

Revisiting the Assumption of the Expropriative Effect of Imitation: The Generative Effect of Imitation in Strategy Theory

Summary:

Imitation impacts inter-firm heterogeneity through two pathways - the expropriative effect and the generative effect. While the former makes the imitator more similar to the target, the latter refines innovative practices by recombining them. This work aims to investigate the generative effect of imitation using an NK model and explore how shaping and exploration can disrupt competitors' advantage and provide opportunities for imitators to explore. The findings can help managers develop effective strategies to deal with imitators and policymakers to understand the impact of imitation on competition.

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Introduction

Imitation has been a central construct in strategy as it is assumed to diminish interfirm performance heterogeneity within an industry. This assumption is based on the logic that imitated practices act directly to make the imitator more similar to its target, leading to the expropriative effect of imitation (Posen et al., 2023). However, this logic is incomplete because imitation also acts indirectly through its recombination effect, which refines innovative practices by recombining them (Csaszar & Siggelkow, 2010).

Moreover, the imitation processes are necessary to fill gaps among non-observable practices and refine the imitated practices for effective functioning. Therefore, we argue that imitation impacts inter-firm heterogeneity via a second pathway, which we call the generative effect of imitation. This effect occurs because the process and outcome of imitation processes (learning) is conditioned by the early imitated practices.

This research aims to revisit the assumption of the expropriative effect of imitation and investigate the generative effect of imitation in strategy theory. Using an NK model, the study aims to examine how imitation impacts inter-firm heterogeneity and how social learning can influence the generative effect of imitation. The research also aims to explore how shaping and exploration can disrupt competitors' advantage and provide opportunities for imitators to explore.

The findings of this study have significant implications for managers and policymakers. They provide a better understanding of the impact of imitation on inter-firm heterogeneity and help managers develop effective strategies to deal with imitators. The findings also provide policymakers with insights into the impact of imitation on competition and inform the debates on policies that promote innovation and protect intellectual property rights. Overall, this study will contribute to the development of a more nuanced understanding of imitation and its impact on inter-firm heterogeneity in strategy theory.

Methods

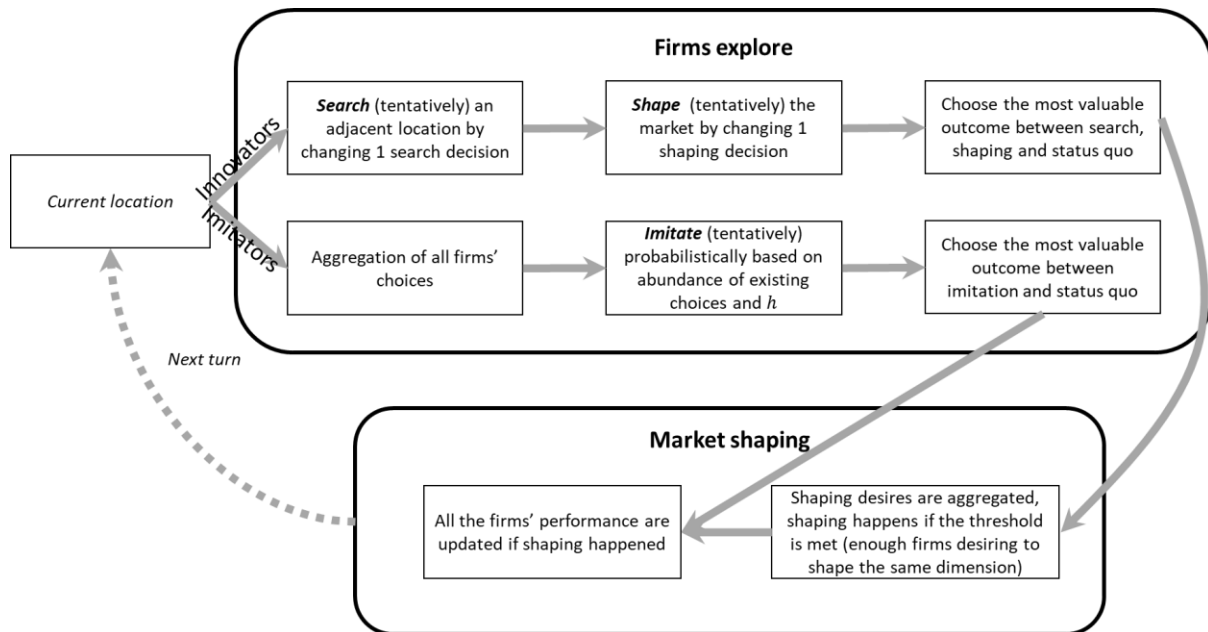
The competitive environment is represented by the NK model (e.g., Lenox et al., 2006; Sharapov & Ross, 2023). In contrast to the conventional NK specification, a firm's decision space has $N + Z$ dimensions. In this space, N dimensions are the standard decisions of the conventional NK model of search: when a firm makes any one of these N choices, its performance can increase or decrease, but the overall payoff function remains unchanged. Let us call them "search" dimensions. Following the model developed by Gavetti and colleagues (2017), when a firm makes any of the remaining Z decisions, the payoff function changes for all firms. Let us call them "shaping" dimensions.

We categorise firms into *innovators*, who **search** and **shape** the environment, and *imitators*, who **imitate** the most salient features observed among the firms. **Searching**, innovators engage in the standard local search used in the NK literature (Levinthal, 1997). Without interdependence between the decisions, innovators can eventually find the best position, but when the number of interdependences grows, local search makes it more likely for an innovator to be trapped on sub-optimal positions with no adjacent improvements available. **Shaping**, innovators have access to Z additional dimensions which do not have a performance of their own but influence the performance of the N dimensions based on parameter E , i.e., the number of shaping interdependences. To control for the ability of innovators to shape the environment, we introduce a threshold parameter $t \in [1, I]$ with I being the total number of innovators. The logic of the threshold is that shaping, i.e., modifying one of the shaping decisions, can only happen if a group of firms equal or superior

to the threshold is willing to shape a given decision. This can be related to the degree of legitimation required for shaping to happen on a market, moving from either the action of a single firm to or the shared, yet uncoordinated, choice action of a group of firms (Gavetti & et al., 2017). If more than one decision reaches the threshold, the shaping decision is chosen at random among the decisions reaching the threshold

Imitation involves copying the most common decision values among firms (see Haunschild & Miner, 1997, for a justification of this “frequency-based imitation”): for instance, if 80% of the firms have adopted the value 0 for their decision 1, an imitator will have a 80% probability to imitate the value 0, and 20% probability to imitate 1. To control for the imitation effort, each firm will face the probability $h \in [0,1]$ when trying to imitate a decision. For instance, if $h = 1$, firms can imitate any decision based on the salience discussed above, however if $h = 0.05$ firms would only imitate 5% of the decision values on average, thus influencing how many decisions can be copied in each attempt (Csaszar & Siggelkow, 2010). The imitation strategy may result in maintaining the status quo on a particular decision if a firm already uses that value.

The figure below summarizes the simulation process.



Analysis

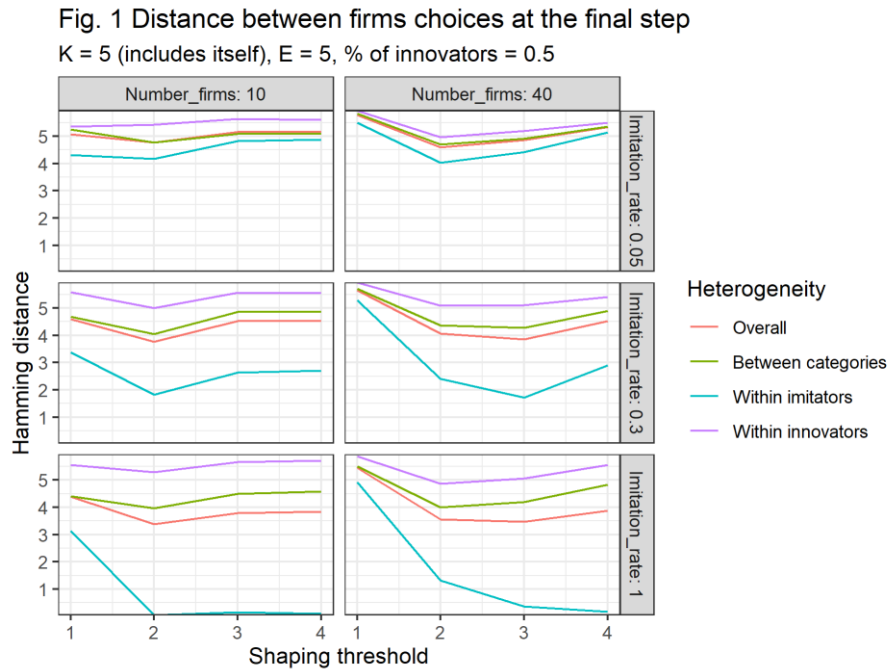
We employ the model to analyse the effects of imitative entry on inter-firm heterogeneity. Table 1 summarizes the model parameters and their default values following Gavetti et al. (2017). To reduce the stochastic effect of each environment, we repeated the simulations 50 times with different random conditions. The simulation lasts 1000 steps, until firms have typically converged to stable positions. In the first section, we examine how the ability of firms to imitate impacts the heterogeneity of the set of strategic decisions accounting for different shaping thresholds that reduce the innovator capacity to change the landscape for its benefit. In the second section we drill down to identify the implication on average performance and, finally on the performance heterogeneity.

Table 1 - Simulation variables and parameters

Parameter	Range	Default values	Description
F	$1 \leq F \leq \infty$	{10,40}	Number of firms
N	$1 \leq N \leq \infty$	12	Search dimensions: Dimensionality of the firm's set of decisions
Z	$1 \leq Z \leq \infty$	12	Shaping dimensions: Dimensionality of the industry's set of policies
K	$1 \leq K \leq N$	5	Complexity of the firm's set of decisions
E	$0 \leq E \leq Z$	5	Interdependencies between the search and shaping dimensions
h	$0 < h \leq 1$	{0.05;0.3;1}	Imitation effort: ability of imitators to replicate a decision
r	$0 < r < 1$	{0.2;0.5;0.8}	Number of innovators relative to the overall number of incumbents
T	$0 < t < I$	[1,4]	Shaping threshold ($I = r \times F$)

Effects of shaping thresholds on Inter-firms' decision heterogeneity

Imitation has the potential to reduce strategic diversity, as imitators tend to replicate the decisions made by most firms in a stable environment. The adoption of strategic decisions that are more widely adopted leads to a convergence of decision-making among imitators. However, in our model, coordination towards a focal decision is constrained by two factors: (a) the stability of policies used to evaluate strategic decisions, and (b) the ability of firms to implement a decision. When the Z policies change rapidly ($T = 1$), as shown in Figure 1, imitation has a limited impact on the heterogeneity of decisions. As market performance can rapidly change, imitators find little value in quickly outdated social information. Even with rapid imitation, the heterogeneity between imitators is only slightly lower than that of innovators. Comparing this result across populations of different sizes reveals that the presence of imitators does not necessarily reduce social influence in a turbulent environment.



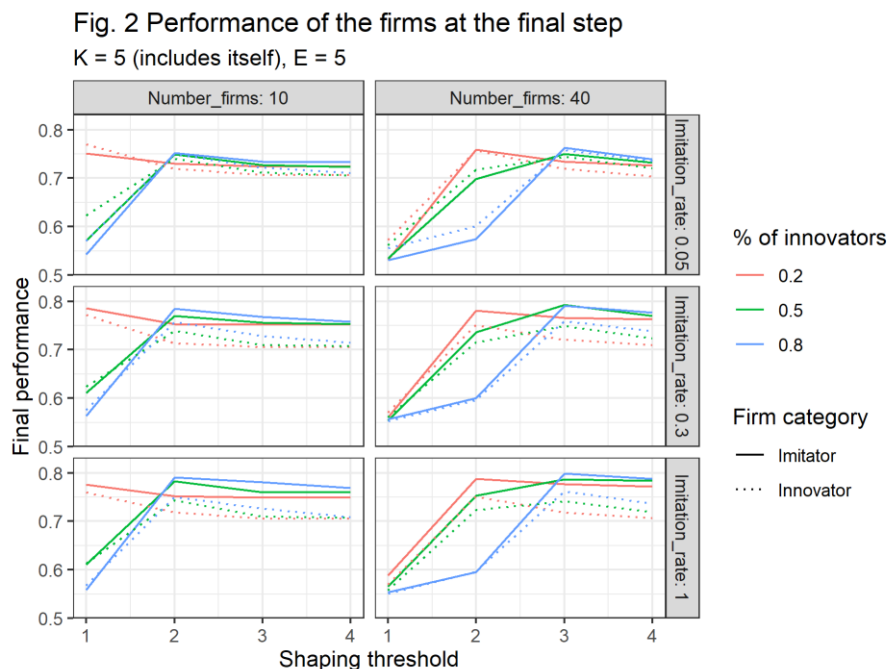
The phenomenon is accentuated by innovators who may not have the incentive to explore new decisions and prefer to shape the environment by focusing on policies that improve the fitness of their current set of decisions. This competitive environment impedes the development of a common set of practices, forcing imitators to continuously explore novel, often outdated, set of practices.

However, when $T = 2$, innovators need the support of at least another innovator to avoid wasting their shaping efforts. These constraints improve the effectiveness of imitation in identifying a stable and valuable set of decisions, which demonstrates a dramatic reduction in heterogeneity. Additionally, the ability of firms to converge towards a similar set of decisions increases as the level of imitation ability improves.

Contrary to expectations, $T > 2$ does not increase convergence around a single set of decisions but instead stabilizes or increases the final level of heterogeneity over the set of adopted decisions. As shaping becomes less likely, imitators have more time to explore alternative combinations of existing features and imperfect imitation can provide the generative capacity to explore different sets of possible combinations.

Effects of shaping thresholds on innovation and imitation performance

When $T = 1$, innovators' shaping is more likely to happen. This causes an increase in the Z policy dimensions' rate of change that affects the entire population's performance, reducing the imitation strategy's effectiveness in surpassing the innovator's strategy (yet made easier by a higher level of imitation rate) (Fig.2: bottom left/right; middle left/right). However, imitators cannot overtake innovators because the constantly changing landscape disturbs the imitator's repertoire without consistent logic. The imitator's success lies in its ability to parasitically exploit the learning of innovators' strategies. However, this relationship's parasitic nature prevents it from completely excluding other strategies (Hoppitt & Laland, 2013). Therefore, firms are said to engage in "Red Queen competition" (Barnett & Hansen, 1996), which is the continuous and escalating activity of firms attempting to maintain relative fitness in a dynamic system, improving as fast as they can to stand still relative to competitors.

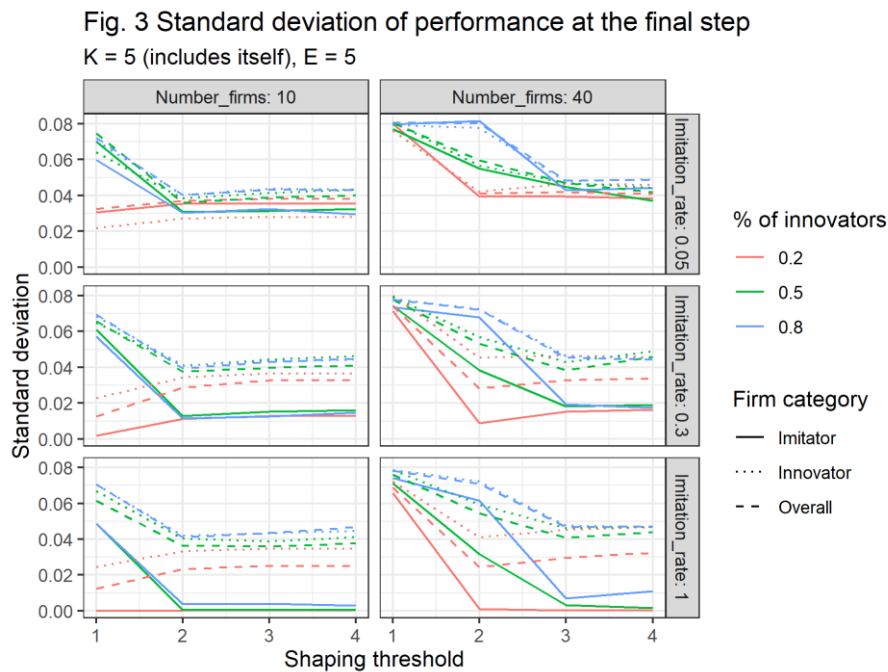


When $T = 2$, there is a notable shift in results. All firms experience an increase in performance, particularly when the number of innovators diminishes. In this scenario, imitators exhibit slightly superior performance to innovators, if they imitate at higher rates. This demonstrates that imitation has the potential to produce a repertoire of decisions with greater payoffs than those generated by innovators. In contrast to prior findings, our observations indicate that a higher imitation rate, which involves near-perfect imitation of

widely diffused repertoires, can lead to the preservation of good attributes in the industry, thereby ensuring sustained performance. However, when firms engage in imperfect imitation, the average performance decreases considerably, which could hinder the identification and diffusion of good attributes in underperforming firms, leading to the performance gain (Posen et al., 2013).

Effects of shaping thresholds on Inter-firms' performance heterogeneity

Figure 3 shows how the standard deviation of performance changes. We have seen that as inter-firm imitation proceeds, firms come to resemble one another and the extent of diversity declines (Figure 1). The results of examining diversity, however, do not fully explain the results of long-run imitators' performance. As shown in Figure 2, the imitators perform worst when $T = 1$. However, the results in Figure 1 demonstrate that under this condition we observe the largest quantity of diversity. Thus, diversity in the industry does not always serve to enhance performance. Why does diversity fail to fully explain the long-run performance of the industry? We suggest that diversity is contingent on the shaping threshold T 's level.



Our results show that at a low shaping threshold's level the population of rational imitators can preserve many incorrect decisions that over time displace correct decisions. In contrast, as the level of t increases, the valuable decisions of the shaping firms diffuse widely. This drives out all attributes of laggard firms not held by the shaping firms, even though some of those attributes may be useful. Therefore, imitators benefit from coordination of shaping effort for two reasons: a) as it slows down the rate of environmental change, and b) as it provides shapers the time and opportunities to explore novel repertoires of decisions for the new policy environment.

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