

## RESEARCH ARTICLE

# Strategic responses to shocks: Comparative adjustment costs, transaction costs, and opportunity costs

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**Research Summary:** Shocks, whether they derive from shifts in demand, supply, regulation, or innovation, can create the need for competitive repositioning by industry participants when they disrupt established sources of competitive advantage. Such situations can therefore create a canonical strategic problem: whether, where, and how to (re-)position following an industry shock. In this paper, we explore the role of comparative adjustment costs in determining competitive advantage in dynamic environments. In so doing, we synthesize contributions from Penrose, Porter, and Williamson to conceptualize the relationship between adjustment costs and related concepts such as resources/capabilities, dynamic capabilities, transaction costs, and opportunity costs.

**Managerial Summary:** Whether, where, and how should leaders reposition their firms in response to industry shocks? This paper develops a framework to guide leaders charged with making these decisions. The framework emphasizes that firms facing an industry shock must: (a) assess their firm's cost and time to move to each new position, and compare that cost and time to rivals' costs and time to move to those same positions; (b) compare the cost of delaying repositioning (such as forfeiting first mover advantage) to the profits from remaining in its original position, and (c) consider that, in order to speed repositioning, the efficient choice may be to temporarily accept certain hazards from outsourcing, and later integrate to eliminate those hazards. We illustrate the framework using an example from the smartphone industry.

**KEYWORDS**

comparative adjustment costs, innovation shocks, opportunity costs, strategic responses, transaction costs

## 1 | INTRODUCTION

A central tenet of the strategy literature is that gaining and sustaining competitive advantage requires a firm to establish a defensible market position, creating and capturing value through product/service differentiation and/or cost leadership (Brandenburger & Nalebuff, 1996; Porter, 1980). A firm's choice of strategic position is highly consequential because it typically requires investments in inter-related and cospecialized resource profiles or activity systems, including assets, capabilities, and knowledge, which are costly and time consuming for others to imitate (Ghemawat, 1991; Nickerson, Hamilton, & Wada, 2001; Porter, 1996). The literature emphasizes that such investments represent commitments (Ghemawat, 1991) that make repositioning difficult because asset redeployment is costly (Capron & Hulland, 1999), the level of asset specificity is high (Williamson, 1985), exit barriers are significant (Oster, 1999), or organizational inertia is present (Hannan & Freeman, 1984). Yet while Caves and Porter (1977) and Porter (1985) emphasized the difficulty of repositioning, today's economy increasingly requires such repositioning (Garcia-Sanchez, Mesquite, & Vassolo, 2014). With a few exceptions, however, strategy scholars have paid little attention to developing a theory of how these "adjustment costs" affect choices regarding whether, where, and how to (re-)position.

This paper lays foundations for such a theory by building on Argyres, Bigelow, and Nickerson (2015)'s conceptualization of *comparative* adjustment costs; the notion that a firm responding to an innovation shock chooses from among strategies of imitation, differentiation, exit, and entry based on comparing its own cost of adjustment for each of these alternatives to rivals' adjustment costs for the same alternative. This concept aims to better capture the reality that competition is fundamentally relative (Barnett & Hansen, 1996; D'Aveni, 1994). We use the concept of comparative adjustment costs to develop propositions regarding how and when firms will reposition following a shock in their industry.

Firms are often triggered to reposition when an industry in which they compete experiences a demand, supply, innovation, or regulatory shock (Porter & Rivkin, 2000; Wang & Shaver, 2014). For example, trade barriers may fall, generating new demand (Hennart & Park, 1994); a new source of raw material supply may be discovered (Amit & Zott, 2001); a rival may introduce a "hit" new product, such as the iPhone, IBM personal computer, or Model T automobile (Argyres et al., 2015; Zahra & Bogner, 2000); or a government may impose restrictions or tariffs on a firm's key input (Luo & Tung, 2007). These kinds of shocks may induce a firm to reposition to maintain parity, gain advantage over rivals, or simply survive (Rumelt, 1984). Responding to a shock also requires a firm's leaders to decide where and how to reposition based on an assessment of its own adjustment costs relative to rivals' adjustment costs (e.g., Argyres et al., 2015). While repositioning may also occur in response to gradual environmental changes, the problem of repositioning in response to a shock puts adjustment costs into high relief, and is thus a useful "laboratory" in which to conceptualize them.

Our framework emphasizes the importance for firms of assessing their own adjustment costs in comparison to rivals' adjustment costs relative to various strategic positions that become available following a shock, but also assessing opportunity and transaction costs. The framework consists of a three-step process for assessing these three types of costs. A process approach is needed because the emergence of new positions in response to a shock is context specific. Following this approach, we derive our first proposition regarding how repositioning choices are contingent on comparative adjustment costs. Next, we incorporate the fact that the benefits of a repositioning move also matter, in addition to comparative adjustment costs. We therefore consider a key tradeoff between adjustment costs, transaction costs, and a specific set of opportunity costs. Namely, we suggest that adjustment

costs can be reduced at the expense of higher transaction costs. However, this tradeoff is justified only when the opportunity costs of moving late to a new position substantially exceed the opportunity costs of moving early from the position established prior to the shock. This tradeoff is described in our second proposition. Finally, we theorize that balancing the tradeoffs among adjustment and transaction costs may require initially adopting a misaligned governance mode, and later, as repositioning is accomplished and competitive pressures increase, realigning organization arrangements to economize on transaction costs. Our third proposition predicts the dynamic adjustment of organizational arrangements by firms that, because of opportunity costs, initially traded off higher transaction costs for lower adjustment costs. Hence, managers must consider comparative adjustment costs, opportunity costs of repositioning early versus late, and transaction costs in determining whether, when, and how to reposition in response to a shock.

We believe that this paper is the first to directly connect three major influences in the Strategic Management field, namely, Porter's (1985) (re-)positioning view, Penrosean adjustment costs, and Williamson's comparative institutional analysis. We further believe that many in the strategy field think of the works of Porter, Penrose, and Williamson in "silos" based on each theory's canonical problem (i.e., firm positioning, adjustment costs in the growth of the firm, and vertical integration/existence of the firm, respectively). One way our paper creates value is by moving the strategy field forward by providing connections among (a) repositioning, (b) adjustment costs, and (c) comparative analysis.<sup>1</sup>

The paper continues as follows. First, we explain how our approach differs from, and contributes to, the prior literatures in economics and strategy that bear on adjustment costs. Next, we introduce our comparative adjustment cost framework and offer three general propositions concerning the relationship between shocks, repositioning, comparative adjustment costs, transaction costs, and opportunity costs. Following our propositions, we develop an illustration from the recent history of the United States smartphone industry to illustrate the utility of our framework, as well as to highlight areas for future conceptual development.

## 2 | BACKGROUND

The term "adjustment costs" gained prominence in the macroeconomics literature, in which it refers to the costs a firm incurs from changing the quantity of its production output in response to changes in demand and/or input prices (Lucas, 1967). Such costs can include those associated with purchasing, installing, and learning how to use new capital equipment (e.g., Cooper & Haltiwanger, 2006), and costs associated with hiring, firing, and training workers (e.g., Rubin, 1973) in order to increase or decrease production. We use the term "adjustment costs" to represent changes in the nature of what the firm produces, rather than simply to changes in output quantity. We broaden the concept of adjustment costs in this way because in order to reposition itself in the industry vis-à-vis competitors, a firm typically must change key characteristics of the goods or services it produces to better compete based on differentiation or cost. Consistent with the traditional concept, the adjustment costs incurred in repositioning processes may involve costs associated with the redeployment of capital and/or labor inputs (Hamermesh & Pfann, 1996; Madhok, Keyhani, & Bossink, 2015; Sakhartov & Folta, 2014).

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<sup>1</sup>We thank Alfonso Gambardella for pointing out that, whereas the economics discipline typically focuses on equilibria, our theory is one of explaining and predicting what will happen during disequilibrium. Therefore, following Penrose's seminal contributions concerning the concept of "adjustment costs" and *disequilibrium* analysis (1959:5), our paper moves beyond the neoclassical firm as a black box and posits that in response to an innovative shock, strategic firms consider *comparative* adjustment costs when *repositioning* in their transition toward a new equilibrium. The strategy field is expressly interested in understanding such managerial processes.

However, they may include costs from other sources as well, such as from changes in organizational capabilities, assets, and knowledge, and from difficulties associated with overcoming managers' mental models (e.g., Tripsas & Gavetti, 2000).

The strategy literature has investigated the costs of obtaining new resources for growth in a given business, and the costs of moving them to new lines of business (Hatch & Dyer, 2004; Helfat & Eisenhardt, 2004; Kor & Leblebici, 2005). Organizational barriers to repositioning include core rigidities (Leonard-Barton, 1992), limited internal communication channels (Henderson & Clark, 1990), and social pressures as emphasized in population ecology (Hannan & Freeman, 1984). However, these theories either do not link the costs they examine to repositioning in response to shocks, or do not develop a *comparative* assessment of adjustment costs faced by different firms in the same industry (following the same shock) in relation to multiple repositioning alternatives, or both.

Perhaps the strategy literature that has come closest to the notion of comparative adjustment costs associated with responses to shocks is that on dynamic capabilities (Teece, Pisano, & Shuen, 1997), in which decisions about (re-) positioning and dynamic capabilities are intimately linked (Pisano, 2017). Dynamic capabilities are associated with first recognizing valuable new opportunities, and then adaptively seizing them by orchestrating, reconfiguring, and upgrading the firm's asset base (Helfat et al., 2009). Differences in dynamic capabilities are thought to underpin differences in firm performance and competitive advantage in dynamic environments. The kinds of comparative adjustment costs treated in our framework are, in a sense, the obverse of dynamic capabilities; they describe the barriers or costs that firms face from reconfiguring or upgrading their capabilities, assets, and knowledge bases. We suggest that such costs, even if they are difficult to measure precisely, are nevertheless often easier for leaders to identify (in their own firm or in a rival firm) than dynamic capabilities themselves. We also suggest that by incorporating the notion of repositioning in response to shocks, comparative adjustment costs can be pinned down more precisely than can dynamic capabilities, which have proven difficult to operationalize (e.g., Arend, 2015).

Many strategy scholars have used terms that are related to adjustment costs and repositioning but are not equivalent to comparative adjustment costs. These terms include asset specificity (Williamson, 1985), isolating mechanisms (Rumelt, 1984), commitment (Ghemawat, 1991), exit barriers (Oster, 1999; Zajac & Olsen, 1993), and mobility barriers (Caves & Porter, 1977). Each of these terms reflects adjustment costs or their sources in some way (Capron & Hulland, 1999: p. 45). However, the literature using these terms does not develop a *comparative* assessment of a firm's costs of repositioning relative to those of its rivals. Instead, these concepts are measured in either absolute terms (e.g., the degree of asset specificity or commitment, height of exit barriers, etc.) or reflect costs of moving from one industry or competitive position to another without reference to rivals' costs. Moreover, uses of these terms do not encompass important concepts from the strategy and organization theory literatures such as mental models, limited internal communication channels, organizational inertia, so forth. Our notion of comparative adjustment costs is meant to offer a broader conceptualization of the full range of costs involved in repositioning.

The most recent contribution to the strategy literature that bears on adjustment costs is by Menon and Yao (2017), who analyze what they call "repositioning costs" using a game-theoretic model. The model is based on a three-period, extensive-form game played by an innovator, who chooses between a generous and stingy licensing strategy, and a single follower who chooses to license from, or imitate, the innovator. Two types of repositioning costs—distance-based and time-based—reduce the players' payoffs in different ways. A key result of the model is that, counterintuitively, a follower's profits may be greater if its repositioning costs are higher. This result occurs because such costs

commit the follower not to imitate in later periods, giving the innovator an incentive to license generously in the first period.

The analysis by Menon and Yao (2017) is an important one, yet the simplifications required by game-theoretic modeling make it difficult to arrive at a broader and comparative conceptualization of adjustment costs. Accordingly, we build upon Menon and Yao (2017) by considering more complex situations of multiple firms (which could be followers of an innovator) choosing among multiple positions. In addition, we consider the possibility that adjustment costs can be manipulated to some degree due to choices made by the firm—that is, they may not be entirely exogenous as in Menon and Yao (2017). In particular, we account for the possibility that adjustment costs can be reduced in the short-run by outsourcing. However, we also recognize that outsourcing may pose the kinds of contractual risks emphasized in the literature on transaction costs (e.g., Williamson, 1985). Thus, our framework seeks to clarify the interactions between adjustment and transaction costs—an interaction not addressed in Menon and Yao (2017).

In summary, our framework contributes to the literature by offering a new conceptualization of the notion of comparative adjustment costs—a conceptualization recognizing that understanding which firms will survive and thrive following a shock requires understanding whether, where, and how these firms' adjust to various competitive positions opened up by the shock, compared to rivals' adjustment costs.<sup>2</sup> Moreover, understanding relative firm performance following a shock also requires understanding how firms trade off adjustment and transaction costs. Finally, these adjustment and transaction costs must be compared to the payoffs associated with moves to various new positions—payoffs that we conceptualize in terms of opportunity costs. Therefore, our comparative adjustment cost framework combines Porter's (1985) (re-)positioning, Penrose's (1959) adjustment costs, and Williamson's (1985) comparative approach. While the prior literature addresses individual elements of our framework in various ways, no contribution examines their interactions in a comprehensive way. We maintain that this synthesis deepens our understanding of strategy, and suggests new insights and avenues for further development.

### 3 | COMPARATIVE ADJUSTMENT COST FRAMEWORK

#### 3.1 | Shocks

We begin the development of our framework by defining and identifying alternative kinds of “shocks.” We conceive of shocks as important changes in a firm's environment that are largely outside of its control, and that other firms (e.g., rivals, suppliers, or complementors) may have helped to cause. Shocks can occur from rapid changes in demand, supply, innovation, or regulation, and can make a substantial impact on the structure of a market (Garcia-Sanchez et al., 2014; Porter & Rivkin, 2000). Perhaps the most common type of shock is associated with innovation. Innovation in new products or services by an innovator—such as the iPhone, IBM personal computer, or Ford Model T—can transform markets by simultaneously affecting demand, supply, incumbents, and potential entrants. However, innovation shocks are not simply a type of demand or supply shock because, whereas a demand or supply shock affects price and quantity in a given market, an innovation shock transforms the fundamental nature of that industry (e.g., the industry definition). All types of shocks

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<sup>2</sup>Following the extant resources/capabilities approach, a firm's stock of resources and capabilities is at the heart of a firm's competitive positioning, rather than the firm's particular current product market positioning (Dierickx & Cool, 1989; Wernerfelt, 1984).

usually affect most firms in an industry, although the effects on different incumbents may be highly unequal in their severity.

In many cases, the occurrence of a shock quickly becomes common knowledge, as would usually be the case for a reduction of trade barriers, a war that blocks access to raw materials for a long duration, or the passing of a new regulation. While the precise economic effects of such shocks may be uncertain, whether the shock occurred (or not) is generally known quickly. In other instances, the occurrence of a shock is uncertain because a consensus does not quickly emerge. For example, some market participants may anticipate that a new, innovative product will be a commercial flop (not a shock); while others might anticipate that it will be a commercial success (a shock). To resolve these issues, we define “innovation shocks” as innovations that experience immediate and rapidly accelerating demand (Argyres et al., 2015).

The suddenness and impact of a shock is relevant for our perspective because it creates a condition in which organizational leaders must explore and evaluate a host of strategic options that go beyond marginal adjustments of input and output quantities, and output price, in a given market. One definition of a shock implies that organizational leaders must engage in a reassessment of their firms' existing strategic positions, which precipitates a decision of whether or not to reconfigure an organization's resources, capabilities or activity system, thereby incurring adjustment costs.

### 3.2 | Strategic positioning

We adopt Porter's (1985, 1996) notion of strategic positioning as a firm's choice regarding the customer segment(s) it will serve, as well as its choices regarding how the segment(s) will be served with an activity system supported by capabilities, assets, and knowledge. A shock can affect strategic positions and the decision to reposition in two ways.

First, a shock may affect strategic positions within an industry by differentially affecting the return on investment of these positions but without altering customer segments. For example, the shock of a new tax on luxury vehicles may create an incentive for firms to change from their initial position to another existing position. Second, a shock, most commonly an innovation shock, may fundamentally devalue a firm's set of capabilities, assets, and knowledge by creating new positions, thereby disrupting the market and stimulating repositioning of many rivals (Tushman & Anderson, 1986). While useful for responding to the first shock, our framework is developed with the second and more challenging kind of shock in mind.

In deciding whether, where and how to reposition in response to a shock, we maintain that firms must assess the expected profitability of various positions postshock, and analyze their comparative adjustment costs associated with moving to each of those positions. These decisions are not mere automatic adjustments in which prices or quantities are adjusted on the margin, but rather can cause a change in a firm's entire strategic position. We first discuss these comparative adjustment costs, and then factors that affect the profitability of repositioning moves.

### 3.3 | Comparative adjustment costs

With the recognition of a shock, organizational leaders can begin to assess whether and where to reposition postshock. In contrast to minimum differentiation in geographic and product competition, which can be found in variations of the Hotelling model (see e.g., de Palma, Ginsburgh, Papageorgiou, & Thisse, 1985; Hotelling, 1929), firms may reposition quite differently because of comparative adjustment costs. The implications of comparative adjustment costs can be determined in a three-step process.

First, a firm must identify the various strategic positions to which it might move following the shock. At a high level, these positions are to imitate, differentiate, exit, or, if not currently an industry participant, enter (Argyres et al., 2015). At a lower level, many sustainable positions may be created by the shock. For incumbents, these new positions might be distant in product (or service) space from the firm's preshock position in the market. Some might be positions that existed in the market prior to the shock, while others might be new positions that the shock made possible. For example, with the introduction of the iPhone, which was an innovation shock, incumbents such as Blackberry, LG, Motorola, Nokia, Samsung, and Sony Ericsson were faced with the decision of whether and how to reposition. The main options were to: (a) imitate the iPhone by facilitating the development of software applications; (b) focus on low-functionality and low-cost cell phones (perhaps for sale in developing countries especially) so as to avoid direct competition with the iPhone; (c) focus on high-functionality and high-cost devices that leapfrog the iPhone<sup>3</sup>; or (d) exit the market (including remaining in its current position and eventually exiting: Cecere, Corrocher, & Battaglia, 2015).

Second, a firm must assess the costs and time that it will incur by repositioning from its current position to each of the possible post-shock competitive positions generated by the innovation shock. With the myriad potential sources and mechanisms of adjustment costs, firms must develop a business plan for assessing the costs and time associated with moving to each position. While developing such a plan may be costly and difficult to undertake, the details of which are beyond the scope of this paper, we nonetheless anticipate that each potential plan will assess costs and time with respect to assembling the additional and necessary capabilities, assets, and knowledge for each alternative position.

For example, consider barriers to successfully hiring the requisite employees or building/acquiring the requisite capabilities. Incumbent firms may be unable to offer the kinds of incentives or offer the kinds of environments needed to hire the desired employees, as discussed regarding governance inseparability (Argyres & Liebeskind, 1999). Time compression diseconomies may be at work (Dierickx & Cool, 1989)<sup>4</sup>: while an incumbent firm may be able to hire knowledgeable employees, these employees may require significant time to develop and apply the requisite knowledge in their new organizational setting (Kor, Mahoney, Siemsen, & Tan, 2016). In this case, the delay may make achieving parity or competitive advantage difficult or impossible. Repositioning may also require building new plants, acquiring another firm, entering new countries, or developing new brand identities or distribution channels, all of which also involve significant (repositioning) costs. In other cases, moving to a new position will involve investments that are smaller in scale and lower in complexity. Moreover, in still other cases, the major adjustment costs will involve selling assets (perhaps at a loss) that, for example, impose overhead costs on the firm in ways that inhibit it from moving to a low-cost position. Thus, following a shock, an incumbent firm's leader is responsible for assessing the levels of these kinds of adjustment costs that the firm would incur from moving to each of the positions in the consideration set—at least up to some approximation.

Third, organizational leaders must assess the costs and time that rivals—*incumbents and potential entrants*—will incur while repositioning from their pre-shock position to each of these same alternative competitive positions. As the focal firm is unlikely to have access to complete information with which to assess adjustment costs and time for rivals, leaders must resort to a comparative assessment:

<sup>3</sup>We simplify differentiation strategy alternatives to this dichotomous choice. More generally, differentiation strategies are multidimensional, and there are many (re-)positioning moves that a firm can take given the new market situation.

<sup>4</sup>Time compression diseconomies apply to the accumulation of any type of asset, including R&D, know-how, reputation, or physical capital. Indeed, 'conceptually, time compression diseconomies and the notion of 'strictly convex adjustment costs' in the theory of capital investment to which they are related express the same fundamental mechanism: the "law of diminishing returns" when one input, namely, time, is held constant" (Dierickx & Cool, 1989: p. 1507; Hawk & Pacheco-de-Almeida (2018)).

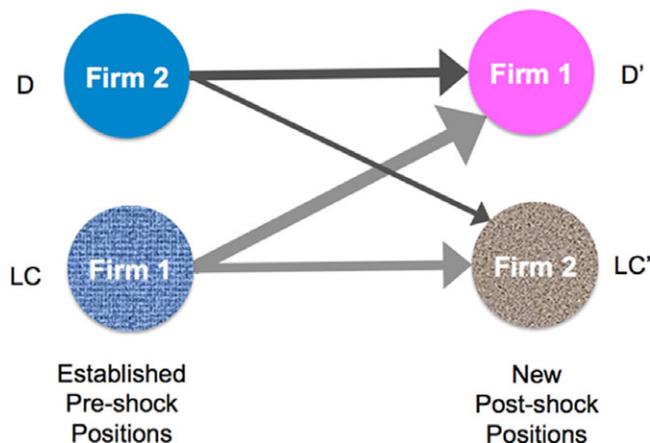
the focal firm's costs and timing are better or worse than rivals' with respect to repositioning to each alternative position. Such a comparative approach involves arriving at an ordinal ranking only, which requires substantially less information than a cardinal ranking. This comparative assessment is vital because most strategic positions support the long-run survival of only a limited number of firms, with only a few of these firms achieving any kind of competitive advantage. Ordinality offers a sufficient statistic for a first-order assessment of the likelihood of survival (and success) in various strategic positions. Furthermore, as we discuss below, rivals whose adjustment costs from moving from their current position to a new one are lower, and who can move faster than the focal firm to the same position, will have a cost and time advantage in the new position.

Perhaps surprisingly, this logic implies that a firm may not move to a position for which its own adjustment costs are lowest, because a rival's costs of moving to that position may be even lower; hence, our emphasis on *comparative* adjustment costs. For example, Figure 1 illustrates two firms considering repositioning from their pre-shock established positions (LC and D) to two alternative positions created by a shock (LC' and D'). The width of the arrow from a firm's initial position to each of the two new positions is indicative of the cost and time for moving, with thicker lines indicating more costly and longer adjustment. In this illustration, assuming all else equal, Firm 1 has lower adjustment costs for moving to position LC' compared to D'. However, Firm 2's adjustment costs from moving to position LC' are lower. In this example, Firm 2's better choice is to reposition to LC' and Firm 1's better choice is to reposition to D', all else equal. We thus propose:

**Proposition 1:** *All else equal, if a firm repositions in response to a shock, it will move to a position to which its adjustment costs are lower relative to rivals'.*

### 3.4 | Adjustment and transaction costs

As mentioned above, adjustment costs include the costs associated with acquiring needed (as well as disposing of unneeded) capabilities, assets, and knowledge to support repositioning. Such “strategic factors” might be “made” through vertical integration, “bought” by accessing the market, or organized through some type of “complex contracting.” Transaction cost economics (TCE) predicts that as resources become increasingly cospecialized, the economizing choice of governance of



**FIGURE 1** Categorization of various adjustment costs

these exchanges shifts from markets, to hybrids, to hierarchies. Although more hierarchical forms of organization are increasingly costly, governance costs are much greater if the governance mode is not selected in an economizing way to match the attributes of the underlying exchange (Williamson, 1996). Because strategic positions that yield competitive advantage often are based on cospecialization, transaction costs represent an important set of costs for firms to consider when repositioning.

Given the comparative assessment of adjustment costs outlined above, we submit that incumbents' leaders may be able to adjust faster to secure an advantageous repositioning of their choosing by lowering the upfront cost of adjustment in exchange for raising the ongoing costs of governance, at least for some period of time. Perhaps the most common scenario arises when, in response to a shock, an incumbent seeks to reposition faster than its rivals to a particular position, even though it believes that its comparative adjustment costs are relatively high. While the high level of asset cospecialization needed to support the target position indicates that vertical integration would be the efficient governance choice, the incumbent's leader may choose instead to outsource key capabilities, assets, and knowledge so that repositioning can occur faster. Outsourcing when cospecialized investments are needed typically results in higher transaction costs or lower value as the risk of ex post opportunistic economic holdup (Teece, 1986; Williamson, 1985) is factored into prices, or the supplier (exercising foresight) refuses to make the cospecialized investments needed to fully support the new position.

In other cases, repositioning may require generic inputs that are available on the market, but perhaps not immediately. An incumbent seeking to reposition quickly may thus choose to produce such inputs internally, raising its 'internal transaction costs' (also referred to as "bureaucratic" or "organizational" costs: e.g., Williamson, 1985). In either scenario, firms may trade off higher transaction costs from choosing an inefficient governance mode in order to lower adjustment costs and adjust faster.

This analysis implies that a firm that is incurring excessive transaction costs, such as severe recontracting and bargaining costs (Caves, 1980; Wernerfelt, 2016), may be doing so strategically in order to accelerate its adjustment—a key insight. The early auto industry provides an example of this tradeoff. As the industry was developing in the 1910s and 1920s, innovation shocks were frequent. The largest innovation shock was the introduction of the Model T (e.g., Argyres et al., 2015), but many other innovations were occurring continuously, such as advances in brakes, steering systems, transmissions, starters, engines, and the like. Argyres and Bigelow (2007) found that many firms during this period were misaligned in transaction cost terms; in particular, many firms were making engines that featured low asset specificity. One interpretation of this observation is that firms were attempting to keep their adjustment costs low, in anticipation of having to reposition in response to some new shock. Indeed, Argyres and Bigelow (2007) found that misalignment had a much smaller impact on a firm's likelihood of survival earlier in the period than later, when shocks were more incremental in nature. These findings are consistent with the possibility that firms do trade off higher transaction costs for lower adjustment costs when innovation shocks are frequent.<sup>5</sup>

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<sup>5</sup>Some might argue that adjustment costs are a subcategory of transaction costs. We maintain, however, that the two types of costs differ with respect to the unit of analysis at which they operate, and in the timing at which they are incurred. Thus, according to Williamson (1985), transaction costs arise at the level of the individual transaction, and are incurred after investments have been made in cospecializing a set of assets. Adjustment costs, however, arise at the level of the entire firm, and influence which transactions and attributes are chosen by leaders ex ante. In essence, adjustment costs can be thought of as ex ante costs at the firm level whereas transaction costs arise largely ex post at the transaction level. Surely some overlap exists in the two cost categories that has yet to be fully delineated. Although we acknowledge that transaction and adjustment costs can be difficult to separate fully conceptually, for expositional purposes we nonetheless treat them as separate categories.

To understand when a firm may choose to incur transaction costs as a way to reduce adjustment costs, we follow Menon and Yao (2017) and consider a firm's payoffs from repositioning gross of (before considering) adjustment costs. A firm considering a repositioning move will first compare the gross payoffs from remaining in its current position to the gross payoffs from each of the possible strategic positions to which it could move. If the firm chooses to move to a new position, the gross payoff from remaining in its current position represents the opportunity cost from *moving early* from this position. Opportunity costs of moving early will include any remaining economic rents associated with remaining in the established position, as well as the loss of opportunities to make investments in long-term R&D to explore as yet unavailable positions, or in improving efficiency in the established position.

If a firm chooses to remain in its current position for a certain time period, it will forego (for this period) the gross payoff associated with the new strategic position that ranked highest in its consideration set, but was not chosen. This foregone gross payoff represents the opportunity cost associated with economic rents lost by *moving late* to a new position. The opportunity costs of moving late can be substantial if the shock enables the possibility of a significant first-mover advantage in the new position (e.g., Lieberman & Montgomery, 1988, 1998). For instance, if the first firm to arrive at a position newly created by a shock can capture economies of scale or scope, develop a valuable brand or reputation, establish dominance in a network of relationships, so forth, then slow imitators are put at a substantial economic disadvantage; the opportunity costs of moving late can be great. Alternatively, if a firm cannot move first to a new position, it may be able to neutralize a rival's first-mover advantage by imitating quickly, as a 'fast second mover' (Markides & Geroski, 2004). This possibility provides impetus to accelerate imitation even at the cost of incurring high transaction costs.

We predict that the more that the opportunity costs of moving late exceed the opportunity costs of moving early ("net" opportunity costs), the more likely that leaders will choose organizational arrangements that incur higher transaction costs in order to lower adjustment costs and increase adjustment speed. As discussed above, the desire to move quickly to a new position in advance of, or in response to, competitors may cause an increase in transaction costs. This added cost may be offset by advantages that accrue to more rapid repositioning, such as the capturing of first-mover advantage or acting as a fast second mover. Thus, in deciding whether to move to a new strategic position, a firm must consider the difference between opportunity costs associated with moving late to a new post-shock position, and those from moving early from their pre-shock position. They must weigh the net gain against the added transaction costs resulting from organizational arrangements needed to accelerate repositioning.

We are not the first to hold that firms might not economize on transaction costs in choosing an organizational mode. In addition to Argyres and Bigelow's (2007) empirical observation, others have maintained that firms may choose to internalize generic transactions to build capabilities (e.g., Argyres & Zenger, 2012; Barney, 1999) and to create real options (e.g., Barney & Lee, 2000). Our framework is consistent with these recommendations in highlighting a role for misaligned transactions, but offers additional insight because it helps to predict when a firm might make this choice in the context of shocks and decisions to reposition. We therefore propose that:

**Proposition 2:** *All else equal, the likelihood that a firm will accept higher transaction costs to quickly move to a new position in response to a shock will be greater if the opportunity costs of moving late exceed the opportunity costs of moving early.*

We have argued that firms' repositioning decisions seek to *economize on adjustment, transaction, and opportunity costs*, which suggests a need for empirical studies to evaluate the relative importance of adjustment costs, transaction costs, and opportunity costs.<sup>6</sup> Proposition 2 suggests the possibility that following a shock, firms' leaders may choose in the short-run to organize inefficiently (by not transaction cost economizing) in order to accelerate repositioning. After repositioning has been accomplished, however, tradeoffs change as adjustment costs have been incurred. For example, as adjustment costs are incurred and progress toward securing a new position is made, economizing on transaction costs may become more salient because, as the firm's new position and those of its competitors are solidified, competition will increase pressure to adopt lower cost organizational arrangements. Therefore, a key insight is that the tradeoff between adjustment costs and transaction costs can lead to a type of organizational vacillation (Nickerson & Zenger, 2002) in which a firm initially organizes one way (e.g., through outsourcing) only to reorganize a different way (e.g., through vertical integration) once a substantial amount of the adjustment has taken place and the level of competitive pressure in the new position encourages economizing. We thus propose that:

**Proposition 3:** *For firms that have already repositioned in response to a shock by utilizing governance modes that were not transaction-cost economizing, the likelihood that they will reorganize and adopt a transaction cost economizing organizational structure increases as competitive pressure intensifies, all else equal.*<sup>7</sup>

In summary, our propositions predict that leaders will decide where and how to reposition based on an assessment of their own adjustment costs relative to rivals' adjustment costs. Should the opportunity costs of arriving late exceed the opportunity costs of departing early to a chosen position, then leaders can accelerate repositioning by, for example, outsourcing key transactions, albeit at a lower level of asset specificity or greater exposure to transaction costs. As competitive pressure intensifies in the new position, firms incur additional adjustment costs by reorganizing in a way that economizes on transaction costs. Leaders who fail to follow these propositions are likely to reposition too late to secure a position with competitive advantage, or move too early (forgoing the benefits of its established position), or fail to choose a position in which they could have achieved an advantage.

#### 4 | ILLUSTRATION: COMPARATIVE ADJUSTMENT COSTS IN THE SMARTPHONE INDUSTRY

In this section, we provide an illustration of our comparative adjustment costs framework based on the evolution of the smartphone industry, with the introduction of the iPhone as the exemplar of an innovation shock. Our account draws on several sources (Alcacer, Khanna, & Furey, 2011; Alcacer, Khanna, Furey, & Mabud, 2011; Cecere et al., 2015; Doornik & Roberts, 2007; Hicks, 2012; Lundin & Bryce, 2015; Woyke, 2010).

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<sup>6</sup>Adjustment costs are likely to be higher when the communication, coordination, and bargaining costs (Wernerfelt, 1997, 2016) associated with gaining access to capabilities, assets, and knowledge required for repositioning, are higher. Transaction costs are likely to be higher when asset specificity, and additionally uncertainty, are higher (Williamson, 1996). Opportunity costs are likely to be higher in contexts where competition is weaker and there are a greater number of potential investments yielding positive economic rents (Smit & Ankum, 1993).

<sup>7</sup>A more nuanced set of hypotheses are envisioned. For instance, the likelihood and timing of a reorganization will depend on the adjustment costs of adopting a more transaction cost economizing structure versus the long-run efficiency gains vis-à-vis the focal firm's competition. Also, the level of competitive intensity may affect the timing for changing governance modes. Developing these hypotheses is beyond the scope of this paper.

Prior to the iPhone, companies such as Samsung, Nokia, Ericsson, and Research in Motion (RIM: hereafter referred to as “Blackberry”) were selling smartphones, while numerous other companies sold cell phones or Personal Digital Assistants (PDA's). Samsung, for example, had begun producing smartphones based on the Palm operating system for Sprint in 2001, and added Windows-based smartphones in 2006. The iPhone was introduced in 2007, and featured easy internet browsing and applications that quickly became popular. Sales topped 1.36 MM units in the first year, exploding to 11.63 MM units in the second year as the number of popular applications available for it grew rapidly. That this surge in demand surprised many in the industry is illustrated by the comment that Microsoft CEO Steve Ballmer made at the time: “There's no chance that the iPhone is going to get any significant market share. No chance.” (USA Today, April 30, 2007).

#### 4.1 | Propositions 1 and 2

Our comparative adjustment costs framework illustrates Proposition 1 by helping to explain why Samsung's comparative adjustment costs were lower than its rivals'. It illustrates our Proposition 2 by explaining how Blackberry's high comparative adjustment costs, together with its high opportunity costs from moving early, combined to cause it to move late.

First, we consider that, in broad terms, three possible strategic positions were available to which incumbents could have moved following the iPhone's introduction. Incumbents could have aimed to: (a) imitate the iPhone, (b) produce phones with substantially less functionality at lower cost, and (c) differentiate by producing a smartphone with even greater functionality than the iPhone.

Second, we consider that each incumbent would incur adjustment costs that varied according to the position to which it moved or could have moved. These costs stemmed from deficiencies in the firm's capabilities, assets, and knowledge in relation to the new positions created by the shock. Capabilities include the ability to produce creative designs, and the ability to collaborate with service providers, application developers, and others. Assets include the intellectual property needed to produce phones of a given type, access to distribution channels, brand name capital, and access to large-scale manufacturing. Knowledge includes that regarding touch screen technology, technology for interfacing with computers, and camera and video technology. Arguably, some overlap exists among the categories of capabilities, assets, and knowledge, but the categorization is sufficient for illustrating our framework.

To keep our discussion to a manageable length, we focus on the four largest incumbents in the United States who were impacted by the iPhone's introduction: Blackberry (RIM), Motorola, Nokia, and Samsung. Table 1 summarizes the sources of adjustment costs of these firms, as well as for incumbents we do not discuss here (HTC, LG, and Sony Ericsson). First, we compare Blackberry and Motorola to Samsung with regard to their adjustment costs from imitating the iPhone, and from moving to the other two positions. Blackberry had earlier committed to its own proprietary operating system that supported one of the smartphone's key differentiating features: high security email. Providing easy access to outside application developers could have compromised these security features, creating a substantial opportunity cost from moving early: therefore, Blackberry kept its OS relatively closed for some time. This strategic decision made it difficult for Blackberry to stimulate outside software developers to develop the kinds of popular applications that would have enabled Blackberry to imitate the iPhone. In addition, Blackberry was committed to a physical keyboard, which limited the ease of internet browsing and further contributed to the difficulty of imitating the iPhone. Yet this keyboard was popular, further increasing Blackberry's opportunity costs from leaving its established position early by making a faster move toward imitating the iPhone. Leaving early would thus have

TABLE 1 Categorization of various adjustment costs

Firm	Imitate iPhone	Differentiate (a) high functionality high cost	Differentiate (b) low functionality low cost
Apple	X		
Blackberry (RIM)			
<i>Capabilities</i> <sup>a</sup>	Mod	Low	Low
<i>Assets</i> <sup>a</sup>	Mod	Low	Mod
<i>Knowledge</i> <sup>a</sup>	High	Mod	Mod
HTC			
<i>Capabilities</i>	Low	High	Mod
<i>Assets</i>	High	High	Low
<i>Knowledge</i>	Mod	High	Mod
LG			
<i>Capabilities</i>	Low	High	Mod
<i>Assets</i>	Mod	Mod	High
<i>Knowledge</i>	Mod	High	Mod
Motorola			
<i>Capabilities</i>	Mod	High	High
<i>Assets</i>	Mod	Mod	High
<i>Knowledge</i>	High	High	High
Nokia			
<i>Capabilities</i>	Low	Mod	Low
<i>Assets</i>	Mod	Mod	Low
<i>Knowledge</i>	Mod	Mod	Low
Samsung			
<i>Capabilities</i>	Low	High	Mod
<i>Assets</i>	Mod	High	High
<i>Knowledge</i>	Low	High	High
Sony Ericsson			
<i>Capabilities</i>	Low	High	Low
<i>Assets</i>	Mod	High	Low
<i>Knowledge</i>	Mod	High	Low

<sup>a</sup> *Definitions:* Assets: intellectual property, distribution, production, brand; Capabilities: create and negotiate collaborations, creative design, ability to stimulate demand; Knowledge: cellular technology, complex operating system technology, touch screen technology, advanced packaging, interface with desktop operating system technology, camera and video technology.

required Blackberry to develop its own touchscreen technology from scratch.<sup>8</sup> Moving early also may have required Blackberry to adopt the Android or Windows operating system, increasing its transaction costs during its repositioning. Blackberry eventually incurred the adjustment cost of rewriting its own operating system to make it more open, and developing a touchscreen-based product, but by that time the iPhone had built an insurmountable competitive advantage and a base of loyal customers. Blackberry now produces phones based on the Android system, but has suffered a catastrophic loss of market share and profitability. Given Blackberry's historical focus on high-

<sup>8</sup>A search of the U.S. Patent Office database reveals that Blackberry's first touchscreen patent was not filed until 2009, (Apple's first such patent filing was in 2004) indicating that Blackberry only developed touchscreen knowledge well after the iPhone was launched.

functionality devices with heavy R&D expenditure, it was ill equipped to adjust to a low-end position in the market. At the same time, it lacked the technological capability to leapfrog the iPhone.

Samsung, however, faced lower comparative adjustment costs from imitating the iPhone. These lower adjustment costs were in part due to the fact that it was not constrained by a commitment to its own proprietary operating system. Samsung produced smart-phones based on others' operating systems, never committing to a single operating system. This implies that the opportunity cost of moving early from its existing position was low. In addition, Samsung had advanced knowledge of chip technology, as well as mass production capabilities. Samsung entered the smartphone market by selling simple yet touchscreen-based smartphones to Sprint that were based on the Palm operating system. This choice led Samsung to build many of the capabilities, assets, and knowledge sets needed to adjust quickly to the iPhone shock. For instance, Samsung responded to the first Blackberry by introducing a copycat phone based on the Windows operating system. Samsung similarly jumped to the Android system in 2007, and was among the first to offer Android-based phones that closely imitated the iPhone. With regard to the other two available positions, Samsung lacked the capability to develop the operating system technology needed to leapfrog Apple, while its knowledge of advanced chip technology could not be profitably exploited in low-end phones.

At first, the Motorola Droid was more popular than Samsung's Android-based phones. However, Samsung's more reliable touchscreen technology, user interface, and hardware enabled it to surpass the Droid with the Galaxy S II and III smartphones, which became very popular. Like Blackberry, Motorola lacked not only touchscreen technology but also reliable advanced chip technology, the capabilities for which were difficult and costly to develop or acquire. This hindered its repositioning to imitate the iPhone successfully. (Motorola's mobile business was acquired by Google in 2012 for \$12.5 billion and sold in 2014 for \$2.9 billion).

Samsung therefore faced lower adjustment costs than Blackberry because it had invested in hardware capabilities that were generic with respect to operating systems and it was free of operating systems technology and related commitments made obsolete by the introduction of the iPhone. Samsung's adjustment costs from imitating the iPhone were ultimately lower than Motorola's due to Samsung's superior touchscreen technology and its more reliable hardware. Motorola did not pursue low-end phones because its production capabilities for the worldwide market were inferior to Nokia's, and thus Motorola would not have been able to achieve comparable economies of scale in production.<sup>9</sup>

Comparing the adjustment costs faced by Nokia, the market-share leader in hand-sets prior to the advent of the iPhone, to those of Samsung in relation to the three positions is also informative. Nokia's operating system, Symbian, was more open than Blackberry's in that application developers could obtain standard development kits and compilers for application writing. However, Symbian was a shell system that needed a substantial amount of "middleware" to form a complete operating system. Moreover, applications had to be written in Symbian's idiosyncratic version of C++, which required learning special techniques such as "descriptors, active objects and the cleanup stack." This technical characteristic made even simple programs difficult to implement, and thus games and applications that are more complex were not easily developed.

Nokia abandoned the Symbian system for Windows in 2011, and later for Android systems. However, the delays in imitating were long, and Nokia suffered greatly in the United States and in other developed country markets for failing to provide an imitative smartphone. Moving late was costly for Nokia because other firms had established first-mover advantages. Instead, Nokia moved to the lower-end position by producing low-cost cell phones, mostly for developing markets. Nokia

<sup>9</sup>For example, Motorola's 2007 worldwide handset market share was only 12%, whereas Nokia's was 40%.

made this move because its worldwide logistics and manufacturing capabilities were superior to most of its rivals' for lower-end phones, giving it lower comparative adjustment costs to the low-end position. However, those low-end positions have been less lucrative than the other two. Microsoft acquired Nokia's mobile business in 2013 for \$7 billion. In 2015, Microsoft wrote down the entire value of the investment.

Table 1 illustrates our Proposition 1 above in several ways. For instance, because of Samsung's historic strengths in electronics hardware technology and weakness in software, it had the lowest adjustment costs to imitate Apple's iPhone, and high adjustment costs to offer a phone that was even more differentiated than the iPhone. In comparison, Nokia's strengths in both hardware and software implied moderate adjustment costs to imitate Apple, but lower adjustment costs to move to a low functionality/low cost position. Motorola faced at least moderate adjustment costs to imitate Apple, but much higher costs to differentiate due its weakness in software. Hence, the innovation shock may have destined Motorola to imitate as a late follower, which was unlikely to yield a sustainable position. Finally, Blackberry had high comparative adjustment costs to imitate due to the constraints of its software and hardware design, and lower costs to differentiate at the high end. It also faced high opportunity costs of departing early from its established and highly successful position, which may have delayed its imitative efforts. Thus, our comparison between the lower adjustment costs faced by Samsung to the higher adjustment costs faced by the other rivals illustrates our Proposition 1. In addition, the delay with which Blackberry made its move in part reflected the opportunity costs emphasized in our Proposition 2.

#### 4.2 | Proposition 3

The smartphone industry also provides insight into our Proposition 3. As mentioned above, most of Apple's followers attempted to lower their adjustment costs to the iPhone shock by outsourcing their operating systems. (Samsung and Motorola did so quickly, while Nokia and Blackberry did so more slowly.) The facts that Google (owner of Android) eventually acquired Motorola's mobile business, and Microsoft (owner of Windows) acquired Nokia's mobile business, suggest that independent ownership of operating systems and phone hardware caused high transaction costs, leading to vertical integration. (The failure of those acquisitions probably reflects late timing rather than a lack of such transaction costs.) Moreover, tensions in the relationship between Samsung and Google (perhaps because of its acquisition of Motorola) were reported in the press in 2013 and 2014 (*Wall Street Journal*, February 25, 2013; *BusinessKorea* July 21, 2014). Samsung began developing its own operating system, Tizen, in 2012, releasing its first phone based on that system in 2015. Tizen, however, has not been successful, again indicating the difficulty of developing successful operating systems. Therefore, it appears that under intense competitive pressures, several rivals traded off transaction cost-economizing organization for faster adjustment, as suggested in Proposition 3, although Samsung was faster than the others. Samsung has not yet vertically integrated successfully, however.

#### 4.3 | Outcomes

By 2012, all rivals listed in Table 1 had completed their repositioning moves. The very low-end cell phone segment had shrunk worldwide, while the market for lower-priced smartphones had expanded. Except for Apple, the rivals in Table 1 all produced smartphones based on the Android or Windows operating system; smartphones that were priced significantly below the iPhone. Because their features in 2018 are so similar to each other, competition in the Android segment has led to low

profitability. Indeed, in recent years, Apple's iPhone has accounted for more than 90% of the profits in the worldwide smartphone market, despite its high price in markets outside the United States.

#### 4.4 | Alternate sources of comparative adjustment costs

Because our framework highlights economic sources of comparative adjustment costs, we have focused on those sources in discussing the smartphone industry to this point. However, other sources of adjustment costs also played a role. For example, cognitive limitations seem to have been important in explaining the delays in Blackberry's response to the iPhone. In July 2011, an anonymous "high level RIM executive" published an open letter in which he/she wrote that, "We missed not boldly reacting to the threat of the iPhone when we saw it in January over four years ago. We laughed and said they are trying to put a computer on a phone, and that it won't work" (Hicks, 2012: p. 18). In a 2008 interview, Blackberry founder and CEO had said that, "Not everyone can type on a piece of glass. Every laptop and virtually every other phone has a tactile keyboard. I think our design gives us an advantage" (Hicks, 2012: p. 15). A Nokia executive similarly noted that participants in a strategy meeting in 2007 argued that Apple hadn't done anything revolutionary, and that, "We...had such wonderful prowess in terms of these technologies, but we got a little too enamored with our technology..." and we were doing more of justifying how ours could do that better, rather than saying, "Wow, what a fantastic innovation, why didn't we think of that"? (Alcacer, Khanna, Furey, & Mabud, 2011: p. 9). In 2010, Nokia's newly hired CEO cited Apple's dominance in smartphones, and complained that the company's slow response was due to excessive bureaucratic centralization at the company, and saying that "too many things were coming through headquarters before they were going back out" (Alcacer, Khanna, Furey, & Mabud, 2011: p. 2). Thus, along with economic sources of adjustments costs, cognitive and organizational sources appeared to be important in determining competitive outcomes in the smart-phone industry.

Thus, the recent history of the smartphone industry illustrates how our comparative adjustment cost framework can help to understand and predict how various rivals will reposition in response to an innovation shock. For example, Nokia and Blackberry suffered from high comparative adjustment costs to the iPhone shock, harming their repositioning efforts, and causing large losses. In contrast, Samsung's lower adjustment costs enabled it to reposition effectively, enabling it to survive and thrive. Moreover, it seems likely that several of Apple's followers accepted high transaction costs as they tried to lower their adjustment costs, attempting to reduce them later by integrating vertically.

Notice that alternative theoretical frameworks cannot explain fully the range of outcomes in this smartphone industry case. Population ecology (Hannan & Freeman, 1984), theories of core rigidities (Leonard-Barton, 1992) and limited internal communication channels (Henderson & Clark, 1990), Porter's (1985) positioning approach, and the resource-based view of the firm (Wernerfelt, 1984) can all help explain the delayed repositioning by Blackberry and Nokia. However, they cannot simultaneously explain the successful repositioning by Samsung, at least not in a straightforward and parsimonious way. Approaches based on Penrose (1959) can explain both adjustment and lack of it, but do not address repositioning choices or shocks per se. Dynamic capabilities approaches also can explain both adjustment and failure to adjust, but have difficulty predicting which firms possess or lack such capabilities, and therefore whether and where firms will reposition. Moreover, none of these frameworks, nor that of Menon and Yao (2017), can explain the "how" of repositioning, namely the organizational choices made during the repositioning process. This paper's comparative adjustment cost framework offers a superior basis for explaining and predicting these outcomes.

## 5 | DISCUSSION AND CONCLUSION

The framework we advance in this paper traces out theoretical connections between innovation shocks, adjustment costs, transaction costs, opportunity costs, and a firm's strategic repositioning. We offer a conceptualization of the managerial challenge of responding to innovation shocks, and develop a framework for comparatively analyzing the relationships between adjustment costs, transaction costs, and opportunity costs. While we focus on exogenous innovation shocks, we maintain that our framework is generalizable to demand, supply, and regulatory shocks, as well as to innovation shocks that arise from within an industry. The framework is thus useful for analyzing various types of comparative adjustment costs. Moreover, such adjustment costs are likely to be relevant to various degrees across different stages of the industry life cycle.

Our framework is also applicable to endogenous shocks, in which firms strategically raise rivals' costs in order to lower their own comparative adjustment cost, thereby gaining advantages in repositioning. A potentially fruitful extension of our framework would be to further incorporate, beyond the opportunity costs of moving early versus moving late, the possibility of differential transactional value (e.g., Postrel, 2018; Zajac & Olsen, 1993) from repositioning, thereby folding in both differential revenues and the comparative adjustment costs of repositioning. Further advances can examine how firms coordinate various strategies when responding to competition. For example, Wang and Shaver (2016) find, in most cases, that firms respond to competition by simultaneously changing their positioning and product launch strategies; and Seamans and Zhu (2017) consider how firms choose between repositioning and cost-cutting in response to competition.

We suggest that our framework can provide useful guidance for econometric studies of the determinants and performance implications of competitive repositioning in response to shocks. Thus, researchers can identify an innovation shock in an industry, and empirically evaluate proxies for incumbents' comparative adjustment costs, opportunity costs, and transaction costs, which are associated with the speed and location of repositioning. Predictions will of course depend critically on the context and characteristics of market participants, and will thus be context-specific. For example, Shimano Inc.'s introduction of index shifting in the sport bicycle industry is an example of an innovation shock that gave rise to repositioning challenges. Proxies for comparative adjustment costs can be developed based on measures of absorptive capacity, cospecialization among index shifting components, and opportunity costs of delaying imitation (Bigelow, Nickerson, & Park, 2018). Whether these proxies help predict which firms reposition more or less quickly can be assessed empirically. Whether faster movers are more likely to outsource even when components are cospecialized (against transaction cost predictions) can also be assessed. One can also observe whether, as our framework also predicts, firms are more likely to shift their organizational structures later in ways consistent with transaction cost economizing as competition intensifies.

While comparative adjustment costs are central to strategic management, our field does not have a sufficiently rich, multidisciplinary vocabulary for conveying and using these concepts for both strategy research and practice. The language of adjustment costs is currently more developed in economics, but nonetheless needs unpacking and richness. For instance, the strategy and economics disciplines still need to unpack the concept of adjustment costs to consider agency costs (Jensen & Meckling, 1976); coordination costs (Marschak & Radner, 1972); communication, adaptation, and bargaining costs (Wernerfelt, 1997, 2016); firing, searching, hiring, and training costs (Rubin, 1973); and commitment (Ghemawat, 1991). The latter concept of commitment includes asset specificity (Williamson, 1996), isolating mechanisms (Rumelt, 1984), and mobility barriers (Caves & Porter, 1977), which can affect (comparative) adjustment costs. However, researchers and managers thinking

about adjustment costs and repositioning exclusively in economic terms will likely come to conclusions that are glib and inaccurate because important sources of adjustment costs are missed.

In terms of developing a more multidisciplinary vocabulary, headway is being made with such concepts as “psychological contracts” (Rousseau & Anton, 1991) and “decision biases” (Du, Li, & Wu, 2018) in cognition, “core rigidities” (Leonard-Barton, 1992) in organization theory, and ‘internal political frictions’ (de Figueiredo, Rawley, & Rider, 2015) along the political dimensions of adjustment costs, but much well-grounded work is still required. Various approaches will likely be useful in developing such a multidisciplinary vocabulary, including engaged scholarship of action research (Argyris & Schon, 1996), collaborative research (Bartunek & Louis, 1996); design science (Rousseau, 2006), and informed basic science research (Van De Ven, 2007). More advanced language in the evolving science of organization will result in better management scholarship and improved managerial heuristics, thereby reducing the research-practice gap. Our *comparative* adjustment cost framework is at a nascent stage of development. With further development, we suggest that it can become a central strategic management framework.

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