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The Impact of New Product Introductions on the Market Value of Firms*

Innovations in the economic system do not as a rule take place in such a way that first new wants arise spontaneously in consumers and then the productive apparatus swings round through their pressure. We do not deny the process of this nexus. It is, however, the producer who as a rule initiates economic change, and consumers are educated by him if necessary; they are, as it were, taught to want new things, or things which differ in some respect or other from those which they have been in the habit of using. [Joseph A. Schumpeter, 1934, p. 65]

Although many mechanisms exist for the evaluation of new products, none have specifically examined the role that financial markets can play in measuring the impact of new products on firms. Using traditional event-study methodology, the present research provides a financial market–based analysis of the impact of new product introductions on the market value of firms.

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Introduction

The marketing literature has extensively documented the process of new product planning, evaluation, and testing.[1] In addition, a large positive research tradition exists that evaluates many aspects of the evolution of new products.[2] But despite this long tradition, little research has focused on the role that new products play in the valuation of firms in the marketplace. Much of this neglect is rooted in the lack of integration between marketing and finance and hence the somewhat different research traditions. It has also been taken for granted that new product innovations are necessary because of competitive pressures and are therefore per se valuable. The actual level of their value appeared to be of little importance. This article attempts to fill this gap by using traditional event-study methodology to study the impact of new product introductions on the market value of a large sample of firms over a 10-year horizon.

The Role and Value of Innovation

Innovative behavior is believed to be the engine of economic growth and development; this belief accounts for the extensive debate, which has raged for decades, centering on the understanding and fostering of that behavior.

Economic analysis has focused primarily on three aspects of the role of innovation. First, does a competitive marketplace allocate resources to invention efficiently? The majority opinion appears to indicate that it does not—or that it only does so under very restrictive circumstances (see, e.g., Arrow 1962). The public-good nature of much inventive activity simply does not allow firms to recover the sunk costs of development. A second stream of research shows that there is no indication that noncompetitive market structures lead to more innovative activity. This second stream of research was driven by a desire to confirm (or refute) the argument, known as the Schumpeterian hypothesis, that monopoly is necessary for the fostering of innovation (Schumpeter 1934). Following the prior two research traditions, a third stream of research has arisen that examines the role that the government can play in fostering innovation. This last stream focuses on the perceived social benefits that are believed to arise from innovation (see, e.g., Machlup 1958).[3]

1. For a textual overview, see Hisrich and Peters (1978) or Urban and Hauser (1980). For a more research oriented review, see Wind, Mahajan, and Cardozo (1981) and Shocker and Hall (1986).
2. See, e.g., Bass (1969), Moore and Lehmann (1982), Horsky and Simon (1983).
3. For a detailed discussion of all three areas of research, see Kamien and Schwartz (1975).

Standard economic analyses have shown a consistent positive relationship between expenditures on research and development (R & D) and patenting behavior and subsequent profitability. Mansfield (1968) and Mansfield et al. (1971) have shown that R & D expenditures on projects are positively related to the expected profits of the project. In addition, they find that firms typically receive returns on completed R & D projects that do not differ materially from the return on stockholder equity (Mansfield et al. 1977). However, they argue that what makes the fostering of innovations worthwhile is that the estimated social return to R & D is found to be significantly higher than the firm's return on investment (ROI) (56% social return vs. 25% ROI). Scherer (1977), in a study of the determinants of patent behavior, found confirmation of the results of Mansfield and his associates. Patent behavior was found to be strongly related to perceived profitability and negatively affected by the ability to imitate the innovation. Both Scherer and Mansfield argue for limited support of the Schumpeterian hypothesis—large returns exist for innovative behavior; however, firms typically cannot recover these returns in competition.

That the development of new product innovations is essential to the continued existence of firms is also supported by several approaches to developing a business strategy. The well-known growth-share matrix, popularized by the Boston Consulting Group in the 1970s, postulated that a balanced portfolio of products—some relatively mature to provide a stable current cash flow and some new to generate cash flow in the future—is needed for the long-term profitability of the firm. The theory of the product life cycle, with its stages of growth, maturity, and decline, indicates that a natural process exists that requires the firm to take active steps to assure that its product line does not become obsolete. Firms keep their product offerings up to date by either expanding the product offerings, redesigning existing products, or "harvesting" existing products to provide the funds to expand into new lines of business (Urban and Hauser 1980).

Along with the necessity of developing new products is the concomitant risk associated with the innovation process. Many cases can be documented of new product failures that cost the sponsoring companies significant amounts of money (e.g., Polaroid's Polavision). Studies by Booz, Allen and Hamilton (1971, 1980) consistently indicate that new product failure rates are very high, with estimates ranging from 33% to 60% or higher. Mansfield et al. (1971) found failure rates that varied from 32% for a chemical laboratory to 48% for a drug laboratory. Moreover, the risk of failure understates the actual risk associated with innovations. Innovators must face the fact that other firms will imitate their actions, typically earning a share of the profits that is greater than their initial investment.

Rationale for the Present Research

The current research applies the well-accepted event-study methodology of finance to marketing decisions. Such an integration is important for three reasons. First, although many marketing and strategic management studies attempt to evaluate specific strategic decisions, few have attempted to link their evaluative criteria to the most common measure of firm valuation, the stock price (a notable exception is Horsky and Swyngedouw's [1987] study of the signal value of corporate name changes). Second, innovative behavior has been argued by many to be the driving force behind managerial and corporate success, yet little evidence exists that relates such behavior to the firm's market value. Mansfield (1968) and others (e.g., Mansfield et al. 1971, 1977; and Scherer 1977) have examined the impact of innovations and patents on profitability and market structure; yet Pakes's (1985) measurement of the long-term market value of patent behavior on stock prices is the only substantive research on innovation and firm value.[4] Third, with further refinements, the market-based valuations determined here can be correlated with more traditional measures, for example, market share, to determine whether such measures are sufficient predictors of market value. As such, this research follows in the steps of recent work by Aaker and Jacobson, who have examined the value of more traditional managerial performance measures (Aaker and Jacobson 1987; and Jacobson 1987).

The present research, therefore, attempts (1) to provide an integration of financial market analysis techniques with marketing behavior and (2) to provide empirical evidence on the value of innovative market behavior. It further addresses important exploratory issues: first, do new product innovators differ based on accounting measures of performance from firms not introducing new products? Second, is there a differential return to new product development across industries or by firm type (e.g., size)? Third, does the market account for differential value of different types of innovative behavior? For example, are true "innovators" (e.g., Hewlett Packard's Laserprinter) rewarded more than companies providing a copy-cat product (e.g., Brown and Williamson's Kool Super Lights, which followed Reynold's Real, Phillip Morris's Merit, and Lorillard's Kent Golden Lights) or a product update (e.g., the McDonnell Douglas DC9–Super 80)? Fourth, does the market react differentially to multiple new product announcements versus single new product announcements?

The remainder of the article will be organized as follows. The next

4. Kamien and Schwartz (1975) provide a detailed survey of this literature. Two other studies, Eddy and Saunders (1980) and Wittink, Ryans, and Burrus (1982), do provide a stock market analysis of innovative behavior. The strengths and weaknesses of these studies will be discussed in the methodology section.

section outlines the process of new product development and how it relates to the determination of market value. In the following section, a discussion of the general methodology is given along with a short review of some literature that has made use of the technique. The results of the project are then discussed. This section examines, first, the impact of a new product introduction; second, how that value varies by industry; and, third, how that value varies based on observable characteristics of the firm and product. Finally, we draw some normative conclusions and outline areas of future research.

The Process of New Product Market Valuation

The Information Effect of a New Product Announcement

Figure 1 presents a rudimentary graphical illustration of the new product valuation process. The process of idea generation, feasibility analysis, and product testing are well documented in the marketing literature. What is important for the market valuation process is how information flows from this marketing process to an updated forecast of the expected future earnings of the firm and ultimately to the stock price.

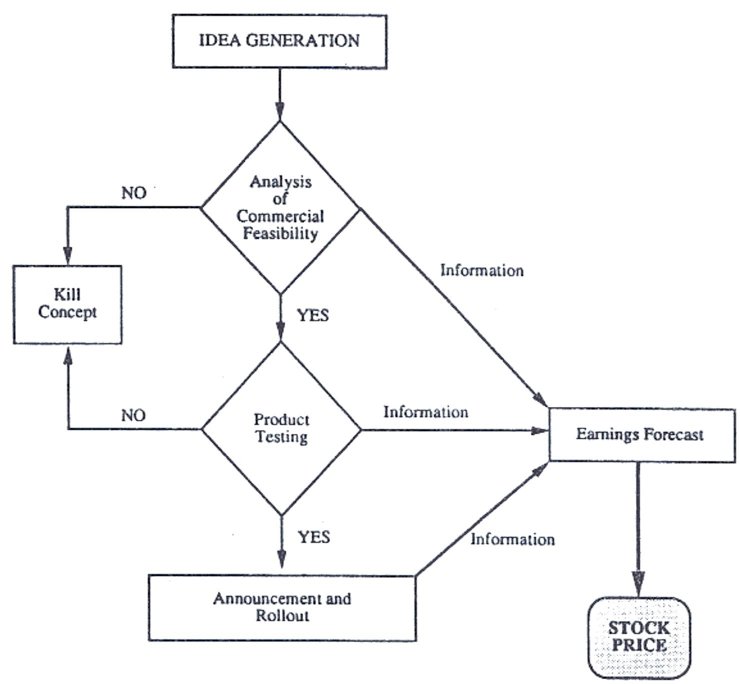

FIG. 1.—The new product evaluation process

As with any corporate endeavor, information is flowing to the financial markets continuously, thus incorporating the value of the information into the firm's stock price. Because of this flow of information, the evaluation of the market value of a specific endeavor is made difficult since much of the information is amorphous, making it impossible to determine exactly when the information is "actually" released. We must, therefore, look on the daily change of a firm's stock price around a formal announcement as possessing only some portion of that information. What is occurring when the public announcement is made is not a full evaluation of the product's market value but the forming of a consensus of opinion about the value of the product and its likelihood of success. Therefore, the final empirical evaluation of the new product represents only a portion, and at times a very small portion, of the actual value of the product.

The updated forecast of the firm's expected future earnings can reflect two underlying components of the expected future cash flows accruing to the firm from the new product introduction—the probability of the success of the product and an evaluation of the level of the profits associated with the product. Let us assume for the moment that the probability of the product's success is the only uncertainty. If no new product is introduced in time period t, the value of the firm would be V. If a new product is introduced and is 100% successful, the value of the firm would be $V + I$, where I is the discounted present value of the profits of the new product. Before the announcement, the success probability of the anticipated new product is p_b, which means that the before announcement market value would be $S_b = V + p_b I$. The firm now announces a new product in period $t + 1$, leading to a revision of the probability of success to p_a. The change in the market value of the firm would be $S_a - S_b = (p_a - p_b)I$. Therefore, the capital gain associated with the announcement would be a measure of the change in the probability of success of the new product. If the revision is upward ($p_a - p_b > 0$), then a positive effect is seen, $S_a - S_b > 0$. If the revision is downward ($p_a - p_b < 0$), then a negative effect is seen, $S_a - S_b < 0$. The same logic could be used to analyze the uncertainty in the profit potential. Overall, a measure of the total value of the change in expected future cash flows because of the announcement would be $S_a - S_b = (p_a - p_b)I_b + (I_a - I_b)p_b + (p_a - p_b)(I_a - I_b) = p_a I_a - p_b I_b$, where I_b and I_a are the before- and after-announcement estimates of the expected discounted profits accruing to the firm from the new product.

Hypotheses

In general, the marketing and strategic planning literature treat new product introductions as necessary activities for firms. Books in the new product area (e.g., Urban and Hauser 1980; Crawford 1987) and standard planning models, such as the product portfolio, urge the use of new products to replace dying ones and to balance the set of products sold by the firm in terms of market growth rates. In addition, industry trade and general business press publications often laud innovators as being "on the forefront of technology." Thus, a hypothesis derived from much of the managerially oriented planning literature is that new products should be highly valued by investors; that is, firms that innovate should generate excess returns when compared with market averages; and the more innovation, the better signal to the shareholders that the firms are willing to invest substantially in the future. This leads to hypothesis 1.

HYPOTHESIS 1. Firms that innovate will receive a market premium over similar firms that do not innovate.

However, on closer inspection, there is much to be said for firms that cleverly manage their existing products. Through innovations in packaging, promotion, and distribution, and by making minor modifications in products to better suit customer tastes, existing products can prove to be highly profitable. For example, a recent study by Hambrick and Macmillan (1982) showed that products categorized either as "cash cows" (high-share products in low-growth markets) or "dogs" by the Boston Consulting Group portfolio model (low-share products in low-growth markets) actually outperformed "problem children" (low-share products in high-growth markets), generally newer products in terms of both cash flow and risk-adjusted profitability, while "cash cows" outperformed "stars" (high-share products in high-growth markets) on both dimensions. Therefore, as an alternative to hypothesis 1, strong operating firms, those that cleverly use existing products and product lines with a minimum of investment, could potentially outperform truly innovating firms. This leads to hypothesis 2.

HYPOTHESIS 2. Strong operating firms will outperform innovating firms on market-based measures of performance.

A third hypothesis relates firm size to the excess returns from innovation. Strategy writers, such as Porter (1980), and the empirical results of the PIMS project (Buzzell and Gale 1987) emphasize the need for firms that are not market leaders to develop "niche" strategies where they position their existing products and develop new ones to serve specific needs in the market. It would seem logical, therefore, that innovation is more valuable to such firms. Furthermore, innovation should be more highly valued for small firms versus market leaders, who need innovation only to stay on top of the market rather than to survive in it. Since market followers are expected to be smaller firms that do not have the resources to develop leadership positions, firm size (as measured later by assets) should be negatively related to excess market returns. Note that this does not say anything about frequency of new product introductions; both may introduce new products at the same rate (see Acs and Audretsch [1988] for supporting evidence), but smaller firms need them in order to differentiate themselves from larger competitors.

Hypothesis 3. Firm size should be negatively related to the relative magnitude of the value of the introduction. Smaller firms should have larger market value increases from any single innovation.

A fourth hypothesis relates industry type to excess returns. Clearly, firms that are technologically based require new product innovations to stay alive. This is not to say that firms in, say, food processing do not need new products to retain or expand shelf space. However, we would expect the market value of industrial products firms or firms producing technologically based consumer products to be more positively affected by new products than services or other low-tech product areas.

Hypothesis 4. The value of an innovation should be higher for firms in more technologically based industries.

There are, of course, a large variety of products that can be classified as "new." Booz, Allen and Hamilton develop four categories: improved, line extensions, new to the firm, and new to the world. For this study, we collapse the four categories into two: "updates," which are product improvements; and "new," which would be any distinct new product, whether it is a line extension, new to the firm, or new to the world. Our hypothesis is that, all else being equal, the market will value "new" products more highly than "updates," as the former have greater potential for generating a long-term stream of cash.

Hypothesis 5. Original new products should receive a larger market value than updates of existing products.

The market assessment of a new product prior to the formal announcement will be more efficient the more information is available about the product and firm. We would, therefore, expect that factors that expand the information set available to investors about the product or firm would be negatively related to the size of the impact seen at the time of the formal announcement. Variables in this category include the size of the firm and the history of prior introductions.

Hypothesis 6. Factors that increase the availability of information about the product being introduced or the firm in general will be negatively related to the magnitude of the impact seen at the time of a formal announcement.

Methodology

The Logic of Event-Study Methodology

Event-study methodology is a natural outgrowth of the rational expectations/efficient markets tradition in financial economics. In an efficient market, security prices reflect all available information about the firm, and any new information received by the market is instantaneously incorporated into the stock price. In such a market, a change in security prices is an unbiased reflection of changes in the expected future cash flows of the firm. Therefore, by investigating the price behavior of the firm's stock price around the time when new information is received about an event that affects the firm's cash flows, one is explicitly testing the underlying change in the unbiased market forecast of the firm's future income.[5]

Prior Event-Study Research

Event studies have been used extensively to examine the information content of firm- and industry-related events in a number of disciplines, most notably finance, accounting, and regulatory economics. Although the methodology has been used in marketing-related contexts, these isolated examples have traditionally been conducted by economists.

Peltzman (1981) found that there are large and significant stock market reactions to unfair and deceptive advertising complaints issued against firms. He argues that the magnitude of the reaction reflects almost complete destruction of the advertising capital of the product. In research somewhat related to the current project, Jarrell and Peltzman (1985) found significant negative excess stock returns for drug and automobile companies facing product recalls. In addition, they found that, since 1975, competing firms in the auto industry experience negative returns when a rival's product was recalled.

The two areas where event-study methodology has found its way into the marketing and strategic management literature is the examination of corporate name changes and new product announcements. In the case of the former issue, Horsky and Swyngedouw (1987) found a mean excess return of 0.61% for corporations changing their name. They also found that the magnitude of the excess return varied by industry type (it was higher for industrial firms and lower for financial institutions) and was positively related to the corporation's estimated beta. Theoretically, Horsky and Swyngedouw argue that the value of the name change is found in the signal that a change in direction of the corporation is occurring. However, they have no direct test as to the validity of this signaling hypothesis; that is, they do not test for unanticipated changes in the operations of the firms.

Two studies have examined the impact of new product announcements on firm stock returns. Eddy and Saunders (1980) found no im-

5. As with all capital market tests, there is a joint hypothesis being tested. That is, one is always testing the efficiency of the market in addition to the hypothesis under consideration. An investigator need also remember that it is difficult, if not impossible, at times to distinguish between actual stock price effects due to real cash flow changes and the impact of signals of future potential changes in cash flows.

pact of new product announcements on monthly stock returns for a sample of 66 firms. A serious limitation of their study was the use of monthly returns that are not precise enough to reflect the impact of new products on security prices. Wittink, Ryans, and Burrus (1982) found a slightly positive value of new product announcements in the computer and office machines business on both the announcement day and the following day. However, they found that the overall impact was negligible. Wittink, Ryans, and Burrus provide only limited insight into the value of new products since they limited their investigation to only those products announced by computer and office machines companies for a 2-year period (1979 and 1980). As we will show, there are significant differences in the magnitude of the impact of new products by industry and year. In addition, they failed to relate their results to either the characteristics of the firms introducing the products or the products themselves. Both of these problems are resolved in the present study.

A General Description of the Methodology[6]

Unanticipated firm-specific events that have cash flow implications for the firm will be revealed by the unexpected return to the firm's shareholders sometime over the period when the unanticipated events become fully realized. The unexpected stock-price return is computed as the difference between the realized stock-price return on day t and the expected stock-price return on day t, or

$$\mu_{it} = R_{it} - E\{R_{it} | \Omega_{t-1}\}, \tag{1}$$

where the return to stock i on day t is $R_{it} = [P_{it} + d_{it} - P_{it-1}]/P_{it-1}$, and Ω_{t-1} represents the information set available to the market about the firm at time $t - 1$.

If no new information is available between period $t - 1$ and period t, we would expect that $E\{\mu_{it}\} = 0$ and $\text{cov}(\mu_{it}, \mu_{it-1}) = 0$ for all t. Define the cumulative average excess return (CAR) as the average error from equation (1) over the event period,[7]

$$\text{CAR}_i = \left[\sum_{t=E-T}^{E+N} \mu_{it}\right] \Big/ [N + T], \tag{2}$$

where day E is the event date, and day $E - T$ through day $E + N$ represent the period over which the abnormal returns are examined—the event window. The expected returns are computed using an estima-

6. The methodology of event studies is presented in several publications. See Schwert (1981) for a general discussion of the methodology and Brown and Warner (1980, 1985) for a description of the appropriate statistical tests.

7. The usage of the event window rather than the actual event date itself allows the investigator to analyze any preannouncement information effects that are occurring.

tion period from sometime in the past, day $E - M$ to day $E - T - 1$. The event is said to have some positive economic value if $\text{CAR}_i > 0$, some negative economic value if $\text{CAR}_i < 0$, and no economic value if $\text{CAR}_i = 0$.

The most common model used to generate the firm's expected stock returns is the market model, which posits a linear relation between the return to the market as a whole (some composite such as the Standard and Poor's [S&P] 500, for example) and the return to a firm's stock, that is,

$$E\{R_{it} | \Omega_{t-1}\} = \hat{\alpha}_i + \hat{\beta}_i R_{Mt}, \tag{3}$$

where R_{Mt} is the return on the market portfolio and $\hat{\beta}_i$ is the estimated systematic risk, or beta, of the firm. The market-model parameters are estimated over the period from day $E - M$ to day $E - T - 1$. The CAR is thus defined as the average daily difference between the actual return and the estimated return over the event window ($E - T$ through $E + N$).

General Limitations of Event Studies

There are several limitations to event studies. First, stock prices are naturally noisy, implying that an event must trigger a reaction that is significant enough to be seen above the normal background noise. Second, most events have no true event date. That is, although a public announcement may exist, it is next to impossible to find out precisely when information has been incorporated into the stock price; hence there is a tendency to see abnormal returns prior to public announcements. Third, many events have a tendency to cluster. For example, firms use stockholders' meetings to announce earnings and major changes. Also, managers have the incentive to attempt to counter bad information, such as low quarterly earnings, with potentially good information, for example, the signing of a government contract or other corporate developments. Fourth, many events do not have a clear impact on the firm. The market reaction is an aggregate expectation. Events without clear consistent expectational effect may appear to be nonsignificant when only stock prices are examined. For example, a new product may be announced for which one group of investors has high expectations and another group has low expectations. These two groups clearly have an incentive to trade, but their trading may have no effect on the firm's overall stock price. In cases such as this, the variance of unanticipated expectations will show up in the unanticipated trading volume rather than the unanticipated stock return.

The limitations of this methodology may be overlooked in many applications; however, they come to the fore when marketing-related events are studied. This is because of several inherent characteristics of marketing events. First, most important marketing phenomena do not reveal themselves as distinct events. Event studies rely on the unexpected nature of the event. Since marketing decisions evolve slowly, the impact may have little surprise value. Second, most marketing events are small relative to the total market value of the firm. Combined with the noisy nature of stock prices, plus the slow evolution of the marketing event, many significant effects may be missed.

Description of the Current Project

The Data

The process of data collection was threefold. First, a new product sample needed to be collected that possessed consistent announcement dates and reporting characteristics. Second, stock returns were collected for each announcement when the firm was listed on either the American Stock Exchange (AMEX) or the New York Stock Exchange (NYSE). These stock returns were collected using the daily returns file available from the Center for Research in Securities Prices (CRSP) at the University of Chicago. Finally, subsidiary accounting information was collected from the COMPUSTAT Annual File.

A comprehensive series of new product introductions was collected from the *Wall Street Journal Index* for the years 1975–84. The *Wall Street Journal* was chosen because it satisfied the criterion of consistent announcement dates across announcements and provided a long-term sample without the use of multiple publications.[8] The new product announcement series consists of all new products and concepts announced through the *Wall Street Journal* with three primary exceptions. First, no automobile companies or airlines were used. This restriction was necessary because of the inability to separate events when numerous products were introduced simultaneously and, in the case of automobiles, at the same time each year. An additional consideration in this case was the upheaval in these industries caused by deregulation and mergers (in the case of airlines) and the predominance of the Japanese automakers and the bailout of Chrysler. Second, joint ventures were excluded. This was done because of the inability to discern the relative contribution of each firm to the venture. For example, many joint ventures are handled through the creation of a new corporation with the partners holding equity stakes in the joint entity.

8. Alternative sources of new product announcements were examined with little success. The requirement of a long time series with no apparent industry bias severely restricted the alternative sources. Also, most trade publications are weekly, bimonthly, or monthly, leading to obvious problems in the determination of the event date and event-date clustering. This latter problem is particularly troubling with trade publications since they contain a host of other firm-related information.

Third, new contracts of a nonunique nature were excluded. It was felt that receiving new customers, even for a customized product, did not represent a new product. This latter restriction applied almost exclusively to government contracts. It is not felt that these restrictions invalidate the results in any manner.[9] A description of the individual announcements are given in Chaney, Devinney, and Winer (1987). A selected sample is presented in the Appendix.

The complete data series consists of 1,685 announcements made by 631 different firms. Of this series, 1,101 announcements by 231 firms were usable for the empirical analysis. The 584 excluded announcements represent the products of firms not listed on the AMEX or NYSE at the time of the announcement. These firms were excluded because, at the time of the investigation, NASDAQ data was unavailable. A description of the announcements by industry and year is given in tables 1 and 2. Table 1 shows that four industries dominate the product introduction sample: computers (27.89%), chemicals and pharmaceuticals (17.88%), photographic equipment (14.91%), and electrical equipment and appliances (12.98%). Interestingly, the dominance by these industries is somewhat attenuated when the number of distinct firms introducing products over the years is considered. This follows because these four industries also have four of the five largest average number of product announcements made over the period; 5.95 announcements in 10 years for the firms in the sample versus 2.01 announcements in 10 years for all other firms for which standard industrial classification (SIC) codes are available.

Table 2 presents the number of announcements by year along with information for comparison on the growth in gross national product (GNP) and short-term interest rates. Two facts stand out. First, the number of new products announced can vary dramatically from year to year and appears to be related to the business cycle and level of interest rates. For example, from the relatively good economic year of 1977 to the recession year of 1980, the number of new products announced dropped almost 37%. It was not until the boom year of 1984 that the number rebounded to more than 100 a year. As further evidence of this relation, the simple correlation between the number of announcements and the change in gross national product is 0.521 while the correlation with the change in nonresidential investment was slightly larger at 0.620. If we compare the number of announcements

9. The sample, while comprehensive for the universe of *Wall Street Journal*-listed announcements, is not argued to be representative of all new products. This fact can be noted when we discuss the industries represented in the sample. Therefore, our results cannot be argued to necessarily hold true for the universe of all new products. However, given that the *Wall Street Journal*'s reporting bias is to report on those things its editors feel are of value to investors, our sample could be described as a sample of "significant" announcements.

TABLE 1 **Distribution of New Product Introductions by Industry** (Defined by Two-Digit SIC Code)

Industry (Two-Digit SIC)	Number of Products	Percentage of Products	Number of Firms	Percentage of Firms	Products per Firm
Agriculture (8)	1	.07		.30	1.00
Mining and construction (13–17)	6	.45	5	1.49	1.20
Food (20)	57	4.23	21	6.25	2.71
Tobacco (21)	9	.67	5	1.49	1.80
Textiles (22–23)	11	.82	9	2.68	1.22
Paper products (26)	20	1.48	8	2.38	2.50
Printing (27)	16	1.19	11	3.27	1.45
Chemicals/pharmaceuticals (28)	241	17.88	47	13.99	5.13
Petroleum (29)	9	.67	6	1.79	1.50
Rubber/leather (30, 31)	20	1.48	7	2.08	2.86
Metal and stone work (32–34)	48	3.56	15	4.46	3.20
Computers (35)	376	27.89	50	14.88	7.52
Electric equipment/appliances (36)	175	12.98	44	13.10	3.98
Transport (excluding autos) (37, 41, 42)	29	2.15	16	4.76	1.81
Photo equipment (38)	201	14.91	26	7.74	7.73
Miscellaneous (39)	20	1.48	11	3.27	1.82
Communications (48)	28	2.08	7	2.08	4.00
Durable/nondurable goods (50, 51)	22	1.63	10	2.98	2.20
Retail trade (52–59)	24	1.78	14	4.17	1.71
Securities/real estate (60–65)	3	.22	3	.89	1.00
Holding companies (67)	16	1.19	10	2.98	1.60
Business services (73)	12	.89	7	2.08	1.71
Motion pictures (78)	3	.22	2	.60	1.50
Health services (80)	1	.07	1	.30	1.00
Total	1,348	100.00	336	100.00	4.01

Note.—This table is based on 336 firms for which SIC codes were available. It represents a slightly larger sample than that used in the data analysis.

TABLE 2 **Number of Product Announcements by Year**

Year	Number of New Product Announcements	GNP Growth (in %)*	Interest Rate (in %)†
1975	100	−1.2	5.82
1976	110	5.4	5.00
1977	141	5.5	5.26
1978	156	5.0	7.22
1979	123	2.8	10.04
1980	89	−.3	11.61
1981	85	2.5	14.08
1982	99	−2.1	10.72
1983	70	3.7	8.62
1984	128	6.8	9.57

* Change in real gross national product (GNP) from prior year (GNP in 1972 dollars). Source.—U.S. Department of Commerce (1987).

† Average of 90-day Treasury bill rates for the year. Source.—U.S. Department of Commerce (1987).

with the level of 90-day Treasury-bill yields, we find a correlation of −0.459.

Table 3 presents accounting and financial results on the sample of announcing firms and an industry-matched sample of firms not announcing new products. The matched sample was found by selecting all firms in all the COMPUSTAT Research and Active files in those industries represented in our sample (defined by four-digit SIC code) who are listed on either the AMEX or NYSE, excluding the firms in our sample, and weighting them to match our sample by industry. For example, if *X*% of our sample is in pharmaceuticals (SIC code 2834), then the average for all COMPUSTAT firms, excluding those in our sample, are averaged and weighted by *X*%.

The results reveal several startling facts about our sample. First, based on any measure of firm size, our sample represents significantly larger firms than are found on average in the individual industries. For example, the 12-year average of assets (in 1972 dollars) is $532.57 million for our sample and $95.84 million for the matched sample. Although one must be careful in making inferences from this information—for example, we do not know the new product history of the firms not in our sample—the results are consistent with other findings on firm size and the degree of innovativeness (see, e.g., Freeman 1982; and Ettlie and Rubenstein 1987). Second, in examining various miscellaneous performance measures, we find that our sample of firms has slightly higher advertising expenditures to assets, slightly lower capital expenditures to assets, and a slightly lower leverage ratio. Sales turnover, defined as the ratio of sales to receivables, and the level of R & D to assets are not significantly different across the samples. Third, various profitability ratios (ROE, ROA, and ROS) provide

TABLE 3 Descriptive Statistics: Firms Making a New Product Announcement versus a Matched Sample of Nonannouncers

	Sample of Firms Announcing New Products (1975–84)					Matched Sample of Firms Not Announcing New Products (1975–84)				
	1972–73	1974–79	1980–84	1985–86	1972–86	1972–73	1974–79	1980–84	1985–86	1972–86
General measures (in $millions):										
Assets	420.09***	484.75***	539.62***	562.1***	532.57***	84.13	93.41	92.45	99.82	95.84
PPEQNET	723.21***	786.08***	865.07***	808.14***	885.87***	112.47	116.79	153.77	191.61	152.37
Sales	1,545.09***	1,845.69***	2,137.13***	2,190.73***	2,119.68***	357.31	397.38	451.38	557.39	467.88
Advertising	28.2***	33.67***	44.23***	49.21***	45.58***	5.06	5.74	8.05	8.43	6.39
R & D	35.37***	42.75***	65.39***	89.78***	56.5***	8.14	9.01	12.22	19.63	11.55
CAPEX	148.6***	153.62***	181.61***	154.45***	178.77***	24.18	26.47	31.08	39.74	32.24
Leverage:										
LTD/E	.58***	.55***	.54***	.6	.55**	.89	.99	.75	.61	.63
TOTD/E	1.31	1.31	1.18	1.32***	1.31***	1.45	1.65	1.24	1.03	1.06
Profitability:										
ROA	.25***	.21	.19	.13	.19	.1	.27	.21	.12	.21
ROE	.27***	.22	.19**	.17***	.21***	.17	.23	.48	.24	.33
ROS	.06***	.06***	.05**	.04	.05***	.03	.05	.04	.03	.04
P/E	10.23***	20.6***	11.49	28.57	15.82***	4.96	6.23	12.9	. . .[a]	7.95
Miscellaneous:										
SALE/REC	8.64***	8.77	8.5	7.83	7.92	8.14	9.18	8.45	7.94	8.73
ADV/ASS	.11***	.12***	.13**	.15**	.14***	.08	.08	.11	.13	.1
CAP/ASS	.31*	.26**	.29***	.25***	.28***	.39	.33	.78	.37	.51
R&D/ASS	.13	.1	.14	.16	.12	.11	.11	.52	.16	.28

NOTE.—All dollar amounts are expressed in 1972 dollars. Variables: PPEQNET = property, plant, and equipment assets less depreciation; CAPEX = capital expenditures; LTD/E = long-term debt to equity ratio (book value); TOTD/E = total debt to equity ratio (long-term plus short-term liabilities); ROE = return to equity = income before taxes and extraordinary items/book value of equity; ROA = return to assets = income before taxes and extraordinary items/assets; ROS = return to sales = income before taxes and extraordinary items/sales; SAL/REC = turnover = sales/receivables; ADV/ASS = advertising/assets; CAP/ASS = capital expenditures/assets; R&D/ASS = R & D/assets; and P/E = price earnings ratio. Test statistics are based on a comparison of the means between the sample of introducing firms and the matched sample.

[a] Firms suffered small losses during this period. Comparison of P/E is not meaningful.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

inconsistent results about the profitability of the firms in our sample versus the matched sample, leading one to conclude that there is little current profitability difference between the two. However, when the price/earnings (P/E) ratio is examined it is found that the matched sample's average P/E ratio is about one-half of that of the product announcement sample. The implication appears to be that the market is valuing the long-term stream of earnings generated by these firms at a much higher rate than their industry peers. These results provide direct support for hypothesis 1. The market-based measure of performance, the P/E ratio, reflects the performance of the innovating firms in the sample in contrast to the matched sample of noninnovating firms.

Empirical Methodology

In our study, the event date examined is the date that the new product(s) is (are) announced in the *Wall Street Journal*. Four separate event windows were used to test for any abnormal stock behavior: 1 day before to 1 day after the announcement $(-1, +1)$, 3 days before to 3 days after the announcement $(-3, +3)$, 5 days before to 1 day after the announcement $(-5, +1)$, and 5 days before to 5 days after the announcement $(-5, +5)$. These time periods are examined because information about the new product may have leaked out prior to the formal announcement. However, it is felt that much of the information about new products will be incorporated into the stock price quickly; hence we chose to use slightly smaller event windows than many other investigators have used.

To develop a returns forecasting model, the market model was estimated for each firm using a period of 600 days prior to the event date up to the beginning of the event window (5, 3, or 1 day[s]). Since the events were spread out over a 10-year period, there was no clustering of events around the same date, thereby alleviating the necessity of estimating these models simultaneously so as to avoid covariance between their errors.

The trading strategy implied by this analysis is that at the beginning of the event period, an equal amount is invested in each of the 1,101 securities. At the end of each event day, the portfolio is rebalanced so that total wealth is equally distributed among the securities. Then $\text{CAR}(-T, +N)$ represents the average daily return the investor would earn above that return expected by the market model during the period between days $E - T$ and $E + N$.

The null hypothesis to be tested is that $\text{CAR}(-T, +N) = 0$. This implies that there is no information content (no impact on security prices) discernible from new product announcements. If $\text{CAR}(-T, +N)$ is not equal to zero, then the firm earns economic rents or suffers economic losses.

Empirical Results

Aggregate Results

Table 4 presents the cumulative average returns for four different event windows by year and in total, along with the market value of the announcement. The overall results show a tendency for the dissipation of the significance of the results as the event window is widened. For the smallest window $(-1, +1)$ the average daily excess return is 0.25% with five of the 10 years showing a significant effect. The two 7-day windows, $(-3, +3)$ and $(-5, +1)$, were next in terms of significance with approximately the same magnitude of daily excess return, 0.12% and 0.11%, respectively. The widest window, $(-5, +5)$, reveals no effect. In terms of average t-statistics across events, all but the $(-5, +5)$ window shows a significant mean t.[10]

10. There are two null hypotheses being tested. The first is that the simple average (summed across the n events) of the market-model excess returns on any event day, t, is equal to zero ($\overline{\mu}_t = [1/n]\Sigma\mu_{it} = 0$). The test statistic, S, for any day, t, is the ratio of the sum, over all firms, of the day's standardized excess return divided by the square root of the number of firms,

$$S_t = \left(\sum_{i=1}^{n} \mu'_{it}\right) \Big/ n^{0.5}$$

where

$$\mu'_{it} = \mu_{it}/\hat{\sigma}(\mu_{it}),$$

$$\hat{\sigma}(\mu_{it}) = \left[\sum_{t=E-M}^{E-T} (\mu_{it} - \mu_i^*)^2/[M - T - 1]\right]^{1/2},$$

$$\mu_i^* = [1/(M - T)] \sum_{t=E-M}^{E-T} \mu_{it}, \text{ and}$$

n = number of events in the sample.

If the μ'_{it} are independently and identically distributed with finite variance, the test statistic is distributed unit normal for large n. The second hypothesis tests whether the total sample CAR, i.e., Σ CAR_i, is equal to zero. The test statistic, X, is

$$X = [1/n] \sum_{i=1}^{n} \mathrm{CAR}_i \Big/ \left[\sum_{t=E-T}^{E+N} \hat{\sigma}^2(\overline{\mu}_t)\right]^{1/2},$$

whei

$$\overline{\mu}_t = [1/n] \sum_{i=1}^{n} \mu_{it},$$

$$\hat{\sigma}(\overline{\mu}_t) = \left[\sum_{t=E-M}^{E-T} (\overline{\mu}_t - \overline{\overline{\mu}})^2/(M - T - 1)\right]^{1/2}, \text{ and}$$

$$\overline{\overline{\mu}} = [1/(M - T)] \sum_{t=E-M}^{E-T} \overline{\mu}_t$$

and is assumed unit normal. The individual CARs are defined as given by eq. (2). See Brown and Warner (1980, 1985) for a complete description of the statistical tests.

TABLE 4 **Average Daily Excess Returns (in %) and Market Value by Year for Different Event Windows (1975–84)**

Year	Beta	N	Event Window (−1, +1)	(−5, +5)	(−3, +3)	(−5, +1)	Average Market Value of Announcement Based on CAR(−1, +1) (in $Millions 1972)
1975	1.148	100	.64*** (66)***	.09 (55)**	.21 (59)**	.17 (53)⁺	57.831
1976	1.198	110	.34* (60)***	.17 (67)***	.27⁺ (66)***	.17 (63)***	50.154
1977	1.182	141	.17 (57)***	.07 (55)***	.13 (61)***	.06 (55)***	22.548
1978	1.321	156	.21** (53)***	.08 (53)***	.11 (61)***	.10 (54)***	15.301
1979	1.173	123	.28** (54)*	.05 (51)	.03 (52)⁺	.14 (54)*	25.939
1980	1.063	89	.11 (54)*	.01 (48)⁺	.11 (47)⁺	.13 (58)**	8.507
1981	1.134	85	.04 (43)**	.08 (49)	.11 (55)*	.08 (53)⁺	3.496
1982	1.014	99	.39*** (63)***	.08 (60)***	.16 (62)***	.19⁺ (62)***	42.489
1983	1.372	70	.21 (58)**	−.16 (43)**	.01 (43)**	−.04 (47)⁺	28.670
1984	1.294	128	.10 (57)**	.04 (62)***	.05 (59)**	.08 (60)***	12.182
1975–84	1.182	1,101	.25** (56)***	.06 (55)***	.12 (57)***	.11 (56)***	26.638
Average t[a]			3.607	.961	1.772	1.633	

NOTE.—The percentage positive appears in parentheses.

[a] Average t-statistic for all 1,101 events treated individually.

⁺ $p < .15$.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

The dollar value of the excess return associated with an average announcement is also shown in table 4. This value is computed by multiplying, for each firm, three times its CAR(− 1, + 1), the percentage excess return over the event window, by the value of its equity outstanding on the day prior to the beginning of the event window (day − 2). The numbers reported are the average market values of an announcement in 1972 dollars. Over the entire 10-year period, the average dollar capital gain accruing to stockholders from an announcement is $26,683,000, with the announcements in 1975 having the highest average value of $57,831,000 each, and the 1981 announcements being the least valuable at $3,469,000 each. The average value of an announcement in 1991 dollars is $84,196,000.

The excess return effect is clarified by looking at the daily excess returns around the announcement date. Table 5 presents the daily excess returns by year and in total, and figure 2 provides graphical illustration of the total result. Examining the average daily excess returns, we see that only two returns are significant, the day before and the day of the announcement. The significance of this result is strengthened by noting that, on day − 1, all 10 years have positive excess returns. For the period (− 2, + 1), 34 of 40 average returns are positive. This lends credence to the hypothesis that the new product announcement is itself responsible for the effect, and it is not simply a case of the firm's publicity in the *Wall Street Journal*. These results support hypothesis 1.

One other clear result is that the major impact of the new product announcements appears in the years 1975–79. As we noted earlier, there is a relation between the level of interest rates and the total number of announcements, and, as we will show shortly, this year effect can possibly be attributed to differences in the interest rates over these periods. The average 90-day T-bill rate was 6.67% for the 1975–79 period and 10.92% for the 1980–84 period. There is a strong rationale for why this might be the case. Since the cost of capital is a function of both the firm's beta and the risk-free rate of interest, we would expect firms to reduce their level of investment as expectations of interest rates rise. Also, on the demand side, rising interest rates can imply a decline in demand, thereby leading to a reduced revenue stream from the innovation.

One final interesting aggregate result stands out. Referring back to table 5, it is seen that the average beta of the sample is 1.182. The implication of this result is that firms introducing new products have a greater market risk, and hence a greater cost of capital, than the market average. This can be justified in two competing manners. First, firms that introduce new products, a naturally risky endeavor, have a higher market risk measure. In other words, new products lead to a greater risk measure. A more logical alternative is to note that the beta represents a component of the cost of capital; the higher the beta, the shorter the life of the capital. Hence, new products are a necessity of the firms with the higher betas. Higher-beta firms need to introduce new products or update existing products more frequently. The implications of this fact are further confused by the finding that, within our sample, there is a negative relationship between the number of products introduced over the 10-year period and beta (correlation = -0.183). In other words, although the sample of firms introducing new products has a larger risk profile than the market, the relation between risk and new product introductions is seen to reverse when the number of introductions is considered. Why might this be the case? If the firms in our sample are the least diversified firms in the largest industries, then it is conceivable that the negative beta within-sample effect is due to the lack of diversification between the high innovators and low innovators in the total innovator sample.[11]

Based on these results we can argue that firms introducing new products accrue an approximate 0.75% 3-day excess return beginning on the day before the announcement and ending on the day following the announcement. (The 3-day excess return is simply three times CAR$[-1, +1]$.) The average value of an announcement over this period was slightly in excess of $26 million (in 1972 dollars). These results indicate that, even in the case of new products, where information leakage is potentially a large problem, some unanticipated effect of the announcement can be seen. In addition, these results are consistent with, although naturally the opposite in sign from, the effects of automobile product recalls found by Jarrell and Peltzman (1985). In their study, an automobile recall led to an approximate -0.81% 3-day excess return.

Industry Results

Table 6 replicates table 4 with industry breakdowns. We see once again that the shortest window provides the strongest evidence of an effect, with all other windows insignificant. The industries exhibiting the strongest significant excess returns are food, printing, chemicals and pharmaceuticals, computers, photographic equipment, and durable and nondurable goods. Several industries show a large absolute magnitude of effect: securities and real estate, motion pictures, and mining and construction. However, the standard errors of these estimates are large due, in a few cases, to the small number of events being considered. In terms of capital gains, the major gainers were companies in the computer industry ($51,194,000 per announcement), the petroleum industry ($33,713,000 per announcement), the tobacco

11. The betas were also tested for stability after the announcement. There was no overall significant change, and the results are not reported.

TABLE 5 **Daily Excess Returns around Announcement Date (in %)**

Day Relative to Announcement	Year										
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	Average
−30	.07	−.12	−.12	−.13	.13	.47	.20	.23	−.28	−.16	.01
−29	.04	.04	−.04	−.15	.07	.08	.20	.02	−.29	.20	.02
−28	−.03	−.31	.03	−.10	−.27	−.31	.01	.02	−.19	.08	−.10
−27	−.09	.26	−.05	−.10	−.01	−.12	.19	.12	−.28	−.14	−.02
−26	−.06	−.08	.21	−.07	.04	−.09	−.01	.09	−.26	−.11	−.02
−25	−.31	−.03	.00	−.20	−.01	−.07	.19	.21	−.03	.00	−.03
−24	−.01	.29	−.39	.10	.10	−.08	−.09	−.12	−.50	−.08	−.06
−23	−.29	.17	.08	−.15	−.31	.30	.10	.18	−.04	.07	.00
−22	.01	−.36	−.01	.15	−.17	.45	.29	.27	.30	−.15	.05
−21	−.10	−.21	−.11	.32	−.03	.03	−.35	−.11	.19	−.14	−.04
−20	−.16	.03	−.14	−.01	−.10	.12	−.15	−.06	−.17	−.06	−.07
−19	.29	.03	.12	.33	.11	−.04	.03	.41	.30	.08	.17
−18	−.28	−.14	.06	−.17	.19	.01	.08	.27	.47	.46	.08
−17	−.26	−.15	−.02	.14	−.17	−.08	−.56	.17	−.07	−.08	−.09
−16	−.10	−.06	−.27	.05	−.20	−.24	.15	.01	.07	−.18	−.09
−15	−.05	.17	−.14	.05	.22	−.23	.23	−.01	.26	.24	.07
−14	.01	.23	.10	−.06	.24	.07	.39	−.06	.36	.30	.14
−13	.17	.16	.26	.21	−.16	.08	.11	−.26	−.31	−.09	.04
−12	.79	.14	.04	.20	−.10	−.32	−.14	.23	.25	−.04	.10
−11	−.08	−.07	−.18	.05	−.27	.26	.11	−.03	−.54	.06	−.06
−10	−.22	.11	.09	.14	.05	.37	.04	.14	−.21	.16	.08
−9	−.26	.13	.01	.09	−.11	−.53	−.20	−.03	−.11	.14	−.06
−8	.07	−.28	.09	.12	−.10	−.10	−.20	.07	−.15	.33	.01
−7	−.09	.16	.05	−.02	.02	−.04	−.05	−.28	−.12	.16	−.01
−6	.12	−.19	−.24	−.10	.07	−.20	.25	.04	.34	.14	.00
−5	−.18	.13	−.13	−.09	−.06	−.31	−.38	.01	−.43	−.07	−.13
−4	−.25	−.01	−.26	.01	.39	.20	.08	−.02	−.41	.18	.00
−3	−.34	.40	.03	−.04	−.03	.25	.26	.11	−.19	.09	.05
−2	.05	.12	.27	.18	−.13	.45	.47	.03	.14	.06	.15
−1	1.55	.98	.11	.13	.30	.30	.14	.29	.25	.16	.40**
0	.72	−.15	.34	.34	.19	.06	−.19	.49	.38	.01	.22*

	.24					
	.35					
.38						
.24						
	.31					
	.25		.32			
					.32	
			.23			
	.34	.28				
			.22			
	.33					
		.39		.04		
				.05		
		.23				
						1,101

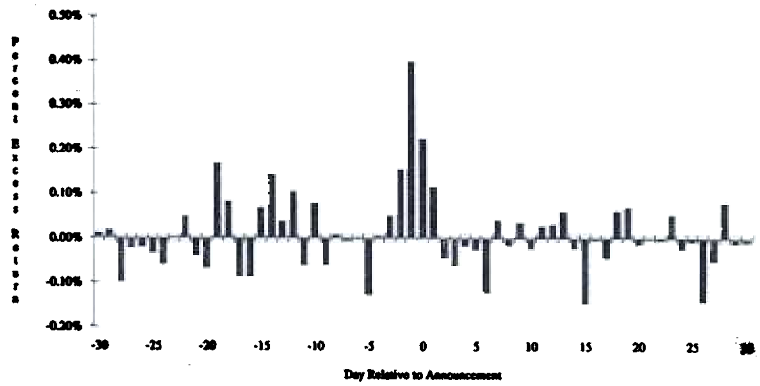

FIG. 2.—Daily excess returns around the announcement date

industry ($30,265,000 per announcement), and the photographic equipment industry ($22,042,000 per announcement). Consistent with hypothesis 4, we find that five of six of the industry average CAR$(-1, +1)$s significant at the 0.05 level are in technologically based industries, the metal and stone work industry being the sole exception.

The Impact of Multiple Announcements and Product Updates

Table 7 provides a breakdown by whether the announcement was for a single product or for a number of products simultaneously (MULTIPLE; yes = 1, no = 0), and whether or not the product introduced was an update of an existing product (UPDATE; yes = 1, no = 0). For a product to be considered an update, the announcement had to explicitly specify that it was an update or an enhancement of an existing product. In the case of multiple-product announcements, only the primary product announced was coded as to whether or not it was an update.[12]

Overall, multiple-product announcements have a significantly stronger impact on excess stock returns than single product announcements. Single-product announcements have a 3-day excess return of 0.61% (three times the CAR$[-1, +1]$ of 0.20%), while multiple-product announcements have a 3-day excess return of 0.93% (three times the CAR$[-1, +1]$ of 0.31%). Original-product announcements also fare better than product update announcements, a 0.74% 3-day excess return versus a 0.41% 3-day excess return. When these results are broken down in more detail, it is seen that multiple-product original

12. Product announcements were also subjectively evaluated as to their innovativeness, that is, whether they were truly new-to-the-world innovations, copies of existing products of other producers (me-too products), or simple improvements of an existing product of the firm. These qualitative rankings were not found to impact on any of the results and were less valuable than the more objective UPDATE variable.

announcements have the largest impact, a 0.95% 3-day excess return, with single-product updates showing the smallest impact, a 0.35% 3-day excess return. It should be noted that multiple-product announcements generate less than twice the effect of a single-product announcement. In terms of dollar market value, we see the same basic effect. The dollar market value (in constant 1972 prices) of an original multiple-product announcement is in excess of $39 million. A single-product update announcement is valued at only $16 million. These results directly support hypothesis 5 and provide evidence against hypothesis 2.

Table 8 provides a companion analysis for the estimated beta of the announcing companies by product announcement type. Firms making original-product announcements or multiple-product announcements have significantly higher betas than those announcing product updates or single products. In addition, firms announcing original products in a multiproduct announcement have the highest average beta, 1.22, while those making single-product update announcements have the lowest beta, 1.05.

Regression Results

Two final analyses related the individual product announcement excess returns (CAR[−1, +1]) and the dollar market value of the excess returns based on CAR(−1, +1) to specific control variables, including the number of product announcements made over the 10-year period (NPROD), the risk of the firm, as measured by its beta, various accounting measures (assets, profitability, and R & D expenditures—the latter two deflated by assets), a measure of the risk-free rate of return (INT = yearly average of 90-day T-bill rates), and a series of industry dummy variables. Additional analyses using R & D expenditures and profitability, both appropriately adjusted for firm size and including current and past measures of each, proved insignificant in both analyses and are excluded.

Excess returns regressions. Cross-sectional differences in the percentage excess return from an announcement were analyzed by regressing the standardized CAR(−1, +1)s against the variables in question. The results are presented in table 9 for those variables of significance. Column 1 of table 9 provides the most complete model, with assets in the year of the introduction, measured by ASSETS (assets in the year of the announcement in 1972 dollars), added for expository purposes. As can be seen, contrary to hypothesis 3, firm size has no apparent impact on the magnitude of the excess stock return reaction from a new product announcement. The major determining factors are the number of products announced by the firm over the 10-year period and whether or not the announcement was for a single product. The product update variable and the firm's beta have

TABLE 6 Average Daily Excess Returns (in %) and Market Value for Different Event Windows by Industry

Industry (Two-Digit SIC)	Beta	Event Window (−1, +1)	(−5, +5)	(−3, +3)	(−5, +1)	Average Market Value of Announcement Based on CAR(−1, +1) (in $Millions 1972)
Mining and construction (13–17)	1.423	.29 (60)++	.68 (60)++	.60 (80)++	.63 (80)++	.670
Food (20)	.759	.39* (66)***	.14 (66)***	.26+ (75)***	.19 (59)*	33.513
Tobacco (21)	.846	.33 (67)++	.51 (100)++	.55 (100)++	.76+ (100)++	59.661
Textiles (22–23)	1.242	.05 (50)++	.10 (50)++	.01 (50)++	.40 (63)++	387
Paper products (26)	1.039	.16 (60)	.07 (55)	.11 (50)	.06 (60)	21.380
Printing (27)	.736	1.27*** (69)*	.58+ (92)***	.88* (85)***	.87* (92)***	23.827
Chemicals/pharmaceuticals (28)	1.051	.20** (53)**	.06 (57)**	.11 (59)***	.09 (53)**	18.178
Pharmaceuticals (2834)	1.063	.21** (51)	.10 (60)***	.13 (61)***	.12 (54)**	13.314
Petroleum (29)	.848	.18 (56)++	.12 (56)++	.15 (56)++	.14 (78)++	66.459
Rubber/leather (30, 31)	.864	−.08 (60)	−.16 (60)	−.08 (47)	.23 (53)	−3.232
Metal and stone work (32–34)	1.239	.21** (55)*	−.10 (43)*	−.01 (55)*	−.11 (43)*	7.988
Computers (35)	1.309	.22*** (57)***	.03 (53)**	.14+ (59)***	.09 (55)**	100.918

Electrical equipment/appliances (36)	1.214	.31**	.07	.10	.10	30.079
		(60)***	(56)**	(51)	(60)***	
Transport (excluding autos) (37, 41, 42)	.312	−.12	.06	−.07	.15	−5.377
		(55)	(50)	(65)*	(50)	
Photo equipment (38)	.188	.25***	.08	.14	.15+	43.452
		(59)***	(58)***	(60)***	(59)***	
Miscellaneous (39)	1.396	1.00*	.41	.36	.75	4.446
		(67)*	(67)*	(60)	(87)***	
Communications (48)	103	−.32	.01	−.05	−.22	−10.867
		(25)***	(42)*	(50)	(33)***	
Durable/nondurable goods (50, 51)	1.862	.73+	−.09	−.10	−.03	2.077
		(42)	(42)	(42)	(42)	
Retail trade (52–59)	1.361	.41	−.04	.02	.01	36.777
		(53)	(37)**	(37)**	(42)	
Securities/real estate (60–65)	1.740	1.20	−.66	−.43	−.34	12.942
		(100)++	(0)++	(0)++	(0)++	
Holding companies (67)	.862	.08	.11	.01	.25	8.552
		(75)**	(50)	(58)	(58)	
Business services (73)	799	−.03	.01	.04	.06	−27.524
		(50)	(58)	(42)	(42)	
Motion pictures (78)	1.512	−.75	−.29	−.59	−.40	−31.799
		(33)++	(33)++	(0)++	(33)++	

NOTE.—The percentage positive appears in parentheses.
++ Expected number of positive CARs was less than five. Lack of reliability led to no test.
+ $p < .15$.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

TABLE 7 CAR(−1, +1) by Type of Product Announcement (in %)

Update	Multiple: No (0)	Multiple: Yes (1)	Total
No (0):			
CAR(−1, +1)	.22[a]	.32[b]	.25[c]
% of sample	60.59	29.00	89.57
Yes (1):			
CAR(−1, +1)	.12[d]	.22[e]	.14[f]
% of sample	8.63	1.80	10.43
TOTAL:			
CAR(−1, +1)	.20[g]	.31[h]	.24[i]
% of sample	69.19	30.81	100.00

NOTE.—t-statistics are for mean differences between CAR(−1, +1)s. Superscripts refer to the relevant numbers: t(a, b) = 2.42; t(d, e) = 2.51; t(g, h) = 2.59; t(a, d) = 2.35; t(b, e) = 2.25; t(c, f) = 2.71.

TABLE 8 Beta by Type of Product Announcement

Update	Multiple: No (0)	Multiple: Yes (1)	Total
No (0):			
Beta	1.17[a]	1.22[b]	1.19[c]
% of sample	60.59	29.00	89.57
Yes (1):			
Beta	1.06[d]	1.18[e]	1.08[f]
% of sample	8.63	1.80	10.43
TOTAL:			
Beta	1.16[g]	1.22[h]	1.18[i]
% of sample	69.19	30.81	100.00

NOTE.—t-statistics are for mean differences between betas. Superscripts refer to the relevant numbers: t(a, b) = 3.73; t(d, e) = 8.94; t(g, h) = 4.47; t(a, d) = 8.20; t(b, e) = 2.98; t(c, f) = 8.20.

a marginal impact on the excess stock return, as does the risk-free rate of interest during the year of the announcement.

The number of products negatively influences the excess return, indicating that there is marginally more "surprise" value associated with the introductions made by firms which introduce fewer products. The impact of MULTIPLE and UPDATE are consistent with the explanation given in the prior section, although the impact of UPDATE is seen to be marginally less pronounced when other factors are accounted for. The interaction effect seen between MULTIPLE and UPDATE (the variable UPMULT) in tables 7 and 8 does not appear important once other intervening factors are accounted for.

The relation between beta and the excess return is less logical since there is no reason to think that higher-beta firms should have less "surprise" in their announcements. Given that the betas do vary across industries, it is conceivable that the effect is more industry driven than due to any economic factor related to the systematic risk itself. For that reason a test was conducted to see if industry effects are causing the relationship between the excess returns and betas. The dummy variables were set to one if the firm was in the industry and zero otherwise. The baseline industry was the chemicals and pharmaceuticals industry (SIC 28). Including industry dummy variables along with beta, we find that the industry dummy variables prove to be insignificant in explaining differences in the excess returns ($F = 0.771$; $p = 0.758$).

Overall, the results appear to indicate that little predictive value exists in using past and current accounting figures to predict the magnitude of the excess stock return. Consistent with hypothesis 6, we see that factors that are related to the information available to investors have something to say about the results. The major impact appears to accrue to firms with a small number of original new product announcements. Some predictive value for the magnitude of the excess returns is found by simply examining short-term interest rates.

Market value of excess returns regression. Table 10 presents the results of the cross-sectional analysis of the dollar market value of the new product announcements. Column 1 presents the most comprehensive analysis with all variables included. The variables MULTIPLE and ASSETS along with the block of industry dummy variables provide the most explanatory power in the regression. The effect of a multiple-product announcement is seen to be identical in direction to the effect found in the excess returns regressions. A multiple-product announcement adds approximately $49 million to the value of an announcement. Once the cross-sectional industry effects are accounted for through the inclusion of dummy variables ($F = 3.165$; $p = 0.0008$), we find, in confirmation of hypothesis 3, that the largest effect of announcements is for the smaller firms in the industry. Taking into account the information in table 3, this finding seems to indicate that the largest impact appears to be accruing to the smaller firms in the larger industries.

Finally, column 1 provides four final insights. Again, consistent with hypothesis 6, we see that firms announcing products more frequently have less of a surprise impact for each individual announcement. Product updates have a less than average effect on the market value of the firm. The negative effect of the firm's beta appears consistent with the excess returns regression, although not significantly. And, finally, both the interest rate and the multiple-update interaction term appear unimportant.

Columns 2–5 point to two primary findings. Excluding industry dummy variables, but including assets, reinforces the size effect argument made previously. Excluding the industry dummy variables re-

TABLE 9 **Regression Results**
Dependent Variable: Standardized CAR(−1, +1)

Variable	(1)	(2)	(3)	(4)	(5)
NPROD	−.0048***	−.0043***	−.0036***	−.0035***	−.0035***
	(−2.883)	(−3.046)	−2.930)	−3.083)	(−3.074)
MULTIPLE	.0947+	.1135*	.1235**	.1305**	.1360**
	(1.532)	(1.875)	(2.067)	(2.215)	(2.204)
UPDATE	−.1139	−.0930	−.1089	−.1027	
	(−1.133)	(−1.033)	−1.221)	−1.116)	
BETA	−.1140*	−.1296*	−.1201*	−.1017*	−.1101*
	(−1.920)	(−1.793)	−1.805)	−1.628)	(−1.824)
ASSETS	.877E − 8	. . .	.474E − 8		
	(.256)		(.078)		
INT	−1.8677*	−1.6962*	−1.7140*		−1.5832*
	(−1.832)	(−1.696)	−1.717)		(−1.614)
UPMULT	.0745				
	(.372)				
Industry dummy:					
Mining and construction	−.1526	.0036			
	(−.245)	(.009)			
Food	.2236	.2113			
	(1.276)	(1.263)			
Tobacco	.1776	.1782			
	(.349)	(.352)			
Textiles	−.3049	−.2719			
	(−.907)	(−.867)			
Paper products	−.0923	−.0945			
	(−.045)	(−.014)			
Printing	.1951	.1992			
	(.773)	(.793)			
Chemicals/pharmaceuticals	. . .	. . .			
Petroleum	−.2171	−.0489			
	(−.447)	(−.165)			
Rubber/leather	−.2182	−.2114			
	(−.928)	(−.905)			
Metal and stone work	−.0090	−.0360			
	(−.061)	(−.246)			

Computers	.0915	.0726			
	(.937)	(.752)			
Electrical equipment/appliances	.0448	.0362			
	(.464)	(.380)			
Transport (excluding autos)	−.2466	−.2803			
	(−1.013)	(−1.202)			
Photo equipment	.0944	.0810			
	(.972)	(.844)			
Miscellaneous	.2071	.1967			
	(.850)	(.811)			
Communications	−.5313**	−.5321**			
	(−1.964)	(−1.976)			
Durable/nondurable goods	.1882	.1088			
	(.556)	(.410)			
Retail	.0606	−.0196			
	(.280)	(−.094)			
Securities/real estate	.3419	.3425			
	(.549)	(.553)			
Holding companies	−.1278	−.1135			
	(−.477)	(−.435)			
Business services	−.0369	.1030			
	(−.105)	(.397)			
Motion pictures	−.7188+	−.7229+			
	(−1.411)	(−1.425)			
R^2	.033	.031	.017	.014	.106
F	1.224	1.280	3.030***	3.806***	4.121***
F(industry)	.771	.747			
p(industry)	.758	.786			
F(beta)	3.684	3.215			
p(beta)	.055	.073			

NOTE.—t-statistics are in parentheses. Variables: ASSETS = assets of the firm in the year of the announcement (in 1972 dollars); BETA = the estimated systematic risk of the announcing firm; INT = average of 90-day Treasury-bills yield for the year of the announcement; MULTIPLE = is the announcement for more than one product (yes = 1; no = 0)? NPROD = number of new product announcements (1975–84); UPDATE = is the announcement for a product update (yes = 1; no = 0)? UPMULT = MULTIPLE × UPDATE. Industry dummy variables = dummy variables for each industry; baseline comparison is to the chemical and pharmaceuticals industry.

+ $p < 0.15$.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

TABLE 10 **Regression Results**
Dependent Variable: Market Value of Announcement Based on CAR(−1, +1)

Variable	(1)	(2)	(3)	(4)	(5)
NPROD	−.2101	−.1100	−.9125**	−1.8279***	−1.3562***
	(−.382)	(−.204)	(−2.005)	(−4.382)	(−3.453)
MULTIPLE	49.4160**	48.0185**	48.3458**	45.4812**	44.7793**
	(2.333)	(2.347)	(2.356)	(2.235)	(2.190)
UPDATE	−34.7436	−38.0699	−43.5870+	−41.4823	−33.8973
	(−1.045)	(−1.267)	(−1.449)	(−1.376)	(−1.123)
BETA	−21.5230	. . .	. . .	−19.2671	−35.5416+
	(−.848)			(−.837)	(−1.575)
ASSETS	−.0032***	−.0031***	. . .	.0027***	
	(−2.846)	(−2.752)		(3.237)	
INT	2.0026	. . .	. . .	. . .	
	(.006)				
UPMULT	−15.9398	. . .	. . .		
	(−.208)				
Industry dummy:					
Mining and construction	−33.9820	−41.4848	−42.0003		
	(−.165)	(−.202)	(−.204)		
Food	−15.2732	−8.9987	−9.4069		
	(−.286)	(−.157)	(−.344)		
Tobacco	268.6694+	273.5089*	254.5211+		
	(1.598)	(1.630)	(1.513)		
Textiles	−12.0175	−14.2056	−14.3314		
	(−.108)	(−.128)	(−.129)		
Paper products	−39.7613	−39.4007	−44.5137		
	(−.586)	(−.582)	(−.655)		
Printing	−54.4986	−46.7424	−47.3234		
	(−.653)	(−.556)	(−.574)		
Chemicals/pharmaceuticals	. . .	. . .	. . .		
Petroleum	373.0563***	374.7482***	293.3978***		
	(3.443)	(3.467)	(2.812)		
Rubber/leather	−14.8407	−12.3412	−19.7316		
	(−.586)	(−.160)	(−.255)		
Metal and stone work	−13.4629	−18.2069	−16.7316		
	(−.273)	(−.373)	(−.344)		

Computers	−16.891	−26.0009	−21.6556		
	(−.520)	(−.847)	(−.704)		
Electrical equipment/appliances	−5.6117	−9.8905	−16.0995		
	(−.175)	(−.314)	(−.510)		
Transport (excluding autos)	−10.2431	−15.3016	−21.1141		
	(−.127)	(−.191)	(−.263)		
Photo equipment	6.2670	1.4006	10.8868		
	(.195)	(.044)	(.345)		
Miscellaneous	−30.6342	−36.8410	−36.1727		
	(−.318)	(−.459)	(−.449)		
Communications	−24.165	−25.4108	−26.9765		
	(−.270)	(−.284)	(−.301)		
Durable/nondurable goods	−16.9990	−28.6458	−27.1106		
	(−.152)	(−.258)	(−.244)		
Retail	5.8806	−1.8347	−8.0964		
	(.082)	(−.026)	(−.114)		
Securities/real estate	12.6977	−2.1767	−14.2713		
	(.062)	(−.011)	(−.069)		
Holding companies	51.0704	53.9052	−1.0725		
	(.577)	(.612)	(−.012)		
Business services	859.332***	854.1620***	636.4194***		
	(7.347)	(7.321)	(7.397)		
Motion pictures	−35.5391	−44.7007	−47.9976		
	(−.211)	(−.266)	(−.285)		
R^2	.088	.087	.080	.027	.016
F	3.407***	3.792***	3.611***	5.539***	4.264***
F(industry)	3.165				
p(industry)	.0008				
F(beta)	.7195				
p(beta)	.3965				

NOTE.—t-statistics are in parentheses. Variables: ASSETS = assets of the firm in the year of the announcement (in 1972 dollars); BETA = the estimated systematic risk of the announcing firm; INT = average of 90-day Treasury-bills yield for the year of the announcement; MULTIPLE = is the announcement for more than one product (yes = 1; no = 0)? NPROD = number of new product announcements (1975–84); UPDATE = is the announcement for a product update (yes = 1; no = 0)? UPMULT = MULTIPLE × UPDATE. Industry dummy variables = dummy variables for each industry; baseline comparison is to the chemical and pharmaceuticals industry.

+ $p < 0.15$.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

verses the sign of ASSETS, implying that much of the positive effect of assets size was really cross-sectional industry differences. Excluding assets (or the industry dummy variables) dramatically affects the significance of NPROD. This is to be expected since the two are highly correlated. This lends credence to the argument that the surprise value of an announcement is higher for firms that introduce fewer new products, most notably the smaller firms in the sample.

The general results of the market value of an announcement regressions are consistent with the percentage excess returns regressions. Multiple-product announcements by firms introducing a small number of products appear to have the largest impact, even when industry differences are accounted for. At the margin, product updates have less than average impact although the effect is insignificant. Unlike the excess returns regression, we find that the effect of beta and the interest rate are unimportant.

Summary of Results

The empirical results support several of our hypotheses. First, confirming hypothesis 1, we see that innovating firms differ in several distinct ways from noninnovating firms. Using standard measures of performance does not allow for a clear distinction between our sample of innovating firms and a matched sample of noninnovating firms. However, the firms do differ on market-based measures of performance. Second, consistent with hypothesis 4, the value of a new product announcement, as measured by CAR(+1, −1) was the greatest for the most technologically based industries such as computers, chemicals, petroleum, pharmaceuticals, printing, and electrical equipment and appliances. Thus, continued emphasis on new products should positively affect the value of firms in these industries. Third, original new product introductions clearly dominate reformulated or repositioned existing products. This supports hypothesis 5 and is further evidence against hypothesis 2. There is more value in innovation than the operating skills associated with repositioning an existing product. This conclusion must, however, be viewed tentatively because of the small number of product updates in our sample. Yet, if subsequently confirmed by future research, this finding would have important resource allocation implications; the substantial money invested in repositioning may be better spent on developing new products.

Hypothesis 3 receives mixed support. Contrary to the hypothesis, we find that firm size is not related to the percentage excess return. However, once industry effects are accounted for, the size hypothesis receives some support from the dollar market value regressions. Larger industries have a larger magnitude of effect, driven by the fact that they have the largest dollar value of equity outstanding. Yet, the largest effect is seen to reside in the smallest firms in each industry.

Conclusion

The present article has presented some results on the impact of new product introductions on the market value of the introducing firms. The aggregate impact of the announcement of a new product was approximately 0.75% over a 3-day period. This effect was also found to vary marginally from industry to industry. It must be emphasized once again that this estimate does not reflect the total value of the product to the firm but is more a measure of the formation of a consensus of the product's value to the firm. As such, it is a lower-bound estimate of the product's value. It was further found that the impact of an introduction varied negatively with the magnitude of the firm's systematic risk and negatively with the number of announcements made over the 10-year period. Finally, the market's reaction to the information in an announcement appears to be related to the number of products in the announcement and whether these are truly new products. Announcements of single-product updates received a minimal reaction, while the largest effect was seen for original multiple-product announcements.

The study presents several avenues for future research while also highlighting the value of the event-study methodology in marketing. First, the sample of announcements examined includes many different types of products, many of which were successful and many of which were not. The addition of a time series of sales data for each of the products announced would allow for an examination of the magnitude of the result by the value of the product to the corporation, as well as an examination of the degree of foresight in the market reaction. Second, an examination of unanticipated trading volume around the event date would provide for a more comprehensive examination of the variance in expectations about the value of the new products announced. The magnitude of the excess return effect is small, and it is conceivable that additional information can be gathered by examining trading volume rather than price changes. Third, the rather large difference in the P/E ratio of our sample and the matched sample of firms presents a perplexing problem that is worthy of further study. A more detailed examination of the causes of, and correlates with, this difference is necessary.

The present research also clearly points out the difficulty of using the event-study methodology to study marketing and strategic management events. Even with such an important announcement as a new product, the effect is small and quickly incorporated into the stock price. However, even with the long lead times in new product development and the large amount of information available in the marketplace, there is still an unanticipated component of the reaction to the announcement, although this component has declined with time. Because of these difficulties, the true importance of this methodology is not the magnitude of the excess return found but what that excess return is relating to and how this information can be integrated with other information to better understand the phenomenon being investigated.

Appendix

Selected Examples of New Product Announcements

1975:
- CBS publishes quarterly magazine entitled *Popular Gardening Indoors* (October 2).
- Dow Jones will launch an Asian edition of the *Wall Street Journal* (December 22).
- Polaroid introduces the "Electric Zip" instant camera (September 24).
- Savin Business Machines unveils the Savin 750 plain-paper copier (October 15).

1976:
- Digital Equipment Corp. introduces the DEC 20 System (January 14).
- Gillette introduces the Good News disposable razor for men at 25¢ (February 6).
- Union Corp. receives FDA clearance for Aquaflex soft contact lens (June 21).
- Wm. Wrigley Co. introduces Orbit, a gum using the sweetener xylitol (August 26).

1977:
- Abbott Labs receives approval for Hydron burn bandage (January 24).
- Anheuser-Busch introduces Natural Light beer (May 19).
- Caterpillar introduces the D10 crawler-tractor (September 14).
- Goodyear Tire & Rubber introduces the All-Season Radial (September 13).
- Kimberly-Clark introduces Kleenex Huggies and Kleenex Super Dry disposable diapers (December 12).

1978:
- Boeing introduces the 767 and 777 aircraft (April 24).
- Coca-Cola test markets Mellow Yellow (May 12).
- Singer introduces the Touchtronic 2001 at $1,000 (October 13).
- Time, Inc. revives *Life* magazine (April 25).

1979:
- Beech Aircraft Corp. introduces the Superking Air F90 corporate propjet (May 23).
- Campbell Soup (Swanson) introduces a 3-minute microwave breakfast line (September 13).
- Dow Jones will distribute *Asian WSJ Weekly* in the U.S. (January 29).
- Lorillard Corp. will test market Aspen low-tar cigarette (June 28).

1980:
- American Can introduces Bolt paper towels (September 25).
- Control Data introduces a supercomputer, the Cyber 205 (June 3).
- Medtronic will introduce Spectrax, a programmable pacemaker (March 12).

1981:

Xerox Corp. introduces the Memorywriter electronic typewriter (January 18).

U.S. Shoe Corp. will market line of Liz Claiborne shoes (November 23).

United Technologies (Otis Elevator) introduces the Electronic 101 elevator (March 31).

1982:

Anheuser-Busch introduces Bud Light beer (March 1).

Campbell Soup Co. introduces Prego spaghetti sauce (December 2).

National Semiconductor Corp. unveils the NS16000 microprocessor (May 20).

Philip Morris (7-Up) enters caffeine-free cola market with Like (March 23).

1983:

Apple Computer introduces the Apple IIe and the Lisa (January 20).

Coca-Cola introduces caffeine-free versions of Tab, Diet Coke, and Coke (April 29).

IBM introduces the PC-XT (March 9).

1984:

AT&T introduces the PC7300 computer (November 9).

Apple Computer introduces the Macintosh computer (January 25).

Cooper Labs. introduces the Model 8800 medical laser system (June 19).

Procter & Gamble introduces Duncan Hines chocolate chip cookies (May 11).

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