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Strategic switchbacks: Dynamic commercialization strategies for technology entrepreneurs

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ABSTRACT

We present a synthetic framework in which a technology entrepreneur employs a dynamic commercialization strategy to overcome obstacles to the adoption of the firm's ideal strategy. Whereas prior work portrays the choice of whether to license a new technology or to self-commercialize as a single, static decision, we suggest that when entrepreneurs encounter obstacles to their ideal strategy they can nevertheless achieve it by temporarily adopting a non-ideal strategy. We refer to the sequential implementation of commercialization strategies, in which the first strategy enables the second, as a switchback—reminiscent of zigzag paths that enable passage up steep mountains. We analyze conditions under which switchbacks can be effective in enabling the entrepreneur's ideal commercialization strategy given the attending costs, risks, and likely incumbent response.

1. Introduction

Commercializing a technical innovation can involve severe challenges no matter which strategic path the entrepreneur is contemplating. Many startups aspire to compete directly in the product market but lack the complementary assets that would allow them to do so effectively. Others seek to cooperate with incumbents in bringing new technologies to market, but find that prospective partners are deterred by uncertainty regarding the technical and commercial viability of the innovation as well as by the startup's own lack of reputation.[1] As a consequence, both the choice and the execution of commercialization strategies for entrepreneurs may be less straightforward than has been theorized to date.

An extensive literature in economics and the management of technology investigates conditions under which an invention should be self-commercialized rather than brought to market in cooperation with partners. Anchored in the analysis of arm's-length contracting versus vertical integration (e.g., Williamson, 1985; Hart, 1995; Aghion and Tirole, 1994), both theoretical and empirical work has investigated the optimal conditions and contracts for licensing (Katz and Shapiro, 1985; Kamien and Tauman, 1986; Gallini and Wright, 1990; Lerner and Merges, 1998) as well as how markets shape the risk of expropriation (Anton and Yao, 1994). Securing intellectual property rights may be necessary for licensing (Gans et al., 2008) but not sufficient (Arora and Ceccagnoli, 2006) unless complementary assets are lacking. Moreover, the commercialization decision is complicated by the fact that licensing revenues can dissipate otherwise-attainable profits (Fosfuri, 2006); the innovator must take into account product differentiation, market-share, and both upstream and downstream competition in the market for technology. Much of this literature examines the behavior of large R&D labs, for whom a single commercialization strategy may suffice given that their resources and reputation enable them to successfully execute either cooperation or competition. But even when scholars have focused specifically on technology entrepreneurs, their analysis yields static strategic prescriptions based largely on the commercialization environment (Gans et al., 2002; Gans and Stern, 2003).

We conceptualize the challenge of executing a strategy as scaling an incline with a steep grade. When a hill is too steep to be climbed directly – an especially apt analogy for typically resource-poor entrepreneurs – an alternative is to construct a switchback. Perhaps best known in the case of mountain trains such as the Darjeeling Express, a switchback involves traveling sideways up the incline at a lower grade than if attempting to climb directly up. At some point, the train stops and backtracks before continuing up the incline at a similarly-reduced grade in the opposite direc-

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[1] We follow the convention in related literature of adopting a wide definition of "cooperative" strategy, including various forms of joint commercialization such as technology licensing and alliances.

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tion. Llobera and Sluckin (2007) show that while direct paths are most efficient for climbing gentle grades, sufficiently steep grades can only be scaled using switchbacks. Similarly, we suggest that entrepreneurs aspiring to a particular commercialization strategy but facing a steep climb may construct a "strategic switchback." In this approach, they initially pursue a non-ideal strategy – but only on a temporary basis – in order to eventually enable their ideal strategy.

We provide a synthetic framework that introduces two switchback strategies which depend on both the entrepreneur's ideal commercialization path and obstacles to executing it. A temporary cooperation switchback applies when entrepreneurs want to self-commercialize but are initially blocked from doing so, often for lack of complementary assets. Here, the entrepreneur uses an initial cooperative strategy to gather the resources and expertise necessary to develop or acquire the needed complementary assets, which then enables product market entry.[2] A temporary competition switchback is essential for entrepreneurs who wish to cooperatively commercialize but find themselves either unable to do so due to partner uncertainty regarding the value of the innovation, or unwilling to do so given their limited ability to negotiate attractive agreements. In this case, entering the product market demonstrates the value of the technology, builds the brand, and develops other assets needed in order to eventually achieve favorable cooperative arrangements. Switchbacks thus initially adopt a non-ideal strategy that works to mitigate existing constraints, and thereby enables transitioning to the ideal strategy.[3]

Our framework extends the literature on technology commercialization in two ways. First, whereas prior work regarding entrepreneurs (e.g., Gans et al., 2002; Gans and Stern, 2003) focuses on the role of the external environment in determining the optimal commercialization path, we identify characteristics of startups themselves that can impede their ability to implement an otherwise-desirable strategy to a greater degree than for established firms. Second, and more importantly, rather than taking these obstacles as given and unchangeable constraints leading to a permanent commercialization strategy, we propose that purposeful entrepreneurial actions can change those external constraints and thus enable the ideal strategy in the long run. We also distinguish our contribution from that of Marx et al. (2014), who provide evidence of compete-then-cooperate strategies among entrants with potentially-disruptive technologies, by sketching a broader theory of when entrepreneurs might first self-commercialize as an enabling step toward licensing—including questions of symmetric uncertainty regarding the innovation, lack of bargaining power, and waiting on intellectual property rights. Moreover, the notion of temporarily cooperating as a prerequisite to product-market entry is unique to our "switchback" formulation of dynamic commercialization strategies.

The next two sections detail first the temporary cooperation switchback and then the temporary competition switchback. In each section we discuss each switchback's benefits and costs to the entrepreneur and the likely incumbent response. Section 4 reviews boundary conditions that may reduce the viability of both types of switchbacks, and Section 5 concludes.

2. Using a temporary cooperation switchback strategy to develop complementary assets

Few inventions are attractive in isolation, and most require additional capabilities or assets for successful commercialization (Teece, 1986). Complementary assets may be other technologies which are required to build a product usable by customers – sometimes obtainable off-the-shelf, but often more specialized in that they need to be customized in order to work with the particular invention. Complementary assets in a different sense are required for marketing, distributing, and servicing a product; in some cases, regulatory approval (itself a type of complementary asset) must be obtained prior to marketing and sales.

When the cost of complementary assets is high, a product-market competition entry strategy may be infeasible for small, entrepreneurial firms. Startups may need to find ways to develop the required assets before they can compete. We see an example of this in the early history of Genentech and how its founders expected the firm's commercialization strategy to change over time as it developed complementary assets. Co-founder Robert Swanson recounts:

"It was a goal from the very beginning to make and market products as soon as we could. The first products we licensed to others. We tried to keep some manufacturing rights but let other people market. Now, why is it that you need to be an integrated pharmaceutical company? Over the long run. . .in order to capture all the value from the research that develops a new drug that treats a disease, you have to be able to make and sell that drug yourself, in part to control the distribution of it, not relying on someone else; and in part because you capture greater rewards by selling it yourself. Over the long run, unless you capture those rewards, you cannot invest as much in R&D that allows you to develop the second and third products. . .It [directly entering the product market] can't be done at once obviously, but as soon as you can I always felt that you needed to do that." (Swanson, 2000: 78–79).

Swanson's switch in commercialization strategy at Genentech was not primarily due to environmental changes but rather was part of a deliberate plan to enable the firm to eventually compete directly in the product market.[4] However, this became possible only later as the firm developed experience in navigating the process of clinical trials as well as skills in marketing and sales.

In summary, one key constraint for an emerging enterprise that aspires to enter the product market is the cost of acquiring and/or developing downstream organizational complementary assets. Note, however, that such costs can change over time—both as a result of processes outside the firm's control and as a consequence of the firm's direct actions. We discuss each of these factors in turn.

2.1. Dynamics of complementary asset development: exogenous factors

The academic literature generally assumes the cost of complementary assets to be static. In reflecting on the twenty year anniversary of Teece (1986), Chesbrough et al. (2006: 1096) remark: "Teecian complementary assets take the innovation and

[2] Although the literature routinely includes acquisition as a cooperative mode (Gans et al., 2002; Marx et al., 2014), an acquisition cannot be the first step in a switchback strategy as the firm ceases to exist.

[3] We consider commercialization strategy changes at the firm level. For single-innovation firms, this is straightforward and applies to many if not most entrepreneurial ventures. For firms with multiple innovations and/or product lines, the firm may choose different strategies for different innovations. We follow the convention that new ventures make commercialization strategy decisions for a major product line or small family of products (e.g., Gans and Stern, 2003) to make our extension to incorporate a dynamic element comparable with the prior literature.

[4] (Eventual) self-commercialization might promote increased value capture by avoiding being held up by downstream licensees (Klein et al., 1978). In addition, entrepreneurs encountering technological opportunities may generalize their innovations to a system level and may have less to gain from partnering with incumbents (Egan, 2013). There are circumstances, however, under which a first stage entrepreneurial cooperative strategy may be infeasible. When innovations are architectural (Henderson and Clark, 1990) or disruptive (Christensen, 1996), incumbent firms are likely to resist a cooperative commercialization strategy with start-up innovators.