



# Imprint–environment Fit and Performance: How Organizational Munificence at the Time of Hire Affects Subsequent Job Performance

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## **Abstract**

Using a longitudinal study of professionals in two information technology services firms, as well as interview data, this paper illuminates how organizational fortunes influence individual performance over time, examining how the economic situation of an organization leaves a lasting imprint on new employees and how that imprint affects subsequent job performance. The core hypothesis, supported by the results, is that the more similar the initially experienced level of organizational munificence is to the level of munificence in a subsequent period, the higher an individual's job performance. This relationship between what I call "imprint–environment fit" and performance is contingent on the individual's career stage when entering the organization and the influence of secondhand imprinting resulting from the social transmission of others' imprints. A possible implication of the core hypothesis may be a "curse of extremes," whereby both very high and very low levels of initial munificence are associated with lower average performance during a person's subsequent tenure. One mechanism underlying these patterns is that employees socialized in different resource environments develop distinct approaches to problem solving and client interactions, which then lead to varying levels of imprint–environment fit in subsequent resource environments.

**Keywords:** imprinting, imprint–environment fit, job performance, employee socialization, organizational munificence and scarcity, careers in organizations

How organizations and individuals affect one another is a classic question in organizational theory, and the "intimate links between organizations and the people that constitute them" (Haveman, 2000: 476) remain a central concern.

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Yet the intertwined fortunes of organizations and individuals, and particularly the relationship between the fate of an organization and the outcomes of its members, are incompletely understood. Scholars seldom “examine the impact of the organization’s success and fitness . . . on the career trajectories of its members,” and thus “we have not fully developed an understanding of how career trajectories are influenced by the fate of the employer—where [those] trajectories are embedded” (Phillips, 2001: 1060). But research has been moving in this direction. Scholars have made important strides in understanding how firms’ economic situations affect individual careers through the expansion and contraction of job opportunities (Haveman and Cohen, 1994; Haveman, Broschak, and Cohen, 2009).

Beyond the creation and destruction of jobs, however, the economic situation of a firm can also profoundly influence the skills, habits, and routines that organization members, particularly newcomers, learn. Newcomers even in the same organization may face very different challenges and opportunities depending on the economic conditions they encounter upon arrival. Some undergo socialization in a time of organizational prosperity, when high-prestige assignments (Briscoe and Kellogg, 2011) and rewards abound; others arrive at a time when such resources are scarce. Such variation is a fundamental aspect of organizational life, but its effect on subsequent job performance presents a puzzle.

On the one hand, it is intuitive to expect a positive relationship between the level of organizational munificence during socialization and subsequent work performance. For example, while newcomers in a time of organizational prosperity enjoy easy access to skill- and reputation-building work assignments (Gibbons and Waldman, 2006; Briscoe and Kellogg, 2011), cohorts that enter in a period of scarcity may face a dearth of such opportunities and suffer a lasting handicap as a result. On the other hand, resource-poor periods of socialization might induce individuals to develop adaptive, resilient responses to scarcity and the associated competition and uncertainty. Thus early scarcity might actually foster subsequent advantage because, by responding to unfavorable conditions during the critical part of their socialization, individuals may acquire an ability to make successful future adjustments (Elder, 1974; Sutcliffe and Vogus, 2003; see also Swaminathan, 1996).

This study offers a new perspective on this puzzle, expanding recent research on imprinting at the individual level (Higgins, 2006; McEvily, Jaffee, and Tortoriello, 2012; Marquis and Tilcsik, 2013) by focusing on what I call “imprint–environment fit”: the degree of congruence between the initial, formative context and subsequent conditions. Initial experiences are likely to leave a persistent imprint on newcomers’ skills, habits, and routines, and this imprint is formed in, and will be best suited to, a particular type of resource environment. When there is a high degree of fit between the early resource context and a subsequent one, this imprint is likely to be compatible with environmental demands, thus enhancing performance. But when formative experiences and the subsequent resource context are incongruent, performance may suffer.

A critical question then is whether a person’s formative experiences tend to lead to high or low imprint–environment fit in subsequent periods. If, for example, extremely resource-rich and extremely resource-poor periods that radically deviate from the organization’s mean are infrequent, then individuals socialized

in such times will carry an imprint that leads to low imprint–environment fit in most subsequent periods. This may result in a “curse of extremes”: relative to individuals who entered at medium levels of munificence, both those who entered in times of scarcity and those who arrived in highly prosperous periods may have lower average performance over time. What underlies this “curse” is the effect of imprint–environment fit on performance.

The relationship between imprint–environment fit and performance, however, might not be uniform across all individuals because the strength of imprinting that occurs during socialization is likely to be contingent on the amount of prior work experience, as well as the influence of secondhand imprinting: the effect of imprints carried by one’s initial coworkers. Secondhand imprinting implies that, because of the social transmission of imprints, individuals may be influenced not only by their own histories but also by organizational conditions that existed even before their careers began.

I explore these ideas using a longitudinal dataset that spans nearly 15 years and includes two measures of job performance for 131 employees in two professional service firms. To account for selection issues, such as the possibility that different types of employees are hired in different resource periods, I examine the relationship between imprint–environment fit and performance with individual fixed effects, thus controlling for observed and unobserved heterogeneity that existed in individuals’ skills, experiences, and other characteristics at the time of hire. I supplement this analysis with 44 semi-structured interviews, which illustrate potential mechanisms at work.

## RESOURCE IMPRINTING AND PERFORMANCE

### Imprinting

The concept of imprinting first emerged in research on animal behavior (Lorenz, 1935), based on the observation that “early experience has . . . proved to exert a crucial and permanent influence in a variety of [behavioral] phenomena” (Immelmann, 1975: 16). Biologists have stressed that imprinting occurs during a limited period of time, known as the “sensitive period,” and that the influence of imprinted experience is lasting. Stinchcombe (1965) introduced the notion of imprinting to organizational theory, stimulating a line of research on how founding conditions affect subsequent organizational outcomes (Johnson, 2007; Marquis and Tilcsik, 2013). Recent research on imprinting has moved beyond the organizational level, exploring the persistent influence of initial conditions at the level of interfirm networks (Marquis, 2003), functional positions within organizations (Burton and Beckman, 2007), and individuals (Higgins, 2006).

At the individual level, imprinting research suggests that the conditions experienced in the early years of organizational tenure or a career exert a lasting influence on subsequent habits, routines, and behaviors. Imprinting has been documented in a variety of settings. For example, the characteristics of coworkers early in the career shape mutual fund managers’ entrepreneurial choices for years to come (Kacperczyk, 2009), and early professional training imprints a set of norms on scientists, which affects their adoption of organizational practices at later career stages (Bercovitz and Feldman, 2008). Similarly, lawyers who are socialized in firms in which female leadership is the norm are

subsequently more likely to create progeny organizations that promote women into partnership positions (Phillips, 2005), and young lawyers' early-career exposure to experienced mentors has a lasting effect on the type of practical knowledge that they acquire and subsequently utilize when they themselves become partners (McEvily, Jaffee, and Tortoriello, 2012).

The key underlying mechanism is that, during periods of organizational and professional socialization, "individuals are particularly susceptible to influence . . . because of the great uncertainty regarding role requirements" (Ashforth and Saks, 1996: 149). Because individuals are highly motivated to reduce such uncertainty, they become especially receptive to cues from the environment (Schein, 1971). Thus the first exposure to the practical aspects of a job or position is often highly formative. With limited prior experience in the position, people are not only more open to learning new skills but also "more receptive to learning . . . work routines and practices" (Briscoe and Kellogg, 2011: 295). Later, by contrast, people tend to be "less receptive to learning and, therefore, are not susceptible to imprinting" (McEvily, Jaffee, and Tortoriello, 2012: 552).

### Resource Imprinting

Imprinting theory (Marquis and Tilcsik, 2013) suggests that the economic conditions under which newcomers' socialization takes place have lasting effects. Prior research in this direction has tended to take a macro-level view, focusing on how early-career macroeconomic conditions affect subsequent behaviors. This work suggests, for example, that CEOs who started their careers during a recession tend to make more conservative decisions than those who had experienced a more favorable initial environment (Schoar, 2008). Similarly, stock market returns and inflation rates experienced early in life are related to individual investors' risk tolerance even several decades later (Malmendier and Nagel, 2007). Although this line of work has focused on the macroeconomic context, it does suggest a link between economic conditions during formative periods and subsequent behavior.

Research on socialization also points to such a link. During socialization, "individuals learn the beliefs, values, orientations, behaviors, skills, and so forth necessary to fulfill their new roles and function effectively within an organization's milieu" (Ashforth and Saks, 1996: 149), but an organization's milieu and the behaviors it necessitates probably vary over time depending on resource conditions. The work environment in which individuals operate is significantly different in a time of organizational decline and scarcity than in periods of organizational prosperity and slack (Cameron, Kim, and Whetten, 1987; Schneider et al., 2003). Clearly, a period in which a firm's priority is to survive and restore short-term profitability will impose different demands on organization members than a period in which the primary task is to satisfy strong consumer demand and to allocate slack resources (Szilagy and Schweiger, 1984). For example, in periods that bring a multitude of prestigious work assignments, a primary challenge for individuals may be to perform complex, high-level tasks (Gibbons and Waldman, 2006). By contrast, in periods that are scarce in such assignments, a key challenge may stem from intrafirm competition because resource-poor times can "pit individuals in the organization against each other in competition for scarce organizational resources and opportunities" (March, 1991: 81).

Thus periods of organizational munificence and scarcity are likely to differ in (1) the types of situations and demands to which newcomers must adapt; (2) the kinds of critical incidents—formative events that shape perceptions of appropriate behaviors—that newcomers experience (Gundry and Rousseau, 1994); and (3) the behaviors that newcomers most frequently observe on the part of supervisors and peers (Reichers, 1987). Imprinting theory suggests that these formative experiences may have a lasting effect on employees' skills, habits, and behaviors at work. Taken together, these arguments point to a process of resource imprinting, whereby the economic situation of a firm during newcomers' socialization can persistently influence individuals' behaviors throughout their tenure. The term "resource imprinting" emphasizes that the source of the imprint is the resource context that newcomers experience, different from mentor imprinting (McEvily, Jaffee, and Tortoriello, 2012) or professional imprinting (Bercovitz and Feldman, 2008), which are due to the influence of mentors and professional training.

### **Imprint–environment Fit and Performance**

Resource imprinting may have implications for individual performance. In general, an "imprint can be perfectly suited to one type of [context], while clashing irrecoverably with another" (Higgins, 2006: 4). Thus in considering the performance implications of resource imprinting, the critical variable is imprint–environment fit—the extent to which skills, habits, and routines that were formed in the initial context fit the demands of subsequent contexts. This idea resonates with the literature on person–environment fit, which suggests that a central issue in understanding individual performance is the degree of congruence between the characteristics of a person and the demands of the environment (McGrath, 1976; Chatman, 1991; Edwards, 2008). Imprint–environment fit is a specific type of person–environment fit; it refers to compatibility between an individual's imprinted experience and the present context.

One source of imprint–environment fit is similarity between the formative environment and the current environment. When the current and the formative resource contexts are similar, the focal individual is likely to have some skills, habits, and routines that suit environmental demands and thus contribute to performance. In particular, imprinted experiences involving work activities similar to those necessary in a subsequent period "should provide portable experience in that they impart knowledge and skill that a worker can transfer and apply" to the present situation (Dokko, Wilk, and Rothbard, 2009: 53). Similarity between formative and current conditions also enables people to draw on personal tactics that helped them adjust to work situations during their socialization (Beyer and Hannah, 2002). Moreover, when present and formative conditions are similar, individuals need to exert less cognitive effort to adjust to environmental demands than when contextual conditions are either unfamiliar (Beyer and Hannah, 2002) or only familiar from periods during which the individual was less receptive to learning (McEvily, Jaffee, and Tortoriello, 2012). If the current context is substantially different from the formative environment, imprinted habits, routines, and problem-solving schemas may even become counterproductive, because these cognitive and behavioral rigidities can "act as baggage, weighing down [individuals'] responsiveness or ability to reflect in the new situation" (Dokko, Wilk, and Rothbard, 2009: 54).

Given that resource conditions represent an important aspect of both newcomers' socialization and the subsequent work context, these arguments suggest that imprints formed in the initial resource context enable or constrain performance in the present, depending on current resource conditions. All else equal, imprint–environment fit due to similarity between the current resource context and the resource environment during organizational socialization should contribute to performance. In turn, imprint–environment misfit due to dissimilarity between these contexts will detract from performance. These arguments suggest a hypothesis about within-individual performance variation over time:

**Hypothesis 1 (H1):** There is a positive (or negative) relationship between imprint–environment fit (or misfit) and job performance: the more similar (or dissimilar) the level of organizational munificence at time  $t$  to the level of organizational munificence during an individual's socialization as a newcomer, the higher (or lower) the level of job performance at  $t$ .

### The Contingent Effect of Imprint–environment Fit

The mechanism that underlies H1 is learning: individuals learn skills, habits, and routines during the initial period, and the effects of this learning persist. This suggests that the relationship in H1 is contingent on the extent of learning that takes place during socialization. If strong and extensive learning occurs, the resulting imprint will be deep, and its consequences will be especially powerful in subsequent periods: imprint–environment fit will be particularly advantageous, and imprint–environment misfit will be particularly burdensome. By contrast, if the initial learning creates a relatively weak imprint, the relationship described in H1 should also be weaker. Two factors are likely to affect the extent and strength of learning during the initial period: (1) the amount of prior work experience, which affects a newcomer's receptivity to learning, and (2) the extent to which the effect of resource conditions on a newcomer's learning is reinforced by the social influence of his or her initial, immediate coworkers. While the first factor affects a newcomer's openness to learning, the second captures the strength of learning due to the consistency of different formative influences.

**Prior experience.** A major factor that affects the extent of learning that occurs during organizational socialization is prior work experience. Individuals whose entry into an organization also represents the beginning of their career are particularly open to environmental influences and are, as a result, especially susceptible to imprinting (Hall, 2004). As McEvily and his colleagues (2012) noted, people at an early career stage are highly receptive to on-the-job learning, which renders them particularly "imprintable." By contrast, those who enter a firm at a later career stage bring with them a more well-formed cognitive and behavioral repertoire from prior jobs (Dokko, Wilk, and Rothbard, 2009) and are consequently "less receptive to learning and, therefore, are not [as] susceptible to imprinting" (McEvily, Jaffee, and Tortoriello, 2012: 552). Thus, although no newcomer is an entirely blank slate, those with prior work experience represent a much fuller slate than those who are at the start of their careers. Hence I expect prior work experience to reduce the strength of imprinting during socialization and, as a result, weaken the relationship in H1.

**Hypothesis 2 (H2):** Prior work experience will weaken the relationship between imprint–environment fit (or misfit) and job performance.

**Secondhand imprinting.** Even among newcomers with similar levels of prior experience, there may be important variation in the strength of initial learning that occurs, depending on the consistency of the environmental influences that they encounter during socialization. In general, if different sources of environmental influence on an individual are consistent and mutually reinforcing, the learning that results from them is likely to be particularly strong. By contrast, when different socialization experiences are inconsistent, they are more likely to weaken each other's effects and hinder the formation of a strong imprint.

An important source of influence on newcomers, in addition to the resource context, is the behavior of more experienced organization members with whom they interact (Wanous, 1992). With the above argument, this suggests that imprinting may be especially strong if the influence of the initial economic conditions is reinforced by the behaviors exhibited by those more experienced coworkers to whom the focal newcomer is exposed. Thus an organization's economic conditions should leave a particularly deep imprint on a newcomer if the experienced coworkers who initially surround him or her were also socialized under similar resource conditions, for example, if a newcomer enters an organization in a period of scarcity *and* is initially assigned to work with colleagues who were also socialized in and carry the imprint of a resource-poor period. In such cases, the newcomer's own direct experiences are consistent with, and hence reinforced by, the formative experiences that shape the behavior of veteran coworkers. Similarity between the initial economic conditions directly experienced by the focal newcomer and the formative experiences of immediate veteran coworkers should lead to the formation of a stronger imprint and hence strengthen the relationship captured in H1. This hypothesis points to a process of secondhand imprinting, whereby one's behavior is influenced by others' formative experiences, and suggests that secondhand imprinting will affect the strength of direct (firsthand) imprinting.

**Hypothesis 3 (H3):** Similarity between the level of organizational munificence directly experienced by the focal newcomer and that experienced by his or her initial, immediate coworkers will strengthen the subsequent relationship between imprint–environment fit (or misfit) and performance.

### Implications: A Curse of Extremes

The central goal of this study was to unpack within-individual performance variation due to imprint–environment fit (H1) and the contingent factors that shape this relationship (H2, H3). It is also instructive to understand the implications of these ideas for the puzzle concerning the relationship between initial munificence and subsequent performance. The argument thus far has focused on imprint–environment fit and has not directly revealed whether it is early munificence or early scarcity that is associated with subsequent performance advantage—a question about between-individual performance variation.

H1 contains the seeds of an answer. It suggests that a key question to ask is whether, on average, the focal individual will tend to experience fit or misfit



between his or her formative experiences and subsequent resource conditions. This implies that what matters for average subsequent performance is not the prosperity of the formative environment per se but its typicality. Is it a typical, regularly recurring type of resource context over the focal individual's tenure or an exceptional one? In the former case, the individual will frequently encounter a resource environment that is congruent with his or her formative experiences; in the latter case, such congruence will be the exception rather than the rule. Thus an individual's average performance over his or her tenure at an organization will tend to be higher in the former case than in the latter.

Of course, the specific prediction implied by this argument depends on how resource abundance varies over an individual's tenure within the relevant organization. While the precise nature of this variation is by no means uniform across organizations and individuals, it is useful to consider the implications of a plausibly common pattern. In many organizational contexts, there are likely to be some moderately strong fluctuations in the level of munificence over time, but radical deviations from the organization's mean—extreme peaks and valleys—probably occur less frequently than do more moderate ups and downs.

If this is the case over the focal individual's tenure, then the above arguments imply that both very high and very low initial munificence might be associated with relatively low subsequent average performance. This relationship arises because, given the infrequency of extreme peaks and valleys, individuals socialized in periods of exceptional prosperity or exceptional scarcity will carry an imprint that more often leads to misfit than to fit between their formative experiences and the current environment. By contrast, those who entered in a moderately munificent period will continue to face similar conditions in most subsequent years; thus these individuals will carry an imprint that is more often congruent with subsequent conditions.

In other words, one potential implication of H1 is a curse of extremes: relative to individuals who entered at medium levels of munificence, those who arrived in periods of either high prosperity or great scarcity may have lower average performance during their tenure in the organization. This effect is not an inherent characteristic of the phenomenon at hand; rather, it emerges—under some assumptions about the nature of variation in resource abundance over time—because of the relationship between imprint–environment fit and performance. My supplementary analyses, therefore, explore whether the above-mentioned assumptions about the nature of resource fluctuations hold in the present empirical context and, if so, examine whether a curse of extremes is observable due to the effect of imprint–environment fit on performance.

Thus I test whether extreme levels of initial resource abundance have a negative relationship to subsequent average performance and whether imprint–environment fit mediates this relationship. An alternative argument for such a relationship is that both “a history of no adversity and a history of high adversity . . . promote less mastery and toughness than low adversity” (Seery, Holman, and Silver, 2010: 1027). This argument, however, suggests distinct empirical patterns. First, it does not predict that imprint–environment fit (and, more generally, subsequent conditions) will have an effect. Second, while I argue that the negative association between the extremeness of initial conditions and subsequent performance is due to imprint–environment fit and thus expect this association to disappear when imprint–environment fit is controlled, this



alternative view suggests no such prediction. Third, I expect individuals socialized under extreme resource conditions to enjoy a performance premium when operating in similar contexts subsequently, rather than exhibiting “less mastery” throughout their tenure.

## METHODS

### Research Setting and Sample

I tested the hypotheses using personnel data on professional employees in two Central European information technology (IT) services firms, which I call “AlphaCo” and “BetaTech.” Both firms were privately owned, independent, and focused on the development of custom IT solutions and professional services, including maintenance and consulting. AlphaCo and BetaTech offered a suitable context for this study because both firms maintained temporally consistent personnel databases over a relatively long period, which made it possible to track individuals’ performance year after year. The firms also provided access to interviewees, allowing me to complement quantitative analyses with qualitative data. Moreover, studying two firms facilitated the immediate replication of analyses beyond a single setting.

AlphaCo and BetaTech served a mix of corporate, public sector, and nonprofit clients and used project-based teams as their primary work units. Both firms staffed their project teams with employees (associates) who held degrees in computer science or related fields. Associates often entered as recent graduates and were not subject to an up-or-out promotion policy. Many remained at their firm for over a decade, with some promoted to senior associate after several years. Senior associates worked together with associates on projects but were often assigned more complex technical tasks. At both firms, managers and partners (rather than associates and senior associates) were responsible for bringing in new projects and providing strategic planning.

Using archival personnel data, I tracked the performance of all 131 associates and senior associates who entered AlphaCo between 1995 and 2009 or BetaTech between 1997 and 2010. Prior to 1995 (AlphaCo) and 1997 (BetaTech), personnel records were incomplete. Thus I focused on employees hired subsequent to these years, and all individuals entered the sample after the beginning of the observation period. I measured job performance continuously from the time of hiring, and hence no one in the sample had left-truncated records. This approach yielded 859 individual-year observations.

In the main analysis, I related resource conditions in the first year of organizational membership to subsequent job performance. Treating the first year of tenure as the critical period for socialization and imprinting is consistent with much prior research (Higgins, 2006; Kacperczyk, 2009; Briscoe and Kellogg, 2011). Thus I did not include performance observations from the first year. The sample of performance observations after the first year totaled 729 individual-years (394 at AlphaCo; 335 at BetaTech).

### Empirical Challenges

In an ideal experiment, workers would be randomly assigned to initial resource conditions. That is, with munificence varying over time, a firm would randomly select new workers to hire from the pool of candidates (which would not

systematically change over time) in each period. Then, within each individual's tenure after the first year, we would examine whether similarity between resource conditions experienced in the first year at the firm and those in year  $t$  is related to performance in  $t$ . Ideally, we would also observe workers in all time periods after they are hired, without attrition. In reality, of course, workers are not randomly assigned to initial conditions, and there is attrition. Both issues require attention.

With regard to non-random assignment to initial conditions, the primary threat is that employees' pre-hire characteristics might vary depending on organizational conditions anticipated to prevail in their first year. The quality of new workers, for example, might differ between resource-rich and resource-poor periods as a result of between-period differences in the selection of new employees and in individuals' attraction to a given firm.

To address this issue, I first examined whether new employees systematically differed on observable human capital indicators by time-of-hire organizational munificence. Three-group comparisons of means using one-way ANOVA (available upon request) could not reject the null hypothesis that the mean level of full-time experience, prior internship at the focal firm, education, and first-year performance ratings were equal for cohorts entering at high, medium, and low levels of munificence. Thus these analyses suggested that basic observable human capital indicators did not vary significantly by time-of-hire munificence.

At the same time, there might still be unobserved differences between cohorts entering in resource-rich and resource-poor periods. To account for this possibility, the main hypothesis-testing models included individual fixed effects. This approach is attractive because it controls for all observable and unobservable time-invariant heterogeneity across workers. Thus it controls for differences between workers that exist at the time of hiring, such as the nature of their skills, prior experiences, and other characteristics that they bring to the firm when they enter, including their career history up to that point. This approach also controls for time-invariant demographic and personality factors, like sex, age at hiring, and stable personality traits. With fixed effects, the models compare an individual's performance at different points in time (e.g., in years in which he or she experiences imprint–environment fit versus years when he or she does not); thus, consistent with my theory, stable between-individual differences are controlled, and the coefficients capture within-individual variation over time.

Individual fixed effects also help account for the possibility that employees might be hired based on fit with the firm's economic situation during the hiring period. In particular, the fixed-effects estimator controls for the time-invariant effects of individual factors that could play a role in selection, such as relevant prior experience at the time of hire and the stable aspects of potentially relevant personality factors and psychological tendencies, including resilience, response to stress, or ability to learn under pressure. For robustness, as explained in the description of the control variables below, I also used a control variable that tests for such selection more directly, and the results were robust to this control.

The second issue is attrition due to turnover. Although there was no up-or-out policy, and many workers stayed in a firm for the entire observation period, some exited earlier (or entered later) than others. Thus these data represent an unbalanced panel in which the number of observations varies across individuals. This may be problematic if attrition is correlated with unobserved factors that

affect both performance and the independent variables. The use of individual fixed effects, however, significantly mitigates this problem because it controls for all (including unobserved) time-invariant differences in turnover propensity. Although some workers may have a greater fixed propensity to exit than others (e.g., because of stable personality factors, underlying abilities, or outside options), and this propensity may correlate with the independent variables, the fixed effects control for stable differences in the propensity to leave. As a result, the fixed effects also control for whether an individual was observed in all time periods or only some of them (see Wooldridge, 2002), thus accounting for any performance differences that might exist between individuals who were in the sample during the entire observation period and those who were not.

As an additional safeguard, I conducted a series of attrition bias tests recommended by Wooldridge (2002) and Nijman and Verbeek (1992) for unbalanced panels. As Wooldridge (2002) noted, attrition in a fixed-effects context presents a problem only if exiting the sample is systematically related to the error term in the regression equation, and thus any test for attrition bias should focus on this issue. A straightforward test involves adding to the models a lead selection indicator (i.e., a dummy variable set to 1 in year  $t$  if the individual exited the sample in year  $t + 1$ ). For those who did not exit, this indicator is always zero, but for those who exited, it changes from zero to 1 in the year just before attrition (Nijman and Verbeek, 1992; Wooldridge, 2002). Because the error term should be uncorrelated with exit in the next period, the selection indicator should not be significant in the regression equation. This was the case for the models used to test the hypotheses: the coefficient on the selection indicator was statistically insignificant ( $p > .25$  for all models), providing no evidence for bias due to attrition. Finally, the data show that only 3.85 percent of all exits occurred before workers completed at least two full years at the focal firm. Thus there were very few exits during the first year and in the following 12 months, providing little evidence that workers departed in significant numbers based on their experience in the first year.

### Dependent Variables

One dependent variable was the employee's annual performance review rating by his or her supervisor. At both firms, managers noted that annual ratings were an important local metric and that supervisors were instructed to rate employees based on the quality and quantity of their contributions to finished projects since their last annual review. Using standardized forms, supervisors rated annual performance on several dimensions (e.g., employee effectiveness in technical problem solving, programming, and teamwork) and then submitted an overall rating that distilled their perception of performance during the year into a single score. At AlphaCo, raters used six categories (from "poor" to "excellent") and could assign half-ratings. At BetaTech, the scale went from 1 to 10, without fractions. The highest and lowest ratings were used rarely. In both firms, annual ratings were submitted in the early fall. My time-variant independent variables in turn referred to the previous 12 months. Thus the independent variables temporally preceded the ratings. The correlation between a person's rating in year  $t$  and in  $t - 1$  was above .60 in both firms, which is consistent with prior work on performance ratings in high-complexity jobs (Sturman, Cheramie, and Cashen, 2005). Thus, consistent with prior studies,

the ratings were relatively stable over time but also showed some non-trivial temporal variation, making it possible to estimate fixed-effects models. At the same time, aggregate patterns of ratings (e.g., the mean and variance of ratings within each firm) were not significantly different between resource-rich and resource-poor periods.<sup>1</sup> This is consistent with my informants' observation that managers rated associates and senior associates based on their specific contributions to given projects, rather than the amount of project work that the firm, i.e., partners and senior managers, sold in a particular period.

A second performance indicator captured an individual's contributions to the firm's knowledge management system—"a set of formal procedures and mechanisms that capture information on innovations and best practices throughout the organization," which is often a "central database through which new products or services, work methods, and . . . knowledge are collected and transferred among members" (Gibson and Vermeulen, 2003: 216). In this context, the knowledge management system was an electronic database into which employees uploaded various software artifacts and solutions. I obtained data on the number of times that these pieces of codified knowledge were downloaded. I then constructed a count measure of the subsequent downloads of the solutions that an employee uploaded into the knowledge management system in year  $t$ . Thus this variable captured the extent to which the contributions that an individual made in year  $t$  had a subsequent impact in the firm—a proxy for an individual's knowledge management productivity in year  $t$ . Given my hypotheses, this variable is plausibly related to imprint–environment fit; for example, as noted above, when imprint–environment fit is high, individuals need to exert less cognitive effort to adjust to environmental demands, which might free up cognitive capacity for developing and sharing knowledge contributions. In the main analyses, I used a count variable that captured how many times the codes that a person uploaded onto the knowledge management system in year  $t$  were downloaded in years  $t$ ,  $t + 1$ , and  $t + 2$ . This definition reflects the fact that the majority of uploaded codes generated few downloads beyond year  $t + 2$ . These data were available from 2002 at AlphaCo and 2001 at BetaTech.

## Independent Variables

The variables I used to model imprint–environment fit were based on annual indicators of organizational munificence. I began the construction of these indicators through informal discussions with associates, senior associates, and managers about the periods during their tenure that stood out as particularly favorable or unfavorable for their firm. Nearly all informants indicated that the defining factor in this regard was the amount of project work that their firm sold

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<sup>1</sup> As explained below, I measured resource abundance as the total number of billed hours in year  $t$  divided by the number of associates employed at the beginning of year  $t$ . At both firms, one-way ANOVA showed that the mean performance rating was not significantly different between abundant years (i.e., when resource abundance was more than 1 S.D. above the mean), scarce years (i.e., when resource abundance was more than 1 S.D. below the mean), and moderate years (i.e., when resource abundance was within 1 S.D. of the mean). Moreover, Bartlett's test for equal variances could not reject the hypotheses that the variances in ratings were homogeneous across these periods ( $\chi^2 = .868$  at AlphaCo,  $\chi^2 = 2.021$  at BetaTech). OLS regressions also indicated that current resource abundance had no significant main effect on ratings at either AlphaCo ( $b = -.04$ ,  $p = .41$ ) or BetaTech ( $b = -.02$ ,  $p = .85$ ).

in a given year, which in turn depended largely on conditions in the firm's niche markets, especially fluctuations in large clients' demand for specialized services. Because of these frequent external fluctuations, and because client contracts were sold by partners and senior managers, the employees in the sample had little influence on the amount of project work sold. They consistently noted, however, that they were affected by that amount in their daily work. Associates described good years as those that brought larger client contracts and more billable project hours, reporting that in such periods they worked on more important assignments and enjoyed the trickle-down effect of slack financial resources in the form of bonuses or technology upgrades. By contrast, bad years saw lengthy periods of "bench time" between contracts, less interesting projects, and more internal austerity.<sup>2</sup>

Accordingly, I created two measures of organizational munificence in year  $t$ : (1) total number of billed hours in year  $t$  divided by the number of regular and senior associates employed at the beginning of year  $t$ ; and (2) inflation-adjusted firm revenue in year  $t$  divided by the number of regular and senior associates employed at the beginning of year  $t$ . Per-capita measures were used to account for changes in firm size over time. The peaks and valleys in these variables were highly consistent with interviewees' identification of years as economically "good" or "bad" for the firm. The main analyses used the first measure; the second variable led to substantively similar conclusions. To protect confidentiality and ease the interpretation of results, this measure and the additional variables derived from it were standardized within each firm.

To test the hypotheses, I used two independent variables to capture the level and direction of imprint–environment misfit. To construct these variables, I first calculated the absolute degree of dissimilarity between initial and current resource abundance (i.e., the level of imprint–environment misfit regardless of its direction):

$$m_{i,t} = |a_{i,t} - a_{i,1}|,$$

where  $m_{i,t}$  is the absolute level of imprint–environment misfit for individual  $i$  at time  $t$ ;  $a_{i,t}$  is the level of resource abundance at time  $t$ ; and  $a_{i,1}$  is the level of resource abundance in the first year. Then, to capture the misfit direction, I created two variables. The variable *positive misfit* took the absolute value of misfit if current munificence exceeded initial munificence, and was set to zero otherwise. The variable *negative misfit* took the absolute value of misfit if current munificence was below initial munificence, and was set to zero otherwise. Both variables were standardized.

### Moderator Variables

Personnel records provided data on the amount of full-time *prior experience* in years (H2). I created a measure of similarity between initial resource abundance in the focal individual's first year and the resource imprints of his or her initial veteran coworkers (H3) in three steps. First, I gathered data on working

<sup>2</sup> For a discussion of "bench time" among IT specialists, see Evans, Kunda, and Barley (2004). The independent contract workers they interviewed, like the full-time, permanent employees in my study, saw unscheduled "bench time" as a major problem and a source of insecurity and hoped to avoid it as much as possible.

relationships among employees using project billing records. Second, I calculated the average level of resource abundance experienced by the focal individual's veteran coworkers in *their* first year, weighted by the number of hours that these coworkers co-billed to projects with the focal newcomer during his or her first year. This weighted average represented the resource imprints carried by those veteran coworkers to whom the focal employee was exposed in the first year. Third, I calculated the reverse of the absolute difference between this weighted average and resource abundance in the focal individual's first year. The resulting variable measured similarity between initial resource conditions personally experienced by a newcomer and initial resource conditions that had been imprinted on his or her veteran coworkers, thereby capturing the degree to which a person's own imprinted experience was reinforced by that of immediate veteran coworkers (*secondhand imprint reinforcement*).

### Controls

As noted above, the main hypothesis-testing models included individual fixed effects, which control for preexisting skills and characteristics, prior histories, and other stable differences across individuals. In addition, I controlled for several time-variant factors that might be related to both performance and current or past resource abundance: rank (*senior associate*), tenure (measured as full years completed by the beginning of year  $t$ ), and, to capture an individual's position in the intrafirm network of work relationships, *network constraint* (Burt, 1992). To create this variable, I constructed a sociomatrix for each year in each firm. Each matrix entry  $X_{ij}$  represented the number of weeks that an associate in row  $i$  worked on a project with an associate in column  $j$ .

Finally, because individual fixed effects controlled for stable differences among newcomers, they helped account for the possibility that employees may be selected based on fit with the firm's economic situation during the recruitment period. In particular, the fixed effects control for heterogeneity due to selection for fit based on time-invariant characteristics, such as preexisting skills, career histories, and stable personality factors. For robustness, however, I also used a control variable to address this issue. If selection for fit with the firm's economic situation during the recruitment period were at play, we should observe that performance in year  $t$  is negatively related to dissimilarity between munificence in  $t$  and munificence in the recruitment season during which the individual was hired (rather than the first year that he or she actually spent on the job). Thus I created the variable *dissimilarity from pre-hire period*, defined as the absolute value of the difference between (1) the level of munificence in  $t$  and (2) the level of munificence during the six-month period before an individual's start date, with the latter adjusted to account for its shorter time window. Finding support for the hypotheses net of this control would suggest a treatment effect due to first-year experience (as hypothesized), rather than a selection effect during the recruitment period.

### Qualitative Data

To illustrate the underlying mechanisms, I complemented the quantitative analyses with qualitative interviews. The purpose of these interviews was not to test hypotheses but, rather, to add some nuance to the analyses. I collected



qualitative data on two questions. First, how might associates' work-related skills, habits, or routines vary by the level of munificence experienced in their first year? Second, what are the performance implications of this potential variation? To build a sample, I contacted all associates and senior associates, as well as all project managers and human resources managers, at the two firms in 2010. Of the 105 individuals contacted, 44 agreed to an interview after several rounds of invitations. The sample included 29 associates or senior associates and 15 managers; 24 interviewees were from AlphaCo and 20 from BetaTech.

Interviews with associates focused on their preferred approaches to work and the challenges and successes they experienced in different assignments and time periods. To prevent priming interviewees for answers, I avoided references to resource conditions. When asking respondents about their experiences in different periods, I used "life grid" techniques (Berney and Blane, 1997), which use timelines of important personal and external events to induce the recall of information (Wilson et al., 2007). In interviews with managers, I presented interviewees with lists of employees who were grouped together on the basis of resource abundance in their first year. Without revealing how I constructed the groups, I asked managers about any behavioral patterns that they saw as typical of each group. I then asked them how the behaviors they mentioned might affect job performance. Interviews were tape-recorded and transcribed. I reviewed transcripts line by line to create initial codes and then reviewed these labels and grouped them into more abstract categories, moving from particular observations to more general labels. Next, using these codes, I created a series of role-ordered matrices (Miles and Huberman, 1994). A matrix in which "roles" (i.e., respondent types) corresponded to different levels of initial resource abundance was particularly useful because it revealed cross-cohort differences by the level of munificence experienced in the first year (see Tilcsik, 2010).

## RESULTS

Tables 1a and 1b display descriptive statistics and correlations. As expected, the tables show that the two performance variables were positively correlated with each other and were negatively correlated with imprint-environment misfit at both firms. The regression models, which appear in tables 2–4 below, examine the relationship of imprint–environment fit and performance net of other

**Table 1a. Descriptive Statistics and Pairwise Correlations for the Main Variables at AlphaCo**

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. Performance rating	4.31	.88											
2. Knowledge contributions	41.1	105.67	.15										
3. Negative misfit	0	1	-.07	-.06									
4. Positive misfit	0	1	-.17	-.08	-.47								
5. First-year resource abundance	0	1	.07	-.05	.64	-.59							
6. Current resource abundance	0	1	-.04	-.08	-.53	.69	-.03						
7. Prior experience	1.27	2.84	-.16	.15	-.06	.04	-.14	-.06					
8. Secondhand imprint reinforcement	0	1	.04	-.06	.06	-.13	.18	.00	-.08				
9. Tenure	5.27	3.49	.32	.15	-.13	.02	-.15	-.04	-.05	.11			
10. Senior associate	.19	.39	.30	.28	.03	-.10	.04	-.08	-.14	.11	.40		
11. Network constraint	.26	.14	-.10	.04	-.16	.09	-.10	.10	.05	.02	.07	-.01	
12. Dissimilarity from pre-hire period	0	1	-.07	-.08	.06	.15	.26	.35	.06	.03	-.19	-.14	-.07



**Table 1b. Descriptive Statistics and Pairwise Correlations for the Main Variables at BetaTech**

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1. Performance rating	6.43	1.99											
2. Knowledge contributions	70.64	67.78	.27										
3. Negative misfit	0	1	-.26	-.27									
4. Positive misfit	0	1	-.14	-.19	-.48								
5. First-year resource abundance	0	1	-.13	.12	.72	-.45							
6. Current resource abundance	0	1	-.01	.15	-.60	.81	-.13						
7. Prior experience	1.30	2.54	-.05	-.11	-.14	.20	-.28	.04					
8. Secondhand imprint reinforcement	0	1	.14	.29	-.14	.03	-.13	.03	-.12				
9. Tenure	4.64	3.27	.20	.67	-.15	-.05	.00	.07	.01	.23			
10. Senior associate	.21	.41	.26	.42	-.13	.03	-.05	.08	.13	.18	.65		
11. Network constraint	.30	.17	-.14	-.08	.13	-.09	.09	-.10	.01	-.02	-.05	.08	
12. Dissimilarity from pre-hire period	0	1	-.21	-.21	.03	.33	-.03	.34	.03	-.03	-.07	-.02	-.07

factors. Models and tables labeled with the letter “a” (e.g., model 1a) are based on the AlphaCo sample; those labeled with “b” pertain to the BetaTech sample. When the text mentions a model without a letter label, it refers to both versions of that model (e.g., “model 1” refers to both model 1a and model 1b).

### Imprint–environment Fit and Performance (H1)

I examined the relationship between imprint–environment misfit and performance by regressing performance indicators on the variables positive misfit and negative misfit.<sup>3</sup> In table 2, models 1 and 2 are ordered logit models predicting performance ratings. Because the ratings are ordinal, rather than continuous, ordered logit models were more appropriate than OLS. For these models, I estimated coefficients both by including indicator variables for each individual and by implementing, as a robustness check, a recently developed consistent estimator of the fixed-effects ordered logit model that is immune to small sample bias even in the case of very small samples (Baetschmann, Staub, and Winkelmann, 2011). Results were consistent across these methods.

Models 3 and 4 take a similar approach but use the impact of knowledge contributions as the dependent variable. Because this is a count variable that takes on only whole values and exhibits overdispersion, a negative binomial model was appropriate. These models included indicator variables for each individual, thus representing an unconditional estimation of a fixed-effects negative binomial model. This approach does not exhibit signs of incidental parameters bias and yields consistent estimates (Allison and Waterman, 2002). The results were also robust to fixed-effects Poisson models (Simcoe, 2008).

Consistent with H1, dissimilarity between current resource abundance and first-year resource abundance was negatively related to current performance. Thus imprint–environment fit had a positive relationship to performance, and imprint–environment misfit had a negative effect. In the ordered logit models (model 2), the negative coefficients on positive misfit and negative misfit imply

<sup>3</sup> For robustness, I also tested H1 using polynomial regressions, a common approach to studying the effects of fit in micro-organizational research (Edwards and Parry, 1993; Edwards 2007). Results from the polynomial models, available from the author on request, were consistent with the findings reported in table 2.

**Table 2. Imprint–environment Fit and Performance (H1)\***

Variable	AlphaCo				BetaTech			
	Ratings		Knowledge contributions		Ratings		Knowledge contributions	
	Model 1a	Model 2a	Model 3a	Model 4a	Model 1b	Model 2b	Model 3b	Model 4b
<i>Controls</i>								
Tenure	.30** (.04)	.29** (.04)	-.00 (.12)	-.06 (.13)	.03 (.05)	.02 (.05)	.22** (.04)	.17** (.03)
Senior associate	-.14 (.43)	-.20 (.43)	.26 (1.04)	.15 (.99)	.67 (.42)	.81 (.42)	-.37 (.22)	-.33 (.20)
Network constraint	-2.24** (.71)	-2.22** (.71)	-.54 (1.52)	2.31 (1.51)	-3.64** (.76)	-3.42** (.76)	-.73 (.41)	-.65 (.37)
Dissimilarity from pre-hire period	-.15 (.11)	.00 (.13)	-.13 (.32)	-.60 (.36)	-.51* (.23)	.01 (.14)	-.27** (.07)	-.22** (.07)
<i>Main independent variables</i>								
Negative misfit		-.24 (.14)		-1.22** (.38)		-1.31* (.57)		-.68** (.20)
Positive misfit		-.39* (.15)		-1.55** (.42)		-1.10* (.42)		-.20* (.09)
Constant			4.12** (1.42)	4.58** (1.59)			3.22** (.42)	3.56** (.39)
N	394	394	288	288	335	335	256	256
Log likelihood	-615.5	-611.3	-771.7	-761.2	-536.6	-505.4	-1223	-1203
$\chi^2$	281.9	290.3	145.5	166.4	307.6	370.1	227.7	268.7

\*  $p < .05$ ; \*\* $p < .01$ .

\* All models include individual fixed effects. Ancillary parameters are omitted from models 1 and 2 to conserve space.

that the lack of imprint–environment fit decreased the odds of being in a higher category of performance ratings. At AlphaCo, this effect was statistically significant for positive misfit ( $p < .05$ ) and marginally significant for negative misfit ( $p < .10$ ). At BetaTech, it was significant for both positive and negative misfit. The negative binomial regressions (model 4) provided further evidence for this effect, as the predicted number of downloads of knowledge contributions made in year  $t$  was significantly lower when current and first-year munificence were dissimilar.<sup>4</sup>

The size of these effects was substantively important. For example, margins calculations after fitting model 2a show that the predicted probability of achieving a performance rating above 4 (out of 6) is approximately 50.5 percent for a hypothetical AlphaCo employee at the mean value of all covariates in the model. But when the current resource context does not differ from the imprinted resource context in either direction, the predicted probability of receiving such a high rating rises to nearly 60 percent, and when the current resource context differs substantially from the imprinted resource context (specifically, when misfit is

<sup>4</sup> When estimated without individual fixed effects, the models in table 2 lead to the same conclusions with regard to the hypotheses. The main difference is that the coefficients on the misfit variables are somewhat smaller in magnitude in the models with fixed effects than those without fixed effects. Suggests that the fixed effects might capture the (relatively minor) influence of some unobserved correlates of the key independent variables.

one standard deviation above its mean in either direction), the predicted probability of receiving such a high rating falls below 50 percent. Margins calculations for BetaTech indicated effects of a similar magnitude.

One interesting question is whether it matters that one experiences misfit because of a move from prosperity to scarcity or vice versa. The coefficients for positive misfit and negative misfit in models 2 and 4 provide direct insight into this question. In all but one case across the two firms and the two dependent variables, the negative coefficients for these variables were significant at the .05 level, suggesting that imprint–environment misfit had a negative performance effect regardless of its direction. Of course, even if imprint–environment misfit hurts performance in both cases, the specific mechanisms whereby it does so might vary depending on the direction of dissimilarity. My qualitative data, discussed below, shed light on this possibility.

### Moderating Factors (H2 and H3)

Tables 3a and 3b present models testing H2 and H3. Models 5–6 and 8–9 include interaction terms for only one of the hypothesized moderating factors.

**Table 3a. Moderating Effects of Prior Experience and Secondhand Imprint Reinforcement at AlphaCo (H2 and H3)\***

Variable	Ratings			Knowledge Contributions		
	Model 5a	Model 6a	Model 7a	Model 8a	Model 9a	Model 10a
<i>Controls</i>						
Tenure	.30** (.04)	.27** (.04)	.28** (.04)	.07 (.13)	-.10 (.123)	.00 (.11)
Senior associate	-.19 (.43)	.03 (.44)	-.01 (.44)	-.26 (1.01)	.13 (.97)	-.03 (.93)
Network constraint	-2.24** (.71)	-2.14** (.71)	-2.19** (.71)	1.02 (1.50)	2.43 (1.58)	1.14 (1.36)
Dissimilarity from pre-hire period	-.09 (.13)	-.04 (.13)	-.09 (.13)	.58 (.36)	.49 (.35)	.21 (.33)
<i>Main independent variables</i>						
Negative misfit	-.42** (.150)	-.22 (.142)	-.43** (.153)	-1.70** (.442)	-1.57** (.456)	-2.12** (.485)
Positive misfit	-.39* (.162)	-.44** (.145)	-.49** (.163)	-2.85** (.612)	-1.99** (.529)	-5.41** (.894)
Prior experience × Negative misfit	.02* (.010)		.02* (.010)	.02 (.011)		.02 (.011)
Prior experience × Positive misfit	.00 (.00)		.00 (.00)	.03** (.01)		.03** (.01)
Secondhand imprint reinforcement × Negative misfit		-.05* (.02)	-.04* (.02)		-.07 (.05)	-.09 (.05)
Secondhand imprint reinforcement × Positive misfit		-.04** (.01)	-.04** (.01)		-.10** (.04)	-.15** (.05)
Constant				3.20* (1.60)	5.38** (1.70)	2.92 (1.70)
N	394	394	394	288	288	288
Log likelihood	-602.9	-601.7	-594.8	-752.6	-756.0	-734.0
$\chi^2$	307.0	309.5	323.2	183.6	176.8	220.8

\*  $p < .05$ ; \*\*  $p < .01$ .

\* Models 5–7 are ordered logit models. Models 8–10 are negative binomial models. All models include individual fixed effects. Ancillary parameters are omitted from models 5–7 to conserve space.

**Table 3b. Moderating Effects of Prior Experience and Secondhand Imprint Reinforcement at BetaTech (H2 and H3)\***

Variable	Ratings			Knowledge Contributions		
	Model 5b	Model 6b	Model 7b	Model 8b	Model 9b	Model 10b
<i>Controls</i>						
Tenure	.02 (.05)	.02 (.05)	.02 (.05)	.16** (.03)	.16** (.03)	.16** (.03)
Senior associate	.82* (.42)	.83* (.42)	.83* (.42)	-.33 (.20)	-.29 (.19)	-.30 (.19)
Network constraint	-3.28** (.77)	-3.39** (.76)	-3.28** (.77)	-.61 (.37)	-.61 (.36)	-.63 (.36)
Dissimilarity from pre-hire period	.06 (.14)	.03 (.14)	.06 (.14)	-.22** (.07)	-.19** (.07)	-.20** (.07)
<i>Main independent variables</i>						
Negative misfit	-1.56** (.43)	-1.34** (.38)	-1.56** (.42)	-.89** (.23)	-.71** (.20)	-.91** (.25)
Positive misfit	-1.37** (.33)	-1.12** (.39)	-1.34** (.32)	-.18* (.10)	-.12 (.07)	-.10 (.09)
Prior experience × Negative misfit	.01 (.01)		.01 (.01)	.006** (.002)		.007** (.002)
Prior experience × Positive misfit	.005** (.002)		.004* (.002)	.00 (.00)		.00 (.00)
Secondhand imprint reinforcement × Negative misfit		-.01 (.01)	-.00 (.01)		-.00 (.01)	-.00 (.01)
Secondhand imprint reinforcement × Positive misfit		-.01 (.01)	-.01 (.01)		-.01* (.004)	-.01* (.004)
Constant				3.69** (.40)	3.86** (.40)	3.68** (.40)
N	335	335	335	256	256	256
Log likelihood	-501.5	-503.8	-500.9	-1198	-1196	-1191
$\chi^2$	377.8	373.2	379.1	277.5	282.6	292.3

\*  $p < .05$ ; \*\*  $p < .01$ .

\* Models 5–7 are ordered logit models. Models 8–10 are negative binomial models. All models include individual fixed effects. Ancillary parameters are omitted from models 5–7 to conserve space.

Models 7 and 10 include both hypothesized moderators simultaneously. Because the variables prior experience and secondhand imprint reinforcement are time-invariant, the fixed-effects approach controls for them implicitly and automatically. Thus these main-effect elements were not explicitly entered into the fixed-effects models. As a robustness check, I reestimated all these models without fixed effects; in those alternative models, I was able to include prior experience and secondhand imprint reinforcement explicitly. The results remained similar.

At AlphaCo, the results were generally consistent with H2 and H3 (models 7a and 10a). The variable prior experience significantly weakened the effect of negative misfit on ratings and the effect of positive misfit on knowledge contributions (H2), while secondhand imprint reinforcement significantly strengthened the adverse influence of both positive and negative misfit on ratings and the adverse influence of positive misfit on knowledge contributions (H3). At BetaTech, although not all coefficients for the interactions were significant, they were all in the hypothesized direction, and three of them were significant:

prior experience significantly weakened the effect of positive misfit on performance ratings and the effect of negative misfit on knowledge contributions, while secondhand imprint reinforcement significantly strengthened the adverse influence of positive misfit on knowledge contributions (model 7b and 10b). Overall, these results are broadly consistent with the moderating influence of prior work experience and also suggest that secondhand imprinting might reinforce firsthand imprinting if their effects are consistent—and weaken it otherwise.

### Supplementary Analysis: A Curse of Extremes

As noted earlier, while the hypotheses focus on within-individual changes over time, H1 also has an implication for between-individual performance variation: the possibility that extreme (very high or very low) initial resource conditions are associated with relatively low subsequent average performance over an individual's tenure. One caveat is that this relationship is not an inherent feature of the phenomenon but simply a possible corollary of H1. If individuals socialized in a moderately prosperous period more frequently experience fit with subsequent contexts than those socialized in extreme periods, then an implication of H1 is that—relative to a moderate level of initial munificence—both very high and very low initial resource abundance may be associated with lower performance on average over a person's tenure.

This implication is likely to manifest itself at AlphaCo and BetaTech because, on average, imprint–environment fit was significantly higher for individuals who entered these firms at the mean level of abundance than those who entered at one standard deviation above or below the mean ( $p < .01$ ). Accordingly, as shown in the results in table 4 of a supplementary analysis, model 11 reveals a negative relationship between extreme levels of initial resource abundance and subsequent performance ratings. The key independent variables in this model are the indicators *top-quartile first-year resource abundance* (set to 1 if the level of first-year resource abundance experienced by the focal individual is in the top quartile of the distribution) and *bottom-quartile first-year resource abundance* (set to 1 if the level of first-year resource abundance is in the bottom quartile). With both these variables in the model, the middle two quartiles, between the 25th and 75th percentile, constitute the reference category.<sup>5</sup> At both AlphaCo and BetaTech, there is a significant negative coefficient on both the top-quartile indicator and the bottom-quartile indicator. These results are consistent with a curse of extremes: relative to moderate first-year resource conditions, both extremely resource-rich and extremely resource-poor first-year experiences were associated with lower average ratings subsequently. But when variables capturing the level of misfit between initial and current conditions were entered into the models, the observed relationship between extreme initial resource abundance and subsequent performance disappeared (model 12). This suggests that, as expected, the underlying driver of the curse

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<sup>5</sup> Because model 11 examines between-individual variation and focuses on a time-invariant independent variable, individual fixed effects could not be included. Instead, this model included time-invariant controls for first-year performance rating, pre-hire internship experience at the firm, sex, and the incoming cohort size when the focal individual was hired. Moreover, for BetaTech, I was able to control for the number of applications the firm received during the six months preceding the focal individual's hire.

**Table 4. Supplementary (between-individual) Analysis of Performance Ratings as a Function of First-year Resource Abundance\***

Variable	AlphaCo	BetaTech	AlphaCo	BetaTech
	Model 11a	Model 11b	Model 12a	Model 12b
<i>Controls</i>				
Tenure	.16** (.03)	-.04 (.04)	.16** (.03)	-.07 (.04)
Senior associate	.84** (.27)	1.27** (.33)	.80** (.27)	1.43** (.33)
Constraint	-1.86** (.66)	-2.55** (.63)	-1.95** (.65)	-2.61** (.62)
Dissimilarity from pre-hire period	-.04 (.10)	-.33** (.10)	.01 (.11)	-.10 (.12)
Female	-.53* (.26)	-.08 (.30)	-.55* (.26)	-.23 (.31)
Internship	.43 (.27)	.80* (.40)	.37 (.27)	.79* (.39)
First-year performance rating	.38** (.11)	.66** (.07)	.35** (.12)	.78** (.07)
Prior experience	-.07* (.03)	.15** (.05)	-.08* (.03)	.19** (.05)
Cohort size	-.02 (.16)	.01 (.05)	-.05 (.16)	.05 (.05)
Applications		-.00 (.00)		.00 (.00)
<i>Main independent variables</i>				
Top-quartile first-year resource abundance	-.92** (.29)	-1.49** (.40)	-.66 (.36)	-.56 (.43)
Bottom-quartile first-year resource abundance	-1.05** (.30)	-1.09* (.44)	-.62 (.32)	-.71 (.45)
Negative misfit			-.28* (.12)	-.98** (.14)
Positive misfit			-.32** (.12)	-.77** (.14)
Observations	394	335	394	335
Log likelihood	-699.0	-59.9	-693.8	-561.5
$\chi^2$	114.9	199.2	125.3	257.9

\*  $p < .05$ ; \*\*  $p < .01$ .

\* Ordered logit models. Standard errors (in parentheses) have been corrected for clustering on individual ID to account for the fact that the data contain more than one observation per employee. Ancillary parameters are omitted to conserve space.

of extremes observed in model 11 is the relationship between imprint-environment fit and performance.

### Qualitative Findings

The qualitative data suggested that associates socialized in times of abundance and those who arrived in less prosperous periods differed in their problem-solving schemas and their orientation toward clients. First, relative to associates who experienced initial scarcity, those who had experienced early munificence more frequently described themselves, and were described by

managers, as typically tackling new work tasks and situations through rapid information searching and a deductive application of existing solutions. As one of these associates explained, "There are only four or five types of projects, and once you figure out the type you are working with, you can figure out what you can reuse from prior projects. . . . and then you can deliver fast." These behaviors, in turn, appeared to foster an ability to complete complex tasks relatively quickly or, as the above respondent put it, to "get in, get it done, and get out as soon as possible."

A second tendency among associates who experienced initial munificence was an emphasis on the transactional, rather than relational, aspects of client interactions. This transactional orientation was apparent, for example, in one respondent's frustration over what he saw as a waste of time at the final stage of a project: "We finished the job and wrapped things up at [the client site] but we still stayed on to make [the client] feel good. That happens too often. Does [the installed product] work? Yes. Can they use it? Yes. Then there's no need to stay around patting each other on the back." As this excerpt illustrates, associates socialized in relatively prosperous periods often described their interaction with clients as a transaction centered on the efficient delivery of a service and assigned less importance to the relational aspects of these interactions.

Individuals who had been newcomers in resource-poor periods exhibited different patterns in both problem-solving strategies and client interactions. First, these individuals often emphasized that every project called for a unique solution rather than a recycled, "copy-and-paste solution." Thus these associates seemed to favor the inductive gathering of situation-specific information, which in turn implied a broader and slower search for solutions. Second, both by their own and their managers' accounts, these associates tended to assume a more relational orientation in their dealings with clients. As a senior associate at AlphaCo emphasized, "[Technical] issues can come up, but if there is a relationship [with the client], there's trust, and that should be nurtured, and I think that's the key to success. . . . If you talk regularly, you can make them see more possibilities and make sure they understand what you have done for them."

Managers' discussions of how the nature of work varied between prosperous and scarce periods provided some insight into how the above-described differences might emerge. Echoing a common theme, a BetaTech manager noted that in periods of scarcity—slow times with much downtime—there is "time to be a perfectionist and develop new things you don't have time for otherwise," and there is also a strong incentive "to talk [current clients] into doing more." By contrast, in busy periods with many billable hours and many complex projects, "finishing things is a priority because the rhythm of things is quite different when projects are pouring in."

This account suggests how performance implications might result from the observed differences across cohorts. For example, rapid information search, deductive exploitation of extant solutions, and a transactional client orientation might be advantageous in prosperous periods because these behaviors might help individuals tackle many tasks under time pressure. At the same time, managers noted that these same behaviors are maladaptive in other times. In more moderate periods—when time pressure is weaker and there is no clear benefit from exceptionally rapid task completion—a transactional orientation might



come across as lack of attention to client needs, and a narrow problem-solving approach might yield suboptimal results. As a BetaTech manager commented on a group of associates who had entered the firm in a highly prosperous period, "They are really very good but, except for a couple of them . . . not as good at projects with a lot of interaction, maybe not as attentive and patient. . . . If you don't have patience, if you don't think through a whole bunch of possibilities, you can't offer a real customized solution."

Likewise, with regard to those socialized in less prosperous periods, the qualitative data suggest both positive and negative performance implications. On one hand, during slow times, relational skills may be valuable in extending projects, and an inductive, exploratory approach can yield benefits. The following episode, described by an AlphaCo associate, provides an example:

We officially finished the project with [a client], but we started to work on an extension. . . . We didn't have many project contracts then. . . . We had time, and so we tried out some crazy solutions and wrote some very good, very creative code then. And we also kept talking to them. . . . We eventually sold them on the idea [of extending the project].

On the other hand, several managers noted that an inductive, exploratory approach might become a liability in fast-paced times. As a senior manager at AlphaCo explained,

When there is a decent amount of work, speed is important. . . . [Associates] need to push themselves to get things done fast, and they need to know when they have done enough. If the client just wants [an update] that works, that's not the time to experiment with a great overhaul. . . . We can't have people spend six weeks on a three-week project.

Although primarily illustrative rather than conclusive, these qualitative data shed some light on how the concepts of resource imprinting and imprint-environment fit might manifest themselves in this empirical context.

## DISCUSSION

This paper offers a new perspective on the intertwined fates of individuals and organizations, exploring how resource conditions upon organizational entry leave a lasting imprint on individuals and how that imprint affects subsequent performance. The results show that what matters for performance is not necessarily the level of initial munificence but, rather, the extent of fit between formative experiences and subsequent resource conditions. This relationship in turn is contingent on prior work experience and the resource imprints of one's initial coworkers, and it may, under some conditions, imply a curse of extremes.

These findings shed light on the phenomenon of resource imprinting, a potentially critical but unrecognized mechanism that shapes individual performance and links organizational success to individual attainment. As Phillips (2001: 1060) observed, there is "a void in our understanding of the relationship between organizational and career processes," particularly the relationship between an organization's economic situation and the trajectories of its

members. Although extant research has begun to fill this void (Haveman and Cohen, 1994; Dencker, 2009; Haveman, Broschak, and Cohen, 2009), it has focused on how the current economic situation of organizations affects individuals. The notion of resource imprinting, by contrast, highlights how past organizational conditions have a lingering effect on individual performance, thus suggesting a mechanism whereby the fate of an organization and that of its members are intertwined not only in the present but also across long stretches of time. Failure to account for this mechanism would lead to an incomplete view of how organizational context affects individual performance.

To examine the effects of resource imprinting, I introduced the concept of imprint–environment fit. Although there is increasing evidence that conditions experienced in the early period of organizational tenure might leave a lasting imprint on individuals' behaviors, little is known about the performance implications that result from such imprints. The concept of imprint–environment fit addresses this gap. It implies that, although the influence of an imprinted experience is persistent, its direction is not constant: the same imprint may exert a positive effect in one period and a negative effect in another. Thus while much research has emphasized the steady influence of imprints (e.g., Higgins, 2006; McEvily, Jaffee, and Tortoriello, 2012), I showed that the effects of imprints are actually time-variant, emerging from the interplay of past and present conditions.

This finding sheds new light on the temporal processes of individual attainment. To date, much research on this topic has focused on cumulative advantage, the process whereby small initial differences (typically within a cohort) become magnified over time, such that the initial advantage of one individual over another increases with time (DiPrete and Eirich, 2006). In this model, an early condition that causes initial relative disadvantage will continue to do so and, in fact, will become increasingly disadvantageous over time. Thus, as time passes, initial advantages and disadvantages grow. In contrast, the concept of imprint–environment fit illuminates how the effect of past conditions varies depending on the current context, such that the same set of initial conditions will have a positive effect in one period and a negative effect in another. Thus the consequences of initial conditions vary from period to period rather than simply becoming magnified over time.

At the same time, though fundamentally distinct, cumulative advantage and the influence of imprint–environment fit are not mutually exclusive mechanisms. The relationships described in this study do not preclude the possibility that relative initial advantages and disadvantages within a cohort persist and grow over time. For example, some individuals might have better technical skills than others in their cohort at the time of entry (controlled for with individual fixed effects in this study), which might create a relative and perhaps increasing advantage for them within the cohort. Yet, as this study shows, a cohort's resource imprint due to shared socialization experiences shapes performance even after accounting for individual heterogeneity.

One intriguing implication of resource imprints is a potential curse of extremes, whereby both very scarce and highly prosperous initial conditions are associated with lower average performance. A paradoxical aspect of this result is that economic conditions that are highly favorable at the organizational level at one point in time may be subsequently detrimental at the individual level. Thus this is a cross-level paradox, like Phillips' (2001) "promotion

paradox," whereby firms with favorable life chances (e.g., large, generalist, high-status firms) have low promotion rates due to their bargaining power vis-à-vis employees. But rather than highlighting the contemporaneous relationship between a firm's current characteristics and the promotion rates of its employees, I focused on the relationship between past conditions at a firm and individuals' subsequent performance, revealing a cross-level paradox across time periods rather than in a given period.

Beyond documenting the performance implications of resource imprinting, the results also illuminate how direct (or firsthand) imprinting is influenced by secondhand imprinting—the social transmission of imprints between individuals. Because secondhand imprinting affects how deeply direct environmental influences are imprinted, there is an interplay between firsthand and secondhand imprinting: a newcomer's own direct experience may be reinforced or contradicted by the formative experiences of socially proximate others. Thus secondhand imprinting constitutes a hitherto unrecognized way in which the past impinges on the present. Whereas firsthand imprinting involves the lasting influence of conditions at the time of socialization, secondhand imprinting originates even deeper in the past: if imprints are transmitted socially, individuals can be influenced by conditions that existed even before their careers began. Thus, although prior research has shown that the shadows of the past are long because imprinted experiences have long-term effects, the results of this study suggest that these shadows are even longer, reaching forward from still earlier times. Prior research on peer effects has shown that the characteristics of peers affect individual performance in the present, but it has focused on the contemporaneous influence of peers (Mas and Moretti, 2009; Bandiera, Barankay, and Rasul, 2010). Secondhand imprinting, by contrast, is a lingering effect of past exposure to peers, and it reflects the experience of peers that occurred even earlier.

The strong influence of the past, however, does not rule out possibilities for managerial intervention in the present, and future work might explore this issue in depth. The literature on person–organization fit (Chatman, 1991; Kristof, 1996) points to two avenues for potential intervention: through selection and through socialization. Even if powerful resource imprinting takes place during the first year on the job, it does not imply that selection has no role. For example, a firm might recruit and hire individuals based on fit with the relatively stable aspects of the organization (e.g., its longstanding culture, values, or climate, aspects of fit that are captured with individual fixed effects in this study) or try to select workers with a preexisting potential to adapt to volatility in the resource environment. Moreover, by actively structuring the socialization process, firms might diversify the experience of newcomers who arrive in extreme resource periods. In my setting, for example, discussions with managers suggested that in busy, high-demand years that bring many billable hours, one intervention might involve diversifying the experience of new associates by occasionally exposing them to slower, internal, early-stage development projects rather than socializing them only through a large number of high-time-pressure external projects, which typically characterize such periods. A field experiment on how changes to selection and socialization practices might affect the performance of subsequent cohorts could provide insight into the possibilities for effective managerial intervention.

Finally, the limitations of this study suggest at least two more avenues for future research. First, people increasingly build careers across organizational boundaries (Bidwell and Briscoe, 2010), while this study focused on intrafirm processes. Although I found that prior work experience in other organizations reduces the strength of imprinting that occurs in the focal organization, I could not directly relate resource conditions during socialization in one firm to subsequent performance in other firms. Thus the data at hand cannot conclusively establish whether the effects of imprinted experience remain restricted to a single firm or spill over to other firms as individuals change employers. The finding that newcomers with prior experience in other firms are less susceptible to imprinting suggests that, to a substantial degree, prior imprints might remain with individuals even as they move to another firm, and evidence from other studies also suggests that imprints formed in one organization shape subsequent behavior in other organizations (Higgins, 2006; Dokko, Wilk, and Rothbard, 2009). Future research, however, should specifically explore the extent to which resource imprints persist across firm boundaries.

Second, although I replicated the analyses beyond a single firm, both organizations were relatively small, young firms performing project-based work in a fast-changing industry. Thus an important next step would be to examine resource imprinting in other settings, including larger and more bureaucratic organizations (Briscoe, 2006, 2007). There is reason to believe that similar imprinting processes might occur in other contexts. For example, corporate executives who start their careers in a resource-poor period “observe how to manage cost cutting, deal with financial constraints and other methods that are valuable in downturns” (Schoar, 2008: 17). Similarly, mutual fund managers exposed to greater market risk early in their careers might develop different skills and habits than those who experienced less risk (Kacperczyk, 2009), and real estate agents who learned the trade in boom times (when the emphasis was on speed and on “picking low-hanging fruit”) may have dramatically different experiences than newcomers in leaner times, when knowledge of pricing and negotiation tactics is more salient (Kelley, 2006). The theory developed here suggests testable hypotheses about how such formative experiences affect individual performance in a range of settings. Understanding resource imprinting can shed light on how individuals are influenced both by their own histories and—as a result of secondhand imprinting—by organizational conditions that existed even before their own tenures or careers began.

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