



RESEARCH REPORT

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INNOVATION *DOES* PAY OFF— IF YOU MEASURE CORRECTLY

Innovation is probably one of the most important forces fueling the growth of new products, sustaining incumbents, creating new markets, transforming industries, and promoting the global competitiveness of nations. However, some critics assert that an earnings-focused, short-term orientation on boosting stock price may undercut investments in innovation that typically have a long payoff. These critics assume that stock markets

respond positively to announcements of immediate earnings but negatively to announcements of investment in innovation that have an uncertain long-term payoff.

As a consequence, many firms may not be investing enough in innovation, and some analysts fear that the U.S. may be losing its competitive edge as a result. Firms may under-invest in R&D because of the high costs, the long delay in reaping market returns, if any, the uncertainty of those returns, and the difficulty of adequately measuring them. Therefore, accurately assessing the market returns to innovation may be critical to understanding how markets respond to innovation and motivating firms to invest in innovation.

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Assessing Innovation Returns

The event study method is one of the best means of assessing the true returns to an innovation project (1,2). The basic assumption underlying the method is the efficient market hypothesis, which states that a stock price at a particular point in time fully reflects all available information up to that point. Thus, any change in price of a stock due to arrival of new information reflects the present value of all expected current and future profits from that new information.

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The method has been widely used in the finance, accounting, economics, management, and marketing literatures to assess the market response to new information. However, past research has focused on isolated events of an innovation project (e.g., alliances, patents or new product launch) to estimate the returns to innovation, instead of the entire project. This approach may lead to a substantial underestimation of the total returns. If the returns to the entire innovation project could be estimated from a single, target event during the project, then returns for other events would not be significantly different from zero. That target event would be critical, with important implications for firms and investors. On the other hand, if firms continue to experience incremental returns to various events over the innovation project,

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ignoring certain events would result in underestimating the total returns to innovation.

Considering All Events

We propose that the total returns to innovation can only be estimated if all events of the innovation project are included in the analysis. We include eight important events spanning the entire innovation project: alliances, funding, expansion, prototypes, patents, pre-announcements, launch, and awards. The total returns to innovation are the sum of returns to all events in an innovation project.

In addition to completeness, the benefit of considering all events in an innovation project is that it compensates for sub-optimal or strategic announcements of the firm. For example, if the firm under-promises in early stages of an innovation project and over-delivers in later stages, the possibly low market returns in early stages will be compensated by high returns in later stages. Conversely, if a firm over-promises and then under-delivers, taking all events into consideration will compensate for possibly too-high returns in earlier stages.

Methodology

For this study, we defined an innovation project as the total of a firm's activities in researching, developing and introducing any new product based on a new technology, from the initiation of the technology to about a year after introduction of the new product. We defined a technology as a distinct principle or platform for producing products to serve a consumer need (3). For example, neon lamps are based on fluorescence technology, which produces light by the distinct scientific principle of fluorescence. Several new products and models (e.g., hard disks, floppy drives, tapes, etc.) could be developed on the platform of one technology (e.g., magnetic storage).

We also identified three distinct sets of activities in the innovation project: initiation, development and commercialization. Initiation activities include alliances, joint ventures and acquisitions, funding, grants, advance orders, funded contracts, and expansions for the start of new innovation projects. Development activities include working prototypes, demonstration in exhibitions, and new materials, equipment and processes, patents, and pre-announcements (more than a week ahead of future events). Commercialization activities include new product launch, initial shipments, new applications, and awards (external recognition of quality).

We collected data using the historical method on 19 technologies from five industries: external lighting, display monitors, computer memory, data transfer technologies, and desktop printer product categories. We identified all major firms and all technologies within each industry.

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We collected all announcements related to innovation projects made by the firms for each activity of the project. There is substantial innovative activity in all the categories during this period. We identified 69 firms in the five industries and collected a total of 5,481 announcements from 1977 until 2006.

We estimated market returns using the Fama–French–Momentum 4-factor model (4) that includes the three factors of Fama–French model and Carhart's Price–Momentum Factor to capture one-year momentum in returns (5). Market returns during the innovation project may also be affected by the firm's announcement strategy or structure. For this reason, we included two strategic variables (announcement frequency and research productivity) and two structural variables (size of firm and age of technology) as control variables. We carried out a number of analyses to test the robustness of the results.

What We Learned

Our analyses lead to the following findings about market returns to innovation:

- Total market returns to an innovation project are \$643 million, substantially greater than the \$49 million, returns to an average *event* in the innovation project.
- Of three sets of innovation activities (initiation, development and commercialization), returns to the development activities are consistently the highest across and within categories.
- Returns to events related to the initiation phase occur 4.7 years ahead of launch. This suggests that investors don't have to wait for those sales if they want to gain from a successful R&D project.

- Returns to events related to new product launch are the lowest of any event.
- Returns to negative events are higher in absolute value than those to positive events.
- Returns are consistently higher for small firms than for large firms and for those that focus on a few rather than many technologies.
- Returns to the announcing firm are substantially greater than those to competitors across all stages.
- Number of prior announcements or time since the last announcement has no effect on the market returns to innovation.
- Returns to the first announcement of an innovation project are not different from returns to later announcements. Similarly, results for older technologies and projects are not different from those for newer ones.

Implications for Managers

1. Markets do respond promptly and substantially to announcements about innovation at all stages of the innovation project. When considering the value of innovation, it is inappropriate to limit the analysis to only one or another event in the innovation project. The frequently cited “under-valuation” of innovation may be due not to markets not appreciating the full value of innovations immediately but to researchers computing returns to isolated events in an innovation project.
2. The findings on various announcement strategies indicate that firms cannot game the system by over-announcing or making multiple announcements of a single event.

Moreover, the first announcement of a project is no more important than later announcements.

3. The absolute value of a negative announcement is greater than that for a positive announcement. Thus, firms should be cautious not to exaggerate progress in their innovation projects or to resort to “vaporware.” Otherwise, they lose the opportunity for increasing market capitalization involved in such announcements.
4. Returns are highest for developmental activities. Thus, it is important that firms exploit the progress in development by fully announcing all such developments.
5. When announcing innovations, small firms do not seem to suffer any disadvantage relative to large firms.

The big surprise for us was that the markets actually react more to the development phase than to the commercialization phase, which shows that the stock market is not so short-term in its outlook. Because the stock markets reward firms for making announcements in the development phase, it is in the firms’ interest to be open to the market and to update progress on an innovation project. ☺

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