Strategic Switchbacks: Dynamic Commercialization Strategies for Technology Entrepreneurs

Matt Marx  
*Massachusetts Institute of Technology*

David H. Hsu  
*University of Pennsylvania*

Follow this and additional works at: [https://repository.upenn.edu/mgmt_papers](https://repository.upenn.edu/mgmt_papers)

Part of the *Management Sciences and Quantitative Methods Commons*

**Recommended Citation**


This paper is posted at ScholarlyCommons. [https://repository.upenn.edu/mgmt_papers/205](https://repository.upenn.edu/mgmt_papers/205)  
For more information, please contact repository@pobox.upenn.edu.
Strategic Switchbacks: Dynamic Commercialization Strategies for Technology Entrepreneurs

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.

Keywords
commercialization strategy, dynamic strategies, technology licensing

Disciplines
Management Sciences and Quantitative Methods
Strategic “switchbacks”: dynamic commercialization strategies for technology entrepreneurs

Matt Marx  
100 Main St., E62-478  
Cambridge MA 02142  
617-253-5539  
mmarx@mit.edu

David H. Hsu  
2028 Steinberg Hall – Dietrich Hall  
3620 Locust Walk  
Philadelphia PA 19104  
215-746-0125  
dhsu@wharton.upenn.edu

December 2013

Abstract

We present a dynamic framework for addressing execution barriers to commercialization strategies for technology entrepreneurs. Even if a particular commercialization path is preferred, it may not be feasible to implement at the outset. Instead, entrepreneurs can benefit from a “switchback” strategy in which a transitional commercialization path is undertaken on a temporary basis and for the purpose of enabling the preferred strategy. We introduce two switchback strategies: 1) “temporary competition” in which the entrepreneur initially competes in the product market in order to establish credibility and gain negotiating leverage before attempting to license; and 2) “temporary cooperation” in which the entrepreneur not only licenses to incumbents but also collaborates with them in order to gain expertise before entering the product market. We then identify circumstances under which a switchback strategy is indicated, as opposed to the adoption of a static commercialization strategy as described in the existing literature. We conclude by discussing managerial implications of these dynamic commercialization strategies.

Keywords: commercialization strategy; dynamic strategies; technology licensing

* Both authors contributed equally. We thank Martin Kenney, Scott Stern, and Simon Wakeman for helpful comments. We acknowledge funding from the Wharton Mack Institute for Innovation Management and the Kauffman Junior Faculty Fellowship.
1. INTRODUCTION

A major contribution to both theory and practice during the past twenty-five years has been identifying factors that (should) shape technology entrepreneurs’ choice of how to commercialize a new innovation. The seminal work of Teece (1986) highlighted that, regardless of the potential of a new technology, innovators will fail to either create or capture value if they do not align their commercialization strategy with the environment. An essential early decision is whether the innovator will keep control of the innovation by incorporating it into an offering for the product market (thereby competing against incumbents), or instead cooperate with incumbents via licensing or other partnership arrangements such as alliances in hopes of accelerating growth. Key to this decision is establishing the degree to which the technology is excludable (e.g., via a patent) so that the entrepreneur is less susceptible to expropriation, as well as the innovator’s costs of developing complementary assets necessary to commercialize the invention (Gans, Hsu, and Stern, 2002). When innovators face a tight appropriability environment at the same time that the cost of assembling the requisite complementary assets is relatively high, licensing to incumbents is a winning commercialization strategy; otherwise, the innovator might be better off entering the product market (Arora and Ceccagnoli, 2006).

While this literature has done much to advance our thinking on which strategies innovators ought to occupy given their commercialization environment, it has less to say about how entrepreneurs can overcome implementation barriers which might make it difficult to execute the preferred commercialization strategy. Consider the example of Italian inventor Mario Moretti Polegato. Finding his rubber-soled shoes unbearably hot on a trip to Nevada, Polegato pierced the soles with a knife to release excess heat. He refined the concept while working in his family’s local footwear company and eventually secured a patent for his “micro-pore” sole structure (Polegato, 1990). Given that the small firm lacked extensive manufacturing and distribution capabilities, he attempted to license his patent to established companies including Nike and Adidas (consistent with the prescriptions of the TCS literature). Unable to garner interest, Polegato reluctantly borrowed 500,000 euros to self-commercialize the technology. That his company, GEOX, eventually grew to become an international footwear brand indicates that Polegato’s inability to secure a licensing agreement was not due to poor quality (Pirro 2013).

As in this example, many entrepreneurs may find it difficult to pursue their preferred commercialization strategy initially. Firms cannot implement a commercialization strategy involving external parties by fiat; doing so requires (re)configuring the necessary resources and securing commitments from the necessary participants. As the difficulty of executing particular commercialization strategies may differ, we conceptualize them as peaks of different heights to be scaled in order to obtain competitive advantage. A low peak may be easy to climb, but it may not afford great visibility or strategic advantage. A high peak is
attractive, but scaling a sharp grade may prove too difficult for a technology entrepreneur. Grades may be sharp for several reasons. Unproven technologies, especially when pioneered by inexperienced entrepreneurs, provide a sharp grade for innovators wanting to license, as potential partners may be reluctant to make specialized investments. A firm wishing to capture a higher share of rents by competing in the product market may find entering the product market a difficult hill to climb when it lacks specialized complementary assets or a clear path to developing them. For these and other reasons, the implementation of a desired strategy may seem to be blocked.

An alternative approach to scaling otherwise-insurmountable peaks is to construct a switchback. Perhaps best known in the case of trains such as the Darjeeling Express making their way up steep mountains, a switchback involves taking a longer, indirect path. The train travels sideways up the hill at a lower grade than if it charged directly to the peak. At some point, the train stops and backtracks before continuing up the hill at a similarly-reduced grade but in the opposite direction, retracing some of its steps. Llobera and Sluckin (2007) show in simulation models that while direct paths are most efficient for climbing weakly inclined slopes, sufficiently steep grades are best scaled using switchbacks. Similarly, we suggest that entrepreneurs aspiring to a particular commercialization strategy but facing a steep climb may profit by constructing a “strategic switchback.” In this approach, they pursue a different strategy initially (and temporarily) but with the expectation of eventually returning to their preferred strategy. Although adopting a switchback strategy may seem counterintuitive or even wasteful, doing so may represent an entrepreneur’s most promising path to commercialization success.

Switchback strategies are inherently dynamic, yet planned. Instead of choosing a single commercialization path, the entrepreneur maps out not just one point but a sequence of strategic positions without which the ultimate configuration could not be achieved. But it is important to distinguish the dynamic nature of a switchback strategy from other types of dynamic strategies. First, the literature on dynamic capabilities is primarily concerned with the responses of incumbents to environmental shifts (Haveman, 1992; Teece, Pisano, and Shuen, 1997; Tripsas, 1997; Eisenhardt and Martin, 2000). By contrast, we focus on early-stage entrepreneurs. Second, we distinguish our argument from entrepreneurial experimentation (Bhide 2000; Murray and Tripsas 2004; Gavetti and Rivkin 2007), which can be a critical tool for entrepreneurs facing uncertainty regarding a particular strategic choice. Experimentation is inherently dynamic (unless the first experiment proves successful). Here, we argue that an entrepreneur might implement a deliberately dynamic strategy even in the absence of uncertainty regarding the ideal strategy. Rather, cognizant of implementation barriers to that final strategy, the founder undertakes a switchback in order to facilitate the eventual adoption of the preferred strategy.
Note that we do not advocate the universal adoption of switchback strategies. Rather, switchbacks will be attractive only when the expected profits from implementing the preferred strategy at the outset are lower than the expected profits from initial implementation of the temporary strategy and the (discounted) profits from the subsequent implementation of the preferred strategy, less the costs of switching from temporary to preferred. Profits from the subsequent implementation of the preferred strategy are discounted given the risk that the temporary strategy may reduce the ability of the firm to profit from the preferred strategy (e.g., expropriation, as we discuss below).

The plan for the remainder of the paper is as follows: in sections 2 and 3, we discuss and illustrate two strategic switchback strategies: temporary competition and temporary cooperation. In section 4, we discuss implications for entrepreneurial and incumbent firm managers. We then discuss the contribution of these “switchback strategies” to the literature and conclude in section 5.

2. TEMPORARY COMPETITION AS A SWITCHBACK STRATEGY

Temporary competition involves switching from a product market entry strategy to a cooperative (licensing or alliance-based) strategy. The main rationale for initial entry into the product market is for the entrepreneur to verify the technical and/or commercial importance of an innovation in order to attract would-be commercialization partners and to strike favorable deal terms.

As is well recognized in the literature, a cooperative commercialization strategy in which one licenses technology to incumbents can have many advantages including specialization and gains from trade. Yet frictions such as the risk of expropriation may discourage an innovator from pursuing what might be an otherwise attractive path. Arora and Cecchagnoli (2006) show that licensing is optimal when the innovation is appropriable but the entrant lacks complementary assets required to commercialize. Gans, Hsu, and Stern (2008) show that acquiring intellectual property rights (i.e., a patent allowance) is a key antecedent of licensing; in its absence, innovators may have little choice but to enter the product market.

Extant literature, however, views the commercialization decision as static: the innovator either licenses the discovery or enters the product market, depending on the environment for complementary assets and excludability. We propose multiple scenarios in which the innovator may not license (at first) though such a path would seem to be the preferred outcome for the innovator given the recommendations of the TCS literature. Rather, the innovator starts by entering the product market to overcome some friction and then later switches to the preferred licensing mode. We discuss various types of frictions that may favor this dynamic commercialization strategy and also consider preconditions underlying the ability to eventually
switch strategy. The key question underlying this part of our analysis is: *for an innovator that would in theory be best served by licensing (or more generally, cooperative commercialization), why might it instead first enter the product market?*

### 2.1 Temporary competition motives

In this section, we explore the factors favoring a switchback strategy for an entrepreneur whose preferred commercialization mode is licensing but who faces implementation barriers that can be ameliorated via product market competition in the short run.

#### 2.1.1 Inability to attract licensees

One scenario in which the innovator will not engage in the preferred licensing strategy is when the innovator is *unable* to attract the interest of a potential licensee. This may result from counterparty concerns regarding either the size of the market or the nature of the innovation itself. As long as concerns persist, the innovator may have no choice but to compete in the product market; moreover, doing so may help to establish the attractiveness of the technology or the market.

Regarding the market, a potential licensee may be concerned that the market for an invention is either unclear or, if known, is too small to attract the resources of an incumbent given its other priorities (Christensen & Bower, 1996). Furthermore, even if the potential market is estimable and known to be large, it may threaten the incumbent’s existing line(s) of business and thus be deemed unattractive (Christensen, 1997).

In addition, even if incumbents find the potential addressable market to be satisfactorily large, the incumbent may be dissuaded from entering into licensing arrangements when it finds that it would be required to make investments in order to co-specialize its complementary assets. As Teece observes, “it may be difficult to induce suppliers to make costly irreversible commitments which depend for their success on the success of the innovation…tak[ing] risks along with the innovator” (1986: 294). Key among these concerns may be uncertainty regarding the value of the innovator’s particular technology, a factor Arora and Gambardella (2010) claim has been neglected in the TCS literature.

Such uncertainty may result when it is not straightforward to evaluate the technology, such as when clear metrics are not available or are disputed. Even if performance metrics have been agreed upon, it may be the case that the evaluation process is complicated and time-consuming. In the presence of many similar innovators, the cost of evaluating the value of various technologies may be prohibitively expensive. In the speech recognition industry, for example, it is quite difficult to establish whether one speech recognition
technology is superior to another because various recognition tasks demand different customization. For instance, the techniques used to recognize a credit-card number composed entirely of digits and having a summation check are very different than recognizing the open-ended response to a question like “how may I help you?” at the beginning of a customer service call. Thus it can be challenging for a licensee to determine whether the speech recognition technology from a particular vendor is superior to available alternatives.

It might appear that one solution to this problem is having the licensee draw up contingent contracts with a number of innovators with a small up-front payment and larger royalty payments. Jensen and Thursby (2001) note the importance of royalty payments in giving the inventor an incentive for ongoing efforts in the commercialization process. Our concern, however, is the effort required not by the inventor but the licensee. If the complementary assets require substantial investment to be co-specialized, the licensee may not be able to simultaneously incorporate many multiple competing technologies. Furthermore, the licensee may have weak incentives to try to do so, particularly if the innovation is most relevant to niche market segments within which the licensee has not operated. Consider the case of a cell-phone manufacturer who must choose from among multiple operating systems including Symbian, Android, Windows Phone, Palm OS, Mee Go, and others. An operating system is an example of an innovation where it is not straightforward to deem one superior based on technical merits alone. Especially given that some operating systems are freely available, it might seem that a handset manufacturer could simply incorporate each of the competing operating systems and offer end-user products based on each platform. However, building a handset based on a particular operating system requires the co-specialization of handset hardware and software, requiring substantial resources from the organization to support the integration of each operating system. Thus entrepreneurs seeking licensees for their innovations cannot rely on incumbents’ willingness to hedge their bets by in-licensing unproven technologies broadly just in case the focal entrepreneur’s approach eventually proves superior. The problem is compounded if the incumbent has already invested in an alternative technological ecosystem or platform.

Entering the product market can provide validation of the technology in multiple ways. End-user products may garner publicity from press or social media. End-users may provide valuable feedback on the integrated product which can be incorporated in future licensing agreements. Of course, sales volume can speak volumes. As a result, an innovator switchback strategy of first entering the product market can provide would-be licensees or alliance partners with more persuasive evidence of technical and market viability than would be achieved through proofs of concept or prototypes alone.

Consider the early history of Qualcomm and its introduction of code-division multiple access (CDMA) technology for handling cellular communications. CDMA took the controversial approach of handling
multiple calls on the same frequency simultaneously and managing the interference as opposed sequentially as in TDMA (time-division multiple access). Although CDMA promised to be more efficient than TDMA, there were many skeptics, including a Stanford University professor who declared that the frequency-sharing approach would “violate the laws of physics” (Brodsky 2008: 199) and accused Qualcomm of faking its first demonstration. The firm temporarily manufactured both base stations and handsets in order to prove the value of CDMA technology. In personal communication, Qualcomm co-founder Andrew Viterbi (2012) recounted:

“[F]or this large and complex opportunity it was essential to produce the infrastructure as well as the handsets…it was necessary to convince the carriers that CDMA was indeed a workable technology which had a major advantage over alternates: GSM, U.S. and Japanese TDMA standards. All of this took a lot of effort, several successful demonstrations, some luck and about three or four years; there were many skeptics.”

Qualcomm did not, however, remain in the product market permanently. It was eager to exit the capital-intensive manufacturing of handsets and base stations and refocus its efforts on the more profitable business of licensing technology. After a few years, it thus sold the base station business to Ericsson and handset operations to Kyocera. Qualcomm’s decision to temporarily enter the product market and subsequently switch to the preferred licensing model serves as an example of how firms can demonstrate the value of their technology to would-be partners by temporarily competing in the product market.

The early experience of commercializing Research In Motion’s BlackBerry followed a similar path. As Somaya, Teece, and Wakeman (2011: 51) recount:

“In the early days, the BlackBerry service was unique in that RIM provided everything needed to make it work: the device itself, the software that made it run, the servers that routed e-mail from the wired network, and the airtime that RIM leased from mobile-phone carriers. In other words, RIM adopted a highly integrated organizational model, which enabled the company to retain control over and coordinate all aspects of its service. However, this arrangement was also reinforced by the challenges of transacting with other firms (such as the mobile-phone carriers who supplied the airtime) and convincing them to partake in what was still a nascent business. As chairman and co-CEO Jim Balsillie later explained ‘[There] was really a lack of interest, in the rest of the market, to work with us…in partnering with us until we became successful’…By offering to license, RIM was able to access the innovative resources of the entire industry…leaving [it] able to focus on what it did best: wireless e-mail.’”

Marx, Gans and Hsu (2013) examine the case of disruptive innovations, in which the technology initially lags in the predominant performance metric, but has a favorable trajectory of improvement. Using data from the speech recognition industry, these authors find that when innovations are disruptive, entrants tend to (like Qualcomm and RIM) first compete in the product market and only later engage in licensing.
2.1.2 Desire to establish leverage by delaying licensing

Even if incumbents have little doubt about the value of the entrant’s technology and believe that the size of the addressable market is satisfactorily large, the innovator may nonetheless be unwilling to enter partnerships and may want to delay licensing even if that commercialization mode would be the preferred long-term path. Such a strategy may be driven by a desire to increase negotiating leverage for the entrepreneur—whether over intellectual property, branding, exclusivity, or other issues. Just as the threat of entering the product market can give an innovator leverage in a licensing negotiation (Gans and Stern, 2000), experience and reputation in the product market can increase the eventual revenue from licensing as the licensee has more to gain by potentially removing competitors from the product market.

Clearly an innovator may hesitate to license for lack of intellectual property protection (Gans, Hsu, and Stern 2008). The patent process can easily take several years, and although most patent applications are eventually granted (Quillen & Webster, 2001) the scope of the final claim set may be reduced. Hence, the innovator is faced with an extended period of time during which intellectual property rights (IPR) are not afforded, coupled with the possibility that such rights, when granted, may not be as far-reaching as might be hoped. For a large firm with a large portfolio of innovations—say, an incumbent chemical producer—waiting for the patent to issue may not be a problem since the firm can divert its energies elsewhere. A new entrant, however, may find it difficult to tread water while waiting for the patent to issue. Temporarily competing in the product market provides an alternative in the interim.

A nascent venture may be concerned about other types of leverage as well, including brand visibility and commoditization. A new firm is by definition not well known, and although affiliation with prominent intermediaries can help bring visibility (Stuart, Hoang, and Hybels 1999), the firm may find it difficult to command pricing power right away, as brand development and reputation only develop over time. Consequently, executing an “Intel Inside” premium pricing strategy reflects prior investments in brand development. With end-users unaware of the source of the technology, it is easier for licensees to substitute other technology providers (or threaten to) and thus negotiate down the entrant’s licensing fees.

By first entering the product market, the entrant can establish end-consumer visibility and create demand for its particular innovation as opposed to substitutes. Accordingly, it may receive more favorable terms when eventually negotiating a license. Consider the experience of FINsix Corporation, an MIT spinoff commercializing high-frequency power converters. These converters enable the firm to eliminate the heavy “brick” attached to most laptop power cords. Although CEO Vanessa Green originally considered licensing their patented technology to laptop manufacturers in order to accelerate distribution, she became concerned that the small startup might not be able to negotiate attractive licenses given its youth and
inexperience. Instead, the firm announced plans to manufacture “brickless” laptop power cords and sell them through retail channels in order to build awareness and possibly a recognizable brand prior to licensing. Green hopes that this switchback strategy will enable the company to negotiate more aggressively (Green 2013). Startups who cannot attract the attention of potential licensees due in part to their status as unknowns, like GEOX’s Polegato, may have no choice but to start in the product market.

Delaying licensing in order to improve an innovator’s bargaining position speaks to the issue of dividing a given size “pie” of value creation with the potential commercialization partner. However, in the process of further developing an innovation, the innovator may also be able to create further value (thereby creating a larger pie). This may stem from discovering broader applicability across markets or further uses within a given target market. In such cases, alongside potentially enhancing its bargaining power in a given use domain, the innovator may also benefit from expanding the possible addressable domains.

### 2.2 Preconditions for Temporary Competition

Temporarily competing in the product market—whether due to inability or unwillingness to license—may be an attractive option for several reasons but can be most successful when entrants are able to efficiently enter and then exit the product market. However, successfully executing a switchback strategy requires several conditions.

#### 2.2.1 Product market entry

As discussed extensively in the literature on technology commercialization, product market entry will be possible only if the entrant can afford to create the requisite complementary assets. Indeed, an attractive aspect of licensing is not having to invest in such. Thus, entrants wishing to compete, even temporarily, into the product market must have or be able to attract the resources to develop the requisite assets themselves. Early-stage startups may need to fund complementary-asset development with external financing such as from venture capitalists.

In some industries such as biotechnology or semiconductor manufacturing, complementary assets may be prohibitively expensive for a new venture to consider developing independently. In other industries, while it may be strongly preferable to have a licensee supply the complementary assets, it may nonetheless be feasible for an entrant to invest (perhaps by raising substantial outside funding). There may also be substantial within-industry variability in the feasibility of temporary competition as submarkets within an
industry may possess different challenges and opportunities for entry, depending on the nature of an innovation and the underlying economics of product market entry.

Note that in some situations there may be multiple types of complementary assets required, some of which can be developed by the startup and others of which cannot. For example, in business-to-consumer ventures the complementary assets required to go to market may differ from those required to scale the business. Releasing a product to consumers may require primarily technical complementary assets that are not prohibitively expensive, while scaling such a business may require multimillion-dollar investments in customer acquisition. In such scenarios, it can be advantageous for the entrant to enter the product market with the aspiration of developing brand reputation and proving the value of the technology and market while patent applications work their way through the US Patent and Trademark Office (USPTO). Then, with those assets in place, the firm can move to a licensing or cooperative commercialization model with partners who have existing customer relationships and channels.

2.2.2 Switching to licensing

The startup likely has dual aims in switching from the product market to licensing. First, the entrant hopes to reduce the cost of operating the business by exiting less-attractive complementary assets. Second, the entrant hopes to leverage licensees’ complementary assets. To take advantage of the first benefit, the firm must be able to reduce its own investment in unattractive complementary assets. This can take the form either of fully divesting those businesses, as when Qualcomm sold its manufacturing operations to Kyocera and Ericsson, or simply de-emphasizing an end-user product by stopping work on future upgrades and minimizing ongoing support.

Indeed, for small firms, reducing product market investment may not only be preferable from a profitability perspective but essential in order to summon the resources needed to support licensees. Samsung, for example, did not insist that Vlingo Corporation pull its consumer product from the market when signing a license to incorporate Vlingo’s underlying technology into its S-Voice offering. Nonetheless, Vlingo CTO Mike Phillips noted that the Samsung deal led to a de facto shutdown of its product market efforts as all available resources needed to be diverted to support Samsung: “we cut back on the consumer effort. We didn’t want to but in fact that was a hard decision in the company. Making sure to sequester 10-12 people to work on direct to consumer would have been great but the pressure meant we needed to divert the resources” (Philips 2013).
Of course by starting with a product entry strategy, not only does the organization incur the costs of downstream vertical integration (or alternatively, accessing these assets via contractual means, such as through an outsourcing relationship), but it must then incur the costs of reversing that organizational scope. While divestiture may at first blush seem simple in that assets such as physical equipment, property, and the like can be disengaged and potentially repurposed or salvaged, there may be more complex issues in shifting the organization’s commercialization strategy away from product market entry. First, the more the organization’s downstream assets were developed specifically to match the innovator’s upstream position, the less salvage value will likely be associated with the asset under divestiture. Second, without the direct linkage with the end consumer or purchasing agent as a result of the new licensing strategy, future development and versions of the firm’s product or service may not be able to incorporate feedback from that audience as tightly. Pursuing a licensing strategy may still yield information about the preferences of the final consumers, though the feedback loop is not as direct and will be filtered through the lens of the licensee.

Another precondition to entering the licensing market is that the entrant has not already disclosed so much information about the innovation in the integrated product that licensing is no longer attractive to potential partners. While this is unlikely to be a concern in “black box” industries like software or microelectronics, with consumer products one might be concerned that competitors could disassemble and reverse-engineer the innovation. Anton and Yao (2002) suggest that an important appropriability mechanism in a cooperative commercialization strategy is the ability to selectively disclose innovation details to the would-be partner. For “switchback” entrepreneurs who plan to compete in the product market before attempting to license, the need to avoid disclosure is even greater. This is sometimes difficult, however. In some cases, the simple act of broad revelation, as may inherently be the case in product market entry, may spur subsequent competition. This then becomes an important reversal cost consideration in implementing a switchback strategy.

As an example, consider the case of the Pebble “smartwatch,” a product that can communicate with a smartphone and can run a variety of applications. The watch raised funding through the crowdsourcing platform, Kickstarter, in April 2012. Although requesting just $100,000 in funds, the product raised $10.2M in a five-week period from nearly 69,000 backers, and garnered considerable media attention. Some analysts (e.g., Novellino, 2013) believe that the highly visible oversubscription provided incentives and valuable market information to possible competitors to the Pebble watch. As of mid-2013, a number of industry incumbents, including Acer, Apple, Google, Foxconn/Hon Hai, Microsoft, Qualcomm, Samsung, Sony, and Toshiba were reportedly engaged in product development in the nascent smartwatch segment. Pebble Technologies may therefore have benefited from alternative possible funding sources.
which would have entailed comparatively less public disclosure, though the company’s ability to raise a subsequent $15M venture capital round may not have been possible without the successful crowdfunding campaign.

* * *

Overall, temporary competition can be a valuable startup switchback strategy for entrant-innovators who view a cooperative commercialization strategy as the desired end state, but due to their inability to initially attract partners and/or their desire to delay partnership, decide to temporarily compete in the product market. Such a dynamic strategy can help validate an innovation to would-be partners and/or enhance the entrants bargaining power in the deal-making process. Executing a temporary competition strategy, spanning initial product market entry and subsequently switching to a cooperative commercialization strategy, comes with its own set of challenges. We discuss implications for startup and incumbent firm managers in Section 4.

3. TEMPORARY COOPERATION AS A SWITCHBACK STRATEGY

The switchback strategy of temporary competition is designed to enable an entrepreneur to eventually implement a licensing strategy despite initial obstacles. Next, we consider the scenario in which licensing is not the desired outcome. For example, Fosfuri (2006) presents theory and evidence that highly differentiated technologies may be best brought to the product market directly in order to avoid the profit-dissipation effect, the diminution of revenues associated with licensing a new competitor into the market. Gans (2012) argues that experience in the product market may fuel future technological leadership. Wakeman (2007) relates experiences of biotech executives being held up by pharmaceutical licensees who allowed commercialization of the startup’s drug to languish. In these and other cases, while the end goal of the firm may be to enter the product market, there may be a variety of difficulties in doing so directly. In this section, we introduce a temporary cooperation strategy, which involves a switchback from initial cooperative partnering to a competitive product market entry strategy. Consider the example of the early history of Genentech. Robert Swanson, co-founder of the company, 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. That was the case of interferon with [Hoffman-La] Roche, but eventually we decided it was better to put our energy into the products we could make and sell ourselves…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, pp. 78-79).

This account describes the essential set of motivations for employing a temporary cooperation switchback strategy: developing specialized complementary assets by first partnering with an established firm. Because of the benefits of control in some circumstances for value capture, eventually switching strategies away from a cooperative mode to product market competition can be performance-enhancing. Maged Nofal, CEO of Nesrsoft, a company in the speech recognition industry, expressed a similar sentiment: “It’s a lot easier to just sit back and sell the licenses. But we found that selling a motor without the car is a big disadvantage. Customers want to sit in the car” (Nofal, 2012).

Of course, if the product market were the preferred commercialization path and complementary assets were straightforward to develop or otherwise access, the entrepreneur would enter immediately; we focus instead on the scenario where complementary assets are difficult to develop and are “specialized” (Teece, 1986). As in the case of temporary competition, entrepreneurs may understand the need for a switchback strategy only after having attempted licensing themselves. Others, possibly having seen peer startups struggle with licensing, may at the outset see a cooperative joint commercialization strategy as a stepping stone to acquiring specialized complementary assets.

3.1. Temporary Cooperation motives

3.1.1 Focusing on technical development

While the rationale for innovator technology licensing is varied, spanning motives such as geographic and product domain reach (e.g., Caves, Crookell, and Killing 1983), one significant motivation for innovators to originally adopt a licensing strategy is to allow the innovator to specialize on technical development at the outset. To the extent that the organization simultaneously tries to assemble the relevant complementary assets in-house, this might slow down the pace of technical development, which might be especially costly in arenas marked by racing behavior, such as when there are strong first mover advantages. Alongside the general notion that emerging organizations are typically resource constrained, and so would benefit from the ability to focus their development efforts, entrepreneurs may also wish to strategically decide which products to initially commercialize through partnerships, and which products might be good candidates for the purposes of product market entry. For example, consider Genentech’s early logic for identifying human growth hormone as a good candidate for product market entry:
“Well, from the very beginning, I set the goal that as soon as we could, we wanted to make our own products and sell them. Obviously we couldn’t do that right away. We had to be careful which products we took first to do that with. With human insulin, Eli Lilly dominated the market with 80 percent market share. It was sold through pharmacies. It would have been a very difficult product for us to take to market ourselves. On the other hand, growth hormone—which was the first product we did take through the FDA approval process and make and sell ourselves—was then being distributed by a quasi-governmental agency…so here was something where there were really no entrenched competitors. We had an alternative that would be safer. This was the kind of product that a small company like Genentech might be able to take to the market itself. Also, the government approval process—although more difficult than we imagined because of our naivety in terms of understanding what it took to go through that process—was straightforward in the sense that either the children were growing or not. So the end point was easy to measure.” (Swanson, 2000, p. 77).

Note that in this example, the decision not to enter the product market directly with Genentech’s human insulin product (instead licensing it to Eli Lilly) probably contributed to the ability of the firm to focus their efforts on developing other products, in part leading to their human growth hormone product.

3.1.2 Developing specialized complementary assets

A second (and primary) motivation for switching from a commercialization strategy of cooperating with industry incumbents to competition, somewhat distinct from but related to technical focus discussed above, is the desire to develop specialized organizational complementary assets. One of the main challenges for firms is developing an organizational structure to capture the economic value commensurate with the quality of their technological innovation (Teece, 1986). Particularly for new ventures, a licensing strategy that avoids duplicating complementary assets typically held by industry incumbents would seem to be attractive. Such a strategy would also allow efficient specialization: startups could have the comparative advantage in upstream innovation while industry incumbents would have the edge in downstream commercialization capabilities – and both types of firms would be better off as a result of the exchange. When downstream complementary assets such as marketing expertise or navigating regulatory processes are specialized in the sense that they are unique and difficult to access on the open market, entrepreneurs will have difficulty developing them, and so this becomes a substantial barrier to entry. Despite the practical importance of this aspect of entrepreneurial organizational development, the literature has only a limited treatment of this issue.

Entrepreneurs facing this situation might consider two actions. A first course of action would be to try to develop the specialized assets alone. However, doing so will be time consuming and relatively expensive in the sense that mistakes and missteps will likely be made in the process. The opposite alternative is to engage in arm’s-length licensing of the technology or innovation to another party who possesses the
specialized complementary assets. This may be attractive because the startup avoids having to recreate the complementary assets incumbent firms have already built. From that standpoint, such a “hands-off” relationship may be societally efficient, notwithstanding the possible socially-productive effects of enhanced market competition. However, a possible downside to this strategy is that much of the learning involved with experiential “doing” is lost in arm’s length technology transfer (Gans, 2012). This might not be problematic if the new venture has no aspirations for entering the product market in the future. However, to the extent that the firm develops routines and competences in a given commercialization mode, changing modes might be difficult and costly (Aggarwal & Hsu, 2009).

A switchback strategy the startup may consider is initially entering into a partnership with an industry incumbent for purposes of learning complementary asset development. After a period of time, the new enterprise may be ready to switch from licensing and enter the product market by itself. A two-step commercialization strategy of initial joint commercialization with a partner, followed by product market entry, may lessen the costs of learning to develop specialized complementary assets. As compared to a strategy of self-commercialization, this type of switchback strategy economizes on learning costs. As compared to a cooperation strategy, the switchback allows option value as to future self-commercialization (Hsu & Wakeman, 2013).

The computer hardware industry in Taiwan illustrates how upstart technology ventures looking to develop themselves as global players by developing specialized complementary assets. Taiwanese companies such as Asustek, Acer, and HTC got their start by being original equipment manufacturers (OEMs) to other firms – producing electronic hardware components according to received specifications. One of the downsides of being completely reliant on partners, however, is the lack of control and interaction with end-users. The knowledge and anticipation of consumer preferences, together with possessing a brand reputation, are specialized complementary assets in the computer and electronic hardware industries.

In their aspiration to develop such assets and move up the value chain, Asustek, Acer, and HTC each eventually began conducting original design manufacturing (ODM) in which the contracting firm would allow the manufacturer to design and produce the component. Thereafter, the firms felt positioned to begin marketing some products with their own brand label, thereby building consumer awareness of their integrated products. These efforts, however, were often not at the exclusion of also providing OEM and ODM services to the marketplace. In summary, if these Taiwanese firms with aspirations to be directly customer-facing had instead directly entered the product market, they might have been less successful. Partnering with industry incumbents enabled the firms to gradually acquire production experience while being insulated from the risk of commercial acceptance.
The same phenomenon of desiring to develop specialized complementary assets to become an integrated company also holds true for entrants in the biotechnology industry. Some of the most important specialized complementary assets in the drug industry are navigating the regulatory landscape and marketing drugs to physicians. A few biotechnology firms have managed to become “fully integrated biopharmaceutical companies” (FIBCOs) as a result of a sequenced commercialization strategy of first collaborating with established pharmaceutical companies to attain exposure to the specialized complementary assets and funding to support those activities. While not necessarily abandoning those partnerships, the experience gained from prior collaborative commercialization has allowed biotechnology firms such as Genentech, Amgen, Genzyme, Regeneron, and Onyx to achieve downstream organizational commercialization capabilities.

3.2 Difficulties in executing a temporary cooperation strategy

3.2.1 Changing internal organizational structure and incentives to align with the new strategy

Changing commercialization strategies from a cooperative to a competitive one is likely to be disruptive organizationally, perhaps akin to what Baron et al. (1996) describe in changing human resource management (HRM) practices within emerging organizations. They study mid-course changes in the archetypal HRM model ventures adopt – and find that such changes are highly disruptive and associated with worse organizational outcomes, perhaps because the processes of selecting, attracting, and retaining employees are all affected by altered HRM systems. At a high level, Aggarwal and Hsu (2009) find that changing from a licensing-only strategy to a different commercialization mode in a sample of biotechnology firms is associated with negative valuation consequences. This might result from the disruption in organizational routines and structure inevitably accompanying the shift in commercialization strategy. Prior to the shift, much emphasis is placed on the lines of communication connecting the internal operations of the firm to the external party. Moreover, the organizational span of scope and operations under a cooperative commercialization strategy is relatively focused as compared to the broader set of skills and expertise required to support a product entry strategy.

3.2.2 Channel conflict with former cooperation partners

Knowing that potential cooperation partners would not engage in joint commercialization if they believed that the focal company would ever directly enter the product market, some firms stake their reputation on
not changing their strategy in this way. A firm undertaking a temporary cooperation strategy must realize that today’s partners may become tomorrow’s competitors when the move is made from licensing to product-market entry. Particular risks include the loss of licensing revenue as former partners defect and before product-market revenue ramps up.

As an example, Nuance Communications expressed its concerns about channel conflict when announcing a switch from licensing to product-market entry. A trade journal article cited that in “a strategy shift which the company admitted carried short-term ‘revenue risk,’ the company is shifting to more direct sales and to selling products that will put it in competition with some of its partners” (Meisel 2002). In that same article, Nuance CEO Ron Croen acknowledged that moving to direct sales “may result in some sales that would otherwise go to partners…[but] that Nuance’s evangelizing speech solutions should also increase total demand, and that partners could compete on the advantages of their particular solutions.” Although Nuance was eventually successful, part of its ability to overcome channel conflict may have been the commanding industry presence it had built during its first nine years. Startups planning to undertake a temporary cooperation strategy might plan an extended period of cooperation in order to build the sort of reputation that enables it to handle channel conflict which might threaten a weaker firm.1

3.2.3 Expropriation risks

Finally, the innovator first attempting a licensing strategy (or more generally adopting a cooperative commercialization strategy with industry incumbents) followed by entry into the product market may be exposed to expropriation costs associated with the switchback strategy. The borders of the innovating organization are invariably opened with cooperative commercialization. This occurs at a minimum at the time of deal terms negotiation, as agreeing to terms necessitates disclosure. Moreover, depending on the negotiated scope of the collaboration, the degree of inter-organizational interaction may be a further source of permeable organizational boundaries on an ongoing basis. For example, scientific personnel may be exchanged in the context of cooperative commercialization, which may lead to the observed pattern that knowledge can flow easily between alliance partners, whether intended or not (Gomes-

---

1 Established firms also struggle with channel conflict. Consider Microsoft’s shift from licensing its Windows operating system to selling devices including the Surface tablet. Microsoft noted the risk of releasing its Surface tablet instead of only licensing the Windows operating system to its hardware partners as had been its commercialization strategy for decades: “Our Surface devices will compete with products made by our OEM partners, which may affect their commitment to our platform” (Microsoft, 2012). At least one licensee threatened to abandon Microsoft: Acer CEO JT Wang told the Financial Times, “We have said to them, ‘think it over. Think twice. It will create a huge negative impact for the ecosystem.’” (Budden and Mishkin, 2012).
Casseres, Hagedoorn and Jaffe, 2006). While there may be a variety of contractual and non-contractual mechanisms to curtail unintended knowledge leakage across organizational boundaries, such efforts are likely imperfect. This risk is heightened given the typical asymmetric resources (and appetite) that startup innovators have in comparison with more established industry incumbents toward dispute resolution. Furthermore, in the switchback to a product entry strategy, the innovator may be more likely to encounter conflict situations with former cooperation partners, such as the channel conflict issues discussed above.

* * *

Overall, temporary cooperation can be a valuable startup switchback strategy for entrant-innovators who view a product entry commercialization strategy as the desired end state. Such a dynamic strategy of transiently cooperating with partners can help the innovator develop specialized complementary assets at a possibly lower cost relative to a direct strategy of product market entry. Executing a temporary cooperation strategy comes with its own set of challenges, including channel conflict with former partners and potential organizational structure/incentive costs. We discuss implications for startup and incumbent firm managers in the next section.

4. IMPLICATIONS FOR TECHNOLOGY ENTREPRENEURS (AND INCUMBENTS)

Our dynamic framework for commercialization strategy suggests that barriers to the realization of a preferred path may indicate an indirect, “switchback” strategy in which the entrepreneur initially pursues an apparently-undesirable strategy designed to enable the preferred TCS. These insights hold several implications for technology entrepreneurs and incumbents alike who contemplate participating in a switchback strategy. This section presumes that the entrepreneur has identified the preferred commercialization strategy as per the extant TCS literature.

4.1 Temporary competition considerations

4.1.1 Considerations for technology entrepreneurs

Entrepreneurs interested in (eventually) pursuing a licensing strategy should consider a number of factors before embarking on that path. First, given that IPR is a virtual prerequisite to technology licensing, at what point does the startup expect to have the patent? Although most patents are eventually granted (Quillen and Webster, 2001), filing and responding to office actions can take several years. Even if
potential licensees are willing to sign a contract in advance of the patent issue, is the entrepreneur willing to take the risk of disclosure in the event that the patent does not issue? What if the scope of claims is reduced substantially?

Even if patents are secured, this is a necessary and not sufficient precondition to licensing if the value of the technology is in question. The burden of the USPTO is not to evaluate whether a given technology is superior to what came before—only that it is sufficiently distinct in its approach not to infringe on previously-granted IP. Thus, the mere acquisition of a patent does not necessarily take care of the technology-value uncertainty.\(^2\)

Entering into the product market may help to resolve concerns regarding the value of the technology, but if this is the purpose of product-market competition the entrepreneur should calibrate efforts accordingly. Instead of growing sales volume or optimizing operations for revenue or profitability as would be appropriate if planning to permanently compete in the product market, the entrepreneur may instead sell products at a loss (or even give them away) in order to maximize reach and customer feedback useful to iterating and improving the product. Further, the startup should seek opportunities to highlight its progress in the press so that potential licensees take notice. Maintaining a high profile is important not only for establishing the value of the technology but also to build negotiating leverage prior to entering licensing negotiations. The entrepreneur may seek to build a brand before agreeing to license by temporarily competing in the product market.

Of course, entrepreneurs deciding to temporarily enter the product market must have sufficient resources to build the required complementary assets. If one cannot raise a large amount of funding early on, assurances of support for a switchback strategy must be sought in the case that investments are “staged” contingent on performance (Gompers, 1995).

Finally, there may be a host of organizational transition challenges accompanying the switch from a revenue model emphasizing product market entry to one based primarily on a cooperative commercialization strategy. Consider the following account of organizational structure changes associated with a partnering strategy:

“To win contracts to supply the likes of Hewlett-Packard and Dell, Taiwanese companies routinely divide their staffs and dedicate teams to each foreign customer. They even set procedures for making sure that engineers and buyers from different clients do not accidentally meet one another while having lunch at company cafeterias here. But that secrecy makes it harder for the Taiwanese industry to learn good ideas quickly from foreign and domestic rivals. They

\(^2\) More generally, adopting an initial cooperation strategy with industry incumbents entails issues and choices of governing the inter-organizational relationship, and may involve contractual and/or non-contractual features.
keep secrets and don’t duplicate, so the customers are happy to work with them,’ said Chan Wen-Hsin, a senior industrial technology specialist at the ministry of economic affairs.” (Bradsher, 2013).

The quote illustrates the type of challenges of changing the formal and informal structure of the organization to align with a switch in commercialization strategy. More generally, the wide-spanning personnel capabilities associated with product market entry may no longer be as compelling in a licensing regime, which instead might emphasize R&D excellence, and so a range of human resource challenges may also accompany changes in commercialization strategy.

Any of these considerations may dissuade an entrepreneur from pursuing a switchback strategy. If funding is not available to finance product-market entry initially, or if the costs of adjusting back to licensing are too high, or if the disclosure that occurs in the product market forecloses future licensing, a switchback strategy may not be indicated.

4.1.2 Considerations for incumbents

Incumbents exploring licensing deals with entrepreneurs who previously competed in the product market also have several considerations. Perhaps most importantly, what will the nature of product-market exclusivity be? Product market participants may have long-term distribution contracts they must honor, which could make it difficult for them to immediately and completely exit the product market. Alternatively, the entrepreneur may seek to remain partially in the product market, instead licensing the core innovation for new markets where it does not intend to compete.

Moreover, how does an incumbent position itself as an attractive licensing partner for an entrant that may have moved beyond the “startup” phase by virtue of its time in the product market? Getting a "first crack" at accessing the startup innovation may involve building absorptive capacity in the first place to identify the most promising emerging technologies. This may involve a host of investments including striking alliances, engaging in research consortia in industry or at academic institutions, etc. These investments will not always yield a payoff for a variety of reasons, due to the inherent nature of research and development. Yet developing a reputation for experimentation and being in the vanguard of technical development may be important in becoming a preferred partner when an innovator decides that it wishes to adopt a cooperation strategy rather than a product competition strategy.

4.2 Temporary cooperation considerations
4.2.1 Considerations for technology entrepreneurs

For entrants pursuing a temporary cooperation strategy, a threat to the first-stage licensing strategy is that the partner may be reticent to strike a deal with the innovator for fear of helping to develop a formidable competitor down the road. Moreover, even if the partner consents to an alliance or licensing arrangement, they may place contractual or non-contractual restrictions that might dampen the entrant’s ability to accelerate their specialized complementary asset development using this learning channel. Anticipating this behavior, the entrant might decide to obfuscate their longer-term aspirations to the partner or adopt other tactics.

For example, if the incumbent is wary of partnering with the entrant for fear of breeding its own competitor, the entrant may try to allay this fear by agreeing contractually to certain terms that might be interpreted as a signal against the entrant's aspirations of eventual product market entry. This may involve a long-term contractual relationship or a broad agreement across market verticals involving joint commercialization. This may be limiting for the entrant, however, and so may diminish the value of the temporary cooperation switchback strategy in the first place—especially when the startup is centered on a single innovation. Entrepreneurs who anticipate having multiple distinct innovations, however, may be able to sacrifice exclusivity on their first innovation in exchange for learning general product-market expertise which will be valuable in directly commercializing future innovations.

A final challenge for the entrant is the channel conflict that may arise from competing with former cooperation partners. (Note that entrepreneurs undertaking a temporary competition strategy worry less about channel conflict because they are likely selling to former competitors, whereas in this case the entrepreneur is now competing with former partners.) More broadly, the organizational challenges of transitioning personnel and incentive systems to one of product market entry from licensing may be substantial, as previously discussed.

4.2.2 Considerations for incumbents

Incumbents also face a number of challenges associated with the innovator temporary cooperation strategy. The challenge of screening out would-be forward integrators may not be easy. Assessing this potential threat and weighing it against the possible benefits of accessing startup innovation is a significant managerial challenge. Consequently, it may be advisable for an incumbent to insist on exclusivity either of long duration or wide industry scope in order to avoid enabling a direct competitor.
Because startups typically have higher powered human resource incentives as compared to established firms, the threat of hiring away employees is another challenge. This threat is compounded because joint commercialization development often involves exchange of personnel and/or allocating dedicated personnel from each side to the joint effort. Although employee non-compete agreements can stop the leakage of workers from one firm to another, several U.S. states including California curtail the use of non-competes (Marx 2011).

5. IMPLICATIONS FOR THEORY AND CONCLUSION

This article calls for a reconceptualization of the process by which entrepreneurs not only conceive of but also execute a commercialization strategy. A major contribution of extant TCS literature has been to establish a framework by which entrepreneurs can determine the ideal strategy for a given commercialization environment. This static view does not however consider the possible obstacles to the implementation of a preferred strategy which may necessitate a more dynamic strategy. Figure 1 attempts to capture the circumstances under which an entrant should consider a dynamic switchback as opposed to a static commercialization strategy as outlined in the TCS literature.

Figure 1 about here

In the sections below, we distinguish the nature of a “switchback” strategy from dynamic conceptualizations in the TCS literature and the strategy literature more generally. We conclude with thoughts on the broader implications of this research for technology commercialization strategy literature.

5.1 The dynamics of switchbacks versus experimentation

The phenomenon of risk in technology entrepreneurship is well known. In a sample of over 22,000 VC funded startups founded between 1987 and 2008, 75% had a liquidation value of zero while 0.39% had an exit value of $500 million or greater (Hall & Woodward, 2010). While the literature on entrepreneurial experimentation, especially at the within-firm level, aims to decrease such risk, we investigate a new domain emphasizing switchback strategies that may help in mitigating entrepreneurial execution risk.

The literature on industry dynamics and technological lifecycles tends to depict each entrant as a single experiment\(^3\) (e.g., Klepper, 1997), but experimentation can take place not only at the industry level but

---

\(^3\) An important driver in the Jovanovic (1982) theory of industry evolution stems from entrepreneurs entering an industry to learn their own cost efficiency as they operate in the industry and exiting if found to be inefficient. In
also within a single firm. The practice-oriented literature has emphasized conducting strategic
experiments with clear assumptions and exit criteria (McGrath & MacMillan, 1995) albeit usually in the
context of R&D labs or other large organizations. These principles are behind the recent practice-oriented
literature notion of entrepreneurial "pivoting." For example, in the lean startup methodology (Ries, 2011),
startups are instructed to build a minimum viable product, introduce it to customers, and run experiments
on various customer groups. The goal of entrepreneurs in this method is to shorten the learning feedback
loop to guide startup actions to persevere or pivot. While the primary goal of entrepreneurial
experimentation is trying to learn about venture viability at the least possible cost and while utilizing the
least possible resources, strategic switchbacks take place as a result of being unable to conduct a first-best
commercialization strategy at the outset. The indirect switchback routes we describe are meant to
facilitate execution of the ultimate strategy.

Like static commercialization strategies, a switchback can be determined ex ante given analysis of
barriers to the implementation of the entrepreneur’s preferred strategy. In this way, the eventual switch
from the initial, suboptimal commercialization strategy to the preferred one is preplanned. Thus the
dynamic nature of a switchback strategy differs fundamentally from the entrepreneurial experimentation
approach frequently prescribed by the academic and practitioner literature. Experimentation is principally
useful when the entrepreneur does not have a preferred commercialization path. As Bhide (2000) states:
"The uncertain nature of many promising opportunities also decreases the value of prior analysis. In new
or changing markets, research can be costly because of the transient nature of the opportunity. In lieu of
extensive planning, we will also see entrepreneurs have to rely on adaptation: they start with a sketchy
idea of how they want to do business, which they alter and refine as they encounter unforeseen problems
and opportunities.” Murray and Tripsas (2004) observe that experimentation need not be merely
opportunistic; rather, entrepreneurs can engage in purposeful hypothesis testing reminiscent of McGrath
and MacMillan’s (1995) discovery-driven planning process. In either formulation, the entrepreneur
implements a dynamic strategy in order to reduce uncertainty. A switchback strategy, while also dynamic,
does not depend on the presence of uncertainty and can be useful even when the desired end-state is clear.

Note that we do not argue that experimentation has no place in formulating commercialization strategy.
To the contrary, in the presence of uncertainty regarding either the commercialization environment or the
barriers to implementing various commercialization strategies experimentation may be the only way to
proceed. Moreover, entrepreneurs who choose to enter the product market (whether permanently or

contrast, venture capitalists have a variety of mechanisms to decrease their risk, such as by staging capital infusions
(Gompers, 1995), investing in founders with prior experience (Gompers, et al., 2010), concentrating their
investments in specialized industries (Gompers, Kovner & Lerner, 2009), and by crafting cash-flow and control-
rights in their financing contracts (e.g., Kaplan & Stromberg, 2003).
temporarily) may find experimentation quite useful. Augmenting our analysis to consider uncertainty is a clear next step.

5.2 (Commercialization) strategy as an arc

While our immediate focus is the TCS literature, the notion of dynamic commercialization strategies also contributes to the broader literature on strategy formulation. Like extant TCS literature, the strategy literature generally conceptualizes the strategic choice as selecting a particular position based on an assessment of the external environment and/or internal resources. In other words, the commercialization strategy decision is static—or, to be more precise, the selection is that of a single point on a “fitness landscape” of possible positions/configurations. Of course, strategy scholars have conceptualized much more complicated decision sets than a binary choice between licensing and product market competition (Levinthal, 1997; Rivkin, 2000). But consistent between the two literatures is the notion of finding an optimal configuration of the firm’s resources given market conditions, avoiding local maxima that might satisfice but not optimize. A switchback strategy necessarily involves two or more points, requiring a line or arc to represent the implementation of a dynamic strategy.

However, it would be incorrect to characterize the strategy literature as entirely static. Extensive work on dynamic capabilities and the failure of large firms has emphasized the need for an incumbent to adapt its positioning when the environment shifts (Haveman, 1992; Teece, Pisano, and Shuen, 1997; Tripsas, 1997; Eisenhardt and Martin, 2000). Still, the strategic decision for any given situation is a (new) point on the landscape. And while the firm’s strategy might sketch an arc over time as the environment shifts, a switchback strategy can be dynamic even in the absence of any environmental change.

Switchbacks are moreover distinguished from the fitness-landscape conceptualization in that the cost of scaling a particular “peak” is accounted for, independent of the firm’s past configuration. While the height of a peak in both corresponds to the attractiveness of a strategic position, in search-oriented formulations (Levinthal, 1997; Rivkin, 2000) there is no inherent cost to relocating one’s self on a peak of a particular height. Rather, the cost of adjusting to a new strategy is derived from the interdependence of the firm’s previous configuration of activities. Menon and Yao (2012) observe various types of costs inherent in adopting a new strategic position. Their “history-influenced” costs correspond most closely to the difficulties characterized by inertia and interdependence, which have been studied frequently (Leonard-Barton, 1992; Siggelkow, 2001). However, they also note that a strategic position may be difficult for reasons having nothing to do with a firm’s past decisions but simply due to the challenges of
assembling and configuring the necessary resources. These “destination-based” costs correspond more closely to our notion of the grade accompanying a particular peak.

5.3 Broader implications for the literature and conclusion

The existing literature on technology commercialization strategy, particularly for entrepreneurs, highlights the role of the commercialization environment in shaping strategy. Furthermore, the focus is on setting initial entry strategy. In contrast, entrepreneurial switchback strategies emphasize the importance of venture execution and implementation strategy in sequencing strategic moves to reach a desired end-state. These strategy dynamics are especially important for startup entrepreneurs, as they typically start in a resource-poor circumstance and as a result need to arguably be more strategic in their entry and scale-up approach than established firms. The second distinguishing feature of strategic switchbacks as compared to the prior literature on technology commercialization strategy is that we move from examining commercialization of a single product to considering a broader set of issues associated with entrepreneurial business development. For example, a main driver of the temporary cooperation switchback strategy is developing specialized organizational complementary assets.

Our primary object in this article is to highlight the challenges entrepreneurs face not in determining the best commercialization strategy but in executing a commercialization strategy. Of course, firms can undertake dynamic, multi-step strategic paths which may include experimentation among unclear alternatives, adaptation to a changing environment, and multi-stage strategies such as we have outlined here. We see integrating these into a more complete dynamic framework as a topic for further study.
REFERENCES


Green 2013. Personal communication with M. Marx, January 2013.


M. Phillips (2013). Personal communication with M. Marx, April 2012.


Figure 1: Circumstances favoring static commercialization strategies vs. dynamic “switchback” strategies