

## INTER-TEMPORAL ECONOMIES OF SCOPE, ORGANIZATIONAL MODULARITY, AND THE DYNAMICS OF DIVERSIFICATION

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*The question of whether corporations add value beyond that created by individual businesses has engendered much debate in recent years. Some of this debate has focused on the pros and cons of related vs. unrelated diversification. A standard explanation of the benefits of related diversification has to do with the ability to obtain intra-temporal economies of scope from contemporaneous sharing of resources by related businesses within the firm. In contrast, this paper deals with inter-temporal economies of scope that firms achieve by redeploying resources and capabilities between related businesses over time, as firms exit some markets while entering others. The transfer of resources due to market exit distinguishes our treatment of inter-temporal economies of scope from standard intra-temporal economies of scope. In addition, these inter-temporal economies can benefit from a decentralized and modular organizational structure. This ability to obtain inter-temporal economies of scope via organizational modularity and recombination suggests that corporations do not necessarily need a high degree of coordination between business units in order to benefit from a strategy of related diversification. Copyright © 2004 John Wiley & Sons, Ltd.*

### INTRODUCTION

The question of whether corporations add value beyond that created by individual businesses has engendered much debate in recent years (e.g., Rumelt, 1991; Bowman and Helfat, 2001; Brush, Bromiley, and Hendrickx, 1999; Martin and Eisenhardt, 2003a). An important aspect of this debate deals with the pros and cons of unrelated vs. related diversification. Although the evidence is not clear cut, many studies have suggested that firms may benefit from related diversification in particular (see Montgomery, 1994; Palich, Cardinal, and Miller, 2000). A standard explanation of the benefits of related diversification involves

utilization of, or reduction in, excess resources within the firm to obtain economies of scope. Such economies of scope (e.g., Bailey and Friedlander, 1982; Panzar and Willig, 1981) derive from the contemporaneous sharing of tangible or intangible assets in the production of multiple products, resulting in lower joint costs of production per unit of output. The resulting *intra-temporal* economies of scope arguably comprise an important benefit of the related diversified corporation.

In contrast, this paper is concerned with *inter-temporal* economies of scope derived from the redeployment of firm resources between businesses over time, as firms exit some product-markets while entering others. Inter-temporal economies of scope have implications for the evolution of related diversified corporations over time, particularly in markets where technologies and demand are in flux. As these sorts of markets emerge, grow, split, combine with other markets, and

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mature, managers must make frequent strategic decisions about whether and when to enter or exit product-markets. In what follows, we use the term 'dynamic' to denote these sorts of fast-paced markets (see also Eisenhardt and Martin, 2000).

Inter-temporal economies of scope in dynamic markets can benefit from an organizational form that consists of a modular, decentralized organizational structure along with processes for recombining businesses (product-market domains in which the firm competes) among modular organizational units. This sort of repeated recombination of organizational units to match changing business opportunities is a form of 'patching' (Brown and Eisenhardt, 1998; Siggelkow, 2002) that results in an evolving path of related diversification through time. As organizational units shift their product-market responsibilities over time (Galunic and Eisenhardt, 1996, 2001), the units co-evolve with the products they produce and the associated organizational, technical, and market knowledge (Helfat and Raubitschek, 2000). Additionally, the ability to obtain inter-temporal economies of scope within a decentralized organization contrasts with standard organizational prescriptions for obtaining intra-temporal economies of scope (see, for example, Hill, Hitt, and Hoskisson, 1992). Corporations do not necessarily need a high degree of coordination between business units in order to benefit from a corporate strategy of related diversification over time.

Our work extends the literature in several ways. First, we explain the concept of inter-temporal economies of scope, formalize the concept in a parsimonious manner, and explain the link to value creation through related diversification. Secondly, we indicate an organizational form, involving recombination of modular organizational units, that is useful in obtaining inter-temporal economies of scope in dynamic markets. Although not the only route to economies of scope in dynamic markets (see also Martin and Eisenhardt, 2003b), modular recombination is an important organizational form that has been overlooked in the literature on related diversification. As part of this analysis of modular recombination, we also suggest ways in which intra-temporal economies of scope are accomplished beyond the usual treatment. Finally, we incorporate inter-temporal economies of scope into an analysis of the dynamics of diversification and the evolution of corporate scope over time.

The analysis begins with a brief review that explains how the standard intra-temporal logic of economies of scope justifies related diversification. Then we turn to the dynamics of continuing related diversification over time. We present our arguments regarding inter-temporal economies of scope and formalize the concept. The analysis then turns to the organizational ramifications for firms seeking to benefit from inter-temporal economies of scope as part of a strategy of related diversification through entry and exit. We also provide a more detailed example of a firm that continually pursues related diversification over time, and achieves inter-temporal as well as intra-temporal economies of scope while employing a highly decentralized and modular organizational structure. Then we discuss the implications of this empirical example for related diversification, organizational form, and the dynamics of diversification. The concluding section draws broader implications regarding market entry and exit, the adaptation of firms to changing markets and technologies, and empirical research on related diversification.

## ECONOMIES OF SCOPE AND DIVERSIFICATION

Penrose (1995, first edition published in 1959) lays out the foundation for the analysis of firm growth over time via continued diversification. Penrose identifies two forms of what we now term 'related' diversification: (1) entry into new product-markets based on the firm's existing resources; (2) introduction of new products in a firm's existing market (Penrose, 1995: 110). Rumelt (1974: 29) states that: '[b]usinesses are related to one another when a common skill, resource, market or purpose applies to each.' As these early works make clear, the sharing of firm resources between businesses underpins much of the logic of related diversification. The concept of economies of scope, initially developed in a separate literature, formalizes the logic that links shared resources to related diversification.

Economies of scope (Panzar and Willig, 1981) for two products at a point in time are defined as<sup>1</sup>

$$C(Y_1, Y_2) < C(Y_1, 0) + C(0, Y_2) \quad (1)$$

<sup>1</sup> This formula easily generalizes to the case of more than two products, such that the total costs of producing all of the products together is less than the total cost of producing the products separately.

where  $C$  = total costs of production,  $Y_1$  = output of product 1, and  $Y_2$  = output of product 2.

Equation 1 states that the total cost of producing  $Y_1$  and  $Y_2$  together is less than the combined cost of producing each product separately. As Bailey and Friedlander (1982) explain, this reduction in costs due to joint production can arise for several reasons. These reasons include: (1) separate products that naturally arise from a shared input, such as wool and mutton produced from sheep; (2) the presence of a fixed factor of production (e.g., a manufacturing plant or distribution channel) that is not fully utilized in production of a single product; (3) economies of networking from joint production of networked products (e.g., use of an airline hub to facilitate transfer of passengers from one airline city-pair market to another); (4) reuse of an input in more than one product (e.g., journal article abstracts reused in multiple indexes of articles); (5) sharing of intangible assets between products (e.g., research and development that supports multiple products).

All of these reasons can help to explain diversification from one product ( $Y_1$ ) into another product ( $Y_2$ ) due to inputs (resources) shared in production of the products. In general, diversification can take place via merger and acquisition, or via internal growth. Diversification through merger and acquisition often generates economies of scope by allowing firms to share a fixed factor of production and cut redundant costs. For example, when a company that produces cheese acquires a company that produces crackers, the two businesses can share the fixed factor associated with grocery store distribution and sales. As a result, the distribution and sales resources of the acquired firm become redundant and their costs can be cut.

Firms also can diversify through internal growth and obtain economies of scope. A cracker manufacturer can enter the cheese business and share grocery store distribution and sales between the two businesses. This example of diversification through internal growth translates the shared cost logic of economies of scope into a motivation for market entry. An excess resource of some type provides the opportunity to reduce unit costs by diversifying and sharing that resource with another business. Economies of scope also can justify simultaneous rather than sequential entry into related markets.

Although by definition a diversification move implies a change in the businesses in which a firm

participates, the economies of scope just described are static in the sense that they are intra-temporal. That is, once two businesses merge, the combined firm achieves intra-temporal economies of scope by sharing resources contemporaneously (intra-temporally) between businesses and cutting redundant costs. Similarly, subsequent to market entry through internal growth, a firm achieves economies of scope by contemporaneous sharing of what previously were excess resources.

Although firms that diversify into related businesses may benefit from intra-temporal economies of scope, Teece (1980) points out that such joint ownership of resources is efficient only when the transaction costs of separate ownership (due to costs of contracting and opportunism) can be reduced through internal organization (Williamson, 1975). Since internalization of transactions also entails costs, diversification based on economies of scope should occur only if the costs of internal organization are lower than the transactions costs of using the market (i.e., production in separate organizations). In the remainder of this analysis, we assume that the transaction cost criterion for internal organization of joint production has been satisfied.

The logic of economies of scope formalizes the benefits of related diversification in terms of cost advantages. These benefits from economies of scope can also be formulated in terms of demand-side benefits related to outputs (products and services) rather than costs. For example, when firms use excess resources to diversify into another market, the firm generates greater revenues per unit of input. This is logically equivalent to Equation 1 for economies of scope, wherein the firm obtains lower costs per unit of output by spreading the cost of a set of inputs over a greater number of units of output. Our previous examples of economies of scope from internal growth reflect precisely this logic. Thus, intra-temporal economies of scope reflect both demand-side revenue enhancements from greater output and cost reductions from shared inputs.

## DYNAMICS OF RELATED DIVERSIFICATION

Although firms can obtain intra-temporal economies of scope after diversification into related markets, the standard treatment of economies of scope

does not deal directly with the dynamic aspects of related diversification. Furthermore, most empirical studies of diversification examine a cross-sectional snapshot of company business portfolios (for a review, see Montgomery, 1994; Ramanujam and Varadarajan, 1989; Palich *et al.*, 2000). Only occasionally do studies analyze diversification moves from an existing product-market into another domain (examples include Montgomery and Hariharan, 1991; Mitchell, 1989; Helfat, 1997; Silverman, 1999). In reality, managers often diversify their firms through a series of moves that occur over an extended time period.

Diversification that unfolds over time can be modeled as a series of single diversification moves that result in standard intra-temporal economies of scope. Such an approach, however, does not explain where the excess resources that support continuing diversification come from. For this, we require additional theory, for which the main source is Penrose (1995).

Penrose (1995) provides three general explanations for the continuing production and/or possession of excess resources, which we briefly note here. The first explanation involves economies of scope from indivisible assets. The second closely related explanation involves assets that are specialized to particular tasks. Due to their generally smaller size, young firms cannot efficiently utilize these indivisible and specialized assets. As firms expand to a size large enough to fully employ the indivisible assets and to utilize assets in their most productive specialized use, growth and diversification eventually cease.

Penrose's (1995) third explanation involves efficiencies gained from learning by doing that result in excess resources, which the firm can use to expand existing businesses or to move into related businesses. Penrose (1995) argues that firms use knowledge accumulated through previous diversification moves as a basis for subsequent diversification. Thus, firms continuously extend their knowledge bases over time via entry into related product-markets (Helfat and Raubitschek, 2000). Consistent with this logic, Chang (1997) finds that firms are more likely to enter industries that have greater knowledge similarity to the industries that they entered in the preceding time period.

The importance of indivisible assets, specialized resources, and especially learning by doing helps us to better understand what underlies the dynamics of diversification. The end result, however,

could still be interpreted as a series of intra-temporal scope economies obtained through a series of related diversification moves over time.<sup>2</sup> Penrose (1995) herself refers to such 'economies of production' obtained after expansion takes place.

Our analysis focuses on a different aspect of related diversification over time that involves inter-temporal redeployment of resources within a firm in response to changing market conditions. Inter-temporal economies of scope derive from entry into new product-markets in conjunction with partial or complete exit from old product-markets. In this situation, a new business partially or completely replaces an old business and the firm shifts resources from the old to the new business. This redeployment of resources differs from the contemporaneous sharing of resources between businesses that underlies standard intra-temporal economies of scope.

The phenomenon of inter-temporal resource transfer in response to changing market conditions receives little attention from Penrose (1995). She does, however, briefly observe that firms continue to expand even when demand for their original products falls or disappears. Wernerfelt (1984) and Anand and Singh (1997) also observe that when a market collapses, a firm still might be able to make good use of a resource from the collapsed market by using the resource in another market. Penrose (1995) further notes in passing that as markets mature, they may become *relatively* less profitable compared with new investment opportunities that firms could undertake using their resources.

Kim and Kogut's (1996) study of entry by individual semiconductor firms into new technical subfields has implications for these types of situations. In their analysis, Kim and Kogut (1996) show that when entering new subfields, semiconductor firms built on knowledge accumulated from prior entry into related markets.<sup>3</sup> These patterns of market entry over time mirrored technological trajectories, where some technologies displaced others.

<sup>2</sup> Rubin (1973) provides a formal mathematical model that captures some of Penrose's (1995) logic. In Rubin's (1973) model, a firm's resources can be used to produce current output as well as larger amounts of the same resource in future periods. He notes that the model can explain diversification as well as expansion in the firm's current market.

<sup>3</sup> Some subfields served as platforms for expansion into other subfields, by virtue of either network externalities of components in a linked technological system or of learning by doing that enabled firms to accumulate knowledge on which to base expansion.

Thus, although Kim and Kogut (1996) do not provide direct evidence, the firms might have exited markets where the technologies were displaced, and used their knowledge from these markets as a stepping stone to enter related markets for the replacement technologies.

This phenomenon of entry into a related market coupled with exit from another market is more widespread than generally recognized. At a micro-organizational level, consider the example of product development. As projects reach fruition, firms repeatedly transfer personnel to other projects, which may include applications in different markets (Brown and Eisenhardt, 1998). Business history also provides many examples of firms shifting from one market to another, while utilizing the same (or an expanded) resource base. After World War I, for example, Du Pont faced a rapid decline in government demand for its military products. In response, the company entered new related industries with the explicit intent of utilizing the managerial and skill base that it had built up in order to meet wartime demand for military products (Chandler, 1990).

More recently, greater frequency of technological change in a number of industries has caused some technologies and products to mature and decline relatively quickly. Additionally, even in some relatively well-established industries such as consumer products, shortened product life cycles may leave firms with excess resources on a regular basis. For example, as the mini-van segment of the automobile market matured, General Motors shifted some of its mini-van plant capacity to the production of SUVs that were in the growth phase of the product life cycle. As this example suggests, changing markets and technologies can provide opportunities as well as threats. In what follows, we analyze how firms can transfer excess resources between businesses over time to obtain inter-temporal economies of scope.

**INTER-TEMPORAL ECONOMIES OF SCOPE**

To add precision to the analysis of inter-temporal resource transfers between related businesses, we next modify the standard formula for economies of scope. We define inter-temporal economies of scope as follows, for two products and two

time periods:

$$C(Y_{1,t-1}, Y_{2,t}) < C(Y_{1,t-1}, 0) + C(0, Y_{2,t}) \quad (2)$$

where  $C$  = total costs of production,  $Y_{1,t-1}$  = output of product 1 in period  $t - 1$ , and  $Y_{2,t}$  = output of product 2 in period  $t$ .

Equation 2 states that the total costs of producing  $Y_2$  in period  $t$  together with  $Y_1$  in the prior period  $t - 1$  is less than the total costs of producing each product in separate firms in their respective time periods.<sup>4</sup> In this simple set-up, production of  $Y_2$  completely replaces production of  $Y_1$ . When the firm ceases production of  $Y_1$  at the end of period  $t - 1$ , the firm transfers the resulting excess resources to  $Y_2$  in the subsequent time period  $t$ . An obvious modification to the formula would involve continuing production of some reduced amount of  $Y_1$  in period  $t$ , while also transferring the excess resources to  $Y_2$ . In the case of either a partial or complete reduction in the amount of  $Y_1$ , inter-temporal economies result because the firm does not bear all of the start-up costs of producing  $Y_2$ . Instead, the firm redeploys some of the necessary resources from the previous business of  $Y_1$ . This contrasts with the contemporaneous (intra-temporal) sharing of resources between  $Y_1$  and  $Y_2$  in the same time period, as reflected in the standard logic of economies of scope.

The potential for established firms to benefit from inter-temporal economies of scope has implications for start-up firms seeking to compete with established firms entering a new market. When an established firm transfers resources and knowledge from an old business to a new business, it has lower up-front costs than does a start-up firm seeking to compete in the new business (all else equal). That is, given that existing firm  $i$  has produced  $Y_1$  in period  $t - 1$ , firm  $i$  has lower costs of producing  $Y_2$  in period  $t$  than does start-up firm  $j$ .<sup>5</sup> Formally:

$$C(Y_{2,t}|Y_{1,t-1}) < C(Y_{2,t}|0) \quad (3)$$

<sup>4</sup> In an analysis of product tying and entry deterrence, Carlton and Waldman (2002) also briefly refer to inter-temporal economies of scope. The authors do not define the term and use it in a narrow context where lower costs for one product in the second period have implications for entry into another product that has demand-side complementarities.

<sup>5</sup> In this set-up, producing  $Y_1$  essentially creates real options for the firm to move into some potential set of  $Y_2$ s in the future. Some  $Y_1$ s may give the firm more choice among potential  $Y_2$ s than do other  $Y_1$ s.

The analysis of inter-temporal economies of scope pertains to redeployment of resources between businesses over time in reaction to permanent changes in technologies and market demand. The analysis does not apply to a repeated pattern of resource transfer between ongoing businesses, such as that which occurs in some seasonal businesses. For example, many ski areas redeploy their facilities and staff every summer for warm weather mountain activities, and then shift these resources back to the ski business in the winter. Although seasonal resource transfers conform to the formula for inter-temporal economies of scope, they are more appropriately modeled using the formula for intra-temporal economies of scope given earlier. The ski area, for example, is permanently in two businesses and has not exited either market. Thus, we can model the company as sharing its resources between two businesses over a time period of one year.<sup>6</sup> Since the company is in the same businesses year after year, this is properly viewed as a stable phenomenon, rather than as a series of diversification moves.

The key element in our analysis that differentiates inter-temporal from intra-temporal economies of scope is market exit. When a firm permanently reduces its presence in one business and adds another business, inter-temporal economies arise from resource redeployment. Although the process of exit and entry may recur over time as markets change, in each instance of market exit combined with entry the firm permanently alters the businesses in which it participates.<sup>7</sup> Moreover, unlike in standard analyses of related diversification and intra-temporal economies of scope, inter-temporal economies do not imply that the size and scope of the firm necessarily increase over time. A firm can

replace existing businesses with new businesses without changing either the number of businesses in which it participates or the size of the firm, and still obtain inter-temporal economies of scope.

Inter-temporal economies apply only to businesses that are related to one another by skill, resource, market, or purpose (per Rumelt, 1974). This relatedness of businesses is critical. Unless the business that a firm exits is related to one that it enters, the firm cannot redeploy resources between the two businesses. Inter-temporal economies also do not accrue through merger and acquisition strategies of the sort where firms buy and sell companies without moving resources. In addition, our analysis of inter-temporal economies does not rely on learning-by-doing, in contrast to Penrose's (1995) emphasis on learning-by-doing to explain diversification over time. Learning-by-doing, as noted earlier, could be viewed as leading to a series of intra-temporal scope economies over time.

### Adjustment costs

Because inter-temporal economies of scope result when one business partially or completely replaces another related business, it is important to consider the adjustment costs of transferring resources between businesses, including the time that it takes to redeploy the resources. The concept of adjustment costs comes from the economics literature on investment and growth. In economics, adjustment costs stem from difficulties that firms may face in adjusting their capital stock due to market imperfections that raise the costs and time period required for investment (Lucas, 1967). For example, a firm that invests in specialized equipment from a small supplier may need to pay a premium in order to obtain a large order or face a time delay in receiving the equipment. If we think of diversification as an investment in a new market, then adjustment costs become relevant, even for standard analyses of diversification that do not incorporate inter-temporal economies of scope. The literature on diversification, however, tends not to focus on adjustment costs of moving between markets.

What sort of adjustment costs might inter-temporal resource redeployment involve? As a first cut, we can divide them into direct and indirect costs of resource transfer. Direct costs of resource transfer include the expense of moving people and equipment between businesses. Indirect costs result from disruption to existing businesses during

<sup>6</sup> For example, Levy and Haber (1986) analyze shifts of resources back and forth between a stable set of product lines when demand for the different products fluctuates. Their analysis, which incorporates some uncertainty about demand shifts and includes adjustment costs of shifting resources between product lines, essentially is a generalization of the situation of seasonal shift in resource usage. Fernandez-Cornejo *et al.* (1992) also estimate an empirical model that includes adjustment costs of shifting resources between a fixed set of product lines over time.

<sup>7</sup> It is of course possible to assume away the time dimension by defining the relevant time period as a long enough period, of say 10 or 20 years, such that the firm can be viewed as participating in all of the businesses during the 'same' time period. Such a model, which includes a business that the firm has already permanently exited as a component of intra-temporal (contemporaneous) economies of scope, would obscure the dynamics of diversification through market exit and entry.

these moves and from the amount of time involved in resource transfer. Time delays result in foregone revenue and therefore constitute a cost of resource transfer. Adjustment costs of resource transfer relate to what Helfat and Raubitschek (2000) call 'integrative knowledge' and what Mitchell and Shaver (2003) term 'integration capability.' Both terms refer to the ability of an organization to absorb new businesses and to manage a variety of different businesses on a continuing basis. Firms that seek inter-temporal economies of scope on a regular basis may develop integrative capabilities directed toward lowering the adjustment costs of resource transfer.

Adjustment costs would matter less if the shift from  $Y_1$  to  $Y_2$  reflected a change from one long-lasting equilibrium to another. In this situation, permanent cost reductions obtained from economies of scope would make up for one-time adjustment costs. In dynamic markets, however, product-life cycles are short and markets mature and even shrink quickly. This limits the time horizon during which the firm can obtain inter-temporal economies of scope between any two businesses. As a result, the firm can profit from inter-temporal economies of scope only if adjustment costs do not offset the benefits of inter-temporal resource transfer between businesses. The length of time that it takes to redeploy resources becomes especially important. If resource transfer occurs slowly, the time period during which the firm can obtain inter-temporal economies of scope is shortened. The need to minimize both the amount of time that it takes to redeploy resources between businesses and the direct costs of transferring resources has implications for organizational form. For these reasons, in the next section we analyze issues of organizational form.

In practice, diversified firms have the potential to benefit from both inter-temporal and intra-temporal economies of scope. A firm might transfer resources over time between some businesses and share resources contemporaneously between other businesses. In addition, if a firm reduces but does not completely eliminate an existing business while also entering another business, the firm may simultaneously benefit from both inter-temporal and intra-temporal economies of scope. When a business matures, for example, a firm may decide to partially or completely eliminate new product development for that business, but maintain production and marketing. At the same time, the

firm may enter a new related business to which it switches the product development team (inter-temporal scope economies), and for which it shares production and marketing with the mature business (intra-temporal scope economies).

In what follows, we provide a detailed example of a firm that operates in dynamic markets and obtains both inter-temporal and intra-temporal economies of scope. This example elaborates on how excess resources arise as a result of changing markets and explains the organizational mechanisms used by this firm to transfer resources between businesses. The organizational structure and processes of this firm are particularly relevant to adjustment costs of resource transfer. For this reason, we first provide an overview of the literature on related diversification and organizational form before proceeding to our company example.

## ORGANIZATIONAL FORM AND RELATED DIVERSIFICATION

The topic of diversification and organizational form has to do with the broad subject of 'strategy and structure.' As documented by Alfred Chandler (1962), many prominent, large, diversified firms in the United States adopted a divisionalized organizational structure that contrasted with earlier structures that organized tasks according to function rather than product-market. Oliver Williamson (1975) later referred to this type of organization as the M-form. Within this structure, operational decision making and control occurred at the level of divisions organized according to product-markets, and strategic decision making took place at the top of the organization. The M-form reduced the need for coordination between product lines within functions, thus economizing on the coordination capacity of top management. In addition, delegation of operational control economized on the bounded rationality of top managers, enabling them to focus on strategic issues for the company as a whole. Using the M-form, top management also could reward division managers based on the performance of their units, creating stronger (more high-powered) incentives. Finally, by using divisions as profit centers, top management could more effectively monitor divisions, reducing the potential for agency problems within the corporation (Williamson, 1991).

In the strong form just described, the M-form does not provide a mechanism for achieving economies of scope across divisions, except insofar as top management might transfer information from one division to another as part of its strategic advice to the divisions. As a result, in diversified firms where divisions operate in related markets, firms may need to modify the strict M-form in order to achieve economies of scope across divisions. Accordingly, Hill *et al.* (1992), in a comprehensive review of the literature, posit that four organizational characteristics affect the success of related diversification and the associated realization of economies of scope. These characteristics have to do with the extent to which corporations employ: (1) centralized control over strategic and operating decisions of divisions; (2) coordination between divisions through integrating mechanisms; (3) non-financial criteria to evaluate divisional performance; (4) incentives and rewards tied to corporate rather than divisional profitability.

Hill *et al.* (1992) argue that centralized control and coordination improve the ability of related diversified firms to share resources across divisions in order to obtain economies of scope. Centralized control can help identify opportunities for resource sharing and ensure that division managers seek to exploit these opportunities. Coordination facilitated by integrating mechanisms such as cross-division teams can help to implement the sharing of resources across divisions. Non-financial evaluation criteria, such as those that reward coordination between divisions, provide incentives for cross-division integration to achieve economies of scope. Finally, when firms use corporate-wide financial incentives, managers have an incentive to share resources with other divisions in the firm, which can lead to economies of scope. Hill *et al.* (1992) also argue that, unlike related diversified firms, unrelated diversifiers should reward managers based on financial measures of divisional performance rather than corporate performance, in order to obtain governance economies. In addition, centralization and coordination would harm the performance of unrelated diversified firms by raising their costs without benefits from economies of scope.

Hill *et al.* (1992) find that greater use of centralization, interdivisional integration, non-financial criteria, and corporate-wide financial incentives have a positive and statistically

significant effect on return on assets for related diversified firms. They also find that greater decentralization, less reliance on non-financial criteria, and use of division-level performance incentives have a statistically significant positive effect on return on assets for unrelated diversified firms.

As these results suggest, and as Hill *et al.* (1992) point out, diversified firms may face a trade-off with regard to their organizational arrangements: the characteristics that promote economies of scope can harm governance economies and vice versa. Recent research has suggested various alternatives for dealing with this dilemma. One new approach is that of patching (Brown and Eisenhardt, 1998), whereby top management adds, splits, combines, and removes decentralized and modular business units over time as markets change. Because the fast pace of dynamic markets makes it more difficult to coordinate operations across businesses from the top of the organization, patching dispenses with ongoing coordination between divisions that might achieve intra-temporal economies of scope. Instead, more limited economies of scope may arise from factors such as the use of a common brand name, product development system, and accounting system across businesses. In addition, because firms that rely on patching are decentralized, they can reward managers based on division profits, reducing agency problems within the firm.

Other approaches seek to benefit from cross-division economies of scope without changing the architecture of the business portfolio of the firm. Goold and Campbell (1987), for example, have argued that an intermediate organizational form that they term 'strategic control' can incorporate aspects of both decentralization and coordination. In particular, when division managers are rewarded based on division performance, they should have an incentive to improve the performance of their divisions, including by obtaining useful resources from other divisions (Goold, Campbell, and Alexander, 1994). Martin and Eisenhardt (2003b) take a more granular view and observe that this approach requires some way for division managers to learn about valuable resources in other divisions and to negotiate the details of resource sharing. They propose that, as part of the process of 'co-evolving,' multi-business teams comprised of the heads of individual businesses can identify collaborative links



among businesses as markets evolve, and negotiate mutually beneficial ways to achieve these collaborations. Thus, as markets shift, these teams enable firms to figure out and then exploit where new intra-temporal economies of scope lie.

These newer solutions focus on the benefits of decentralization and high-powered incentives found in the M-form, and then build in resource sharing across divisions in a way that does not preclude decentralization. Yet, firms still face a tension between decentralization and resource sharing, and these solutions are likely to favor decentralization over coordination and economies of scope. Moreover, like the older literature on diversification strategy and structure, these newer solutions involve intra-temporal economies of scope that derive from contemporaneous (albeit dynamic) sharing of resources between divisions.

Unlike standard intra-temporal economies of scope, achieving inter-temporal economies of scope does not create a tension between decentralization of businesses and coordination across businesses that firms must overcome with creative solutions. Because inter-temporal economies do not involve contemporaneous resource sharing, achieving these economies does not require ongoing coordination and integration across divisions. This reduced need for coordination implies that firms can decentralize divisions and use division-level financial performance as the basis for high-powered incentives and monitoring of managers. Firms do require some centralization of decisions regarding market entry, exit, and the resulting redeployment of resources, but do not require centralized control of division strategy and operations. As a result, related diversifiers that pursue inter-temporal economies of scope can benefit from decentralized business units, high-powered financial incentives, and monitoring of managers based on division performance. In contrast with other approaches to achieving economies of scope in related diversified firms, inter-temporal economies of scope do not conflict with governance economies to nearly the same extent.

In what follows, we provide a detailed example of inter-temporal economies of scope and associated organizational arrangements in a company that participates in dynamic markets. The example involves a company, Omni Corporation (a pseudonym used to preserve confidentiality), that pursues a corporate strategy of related diversification. The firm also has a decentralized and

modular organizational structure, with only limited sharing of resources between corporate divisions on an ongoing basis. Inter-temporal resource transfer occurs by a process of recombining organizational units with businesses in a manner described next.<sup>8</sup>

### ECONOMIES OF SCOPE IN OMNI CORPORATION

Omni Corporation is a *Fortune* 100 high-technology company that participates in many businesses with overlapping customers and related technologies, and has been one of the most consistently high-performing technology corporations in the world.<sup>9</sup> During the time period of the mid 1990s described here, Omni's businesses included electronic instrumentation (from voltage meters to sophisticated microwave analyzers), computing and information technology (handheld computers, desktop computers, and servers), and computer peripherals (such as monitors and printers). The company was organized into several business groups, each composed of multiple divisions related to one another on the basis of product lines, customer segments, and technology. Each division had global strategic and operational control over its business, and operated as a profit center within the corporation. That is, Omni had a decentralized organizational structure, where businesses were run largely separately and managers were rewarded for the performance of their businesses and products (high-powered incentives). A division could produce more than one product, but each division had relatively narrow product-market responsibilities.

Omni participated in markets that often changed rapidly as a result of evolving and new technologies, and shifts in customer desires once new technologies were commercialized. To deal with these ongoing technological and market changes, Omni executives reallocated what they called 'charters' among its divisions. A charter was defined as a product-market area of responsibility, such as 'desktop computing.' When company executives

<sup>8</sup> This recombination process is a subset of the corporate 'patching' strategies discussed earlier (Brown and Eisenhardt, 1998). The literature on patching has yet to identify the link to inter-temporal economies of scope analyzed here.

<sup>9</sup> The facts about Omni Corporation described here draw in part on Galunic and Eisenhardt (1996, 2001), but the interpretation offered with regard to economies of scope is new.

moved charters between divisions, they moved only product-market responsibility, not staff or other resources (with the exception of isolated managerial changes).

The charter changes in Omni consisted of three main types. First, new business opportunities resulting from technological and market changes led to new charters. Second, when shifts in the nature of markets and technologies produced a poor fit between a division's capabilities and the business specified by the charter, Omni executives moved the charter to another division. Third, businesses with pressing difficulties precipitated temporary charter reallocations. To accomplish these charter changes, which occurred with regularity, Omni executives used a few main approaches, as next described. The company executives approached the first type of charter change, which involved new business opportunities, in a manner that enabled the firm to obtain inter-temporal economies of scope. For this reason, we devote particular attention to this type of charter change. We also describe the other two sorts of charter changes.

### New business opportunities

Corporate management played an important role in spotting new related business opportunities for Omni in emerging markets and technologies. Omni's corporate management used its knowledge of the firm as a whole to actively search for and evaluate new related diversification opportunities. For example, in one instance, Omni corporate executives realized that technologies being developed in two different divisions could be merged to create a new business. The way in which Omni executives dealt with the new business opportunity, however, is noteworthy. They often did not form a new division to handle this opportunity. Instead, as occurred frequently when corporate management identified new business opportunities, Omni executives allocated the new charters to existing divisions that were attaining modest or weak performance under their current charters as a result of shrinking market growth or increased competition.

The weakened performance of the recipient divisions had resulted in part from the normal growth and maturation of the high-technology markets in which Omni participated. As a technology matured, margins and sales growth declined due to

factors such as entry by competitors, which tended to lower product prices. The divisions were no longer in a fast-growth mode, and in some situations sales were slipping. Managers could have tried to increase margins or sales growth in the divisions' existing charters. Raising profitability, however, would have been difficult in the face of increased competition in markets where the products had become more of a commodity (and therefore, lower margin almost by definition) due to maturation of the underlying technology. Managers also could have laid off personnel and sold off equipment.

As an alternative, Omni's method of charter recombination transferred resources within a division to a new product-market area of responsibility, which partially supplanted the declining business from which the new business drew its resources.<sup>10</sup> The new business opportunity offered the prospect of much higher margins than did the existing charter in a mature market. As Penrose (1995) notes, when markets mature, they may become *relatively* less profitable compared with new investment opportunities that firms could undertake using their resources. In Omni's case, resources were redeployed by recombining divisions with business opportunities (known as charters at Omni) through time.

In addition to the generation of new charters by corporate management, there was a second source of new charters: new business ideas sometimes emerged from divisions within Omni, stemming from ongoing operations. Omni executives, however, often considered these business ideas to be 'new charters,' took them away from divisions that had originated them, and (as in the previous example) allocated them to other divisions. Generally, the divisions that originated but lost charters for new business opportunities were growing rapidly in their main businesses. These divisions would have been hard pressed to extend their resources to take on new businesses as well. Although Omni executives could have transferred personnel such as engineers and marketing specialists from elsewhere in the company to these divisions, so that the divisions could take on new businesses, Omni did not have enough managerial capacity at the top of the corporation to facilitate such transfers on

<sup>10</sup> In many instances, Omni proactively exited businesses where sales were declining, rather than waiting until market conditions worsened.

a regular basis. In addition, top management frequently preferred to keep the divisions that inaugurated new charters tightly focused on their current businesses.

The recombining of divisions and charters just described was possible only because the company participated in related businesses. Without the relatedness of businesses, so that excess resources in one division could be productively applied to a new business (charter), corporate management would have found it more difficult to reallocate resources within a division to a new business opportunity that did not necessarily arise from within that division.

Omni's charter changes in order to pursue new business opportunities created inter-temporal economies of scope, based on redeployment of resources from a business with slowing market growth, or even sales declines, to a new related business. In terms of the earlier formula for inter-temporal economies of scope,  $Y_2$  denotes the new business opportunity and  $Y_1$  denotes the prior business of the division that received the new charter, where  $Y_2$  partially (but not fully) replaced  $Y_1$ . Excess resources that developed in period  $t - 1$  for  $Y_1$  were transferred to  $Y_2$  in the subsequent time period, as the firm reduced its commitment to the market for  $Y_1$ .

### Mismatched capabilities and markets

A second type of charter change within Omni resulted from shifts in the nature of product-markets and technologies, which produced a mismatch between the capabilities of a division and the basis of competition in the business. For example, as often occurs in high-technology industries as markets mature, the competitive basis of the industry for one Omni division was shifting from R&D, where the division's competencies lay, to manufacturing efficiencies. Similarly, for another division, the basis of competition was shifting from the ability to serve the military customer to the commercial customer.

Given the dynamic nature of the markets in which Omni competed, such mismatches occurred frequently (as did the new business opportunities previously discussed). As mismatches emerged, divisions often encroached upon the charters of other divisions. Corporate management would then intervene to formally allocate the charter either to the originating division, or more frequently to

'give' the charter to a division that had skills that better fit with the business. For example, instead of trying to undertake the time-consuming and potentially tortuous process of making a division whose competencies lay in R&D become a cost-driven unit with superior manufacturing capabilities, Omni executives moved the charter to a unit that already had the necessary capabilities.

The divisions that received the charters, however, were not necessarily those within Omni that had the skills that best fit the charter. Instead, the charters went to divisions that, while they had relevant capabilities, also had excess resources. Galunic and Eisenhardt (2001) characterize the receiving divisions as somewhat successful performers that were constrained by modest charters (i.e., of limited actual and potential market size). As a result, these divisions had excess and related resources that could be applied to the additional charter they received. For example, in one case, the charter involved a complementary product in the same industry as the recipient division's current business. In addition, corporate management worked with the losing divisions to find new uses for their now excess resources in the form of new charters that fit better with the divisions' competencies.

These charter changes due to mismatches between product-markets and division capabilities yield the standard sort of intra-temporal economies of scope, in the following sense. When a receiving division obtains an additional charter because its current charter has limited market size, the division already has excess resources available to share contemporaneously with the new business. These excess resources might have arisen as a result of prior learning by doing (Penrose, 1995), for example. The charter change, however, does not involve exit from a product-market or the redeployment of resources from an exited business to another business that creates inter-temporal economies of scope.

### Unexpected orphans

The third type of charter change at Omni involved 'orphaned' businesses. These were often smaller businesses that did not fit well within their current divisions and posed pressing problems. Corporate management often quickly dealt with these problems by moving the charter to another division (termed 'foster homes') on a temporary basis until

a permanent solution could be found. One sort of temporary charter change occurred when divisions that were pursuing new charters were hindered by responsibility for their old businesses in a way that was not anticipated. Omni executives usually preferred to move the old businesses to 'foster home' divisions so as not to hold back the new growing businesses. A second sort of temporary charter change involved situations where the scale of operations had shrunk to the point where the businesses were difficult and/or costly to manage on a stand-alone basis. In both types of charter change, the problems also had escalated to the point where they needed immediate attention that could not wait for corporate management to fully diagnose the sources of the problems and devise a permanent solution.

The foster home divisions that received temporary charters were well-run, solid performers with stable markets. In the parlance of economies of scope, while these divisions did not have large amounts of excess resources, they were not running completely flat out and could share their current resources to accommodate a small charter addition, resulting in intra-temporal economies of scope.

## DISCUSSION

Omni's approach to diversification has implications for several features of our analysis of inter-temporal economies of scope. As next explained, Omni's approach adds to our understanding of: (1) value creation through related diversification, (2) an organizational form for achieving value through related diversification that runs counter to the prevailing wisdom, and (3) how a combination of market entries, exits, and resource recombinations supports an evolving set of related businesses over time.

### Related diversification

The charter change processes within Omni reveal important ways in which relatedness of businesses is linked to achieving corporate value. Omni is a related diversified firm and the relatedness of Omni's businesses was critical to the firm's ability to transfer charters among businesses over time. Personnel in the receiving divisions could take on the new businesses because the knowledge bases of the divisions were related within each business

group. The personnel in the receiving divisions could also take on new businesses because Omni had some degree of standardization among divisions, including a common accounting system, a common brand, and a common framework for the product development process. For example, products under development in one division could be moved to another division, and the receiving division would have a clear understanding of the progress and status of the development project. As a result, these standardized systems and processes also lowered the adjustment costs of resource redeployment associated with charter changes.

The charter changes within Omni also reveal ways that related diversified firms can achieve both inter-temporal and intra-temporal economies of scope, as firms redeploy some resources among businesses over time and share other resources between businesses contemporaneously. The first type of charter change in Omni, involving new business opportunities combined with partial and occasionally complete exits of old businesses, resulted in inter-temporal economies of scope. These inter-temporal economies may also have been accompanied by intra-temporal economies of scope in cases where some resources (e.g., a distribution channel) were shared contemporaneously between the new business and any remaining portion of the old business. Moreover, because systems and processes were shared contemporaneously between the divisions, they produced intra-temporal economies of scope as well. The other two types of charter changes also involved contemporaneous resource sharing between businesses, resulting in intra-temporal economies of scope that are more dynamic in character than the standard treatment of shared resources across divisions.

More generally, firms can achieve both inter-temporal and intra-temporal economies of scope not only through entry into related product-markets, but also from introduction of new generations of products in the same market. Resources that are shared contemporaneously across two generations of a product that coexist yield intra-temporal economies of scope, and resources that are redeployed one from product generation to another yield inter-temporal economies of scope.

### Organizational form

Omni's approach highlights the importance of an appropriate organizational form in order to create

value from related diversification. In allocating resources to businesses (charters), Omni used a decentralized and modular organizational structure that runs counter to the view that related diversified firms ought to benefit from centralized coordination and control. Omni's objective financial criteria and incentives based on division performance, as well as the lack of extensive integration and coordination mechanisms across divisions, also are inconsistent with the traditional view (e.g., Hill *et al.*, 1992). Although Omni did centralize decision making regarding charter transfers, most if not all of the decisions on business strategy and related operating matters were made at the division level. While the particular types of charter changes just described are specific to Omni, other related diversified firms have employed a similar approach of recombining organizational units with business charters, although perhaps not as extensively. Examples include Johnson and Johnson, 3M, Microsoft, Dell, Adobe, and Symantec. Thus, in contrast to more standard prescriptions, it appears that successful related diversified firms can be decentralized and modular.<sup>11</sup>

Omni's approach to inter-temporal economies of scope may work because its combination of a decentralized, modular structure and recombination processes helps to minimize the adjustment costs and amount of time for resource transfer required to obtain inter-temporal economies of scope in dynamic markets. It may be faster to transfer charters between divisions than to transfer resources across divisions as markets emerge, converge, segment, mature, and decline. Especially when businesses are related, a division that receives a new charter can probably come up to speed more rapidly and efficiently than when extensive resources must be transferred between divisions. In addition, by keeping divisions intact, Omni avoids disrupting the social relationships that enable the smooth functioning of routines and resources within divisions.

Of course, Omni's approach may not be the only one that related diversified firms might use to achieve inter-temporal economies of scope. An alternative to Omni's approach might involve a matrix type of organization, where personnel and plant and equipment in a particular functional area could be reassigned to a new business. A matrix

type of organizational arrangement, however, tends to entail higher coordination costs that erode some of the benefits of decentralization. Although firms that compete in multiple geographic and product markets sometimes utilize a matrix type of arrangement, the complexity of this approach adds to the costs of day-to-day operations. A matrix organization also makes it more difficult to obtain the governance economies that Omni achieves through high-powered evaluation and incentive systems tied to division performance.

In addition to the benefits of Omni's organizational form for inter-temporal economies of scope, Omni appears to have successfully applied this form of organization to obtain intra-temporal economies of scope via reallocation of existing charters. The benefits of applying this modular, decentralized organizational structure to existing businesses may come about because Omni participates in dynamic markets, where the firm must continually readjust the match between its resources and changing market needs.

Overall, the Omni example suggests that firms can effectively employ modular recombination as a powerful organizational form that contrasts with the standard prescriptions for related diversified firms. Particularly in dynamic markets, related diversified firms may be able to achieve economies of scope along with (rather than instead of) governance economies. A decentralized organization structure, low levels of coordination between divisions, and incentives and monitoring tied to division performance can be used in a manner that enables firms to obtain both inter-temporal and intra-temporal economies of scope.

### Dynamics of diversification

Application of the concept of inter-temporal economies of scope to charter changes within Omni brings out several important features of the dynamics of diversification. Omni combined exit from some product-markets with entry into others, which in turn produced inter-temporal economies of scope as the company redeployed resources between related businesses over time. This process created exactly the sort of evolving path of dynamic related diversification documented by Kim and Kogut (1996), Chang (1997), and Helfat and Raubitschek (2000). Omni repeatedly used its existing knowledge base as a platform for expansion into new

<sup>11</sup> It is worth noting that Omni produced superior financial performance for several decades using the approach described.

related businesses, even though the expansion frequently took place within another division of the company. That is, charters for new business opportunities developed in one division often went to other divisions that had related resources that could be productively redeployed to the new businesses. The originating divisions understood that they were stretched too thin to undertake the new businesses. The originating divisions also understood that if and when their current businesses declined, they would gain a new charter, possibly developed from elsewhere within the company. Thus, the process of building new knowledge and related diversification based on this knowledge continued.

In addition to allocating charters for new business opportunities, Omni reallocated existing business charters between divisions. Although these reallocations were not new diversification moves, they supported the related diversification posture of the company by seeking to improve the performance of the related businesses within the corporation through frequent readjustment of divisional capabilities with businesses. Taken as a whole, Omni's approach of combining product-market entry, exit, and business reshuffling supported an evolving set of related diversified businesses within the firm.

## CONCLUSION

This paper asks: what value does the corporation add beyond what markets and individual businesses can accomplish effectively? We began by observing that the value of the corporation beyond the sum of its businesses is in debate. This debate focuses in part on the value of related diversification and attendant economies of scope. In this paper, we have analyzed more fully and with greater organizational depth how related diversified firms can obtain economies of scope, particularly in dynamic markets. Our discussion of Omni identified how related diversification can create value through inter-temporal and non-traditional intra-temporal economies of scope, how modular recombination can be used to achieve that value in a manner that does not entail a trade-off between economies of scope and governance economies, and how an evolving set of related businesses results over time. The analysis also has implications for market entry and exit, the adaptation of firms to changing markets and technologies, and

empirical research on related diversification, as next explained.

With regard to market entry, inter-temporal economies of scope provide an additional explanation for the empirical regularity of success through diversified market entry. In a well-known study, Dunne, Roberts, and Samuelson (1988) found that diversified entrants performed better than other entrants. As Helfat and Lieberman (2002) explain in a comprehensive analysis of the relationship between firm resources and market entry, diversified entrants tend to meet with greater success for reasons specifically due to the nature of their pre-entry resources. In line with this reasoning, our analysis suggests that inter-temporal economies of scope may contribute to the success of diversified entrants through resource redeployment between businesses, because inter-temporal economies of scope lower entry costs for related diversifiers relative to newcomers.

Inter-temporal economies of scope also point to the advantages of timely market exit. In redeploying resources, firms may benefit when they exit markets with declining opportunities in order to take advantage of new opportunities in other markets (Penrose, 1995). The ability to obtain inter-temporal economies of scope from simultaneous exit and entry provides an incentive for related diversified firms to more quickly exit declining businesses. As Sull (1999) observes, failure to exit from a declining business in a timely fashion can degrade the performance of the entire firm. Firms that proactively exit declining markets while at the same time successfully entering new markets are what Tushman and O'Reilly (1997) term 'ambidextrous organizations,' and what Brown and Eisenhardt (1998) refer to as operating on 'the edge of chaos.'

This process of market entry combined with exit enables firms to adapt to changing markets and technologies as firms alter the composition of their businesses over time. For example, product-market opportunities often shift during the life cycle of products and technologies. As products and technologies mature and even decline, firms may be left with resources that can be reapplied to new related business opportunities to produce inter-temporal economies of scope. Moreover, a decentralized, modular organizational structure together with recombination processes can enable managers of a related diversified firm to relatively quickly match organizational

units with new business opportunities. Resources from mature, declining, or defunct businesses can be reallocated quickly to more promising product-market opportunities. Thus, a modular organizational structure and recombination process can enhance adaptation to changing markets and technologies (Brown and Eisenhardt, 1998), including the creation of new product-market domains.<sup>12</sup>

Finally, our analysis has implications for empirical research on diversification. First and foremost, studies of diversification may understate the benefits of related diversification because research generally has not incorporated the possibility of inter-temporal economies of scope. Evaluating inter-temporal scope economies empirically requires longitudinal data as well as a different research design that incorporates exit from some businesses and entry into other related businesses, in order to capture economies of scope over time. In addition, future research might test whether redeployment of resources within firms as part of a process of combined market exit and entry improves firm performance relative to market exit unaccompanied by entry into related product-markets, and relative to the performance of start-up companies in new markets. Research also could test whether firms that seek inter-temporal economies of scope by transferring resources among businesses over time achieve better performance when they use a modular, decentralized organization. Entry and exit information can be derived from sources such as the Compustat business segment database and the Trinet plant-level database. Both of these databases contain performance information as well. These data could also be supplemented with surveys of companies in order to collect more detailed information on resource profiles, resource transfer, and organizational form. And these are but a few of the possibilities for future research based on the concept of inter-temporal economies of scope as part of a related diversification strategy.

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<sup>12</sup> See also Capron, Mitchell, and Swaminathan (2001) on the role of mergers and acquisitions in leading to resource recombination and the evolution of firms through time.

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