta | \theta \leq \theta^{3+}_{B,M}\right)\right) \text{ on job } m & \forall \theta' < \theta_i \leq \theta^{3+}_{B,M}, \\ \alpha\left(c_m + d_m \mathbb{E}\left(\theta | \theta^{3+}_{B,M} < \theta \leq \theta^{2+}_{B,M}\right)\right) \text{ on job } m & \forall \theta^{3+}_{B,M} < \theta_i \leq \theta^{2+}_{B,M}, \\ \alpha\left(c_m + d_m \mathbb{E}\left(\theta | \theta > \theta^{2+}_{B,M}\right)\right) \text{ on job } m & \forall \theta_i > \theta^{2+}_{B,M}. \end{cases}$$

In this case, Employer 2's promotion decision is inefficient, because there is a signaling concern when promoting an incumbent worker; Employer 1's promotion decision is, however, fully efficient, because there is no signaling concern when hiring back a returning employee as an outsider.

We then consider a worker stayed in period 2, for which there are two possible cases in period 3.

1. If the match with Employer 1 is bad, the worker is poached away by an uninformed outsider with a good match, and receives wage

$$\begin{cases} \alpha\left(c_l + d_l \mathbb{E}\left(\theta | \theta \leq \theta^{3+}_{B,M}\right)\right) \text{ on job } l & \forall \theta_i \leq \theta^{3+}_{B,M}, \\ \alpha\left(c_m + d_m \mathbb{E}\left(\theta | \theta^{3+}_{B,M} < \theta \leq \theta^{2+}_{B,M}\right)\right) \text{ on job } m & \forall \theta^{3+}_{B,M} < \theta_i \leq \theta^{2+}_{B,M}, \\ \alpha\left(c_m + d_m \mathbb{E}\left(\theta | \theta > \theta^{2+}_{B,M}\right)\right) \text{ on job } m & \forall \theta_i > \theta^{2+}_{B,M}. \end{cases}$$

In this case, Employer 1's promotion decision is inefficient, because there is a signaling concern when promoting an incumbent worker; the new employer's promotion decision is inefficient because $\mathbb{E}\left(\theta | \theta \leq \theta^{3+}_{B,M}\right) < \mathbb{E}\theta < \theta'$.

2. If the match with Employer 1 is good, the worker remains with Employer 1, and receives wage

$$\begin{cases} \alpha\left(c_l + d_l \underline{\theta}\right) \text{ on job } l & \forall \theta_i \leq \theta^{3+}_{B,M}, \\ \alpha\left(c_m + d_m \theta^{3+}_{B,M}\right) \text{ on job } m & \forall \theta^{3+}_{B,M} < \theta_i \leq \theta^{2+}_{B,M}, \\ \alpha\left(c_m + d_m \theta^{2+}_{B,M}\right) \text{ on job } m & \forall \theta_i > \theta^{2+}_{B,M}. \end{cases}$$

In this case, Employer 1's promotion decision is inefficient, because there is a signaling concern when promoting an incumbent worker.

Next, we study equilibrium behavior in the second period. Suppose that an uninformed outsider with a good match thinks that worker i's ability is $\hat{\theta}_i$. Then, using the period 3 wage for a worker moved in period 2, the worker's expected lifetime wage for moving is given by

$$\alpha \max\left\{c_l + d_l \hat{\theta}_i, c_m + d_m \hat{\theta}_i\right\} + p(1-p)\left[(1+k)\alpha \max\left\{c_l + d_l \hat{\theta}_i, c_m + d_m \hat{\theta}_i\right\} - \alpha\left(c_l + d_l \underline{\theta}\right)\right] + \left[\begin{array}{c} p(1-p)\alpha\left(c_l + d_l \underline{\theta}\right) + p^2(1+k)\alpha \max\left\{c_l + d_l \theta_i, c_m + d_m \theta_i\right\} \\ + (1-p)\,\alpha\left(c_l + d_l \mathbb{E}\left(\theta | \theta \leq \theta^{3+}_{B,M}\right)\right) \end{array}\right], \forall \hat{\theta}_i \leq \theta^{3+}_{B,M}$$

or

$$\alpha\left(c_m + d_m \hat{\theta}_i\right) + p(1-p)\left[(1+k)\alpha\left(c_m + d_m \hat{\theta}_i\right) - \alpha\left(c_m + d_m \theta^{3+}_{B,M}\right)\right] + \left[\begin{array}{c} p(1-p)\alpha\left(c_m + d_m \theta^{3+}_{B,M}\right) + p^2(1+k)\alpha\left(c_m + d_m \theta_i\right) \\ + (1-p)\,\alpha\left(c_l + d_l \mathbb{E}\left(\theta | \theta^{3+}_{B,M} < \theta \leq \theta^{2+}_{B,M}\right)\right) \end{array}\right], \forall \theta^{3+}_{B,M} < \hat{\theta}_i \leq \theta^{2+}_{B,M}$$

or

$$\alpha\left(c_m + d_m\hat{\theta}_i\right) + p(1-p)\left[(1+k)\alpha\left(c_m + d_m\hat{\theta}_i\right) - \alpha\left(c_m + d_m\theta^{2+}_{B,M}\right)\right] + \left[\begin{array}{c} p(1-p)\alpha\left(c_m + d_m\theta^{2+}_{B,M}\right) + p^2(1+k)\alpha\left(c_m + d_m\theta_i\right) \\ +(1-p)\,\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right) \end{array}\right], \forall\hat{\theta}_i > \theta^{2+}_{B,M}.$$

If $\hat{\theta}_i = \theta$, the expected lifetime wage for moving simplifies to

$$\boxed{\begin{cases} [1+p(1+k)]\,\alpha\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} + (1-p)\alpha\left(c_l + d_l\mathbb{E}\left(\theta|\theta \le \theta^{3+}_{B,M}\right)\right) & \forall\theta_i \le \theta^{3+}_{B,M}, \\ [1+p(1+k)]\,\alpha\left(c_m + d_m\theta_i\right) + (1-p)\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M} < \theta \le \theta^{2+}_{B,M}\right)\right) & \forall\theta^{3+}_{B,M} < \theta_i \le \theta^{2+}_{B,M}, \\ [1+p(1+k)]\,\alpha\left(c_m + d_m\theta_i\right) + (1-p)\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right) & \forall\theta_i > \theta^{2+}_{B,M}. \end{cases}}$$

As for the worker's expected lifetime wage of staying, using the period 3 wage for a worker stayed in period 2, there are two possible cases.

1. If the match with Employer 1 is good, the worker's expected lifetime wage of staying is as high as

$$(1+k)\alpha\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} + p\left[(1+k)\alpha\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} - \alpha\left(c_l + d_l\underline{\theta}\right)\right] + \left[(1-p)\,\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta \le \theta^{3+}\right)\right) + p\alpha\left(c_l + d_l\underline{\theta}\right)\right], \forall\theta_i \le \theta^{3+}_{B,M},$$

or

$$(1+k)\alpha\left(c_m + d_m\theta_i\right) + p\left[(1+k)\alpha\left(c_m + d_m\theta_i\right) - \alpha\left(c_m + d_m\theta^{3+}_{B,M}\right)\right] + \left[(1-p)\,\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M} < \theta \le \theta^{2+}_{B,M}\right)\right) + p\alpha\left(c_m + d_m\theta^{3+}_{B,M}\right)\right], \forall\theta^{3+}_{B,M} < \theta_i \le \theta^{2+}_{B,M}$$

or

$$(1+k)\alpha\left(c_m + d_m\theta_i\right) + p\left[(1+k)\alpha\left(c_m + d_m\theta_i\right) - \alpha\left(c_m + d_m\theta^{2+}_{B,M}\right)\right] + \left[(1-p)\,\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right) + p\alpha\left(c_m + d_m\theta^{2+}_{B,M}\right)\right], \forall\theta_i > \theta^{2+}_{B,M}$$

which simplifies to

$$\boxed{\begin{cases} (1+p)(1+k)\alpha\max\{c_l + d_l\theta_i, c_m + d_m\theta_i\} + (1-p)\alpha\left(c_l + d_l\mathbb{E}\left(\theta|\theta \le \theta^{3+}_{B,M}\right)\right) & \forall\theta_i \le \theta^{3+}_{B,M}, \\ (1+p)(1+k)\alpha\left(c_m + d_m\theta_i\right) + (1-p)\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M} < \theta \le \theta^{2+}_{B,M}\right)\right) & \forall\theta^{3+}_{B,M} < \theta_i \le \theta^{2+}_{B,M}, \\ (1+p)(1+k)\alpha\left(c_m + d_m\theta_i\right) + (1-p)\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right) & \forall\theta_i > \theta^{2+}_{B,M}, \end{cases}}$$

which is no less than the expected lifetime wage of moving. Thus, there is a winner's curse for poaching, where the worker remains with Employer 1, and the period 2 poaching offer by an uninformed outsider with a good match is

$$\alpha\left(c_l + d_l\underline{\theta}\right) + p(1-p)\left[(1+k)\alpha\left(c_l + d_l\underline{\theta}\right) - \alpha\left(c_l + d_l\underline{\theta}\right)\right] = [1 + p(1-p)k]\,\alpha\left(c_l + d_l\underline{\theta}\right), \forall\theta_i \le \theta^{2+}_{B,M}$$

or

$$\alpha\left(c_m + d_m\theta^{2+}_{B,M}\right) + p(1-p)\left[(1+k)\alpha\left(c_m + d_m\theta^{2+}_{B,M}\right) - \alpha\left(c_m + d_m\theta^{2+}_{B,M}\right)\right] = [1 + p(1-p)k]\,\alpha\left(c_m + d_m\theta^{2+}_{B,M}\right), \forall\theta_i > \theta^{2+}_{B,M}.$$

In turn, the worker's expected lifetime wage of moving equals

$$\begin{cases} [1+p(1-p)k]\,\alpha\,(c_l+d_l\underline{\theta})+\left[\begin{array}{c} p(1-p)\alpha\,(c_l+d_l\underline{\theta})+p^2(1+k)\alpha\max\{c_l+d_l\theta_i,c_m+d_m\theta_i\} \\ +(1-p)\,\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta\leq\theta^{3+}_{B,M}\right)\right)\end{array}\right] & \forall\theta_i\leq\theta^{3+}_{B,M}, \\ [1+p(1-p)k]\,\alpha\,(c_l+d_l\underline{\theta})+\left[\begin{array}{c} p(1-p)\alpha\left(c_m+d_m\theta^{3+}_{B,M}\right)+p^2(1+k)\alpha\,(c_m+d_m\theta_i) \\ +(1-p)\,\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta^{3+}_{B,M}<\theta\leq\theta^{2+}_{B,M}\right)\right)\end{array}\right] & \forall\theta^{3+}_{B,M}<\theta_i\leq\theta^{2+}_{B,M}, \\ [1+p(1-p)k]\,\alpha\left(c_m+d_m\theta^{2+}_{B,M}\right)+\left[\begin{array}{c} p(1-p)\alpha\left(c_m+d_m\theta^{2+}_{B,M}\right)+p^2(1+k)\alpha\,(c_m+d_m\theta_i) \\ (1-p)\,\alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta>\theta^{2+}_{B,M}\right)\right)\end{array}\right] & \forall\theta_i>\theta^{2+}_{B,M}, \end{cases}$$

and Employer 1 simply matches this value by offering wage

$$[1+p(1-p)k]\,\alpha\,(c_l+d_l\underline{\theta})+\left[\begin{array}{c} p(1-p)\alpha\,(c_l+d_l\underline{\theta})+p^2(1+k)\alpha\max\{c_l+d_l\theta_i,c_m+d_m\theta_i\} \\ +(1-p)\,\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta\leq\theta^{3+}_{B,M}\right)\right)\end{array}\right] - \left[\begin{array}{c}(1-p)\,\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta\leq\theta^{3+}_{B,M}\right)\right) \\ +p\alpha\,(c_l+d_l\underline{\theta})\end{array}\right],\forall\theta_i\leq\theta^{3+}_{B,M}$$

or

$$[1+p(1-p)k]\,\alpha\,(c_m+d_m\underline{\theta})+\left[\begin{array}{c} p(1-p)\alpha\left(c_m+d_m\theta^{3+}_{B,M}\right)+p^2(1+k)\alpha\,(c_m+d_m\theta_i) \\ (1-p)\,\alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M}<\theta\leq\theta^{2+}_{B,M}\right)\right)\end{array}\right] - \left[\begin{array}{c}(1-p)\,\alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M}<\theta\leq\theta^{2+}_{B,M}\right)\right) \\ +p\alpha\left(c_m+d_m\theta^{3+}_{B,M}\right)\end{array}\right],\forall\theta^{3+}_{B,M}<\theta_i\leq\theta^{2+}_{B,M}.$$

or

$$[1+p(1-p)k]\,\alpha\,(c_m+d_m\underline{\theta})+\left[\begin{array}{c} p(1-p)\alpha\left(c_m+d_m\theta^{2+}_{B,M}\right)+p^2(1+k)\alpha\,(c_m+d_m\theta_i) \\ (1-p)\,\alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta>\theta^{2+}_{B,M}\right)\right)\end{array}\right] - \left[\begin{array}{c}(1-p)\,\alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta>\theta^{2+}_{B,M}\right)\right) \\ +p\alpha\left(c_m+d_m\theta^{2+}_{B,M}\right)\end{array}\right],\forall\theta_i>\theta^{2+}_{B,M}$$

which simplifies to

$$\boxed{\begin{cases} \left[1-p^2+p(1-p)k\right]\alpha\,(c_l+d_l\underline{\theta})+p^2(1+k)\alpha\max\{c_l+d_l\theta_i,c_m+d_m\theta_i\} & \forall\theta_i\leq\theta^{3+}_{B,M}, \\ [1+p(1-p)k]\,\alpha\,(c_m+d_m\underline{\theta})-p^2\alpha\left(c_m+d_m\theta^{3+}_{B,M}\right)+p^2(1+k)\alpha\,(c_m+d_m\theta_i) & \forall\theta^{3+}_{B,M}<\theta_i\leq\theta^{2+}_{B,M}, \\ \left[1-p^2+p(1-p)k\right]\alpha\left(c_m+d_m\theta^{2+}_{B,M}\right)+p^2(1+k)\alpha\,(c_m+d_m\theta_i) & \forall\theta_i>\theta^{2+}_{B,M}. \end{cases}}$$

2. If the match with Employer 1 is bad, the worker's expected lifetime wage of staying is as high as

$$(1+k)\max\{c_l+d_l\theta_i,c_m+d_m\theta_i\}+p\left[(1+k)\alpha\max\{c_l+d_l\theta_i,c_m+d_m\theta_i\}-\alpha\,(c_l+d_l\underline{\theta})\right] + \left[\begin{array}{c}(1-p)\,\alpha\left(c_l+d_l\mathbb{E}\left(\theta|\theta\leq\theta^{3+}\right)\right) \\ +p\alpha\,(c_l+d_l\underline{\theta})\end{array}\right],\forall\theta_i\leq\theta^{3+}_{B,M}$$

or

$$(1+k)\,(c_m+d_m\theta_i)+p\left[(1+k)\alpha\,(c_m+d_m\theta_i)-\alpha\left(c_m+d_m\theta^{3+}_{B,M}\right)\right] + \left[\begin{array}{c}(1-p)\,\alpha\left(c_m+d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M}<\theta\leq\theta^{2+}_{B,M}\right)\right) \\ +p\alpha\left(c_m+d_m\theta^{3+}_{B,M}\right)\end{array}\right],\forall\theta^{3+}_{B,M}<\theta_i\leq\theta^{2+}_{B,M}$$

or

$$(1{+}k)\left(c_m + d_m\theta_i\right){+}p\left[(1+k)\alpha\left(c_m + d_m\theta_i\right) - \alpha\left(c_m + d_m\theta^{2+}_{B,M}\right)\right]{+}\left[\begin{array}{c}(1-p)\,\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right)\\ +p\alpha\left(c_m + d_m\theta^{2+}_{B,M}\right)\end{array}\right], \forall\theta_i > \theta^{2+}_{B,M}$$

which simplifies to

$$\boxed{\begin{cases}[1+k+p(1+k)\alpha]\max\left\{c_l + d_l\theta_i, c_m + d_m\theta_i\right\} + (1-p)\alpha\left(c_l + d_l\mathbb{E}\left(\theta|\theta \le \theta^{3+}_{B,M}\right)\right) & \forall\theta_i \le \theta^{3+}_{B,M},\\ [1+k+p(1+k)]\,\alpha\left(c_m + d_m\theta_i\right) + (1-p)\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta^{3+}_{B,M} < \theta \le \theta^{2+}_{B,M}\right)\right) & \forall\theta^{3+}_{B,M} < \theta_i \le \theta^{2+}_{B,M},\\ [1+k+p(1+k)]\,\alpha\left(c_m + d_m\theta_i\right) + (1-p)\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right) & \forall\theta_i > \theta^{2+}_{B,M}.\end{cases}}$$

which is less than the expected lifetime wage of moving. In this case, the worker is poached away by an outsider with a good match who offers wage

$$\boxed{\boxed{\begin{cases}\alpha\left(c_l + d_l\mathbb{E}\left(\theta|\theta \le \theta^{2+}_{B,M}\right)\right) + p(1-p)\left[(1+k)\alpha\left(c_l + d_l\mathbb{E}\left(\theta|\theta \le \theta^{2+}_{B,M}\right)\right) - \alpha\left(c_l + d_l\underline{\theta}\right)\right] & \forall\theta_i \le \theta^{2+}_{B,M},\\ \alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right) + p(1-p)\left[(1+k)\alpha\left(c_m + d_m\mathbb{E}\left(\theta|\theta > \theta^{2+}_{B,M}\right)\right) - \alpha\left(c_m + d_m\theta^{2+}_{B,M}\right)\right] & \forall\theta_i > \theta^{2+}_{B,M}.\end{cases}}}$$