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RESEARCH ARTICLE

A contingency perspective on imitation strategies: When is "benchmarking" ineffective?

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Abstract

Research Summary: Imitation is ubiquitous, yet the comparative efficacy of imitation strategies is poorly understood. A popular imitation strategy, sometimes called benchmarking, "mixes-and-matches" practices common to leading firms. Using computational models, we compare benchmarking with the "copy-the-best" imitation strategy of copying a subset of the best-performing firm's practices. We find that benchmarking is more effective in heterogeneous environments, where practices that are good for firms in one group (e.g., geographic submarket) may be bad for firms in another. Firms using mix-and-match tend to imitate practices of rivals within their group, less likely copying inappropriate practices from other groups. In homogeneous environments, however, the "copy-the-best" strategy is superior because firms are more likely to go beyond their group and copy novel good practices from rivals in other groups.

Managerial Summary: Mix-and-match imitation, popularly known as benchmarking, is believed to be an effective means of enhancing firm performance. The popular press is replete with how-to books for managers. However, our results suggest that this belief may be wrong under some industry conditions, in particular, where practices that are good for firms in one group (e.g., geographic submarket) are also good for firms in another. The efficacy of benchmarking is likely to be undermined by fads, fashions, and bandwagons that overemphasize practices common to leading firms. Our study highlights the possibility that, under these conditions, imitating common practices is prone to propagate bad practices and widespread practices may not always be good practices.

KEYWORDS

benchmarking, computational model, firm performance, imitation

1 | INTRODUCTION

The strategy literature has devoted substantial attention to imitation not only because imitation deterrence is central to competitive advantage (Caves & Porter, 1977; Lippman & Rumelt, 1982; Rumelt, Schendel, & Teece, 1991), but also because imitation is a frequently used approach to learning and a "prevalent road to business growth and profits" (Levitt, 1966, p. 63). Alchian (1950) and Nelson and Winter (1982) conceptualize imitation as a purposeful adaptive behavior in which successful firms are assumed to engage in practices that are superior to those of others, and other firms imitate them as a pathway to success. While a large body of research has examined why firms imitate each other (see Lieberman & Asaba, 2006 for a review), as Ethiraj and Zhu (2008) note, the performance implications of imitation have received less attention. Recently, strategy scholars have begun to address the efficacy of imitation (e.g., Csaszar & Siggelkow, 2010; Lenox, Rockart, & Lewin, 2006; Posen, Lee, & Yi, 2013; Posen & Martignoni, 2018; Rivkin, 2000), employing assumptions of bounded rationality and uncertainty. In this paper, we build on this burgeoning stream of research to examine the comparative efficacy of alternative imitation strategies.

Alchian (1950, p. 218) famously characterized one common imitation strategy as follows: "Whenever successful enterprises are observed, the elements common to those observable successes will be associated with success and copied by others in pursuit of profits or success." We call this the "mix-and-match" imitation strategy—a firm seeks to identify the practices and knowledge that are common to leading firms, then mixes and matches these practices as a means of enhancing its own performance. This imitation strategy, popularly called "benchmarking," may have first been formalized as an imitation strategy at Xerox in the late 1970s. In responding to the rapid emergence of rivals' new, low-cost alternatives to its copy machines, Xerox mixed and matched the practices of Canon, Fuji, and other Japanese rivals to improve firm performance. A plethora of books and articles in the practitioner literature have argued for the merits of the mix-and-match imitation strategy. While benchmarking is, among practitioners, generally believed to be an effective imitation strategy, there is little systematic research that underpins this belief.

In contrast, the strategy research literature has focused extensively on another type of imitation strategy, which we call "copy-the-best" imitation. It works as follows. An imitator identifies the best-performing firm among those directly observable and then copies a subset of the target firm's practices (e.g., Csaszar & Siggelkow, 2010; Ethiraj, Levinthal, & Roy, 2008; Lenox et al., 2006; Nelson & Winter, 1982; Posen et al., 2013; Posen & Martignoni, 2018; Rivkin, 2000). Although copy-the-best imitation is well established in the strategy literature, in reality, an imitator faces a large number of dimensions from which to choose, such as whom to observe, what practices and knowledge to evaluate, how to evaluate them, and so on. There are many potential strategies that a firm can employ in copying its rivals, and copy-the-best imitation is only one example among all possible combinations of choices along these dimensions.

Absent in strategy research is a systematic examination of the comparative efficacy of imitation strategies. Although practitioners tend to believe that benchmarking (i.e., mix-and-match imitation) is an effective means of enhancing firm performance, there may be critical contingencies under which mix-and-match imitation is inferior to copy-the-best imitation. Given the paucity of research on the efficacy of imitation strategies, however, we have no *ex ante* basis for determining whether this belief is correct or not. To fill this gap, we take an early step in developing a contingency theory of imitation by building computational models of the two archetypal imitation strategies described herein and examining their comparative efficacy.

We focus on two industry-level contingencies that may impact the efficacy of imitation strategies: observability structure and environmental heterogeneity. The observability structure of an industry encompasses *who can observe and imitate whom in an industry*. If a firm is not observable, its practices cannot be imitated. Traditionally, observability is assumed to take one of the following extreme forms: (a) all firms can observe all others or (b) firms can observe and imitate one another within the same group, but inter-group barriers block them from observing and imitating others in different groups (e.g., Caves & Porter, 1977; Cool & Schendel, 1987; Hunt, 1972; Lee, 2003). The environmental heterogeneity of an industry reflects the extent to which firms in different groups encounter different performance landscapes (Ghemawat, 2010; Ghemawat & Levinthal, 2008). When environmental heterogeneity is high, what is good for firms in one group is unlikely to be good for firms in another. Research in international business, for example, notes that sometimes differences across geographic markets persist, and thus, groups of firms in one market may face quite different demands than groups of firms operating in other markets (Bartlett & Ghoshal, 2002; Ghemawat, 2007).

Our computational results show how the comparative efficacy of these archetypal imitation strategies depends on these two contingencies. First, in homogeneous environments, the mix-and-match imitation strategy is inferior under two broad observability conditions. When all firms in an industry can observe all others globally, the efficacy of mix-and-match imitation can be undermined by the bandwagon process inherent in imitation dynamics, which tend to overemphasize practices common to superior firms—the more common a practice is among higher-performing firms, the more likely it is to be imitated. In this situation, choosing common practices can sometimes be misleading. This bandwagon process is error-prone in that bad practices may be propagated, and therefore, common practices may not always be good practices. Copy-the-best imitation is, by contrast, largely immune to this problem because it focuses imitation on the practices of the single best firm among those observable and copies a subset of those practices regardless of their commonality.

Mix-and-match imitation in homogeneous environments is also less effective if the industry consists of balkanized small groups of firms with imitation confined largely within each group. In such an observability setting, there is an additional problem for firms pursuing mix-and-match imitation—they tend to look inward toward rivals within their own groups. This tendency can lead to copying an ever narrower set of practices, which in turn limits the performance benefits of imitation. In contrast, even in this balkanized observability context, a firm pursuing the copy-the-best strategy is receptive to boundary-crossing imitation in that it may choose and copy the best observable firm, regardless of whether it is inside or outside the imitator's own group. This feature makes the copy-the-best strategy more effective if some good practices are only available across group boundaries.

Second, when there is substantial environmental heterogeneity, our results show that mix-and-match imitation (benchmarking) is more effective. Firms' imitation of others in different groups may lead to an influx of inappropriate practices, particularly when the practices that are good for firms in one group are bad for firms in another. Firms pursuing copy-the-best imitation are more prone to this kind of mistake. The virtue of the copy-the-best strategy, which allows a firm to go beyond its own group and imitate novel practices from firms in other groups, becomes a vulnerability with increasing environmental heterogeneity.

In contrast, firms engaging in mix-and-match imitation when there is substantial environmental heterogeneity are less likely to fall prey to this problem because they tend to look inward toward practices of rivals in their own group. Mix-and-match imitation is analogous to a conservative decision-making structure that reduces commission errors (Sah & Stiglitz, 1986; Christensen & Knudsen, 2010; Csaszar, 2013; Csaszar & Eggers, 2013). A commission error happens when a firm does something that should not have been done. In the context of imitation, a commission error occurs when an imitator copies a practice from a firm in some other group that turns out to be a bad practice from the perspective of the imitator's own group. Mix-and-match imitation is conservative in terms of reducing such errors, and this conservative attribute makes mix-and-match imitation more effective.

This paper is organized as follows. First, we review the literature and outline the logical underpinnings of our argument. Second, we develop a computational model of imitation through which we examine the mix-and-match imitation strategy and compare it with the copy-the-best imitation strategy. Next, we numerically demonstrate the association between these strategies and performance over time, noting how observability conditions and environmental heterogeneity affect performance. We conclude by briefly highlighting key theoretical insights resulting from our analysis and suggesting directions for future research.

2 | THEORETICAL BACKGROUND

Imitation has been often viewed as simple and easy. This view was formed early on in strategy research and largely influenced by the industrial organization (IO) economic tradition (for a review, see Rumelt et al., 1991). In the classic economic framework of competition, all firms are assumed to have unconstrained ability to observe and imitate the knowledge and practices of other firms. At the core of this view are the assumptions of perfect information and fully rational firms. Under these assumptions, there is very little reason to study imitation; therefore, imitation has long been neglected in the literature. In the next subsection, we review research that relaxes these assumptions and views imitation as purposeful adaptive action.

2.1 | Imitation strategies under uncertainty and bounded rationality

Once the assumptions of perfect information and rationality are relaxed, imitation may be revealed as more complex and difficult than previously imagined. The challenges inherent in imitating rivals often stem from uncertainty. In his seminal work on evolutionary economics, Alchian (1950, p. 216) succinctly highlights this point: “Where there is uncertainty, people's judgments and opinions, even when based on the best available evidence, will differ.” Alchian (1950, p. 219) noted: “In general, uncertainty provides an excellent reason for imitation of observed success.” In particular, imitating practices common to observed successes is identified as an adaptive firm strategy under uncertainty. Likewise, Nelson and Winter (1978, 1982) view imitation as a conscious adaptive means of enhancing firm performance in that it permits followers to narrow the gap between them and industry leaders (for relevant empirical work, see Knott, Posen, & Wu, 2009).

This evolutionary view also assumes that firms are boundedly rational. Bounded rationality implies that firms seek better practices via a process of sequential adaptation, in which "events are permitted to unfold and attention is restricted to only the actual rather than all possible outcomes" (Williamson, 1975, p. 25). In the context of imitation, boundedly rational firms cannot monitor all possible activities of all rivals in an industry, and thus, they have little choice but to restrict their attention sequentially to a subset of rivals and a limited number of their practices.

Under the assumptions of uncertainty and bounded rationality, there are many ways in which imitators could choose to copy superior rivals. The literature suggests two archetypes. Under the mix-and-match imitation strategy, an imitator seeks to identify the practices that drive the performance of leading firms among those directly observable. Within this target set of leading firms, the imitator identifies those with performance superior to its own, and then mixes and matches a subset of the most common practices among higher-performing firms with the aim of improving its own performance. Under the copy-the-best strategy, on the other hand, an imitator identifies the best-performing firm among those observable and then copies a subset of that firm's practices.

The literature on mix-and-match imitation has its genesis in Alchian (1950), who argues that firms imitate practices commonly used by successful firms. This conception of imitation has become the dominant view of practitioners. Benchmarking has become a buzzword for mix-and-match imitation—bookshelves are overflowing with how-to manuals, such as Boxwell's (1994) *Benchmarking for Competitive Advantage* and Camp's (2006) *Benchmarking*: *The Search for Industry Best Practices that Lead to Superior Performance*. In addition, Xerox, one of the early adopters of mix-and-match imitation, published a booklet in 1987 titled *Competitive Benchmarking*: *What It Is and What It Can Do for You*. The strategy literature, however, has not extensively examined the mix-and-match imitation strategy.

The exception is the literature on organizational learning, where the mix-and-match learning algorithm (e.g., Fang, Lee, & Schilling, 2010; March, 1991) has been formalized as an adaptation of the genetic algorithm of Holland (1975) to social contexts. Yet, because the organizational learning literature has a very different objective than the strategy literature, no strategic implications of alternative imitation strategies have been derived, and no systematic understanding of the comparative efficacy of imitation strategies has been reached.

Research on copy-the-best imitation has a much richer foundation in the strategy literature. Nelson and Winter (1978, 1982) were among the few economists who dedicated effort to formalizing the dynamics of imitation. They describe "the imitator's basic tactic" as "follow the example … wherever possible … and … fill in the remaining gaps by independent effort" (Nelson & Winter, 1982, p. 124). Subsequent theoretical research in strategy has followed in their footsteps by modeling imitation as a copy-the-best process under assumptions of uncertainty and bounded rationality (Csaszar & Siggelkow, 2010; Ethiraj et al., 2008; Posen et al., 2013; Posen & Martignoni, 2018; Rivkin, 2000).

Absent in strategy research is a systematic examination of the comparative efficacy of imitation strategies. We take an early step in developing a contingency theory of imitation by focusing on the two archetypal imitation strategies described above. To represent these strategies, we build on two existing models. First, we model copy-the-best imitation by building on the model of Posen et al. (2013). Second, we exploit a basic building block offered by Fang et al. (2010) to model mix-and-match imitation.

2.2 | Two contingencies: Observability structure and environmental heterogeneity

In developing a contingency theory of imitation strategies, we focus on two important contingencies: the observability structure within an industry and the extent of environmental heterogeneity. The first contingency is the observability structure within a given industry, which reflects who can observe and imitate whom in the industry. Much of prior work on imitation and the classic studies in IO economics implicitly assume the possibility of global imitation—every firm has the unconstrained ability to observe and imitate the knowledge and practices of every other firm in an industry.

However, research on the localization of knowledge spillovers offers evidence against unconstrained ability to observe and imitate (e.g., Jaffe, Trajtenberg, & Henderson, 1993). For example, Glaeser, Kallal, Scheinkman, and Shleifer (1992, p. 1127) recognize that "intellectual breakthroughs must cross hallways and streets more easily than oceans and continents." This type of localization has its roots in Marshall (1920), who argued that access to labor, suppliers, and knowledge is facilitated when firms are geographically collocated. Collocation facilitates not only social interactions among employees of different firms (Audretsch & Feldman, 1996; Saxenian, 1994) but also employee mobility between firms (Almeida & Kogut, 1999; Singh, 2005). The findings of this research imply that geographically distant firms will have less ability to observe and imitate one another. Rosenkopf and Almeida (2003, p. 765), recognizing the "pervasive bias toward geographically and technologically local search," argue that boundary-spanning connections are important because they make it possible for knowledge to cross the boundary between "distant contexts (that) may offer ideas and insights that can be extremely useful" (p. 751).

Research on strategic groups also suggests that firms are limited in their ability to observe and imitate others (e.g., Caves & Porter, 1977; Cool & Schendel, 1987; Hunt, 1972; Lee, 2003). Observability and imitation may be driven by an industry's group structure, and within-group observability by rival firms is greater than between-group observability. Porac, Thomas, Wilson, Paton, and Kanfer (1995, p. 203), in their study of the Scottish knitwear industry, find that boundaries that define groups of firms are socially constructed such that "firms observe each other's actions…" more strongly within a group. Peteraf and Shanley (1997, p. 166) argue that "cognitive groups emerge as managers partition their environment to reduce uncertainty and cope with bounded rationality." The findings of this stream of research suggest that industries may be characterized by a wide variety of observability conditions. These conditions may be classified into two extreme types: a single large group of firms where everyone can observe everyone else, and balkanized small groups with observability and imitation confined mostly within each group.

The second contingency is environmental heterogeneity—differences in the performance landscapes within which different groups of firms operate. While the groupings of firms may, in part, be socially constructed, they may also come to reflect actual differences in performance landscapes (Ghemawat, 2010; Ghemawat & Levinthal, 2008). That is, what is good for firms in one group may not be good for firms in another. The literature on international business highlights the importance of environmental heterogeneity. Groups of firms in one geographic market may face quite different demands than groups of firms operating in other markets (Bartlett & Ghoshal, 2002; Ghemawat, 2007). These differences often arise from different demand conditions or regulatory regimes. For example, firms based in the Chinese market may face a very different performance landscape than firms based in the U.S. market. These differences across markets sometimes converge, but at other times, they persist (Ghemawat, 2003).

In sum, we argue that the efficacy of alternative imitation strategies depends on the two contingencies described earlier. In the next section, we develop a model of imitation to show how these contingencies affect the aforementioned strategies.

3 | MODEL

To study the comparative efficacy of the two imitation strategies described earlier, we build computational models of these strategies under various observability structures and environmental heterogeneity conditions. Each model consists of three main entities: reality, firms, and industry, as described in the following.

3.1 | Firms and their performance

Reality is modeled as an m-dimensional vector $R = \{r_1, r_2, \ldots, r_m\}$ with each element r_i set to either 0 or 1. A firm is modeled as a configuration of practices, X, which is an m-dimensional vector $\{x_1, x_2, \ldots, x_m\}$ corresponding to the elements of reality. The firm faces m decision problems. For each decision problem, the firm must select a practice such that each decision x_i is set to 0 or 1 (e.g., Ethiraj et al., 2008; Posen et al., 2013; Rivkin, 2000). For example, an HR decision may reflect one of two types of practices: low-powered or high-powered incentives.

The performance of a firm is a function of the number of matches between its practice vector, X, and reality, R. This function can be specified in several ways (e.g., Fang et al., 2010; Hinton & Nowlan, 1987; Levinthal, 1997; March, 1991). We use a generalized form that parameterizes the difficulty of the search problem in terms of the interdependence across decision problems with a parameter k. Let $Y(X)$ denote the performance of a firm with practice vector X, normalized such that $Y(X) \in [0, 1]$. Formally, $Y(X)$ is represented as follows:

$$Y(X) = f(X,R) = \frac{k}{m}\left(\prod_{i=1}^{k}\delta_i + \prod_{i=k+1}^{2k}\delta_i + \cdots + \prod_{i=m-k+1}^{m}\delta_i\right), \quad (1)$$

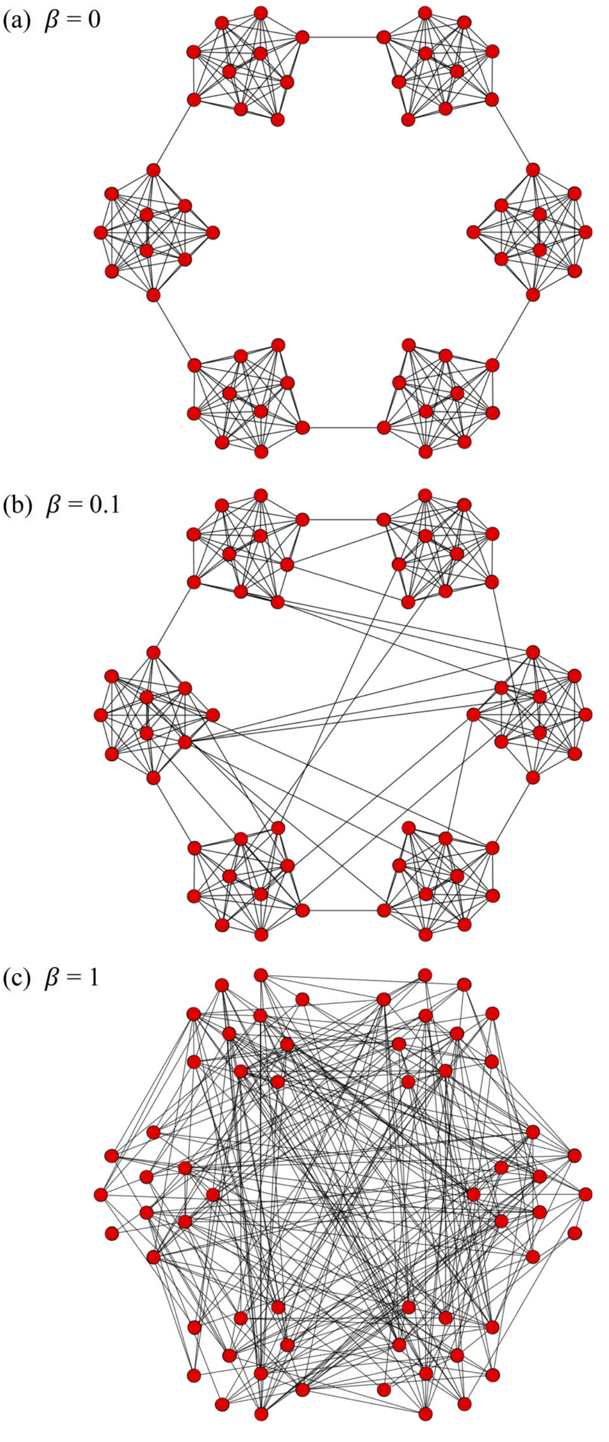
where $\delta_i = 1$ if the ith element of the practice vector X matches the corresponding element of the reality vector R (i.e., $x_i = r_i$); otherwise $\delta_i = 0$.

The m decision problems are partitioned into several subsets or modules that consist of subsequent k decision problems. Each module gets a partial payoff k/m if all practices in it match reality. In the absence of interdependence ($k = 1$), performance is proportional to the number of practices that match reality (March, 1991). In the case of maximum interdependence ($k = m$), if any of the m practices are wrong, the payoff for the configuration of practices is zero (Hinton & Nowlan, 1987).

3.2 | Industries

Industries in our model may differ along two contingencies: observability structure and environmental heterogeneity. The observability structure reflects who can observe and imitate whom in an industry. We conceptualize it at the firm level (rather than the practice level) because one must recognize a target of imitation before deciding what practices to imitate. Two extreme types of observability structures are: (a) a single large group of firms where every firm can observe every other firm and (b) balkanized small groups with observability and imitation confined mostly within each group. Reality may lie between these extremes (e.g., multiple groups with substantial observability across firms within the same group and a moderate number of boundary-spanning connections that make possible observation and imitation of firms in different groups).

FIGURE 1 Observability structure ($F = 60$, $G = 6$) [Color figure can be viewed at wileyonlinelibrary.com]



To model these possible observability structures, we employ the notion of the connection topology. We start with Watts' (1999) "connected caveman" model, which represents interaction patterns among firms (see Figure 1a). Each node in the graph represents a single firm. Each link represents a connection between firms by which one firm can observe and imitate the knowledge and practices of another. For a given number of firms, F, the connection topology is defined by two parameters, G and β, where G is the number of groups and β represents the number of boundary-spanning connections as a fraction of all inter-firm connections. In this stylized model, F firms are grouped into G groups of equal size. Each firm is connected to F/G-1 other firms that constitute its set of imitation targets.

We modify the Watts model with a rewiring parameter β. When $\beta = 0$ (Figure 1a), the groups are nearly isolated as in Watts (1999). Only two firms in the group span the boundary between groups such that they are able to observe and imitate firms in other groups, and even for those firms, the percentage of these boundary-spanning connections is very low. As such, imitation is highly inward-looking because all firms within a group have very similar target sets of firms that are directly observable. As β increases, the percentage of boundary-spanning connections increases. For every firm, each of its connections to other firms is removed with probability β, and a new connection for the firm is formed to a randomly selected firm. For instance, at $\beta = 0.1$ (Figure 1b), approximately 10% of connections are rewired. A firm's target set still contains, on average, the same number of connections (F/G-1), but about 10% of these connections are additional boundary-spanning connections between groups. In the extreme case, $\beta = 1$ (Figure 1c), the connection topology of an industry becomes a random network, and boundary-spanning connections are much more likely than within-group connections so that distinct groups disappear. This is akin to the theoretical ideal of IO economics, where all firms can easily observe and imitate all others in the industry.

Environmental heterogeneity reflects the extent to which the practices that are good for firms in one group may not be good for firms in another. The parameter E reflects differences in the "reality" vectors across groups. We establish a reality vector for one group, $R = \{r_1, r_2, \ldots, r_m\}$. If $E = 0$, all other groups face the same reality vector. If $E = 1$, we randomly reset all elements of the reality vector for each group to make the performance landscapes maximally different across groups. Likewise, if $E = 0.5$, we select, on average, one half of the elements of each groups' reality vectors and reset them randomly, while the other half remains the same across all groups.

3.3 | Imitation strategy

In our model, firms search for a better-performing configuration of practices by attempting to imitate the practices of high-performing firms. Given the uncertainty and bounded rationality assumptions, we operationalize this by allowing a firm to consider as imitation targets only those alters with whom it has a direct connection (i.e., those whom the firm can directly observe make up the target set). Second, firms are bounded in their ability to discriminate good from bad practices. As such, a firm copies targets' practices without knowing the potential consequences of imitation. Third, firms cannot imitate the complete set of targets' practices. We assume that a firm copies p fraction of target practices in a given time period (Ethiraj et al., 2008; March, 1991; Posen et al., 2013; Rivkin, 2000).

We consider two archetypal imitation strategies that firms may use in deciding what practices to imitate: *mix-and-match* and *copy-the-best*. For the mix-and-match strategy, a focal firm identifies those firms in its target set that have performance superior to its own. For each decision problem, the focal firm then looks for the common practices among these higher-performing firms. Specifically, for each practice, the focal firm identifies the practice used by a majority of superior firms, and imitates that practice with probability p (Fang et al., 2010; March, 1991).[1] For the copy-the-best

[1]If no firms have performance superior to the focal firm, then no imitation occurs. If only one firm has performance superior to the focal firm, then it selects p fraction of the superior target's practices to imitate. Additionally, in the case of a tie in practices, such that half of a firm's superiors have one setting for a given practice and half of a firm's superiors have the other setting for that practice, then the practice is not copied.

strategy, we follow the specification of Posen et al. (2013). The focal firm selects from its target set the highest-performing firm, then selects, on average, p fraction of the highest-performing target's practices to imitate.

In the following set of simulation experiments, we examine how the comparative efficacy of these two imitation strategies depends on the observability structure (i.e., connection topology) and environmental heterogeneity of the industry.

4 | SIMULATION RESULTS

In this section, we examine the comparative efficacy of the mix-and-match and copy-the-best imitation strategies. The results reported are for the case of 20 groups, where each group consists of 10 firms ($F = 200$, $G = 20$). The task environment is represented by a reality vector of dimension $m = 100$ and a moderate interdependence level of $k = 5$. The values of the reality vector are assigned randomly such that r_i is set to either 0 or 1 with probability 0.5, which is fixed across time. Initially, each firm's decision vector is also assigned randomly such that x_i is set to either 0 or 1 with probability 0.5. Thus, on average, 50% of each firm's practices will be good in the sense that they match the state of reality. In each period, firms, on average, imitate 30% of their targets' practices ($p = 0.3$). All reported results here are computed by averaging over 1,000 simulation runs. These parameters are summarized in Table 1.

We begin by simulating the baseline model in which there is no environmental heterogeneity ($E = 0$) and consider the comparative efficacy of the imitation strategies across a range of observability structures, $0 \leq \beta \leq 1$. We then analyze the full range of environmental heterogeneity, $0 \leq E \leq 1$. Finally, we examine a variety of sensitivity analyses.

4.1 | Efficacy of imitation strategies in a homogeneous environment

To understand the efficacy of imitation strategies in the absence of environmental heterogeneity, we begin with the baseline model results across the range of observability structures. We then proceed to

TABLE 1 Parameter values for simulation

Parameter	Remarks	Range of values analyzed
m	Number of firm practices	100
k	Degree of interdependence (number of interdependent practices per module)	5
p	Rate of imitation (probability that a target practice is imitated in a time period)	0.3
F	Number of firms	200
G	Number of groups of firms (group size = F/G)	20
β	Industry observability structure (degree of boundary-spanning connections = probability of rewiring connections)	Figures 2, 4, and 6: [0, 1] Figure 3: 0, 0.1, 1 Figure 5: 0.1
E	Environmental heterogeneity	Figure 6: 0, 0.1, 0.4, 1.0 All other figures: 0

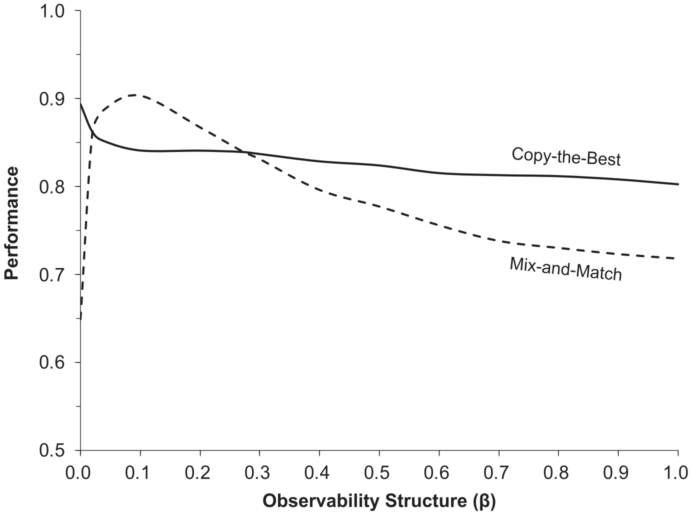


FIGURE 2 Steady-state performance for mix-and-match and copy-the-best imitation strategies

examine how bandwagon dynamics play out across observability structures and how these dynamics influence the performance of imitation strategies. We consider industries wherein all firms pursue the same imitation strategy.

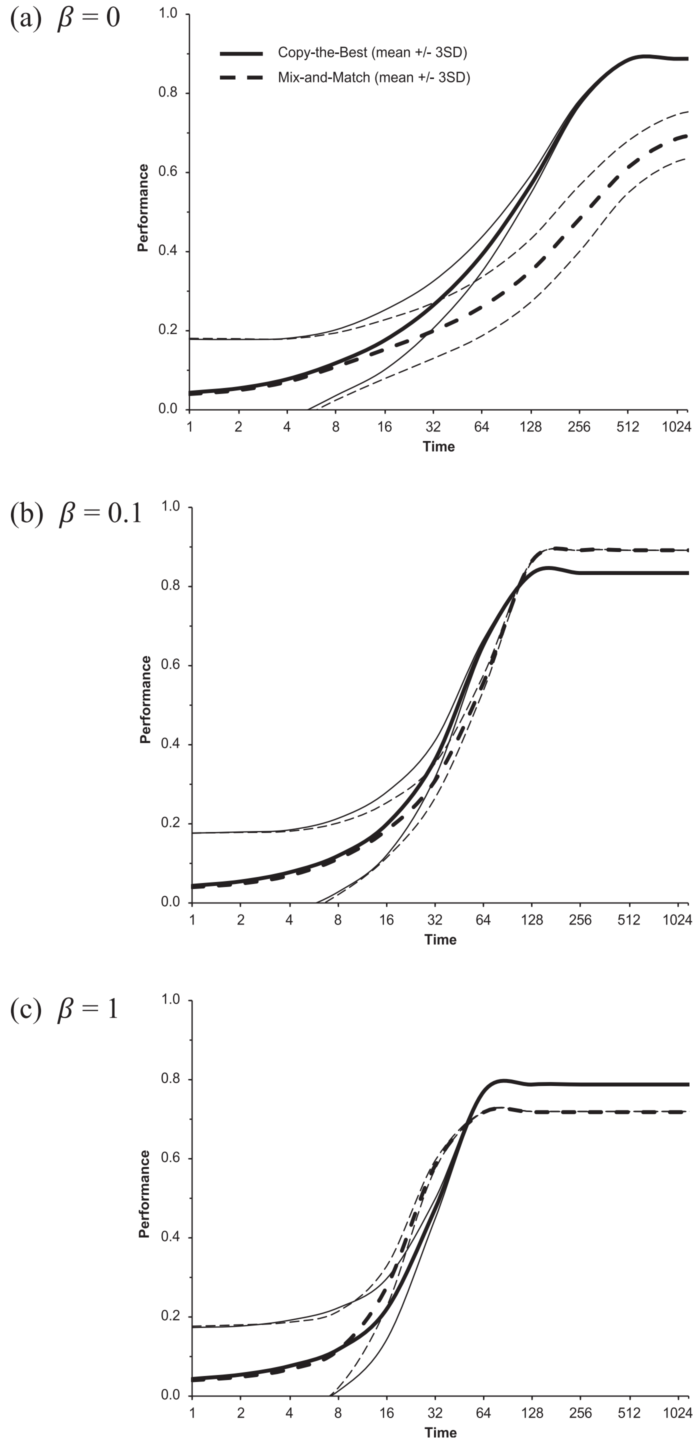
4.1.1 | Baseline model results

Our analysis shows that the copy-the-best imitation strategy is more effective than the mix-and-match strategy over a wide range of observability structures when the environment is homogeneous. The results are reported in Figure 2. The vertical axis in the figure represents the performance achieved when the industry reaches an equilibrium (practices no longer change), and the horizontal axis represents the observability structure with varying levels of boundary-spanning across firms in different groups, from few ($\beta = 0$) through very many ($\beta = 1$) boundary-spanning connections. In particular, the copy-the-best strategy is superior in an industry with either high or low levels of boundary-spanning connections between groups. On the other hand, the mix-and-match strategy is more effective under a narrow range of observability conditions where groups are semi-isolated with a modest number of boundary-spanning connections (moderate β). Although β ranges from 0 to 1 in our model, only over the range $0.02 \leq \beta \leq 0.27$ is the mix-and-match strategy superior.

An interesting result is that the performance of the mix-and-match strategy is more sensitive to the industry observability structure. In contrast, the copy-the-best strategy is highly robust to different observability conditions. From a practitioner perspective, given limited knowledge about the observability structure, the chance is high that firms will be better off employing the copy-the-best rather than the mix-and-match imitation strategy. That is, it may be worthwhile sacrificing peak imitation performance over a narrow range of topological conditions to achieve a relatively high level of performance across a broad range of topological conditions.

In Figure 3, we examine inter-firm performance heterogeneity and how it changes over time. We plot mean performance and the band encompassing plus/minus three standard deviations of mean performance across three levels of β. The solid lines reflect copy-the-best imitation, and the dashed lines reflect mix-and-match imitation. In general, we observe that performance heterogeneity decreases over time, although there is wide variation in this pattern. When there are many distinct groups with very few boundary-spanning connections (i.e., $\beta = 0$), copy-the-best imitation

FIGURE 3 Performance heterogeneity over time



rapidly eliminates performance heterogeneity from the industry. In contrast, with mix-and-match imitation, performance heterogeneity persists because, when β is low, firms using mix-and-match imitation are unable to cross boundaries.

4.1.2 | Bandwagons and the efficacy of imitation strategies

We explore why the mix-and-match imitation strategy is less effective than the copy-the-best strategy over a broad range of industry observability conditions (β). In particular, when β is low, the industry is characterized by multiple separate groups that have distinct boundaries and limited connections between groups, and when β is high, the industry is characterized by a single group encompassing all firms. Performance improvement in our model results from observing and imitating good practices (i.e., practices matching reality) from higher-performing firms. Imitation diffuses these good practices across firms in the industry, but this comes at a cost. In this imitation process, some good practices are not imitated and may be discarded completely by all firms within a group, while instead, bad practices are imitated. Thus, this process is error-prone in that bad practices may be propagated, thereby limiting the performance gains available via imitation.

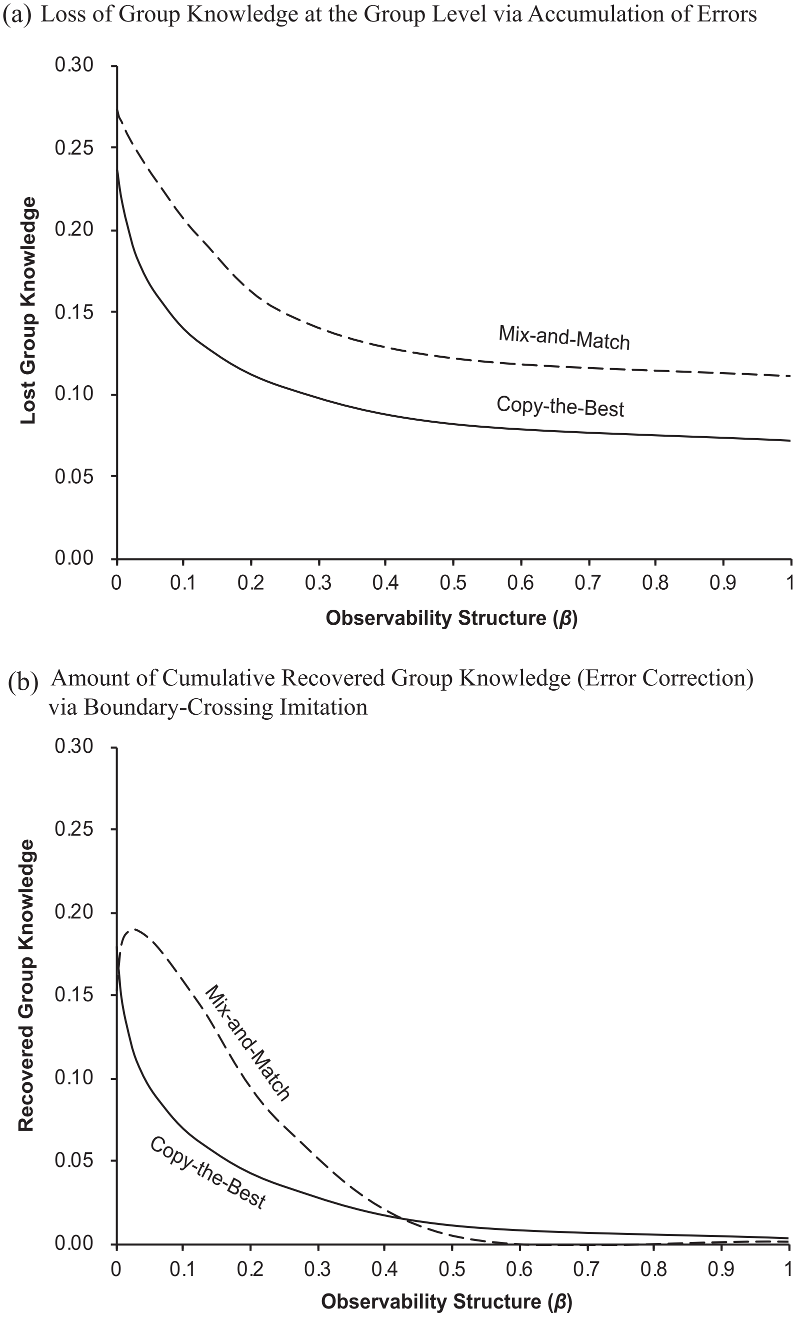
In Figure 4a, we plot the cumulative loss of knowledge at the group level via the accumulation of errors. Group knowledge measures the extent to which firms in a group collectively harbor many good practices (matching reality), as opposed to errors (bad practices). A group has a good practice on a particular dimension (element of m) in a given period if at least one firm within the group engages in that good practice. Knowledge is lost to a group when no firms in the group engage in that good practice; in this case, errors among group members are highly correlated. Our results indicate that the mix-and-match imitation strategy loses more knowledge over time than the copy-the-best imitation strategy.

This regularity results from the decision-making processes inherent in the mix-and-match and copy-the-best imitation strategies. First, we consider a case in which the two strategies converge in the sense that the practices imitated are the same under both strategies. Suppose that only one firm in the target set has performance superior to that of the focal imitator firm. In this case, decision-making in the mix-and-match and copy-the-best imitation strategies is the same: it involves imitation of a fraction of the practices from that superior firm. Second, we consider a case in which the two strategies diverge. When there are multiple superior firms in the target set, then the two strategies diverge because mix-and-match imitation focuses imitators' attention on a narrow set of common practices, and in turn, this generates a bandwagon effect that leads to faster convergence on an ever-narrower set of common practices. For each decision problem, a focal firm employing the mix-and-match strategy chooses among the practices of superior firms by looking at the extent to which individual practices are commonly employed within these firms. This process has characteristics of majority rule.[2] The more common a practice is among higher-performing firms, the more likely it is to be imitated. Surprisingly, this tendency causes more rapid loss of knowledge via accumulation of errors. In particular, good practices are likely to be discarded when only the minority of higher-performing firms engage in them, leading to the propagation of errors.

Another important characteristic of mix-and-match imitation is that it encourages a strong inward-looking tendency in which firms within a group are more likely to be imitated by one another than those outside the group. This is particularly true when distinct groups of firms exist within an industry. To illustrate, suppose that out of its target set of nine connections to other firms, a focal firm observes four firms that have superior performance, among which three are inside its group and one is a firm in another group. If the three targets inside the group are somewhat similar (which is likely),

[2]Majority rule simply requires some mechanism of voting or determining popularity according to some threshold; whether it is 50% or some other threshold makes no substantive difference.

FIGURE 4 Loss and recovery of group knowledge



then the practices from outside will have little influence on the choice of practices to be imitated. Thus, firms pursuing the mix-and-match strategy will tend to ignore knowledge in other groups.

In contrast, the copy-the-best imitation strategy is more immune to the bandwagon problem. A practice is more likely to be selected for imitation if it is among the best target's practices, regardless of how common the practice is among the imitator's target set of observable firms. This feature makes the copy-the-best strategy more effective, particularly when some good practices are only available across group boundaries. In this sense, copy-the-best is a very open-minded strategy by design. Therefore, its long-term performance is not sensitive to industry observability conditions with distinct groups. Moreover, copy-the-best imitation has another surprising and critically important feature. In a world in which firms exhibit a strong tendency toward "geographically and technologically local search" (Rosenkopf & Almeida, 2003), copy-the-best imitation leads to higher rates of boundary-crossing imitation, even when group boundaries are quite strong and there are few boundary-spanning connections to firms in distant groups.

4.1.3 | Why is mix-and-match imitation effective under some observability conditions?

In Figure 2, we showed that while copy-the-best imitation is generally more effective, mix-and-match imitation outperforms under a narrow range of observability conditions, particularly in the neighborhood of $\beta = 0.1$. The mechanisms underlying the narrow efficacy of mix-and-match imitation are fairly technical. Readers less interested in these technical details may choose to skip the rest of this subsection.

Mix-and-match imitation benefits from boundary-crossing

The central observation is that a group may recover lost knowledge by boundary-crossing imitation, thereby correcting accumulated errors. Boundary-crossing reflects the actual flow of knowledge across a boundary-spanning connection. In our model, firms pursuing the mix-and-match strategy benefit far more from boundary-crossing imitation than do firms pursuing the copy-the-best strategy when the number of boundary-spanning connections is moderate (e.g., $\beta = 0.1$).

In Figure 4b, we plot the cumulative recovered group knowledge—the extent to which boundary-crossing imitation functions to correct errors due to loss of good practices at the group level. The results show that the mix-and-match strategy recovers far more knowledge via boundary-crossing imitation than does the copy-the-best strategy. Our model shows that performance resulting from an imitation strategy is driven by knowledge losses less knowledge recovered. When $\beta = 0.1$, the net loss of knowledge (from the initial random allocation of knowledge) is smaller for firms engaging in the mix-and-match imitation strategy (4.6% net knowledge loss) than for those engaging in the copy-the-best imitation strategy (6.9% net knowledge loss).

To understand the mechanism by which the mix-and-match imitation strategy more successfully recovers knowledge, we focus on how imitation alters inter-firm heterogeneity. We point to two related factors that connect inter-firm heterogeneity to knowledge recovery via boundary-crossing imitation. First, imitation dynamics may build reservoirs of diverse knowledge across different groups of firms. Second, firms engaged in imitation may endogenously switch from primarily accessing knowledge within the group to boundary-crossing, that is, accessing knowledge in other groups that may be used to correct errors.

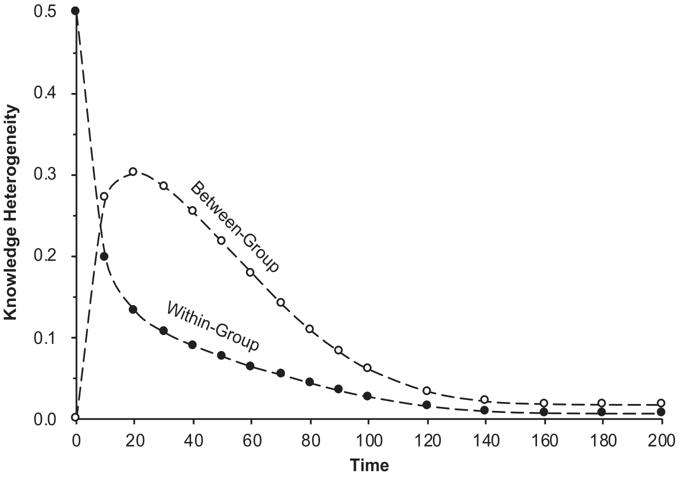
At $\beta << 0.1$, there are too few boundary-spanning connections, and as such, the amount of lost knowledge is greater than that of recovered knowledge. At $\beta >> 0.1$, there are no distinct groups to preserve diverse knowledge, and as such, there is no possibility of recovering lost knowledge. Interesting dynamics occur at moderate levels of β.

Within- and between-group heterogeneity over time

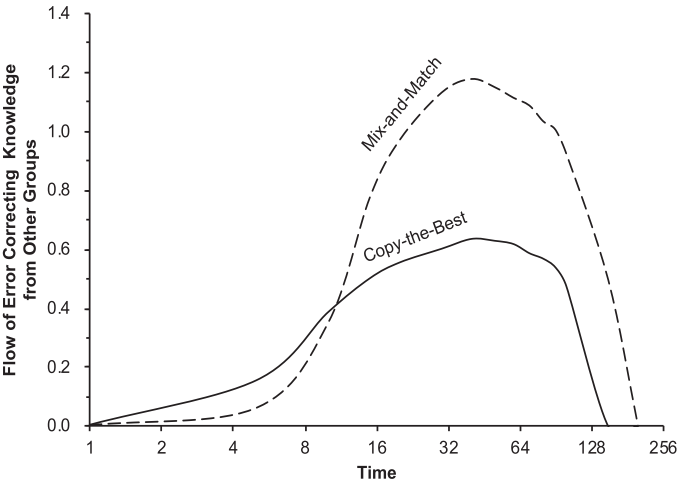
In the analysis that follows, we focus on an observability structure with a moderate number of boundary-spanning connections, $\beta = 0.1$. We start by examining how imitation alters inter-firm heterogeneity in practices. Heterogeneity in practices matters because of the propagation of errors within

FIGURE 5 Knowledge heterogeneity and knowledge flowover time

(a) Dynamics of Within- and Between-Group Heterogeneity for Mix-and-Match at $\beta = 0.1$



(b) Flow of Error-Correcting Knowledge from Other Groups at $\beta = 0.1$



a group. With sufficient heterogeneity across groups of firms, some good practices may be absent in one group but present in others.

In Figure 5a, we plot heterogeneity over time for the mix-and-match strategy when $\beta = 0.1$, decomposing it into within-group and between-group heterogeneity. Heterogeneity is measured on a dissimilarity index, reflecting average pairwise percentage differences. For instance, for a given practice, if a focal firm has adopted the bad version of the practice (i.e., an error), and another firm in its group has adopted the good version of the practice, then the two firms are dissimilar on that practice. Within-group heterogeneity is measured by making a pairwise comparison of the m-dimensional practice vectors of all firms within a group. A focal firm is compared with all other firms in its group. Between-group heterogeneity, likewise, is based on a pairwise comparison of all pairs of firms not in the same groups (a focal firm compared with all other firms not in its group). Between-group heterogeneity implies that errors are not correlated across different groups.

The basic pattern is that within-group heterogeneity in practices steadily declines over time when $\beta = 0.1$. This dynamic pattern is consistent with the standard expectation about how imitation reduces heterogeneity. However, the dynamic pattern of between-group heterogeneity is substantially different from the standard expectation. In early periods, between-group heterogeneity increases rapidly, even while within-group heterogeneity is decreasing. Between-group heterogeneity peaks around period 15, then begins to decline as well. In this early-to-middle time frame, between-group heterogeneity helps firms build a reservoir of diverse knowledge across groups that can be drawn from in later periods to correct errors within groups. This explains why the amount of recovered knowledge at equilibrium is larger for the mix-and-match strategy than for the copy-the-best strategy, as shown in Figure 4b.

Local bandwagon generates between-group heterogeneity in practices

A bandwagon effect created by the mix-and-match strategy results in the formation of reservoirs of group-specific knowledge. In early periods, firms engaging in mix-and-match imitation have a strong inward-looking tendency. Firms tend to imitate others in the same group, in part because imitation is oriented toward superior-performing firms. In an industry set at $\beta = 0.1$, a firm will have, on average, nine connections to firms within its group and only one boundary-spanning connection to a firm in another group. Because of the initially random knowledge distribution and this inward orientation, an imitating firm is more likely to discover superior performers inside its own group, and much more likely to imitate others within its own group. This inward bias is magnified by the bandwagon effect—firms pursuing the mix-and-match strategy are likely to key in on and choose to adopt common practices, and the more common a practice, the more likely it is to be imitated.

Given that mix-and-match imitation leads to substantial loss of within-group heterogeneity, we ask the question: why is it so effective over the narrow range of connection topologies in the neighborhood of $\beta = 0.1$? The answer is that as within-group heterogeneity diminishes, mix-and-match imitation is able to leverage diverse knowledge preserved across groups and correct accumulated within-group errors. In the early periods, the inward orientation of firms engaging in mix-and-match imitation leads to a quasi-equilibrium within each group wherein all firms are highly similar. As there are no superior firms to imitate within such groups, firms pursuing mix-and-match imitation endogenously switch from an inward-looking mode to an outward-looking mode, subsequently imitating firms in other groups.[3]

Boundary-crossing imitation by a given firm may enable it to copy practices that correct errors in its focal group. In Figure 5b, we plot the average number of novel practices that flow into a focal group from other groups. A flow of novel, error-correcting knowledge occurs when good practices that do not exist within the focal group enter that group via boundary-crossing imitation. We examine the flow of error-correcting knowledge at $\beta = 0.1$. The figure reveals that, because of the more pronounced bandwagon effect within this range, the transition from the inward-looking phase to the outward-looking phase is much sharper for the mix-and-match strategy than for the copy-the-best-strategy. We plot time on a log scale of base 2 to enable observation of the fine detail of this transition. The figure suggests that in early periods, the mix-and-match strategy has a very strong inward-looking focus, with little boundary-crossing imitation to allow access to error-correcting

[3]Prompted by an interesting reviewer question, we examined a model involving exogenous switching (results available from the authors) in which firms are isolated for T periods into "islands" (groups in our model) with no inter-group imitation. After T periods, every member of every group switches to copy the global best performer (group). In this model, performance of both the mix-and-match and copy-the-best imitation strategies was dramatically reduced, suggesting that the endogenous switching of mix-and-match imitation is quite effective, albeit only under a narrow range of topological conditions.

knowledge. By period 10, the mix-and-match strategy overtakes the copy-the-best strategy in terms of the flow of error-correcting novel knowledge from other groups. At its peak, the mix-and-match strategy generates almost double the flow of error-correcting knowledge across groups than does the copy-the-best strategy. Through this boundary-crossing imitation and its timing, the mix-and-match strategy improves firms' ability to recover lost knowledge (per Figure 4b), thereby correcting errors. In this case, it outperforms the copy-the-best imitation strategy.

4.2 | Environmental heterogeneity and the efficacy of imitation strategies

The results above suggest that copy-the-best is a more effective imitation strategy under a wide range of observability conditions. However, environmental heterogeneity, which represents differences in the performance landscapes faced by different groups of firms, changes the results substantially. The results are shown in Figure 6.

The earlier results presented in Figure 2 reflect the case in which there is no environmental heterogeneity ($E = 0$). In Figure 6, we examine environmental heterogeneity over the range $E = [0, 1]$. Not surprisingly, average performance decreases as environmental heterogeneity increases. With increasing environmental heterogeneity, the practices that are good for firms in one group are more likely to be bad for firms in another. In the extreme case, as environmental heterogeneity approaches one, imitation, regardless of the choice of strategy, becomes ineffective as a means of learning. In particular, copy-the-best becomes increasingly more ineffective with increasing environmental heterogeneity.

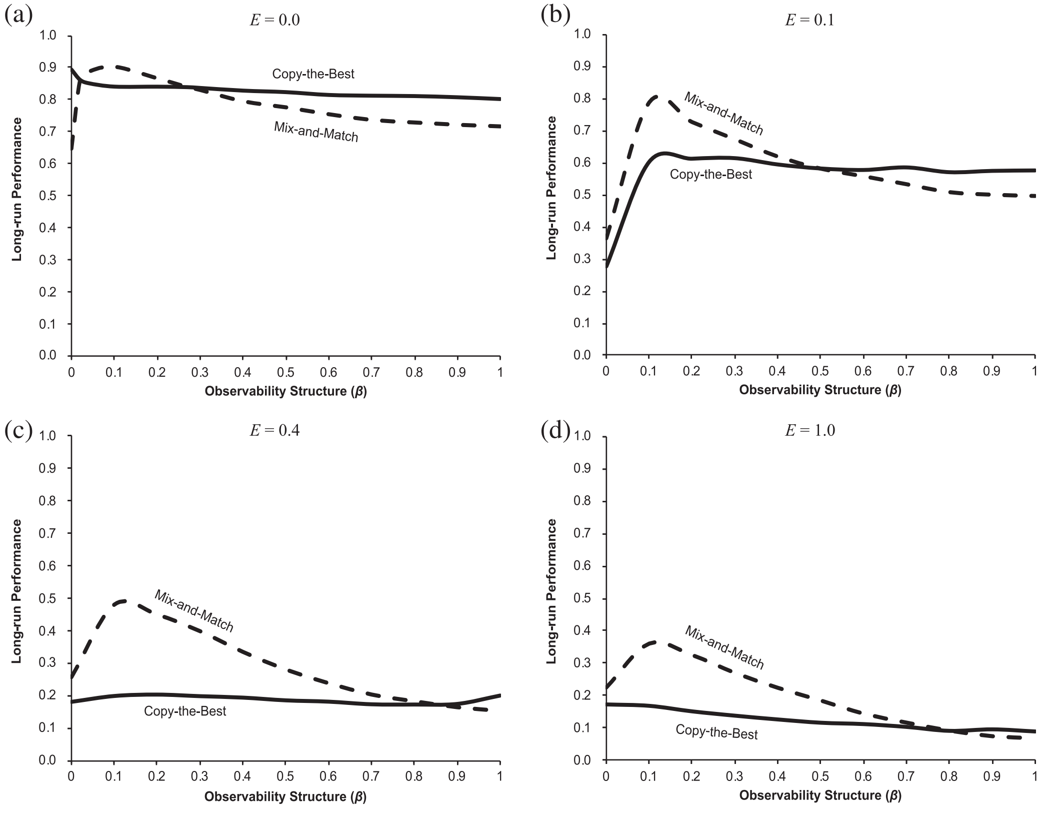


FIGURE 6 Effects of environmental heterogeneity on performance

The mix-and-match strategy is superior in two senses. First, it is more robust than copy-the-best in that its performance is less degraded by an increase in environmental heterogeneity. Second, it produces superior performance across a wide range of observability structures.

As the prior experiment suggests, the copy-the-best imitation strategy has a powerful capability to cross group boundaries and diffuse practices from other groups. Even in a highly balkanized context, one with very few connections across groups, copy-the-best imitation rapidly eliminates performance heterogeneity within an industry because of its boundary-crossing prowess. This is a virtue in homogeneous environments, but is severely penalized in heterogeneous environments because firms are more likely to imitate practices that were good in some other group, but bad in their own groups.

Mix-and-match imitation is less likely to be affected by this boundary-crossing problem in heterogeneous environments because it is a much more conservative strategy. As shown in the prior experiment, firms engaging in the mix-and-match imitation strategy tend to look inward toward practices in their own group, ignoring the practices of boundary-spanning rivals in its group; consequently, they are less likely to imitate inappropriate practices from other groups. This finding of the conservativeness of mix-and-match imitation is consistent with prior work on commission errors in organizational decision-making. A commission error occurs when a firm does something that should not have been done. Commission errors are shown to be reduced for decision-making structures, such as hierarchy or consensus that have "and-gate" type properties (Christensen & Knudsen, 2010; Csaszar, 2013; Csaszar & Eggers, 2013; Sah & Stiglitz, 1986). In the context of imitation under environmental heterogeneity, commission errors occur when a firm imitates bad practices from other groups. Mix-and-match imitation is conservative in terms of reducing such errors, and this attribute makes mix-and-match imitation more effective when there is environmental heterogeneity.

An additional interesting feature of mix-and-match imitation is that the performance peak at an observability structure of approximately $\beta = 0.1$, which is shown in Figure 2, persists even when environments are highly heterogeneous (Figure 6c,d). Under this observability structure, as shown in the prior experiment, the mix-and-match strategy builds a reservoir of diverse knowledge across groups that can be drawn from in later periods to import novel practices. Mix-and-match imitation leverages this boundary-crossing imitation to its best, albeit limited, advantage in heterogeneous environments.

4.3 | Sensitivity analysis

We examine sensitivity to four parameters in the baseline model (i.e., with no environmental heterogeneity, $E = 0$): (a) the level of interdependence, (b) the number of groups, (c) the rate of imitation, and (d) innovation. The figures referenced in the following are available in the Online Appendix.

First, we examine the implications of varying levels of interdependence across practices. In our baseline model, the level of interdependence is held constant at $k = 5$. Here, we examine interdependence at levels ranging from $k = 2$ to 10 (Figure A1). The literature suggests that moderate levels of interdependence reflect many real-world problems (Kauffman, 1993). The challenge of imitating practices increases at higher levels of interdependence. Nonetheless, the basic tenet of our argument, that mix-and-match imitation is less effective than is typically expected, is robust to a broad range of interdependence conditions.

Second, we examine the performance results for industries that differ in the number of groups, G, holding the number of firms fixed at $F = 200$. In our baseline model, the number of groups is fixed at $G = 20$. Here, we examine the number of groups ranging from $G = 2$ to 20 (Figure A2). A decrease (increase) in the number of groups reflects an increase (decrease) in group size. If the industry consists of two large groups of 100 firms, then copy-the-best is superior. The strength of mix-and-match is realized when the industry consists of a sufficiently large number of groups that allows this strategy to create reservoirs of diverse knowledge across different groups. Thus, when G is smaller, mix-and-match imitation tends to be ineffective under a broad range of observability conditions.

Third, we develop an additional set of simulations to examine sensitivity to the rate of imitation. In our main models, we set and hold the imitation rate at $p = 0.3$. Here, we examine p ranging from 0.1 to 0.7. Recall that the imitation rate reflects the fraction of practices imitated in each period. Thus, $p = 0.7$ would imply that 70% of practices are imitated in each and every period (we believe that this level is unrealistically high). Figure A3 shows that as the imitation rate increases, average performance declines (Fang et al., 2010; March, 1991; Posen et al., 2013). More generally, the results show that our conclusions regarding the merits of the alternative imitation strategies are not very sensitive to changes in the imitation rate.

Finally, firms not only imitate their rivals, but also, from time to time, change existing practices without knowing the potential effect on performance. To model such trial-and-error innovation, we add a tunable parameter q, which represents the probability that, after imitating, a firm changes an existing practice in a given period. In our baseline results $q = 0$. We examine the performance implications for $q > 0$. For example, if $m = 100$ and $q = 0.01$, then, on average, a firm will change one practice per period (i.e., 1 to 0 or 0 to 1). The results (Figure A4) show that when q is very small ($q = 0.005$), innovation experiments introduce diversity that is, on average, performance-enhancing, and the copy-the-best strategy exhibits superior performance across all observability conditions. In contrast, when q is large ($q = 0.1$), innovation experiments are deleterious. This reflects the well-known “error catastrophe” in the literature on evolutionary biology (Kauffman, 1993). Finally, when q is moderate ($q = 0.01$), the range of observability over which mix-and-match is superior to copy-the-best increases (relative to the baseline case of $q = 0$). Mix-and-match outperforms copy-the-best when $\beta < 0.4$, although overall performance is reduced. Trial-and-error innovation may introduce some bad practices. As was the case in our discussion of environmental heterogeneity, mix-and-match is a conservative strategy, seeking to imitate the commonalities among leading firms, and thus is less punished by bad practices introduced by trial and error innovation.

5 | DISCUSSION

Imitation is a core concept in strategy research not only because of the centrality of imitation deterrence (Barney, 1991; Caves & Porter, 1977; Lippman & Rumelt, 1982; Rumelt et al., 1991) for understanding competitive advantage, but also because imitation is a pervasive activity by which firms seek to narrow the performance gap with leaders (Alchian, 1950; Nelson & Winter, 1978, 1982). In the broader strategy literature, the resource-based view (RBV) has made imitation a central theoretical construct (e.g., Barney, 1991; Wernerfelt, 1984; Wibbens, 2019). A firm's job, given that it has valuable rare resources, is to protect them from rivals' imitative attacks, by using, for example, intellectual property rights, secrecy, complementary assets, and so on. Yet, RBV studies on how to deter imitation have often omitted the essential details of how imitation actually takes place and its effect on performance. In this paper, we examine the comparative efficacy of alternative imitation strategies.

In early theoretical work on evolutionary economics, Nelson and Winter (1978) formalize imitation dynamics as what we now call the copy-the-best strategy. Using this strategy, an imitator identifies the best-performing firm among those directly observable and then copies a subset of this target firm's practices. Subsequent strategy research follows in Nelson and Winter's footsteps by treating copy-the-best as an archetypal imitation strategy (Csaszar & Siggelkow, 2010; Ethiraj et al., 2008; Lenox et al., 2006; Posen et al., 2013; Posen & Martignoni, 2018; Rivkin, 2000). On the other hand, in his seminal work on evolutionary economics, Alchian (1950) envisions and describes, but does not formalize, another archetypal imitation strategy, in which imitators seek to identify practices that are commonly observed among leading firms, mixing and matching these common practices as a means of enhancing their own survival. In the practitioner literature, the latter strategy has received substantial attention under the label "benchmarking," which has become a common buzzword, whereas in the strategy research literature, the former strategy has garnered the most attention. Thus far, few studies have tried to bridge the two disparate literatures, although doing so may substantially enrich our understanding of imitation strategies. To fill this gap, we take an early step in developing a contingency theory of imitation by building formal models of these two archetypal imitation strategies and examining their comparative efficacy.

We consider two contingencies that are salient in the context of imitation. The first is the environmental heterogeneity of an industry, which reflects the extent to which firms in different groups operate within different performance landscapes. The second contingency is the observability structure of an industry, which defines who can observe and imitate whom within that industry.

When environments are heterogeneous such that performance landscapes are dissimilar for different groups of firms, our analysis shows that the mix-and-match imitation strategy is superior. Environmental heterogeneity presents a challenge to an imitator who wishes to improve its performance via copying its rivals because the practices that are good for firms in one group may be bad for firms in another. A firm pursuing copy-the-best imitation is more likely to copy firms in other groups whose performance landscapes are dissimilar. Mix-and-match imitation is much less prone to this kind of mistake because firms engaging in this strategy are more likely to copy rivals within their groups. Firms engaging in mix-and-match imitation thus tend to ignore the practices of boundary-spanning rivals in their groups, and, consequently, are less likely to imitate inappropriate practices from other groups.

When environments are homogeneous such that all groups of firms operate within the same performance landscape, our analysis shows that the mix-and-match imitation strategy is less effective than the copy-the-best imitation strategy under a wide range of observability conditions. Imitators employing the mix-and-match strategy focus attention on the practices that are common to high-performing firms. Such imitators tend to "jump on the bandwagon"—the more common a practice is among higher-performing firms, the more likely it is to be imitated. This bandwagon process, over time, leads to rapid convergence on an ever-narrower set of common practices, with no guarantee that they will be good practices. We find that this process undermines the efficacy of the mix-and-match imitation strategy. In contrast, the copy-the-best imitation strategy is largely immune to this bandwagon problem because practices of the best target are more likely to be selected for imitation, regardless of how common they are. Moreover, copy-the-best imitation is more receptive to boundary-crossing, meaning that an imitator is more likely to copy the practices that exist outside its own local group. This distinctive feature makes the copy-the-best strategy more effective, particularly when some good practices are only available across group boundaries.

Our results have managerial implications. Mix-and-match imitation, popularly known as benchmarking, is pervasive in practice. It is often believed to be an effective means of enhancing firm performance, and the popular press is replete with how-to books on the subject. Our study suggests that this belief may be wrong under some industry conditions: when all firms in an industry can observe all others globally or when the industry consists of balkanized small groups of firms with imitation confined largely within each group. Under these conditions, the efficacy of benchmarking is likely to be undermined by fads, fashions, and bandwagons that overemphasize practices common to leading firms. One example suggestive of the dangers of benchmarking is highlighted by Adler (1999). In the 1980s and 1990s, downsizing was popular. When leading firms seemed to benefit from downsizing, laggard firms followed suit by imitating popular downsizing practices, which include cutting layers of middle management. Adler (1999, p. 36) noted that "…many firms have discovered that these layers of middle management are often the repository of precious skills and experience. Only after they have been cut by downsizing programs is their loss recognized—and sorely regretted."

The limitations of our study reflect the need for future research. First, as an early step in developing a contingency theory, we focus on the two archetypal imitation strategies and examine their comparative efficacy under the two environmental contingencies described above. There may well be many other important contingencies that affect these imitation strategies positively or negatively. In addition, future research may identify and examine other imitation strategies. We believe there are ample opportunities for future research to extend our work and to move toward building a more comprehensive contingency theory of imitation strategies.

Second, we make some general assumptions about the observability structure of industries. Given the paucity of empirical work on this topic, we employ and build upon the idealized topological assumption developed by Watts (1999). We recognize that this topological assumption is, at best, a first approximation. We believe that there are promising research opportunities associated with identifying the specific features of observability within industries. More detailed data on realistic observability structures will stimulate further empirical work on imitation. Moreover, it will facilitate future theoretical work that will sharpen our understanding of imitation dynamics and the efficacy of alternative imitation strategies.

In sum, imitation is a pervasive business practice. Yet the comparative efficacy of alternative imitations strategies remains poorly understood. While this paper represents a first step in addressing this gap, we believe that substantial opportunities exist for future research to further advance our understanding of imitation strategies.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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