How Does Strategic Competition Affect Firm Values? A Study of New Product Announcements

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We examine the role of strategic interaction in explaining the valuation effect of new product announcements and employ Sundaram, John, and John's (1996) competitive strategy measure to operationalize the nature of a firm's competitive interaction. Using a sample of new product introductions between 1991 and 1995, we find that the market values introductions announced by firms in strategic substitutes competition more favorably than those announced by firms in strategic complements competition. These results hold after we control for other variables that could explain the announcement effect. We also find that industry rivals of those announcing firms that compete in strategic substitutes and experience a positive announcement effect generally suffer a small, but significant wealth loss. The evidence supports the notion that the nature of competitive interaction in an industry is important in assessing the effect of corporate product strategies on shareholder value.

Previous studies show that announcements of new product strategies are generally associated with a positive effect on shareholder value (Woolridge, 1988; Chaney, Devinney, and Winer, 1991; Kelm, Narayanan, and Pinches, 1995; and Chen and Ho, 1997). Chaney et al. (1991) find that the value of a new product announcement is higher for firms in more technologically based industries and for firms that make original- or multiple-product announcements. They find that the value is lower for firms that make frequent product announcements. Chaney et al. (1991) also find that higher short-term interest rates have a negative impact on the value of new product introductions. Kelm et al. (1995) find that the announcement-period returns are negatively related to firm size and industry-wide R&D intensity and positively related to announcement frequency and industry concentration. Chen and Ho (1997) find that new product strategies by firms with good investment opportunities are generally regarded as worthwhile, and those by firms with poor investment opportunities are not. They find that free cash flow has no explanatory power.

Although these empirical studies on the wealth effect of new product strategies are insightful, they do not consider the impact of competitive interaction in an industry. Bulow, Geanakoplos, and Klemperer (1985), Sundaram, John, and John (1996), and other studies suggest that in situations of imperfect product markets, incomplete contracting, or incomplete information, strategic interaction can affect the outcomes of financial and investment choices. Sundaram et al. (1996) provide the first empirical evidence that the nature of competitive interaction in an industry has a significant impact on individual firms' share-price response to the announcement of R&D spending.¹ In this paper, we examine whether strategic interaction can also explain the wealth effects of new product announcements.

New product introductions can create opportunities for differentiation and competitive

¹The importance of strategic competition is also demonstrated in other areas. For example, Aggarwal and Samwick (1999) find that strategic interactions among firms can explain firms' executive compensation schemes.

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advantage, which can have a positive impact on the announcing firms' earnings and shareholder values. However, the actual impact depends on how the rival firms respond. If the rivals accommodate the announcers by staying put, then the expected impact on the announcers' profits and firm values will be positive and that on the rivals' will be negative. Bulow et al. (1985) describe this situation as competition in strategic substitutes.

On the other hand, if the rivals' respond to the announcers' product launches by adopting a matching strategy, then the impact on the announcers' profits would be ambiguous. Although the product innovators can enjoy a temporary competitive advantage, they also incur costs in developing and introducing the new products that imitators do not bear (Mansfield, Schwartz, and Wagner, 1981). By imitating the innovators' actions, the rivals might reduce the competitive advantage enjoyed by the innovators and, thus, share in the profits (D'Aveni, 1994). Under this scenario (referred to as competition in strategic complements), the announcers' wealth changes, resulting from the new product announcements, would be ambiguous and could even be negative.

In this study, we use Sundaram et al.'s (1996) competitive strategy measure (*CSM*) to operationalize the nature of a firm's competitive interaction. The *CSM* estimates the responsiveness of a firm's marginal profits to changes in its competitors' revenues. The measure is negative when the competition is in strategic substitutes and positive when the competition is in strategic complements. We use this measure to study the role of strategic interaction in determining the effect of new product announcements on shareholder values.

Although we pursue the same goal as Sundaram et al. (1996), that of examining the effects of competitive interaction on corporate investment decisions, this paper differs from theirs in several respects. First, Sundaram et al. (1996) examine the role of *CSM* in explaining the announcement effects of R&D spending. Their sample consists of firms that voluntarily announced plans to increase, decrease, or leave unchanged from their previous fiscal year their company-sponsored R&D expenditures for the forthcoming fiscal year. Kelm et al. (1995) highlight the importance of examining the valuation effects of specific projects. They also argue that investors employ different criteria in valuing the announcements made during the innovation stage of an R&D project and the commercialization stage, at which new products are launched. However, although Kelm et al. (1995) show that the determinants of the wealth effects of new product announcements can differ from those of R&D spending, they do not take into account the impact of competitive interaction in an industry. In this paper, we fill the gap by examining the role of *CSM* in explaining the wealth effects of specific product announcements, instead of announcements of general increase or decrease in R&D spending. We provide further evidence on the impact of strategic interaction on the outcomes of corporate investment decisions.²

Second, Sundaram et al.'s (1996) sample comprises 125 R&D announcements by 65 firms, which are mainly in R&D-intensive industries. The sample comprises 384 new product announcements by 101 firms in 39 industries. Thus, the sample size is much larger, and we cover a broader set of industries. Further, only 21 of the 125 announcements in Sundaram et al.'s (1996) sample are "pure" R&D announcements; the rest are made simultaneously with announcements related to earnings and/or capital expenditures. Sundaram et al. (1996) must control for these confounding effects in their analysis. We use only "non-confounded" news items on new product introductions.

In this paper, we examine a more comprehensive set of control variables than has been used in previous studies. In particular, we control for the potential impact of the announcing

²Woolridge (1988) suggests that R&D expenditures and specific new product introductions are equally important corporate strategic investment decisions.

firm's stock of patents, which has not been examined in previous studies on new product introductions. Patents might matter in the announcement effects of new product introductions, especially when considering how competitors react. We expect that new products backed by patents should be more valuable to the announcing firms, since competitors would be less able to come up with a matching response. Recent papers (e.g., Deng, Lev, and Narin, 1999; and Hall, 1999) also show that patent measures can have a significant impact on firm value. The sample period from 1991 to 1995, which is more recent than those in previous studies,³ coincides with a period of high patenting activity in the US (Hall, Jaffe, and Trajtenberg, 2001b). Thus, it is important that we control for the patent variable.

The results show that, although the average announcement-period return associated with new product introductions is positive, only those firms that compete in strategic substitutes show a significantly positive announcement effect. The valuation effect for those firms that compete in strategic complements is not significantly different from zero. The regression results show that the announcement effect of a new product introduction is significantly negatively related to the *CSM*. This finding holds even after we control for other variables that could affect the announcement-period return. We also find that industry rivals of those announcing firms that compete in strategic substitutes and experience a positive announcement effect generally suffer a small, but significant wealth loss. The overall results in this study suggest that the nature of competitive interaction in an industry is an important consideration in assessing the effect of corporate product strategies on firm values.

The remainder of the paper is organized as follows. Section I reviews the literature on the determinants of the wealth effect of new product introductions. Section II describes the sample and presents summary statistics. Section III examines the relation between stock price response and the *CSM* for the announcing firms; section IV examines this relation for the rivals. Section V concludes.

I. The Determinants of the Wealth Effect of New Product Introductions

In this section, we provide a review of the literature on the determinants of the wealth effect of new product introductions.

A. Strategic Competition

A new product announcement conveys new information about the announcing firm's outlook, and this information shapes investors' perception on its market value. When a firm announces new products, it signals to the market that it creates more opportunities for differentiation and competitive advantage, and, hence, increases its long-term stream of earnings and market share (Chaney et al., 1991; Kleinschmidt and Cooper, 1991; and others). Such benefits in profits and market share should have a positive impact on the announcing firm's share price.

As suggested by Bulow et al. (1985), Sundaram et al. (1996), and others, the actual impact on the firm that introduces the new product depends on how its rival firms respond to the introduction. If the rivals accommodate the announcer by staying put, then the announcer's profits and market share will increase and those of its rivals will suffer a reduction. Bulow et al. (1985) describe this situation as competition in strategic substitutes (SS). Under this scenario, the share-price effect associated with a new product introduction will be positive

³For example, Kelm et al.'s (1995) sample period is from 1977 to 1989.

for the announcer and negative for the rivals.

But perhaps the rivals respond to the announcer's strategy by imitating the new product introduction. In this situation, the profit and market share effects on the product introducer could be ambiguous. Although the product innovator can enjoy a temporary competitive advantage, the firm will also incur costs of developing and introducing the new product that imitators do not bear (Mansfield et al., 1981). The product innovator can also face greater risk and market uncertainty and suffer pricing mistakes (Baldwin and Childs, 1969). D'Aveni (1994) argues that, by imitating the innovator's action, the firm's rivals can enjoy the free-rider effects by sharing in the profits, or reduce the competitive advantage granted to the innovator, or both. If this happens, then the profit and share-price effects on the product innovator could be ambiguous and might even be negative. Bulow et al. (1985) describe this situation as competition in strategic complements (SC).

Sundaram et al. (1996) argue that whether or not competition occurs in SS or SC depends on the effects of a firm's moves, not on its competitor's average profits, but its marginal profits. For example, assume that two duopolistic firms, A and B, are in an initial equilibrium prior to the announcement (i.e., both firms have already set marginal revenues equal to marginal costs.) If firm A changes its strategy, it affects its own and firm B's marginal profits. To reach a new equilibrium, both firms would re-optimize based on what happens to their marginal profits. If firm B re-optimizes by competing in SS, then its marginal profits must be decreasing. On the other hand, if firm B re-optimizes by competing in SC, then its marginal profits must be increasing. Thus, the profit (and hence the stock price) outcome depends on the sign of the second (cross-partial) derivative of firm A's profits with respect to its own and firm B's strategic variable.

Sundaram et al. (1996) provide the first empirical test on this idea by constructing a proxy for the second (cross-partial) derivative in the context of R&D competition. They use net income as a measure of "profit" and revenues as a measure of "quantity", to derive a measure called competitive strategy measure (*CSM*). If *CSM* is less than zero, then competition is in SS. If *CSM* is greater than zero, then competition is in SC. Sundaram et al. (1996) find that the market responds positively to increased R&D spending in situations in which competition is in SS (i.e., $CSM < 0$), but the reaction is zero-to-negative when competition is in SC (i.e., $CSM > 0$).

In this study, we examine whether the *CSM* has similar explanatory power in explaining the announcement effects of new product introductions.

B. Investment Opportunities

The availability or lack of investment opportunities can be an important consideration in assessing the value of corporate strategic investments (Lang, Stulz, and Walkling, 1989 and 1991; Szewczyk, Tsetsekos, and Zantout, 1996; and others). Chen and Ho (1997) find support for the investment opportunities hypothesis that new product introductions by firms with good investment opportunities are generally regarded as worthwhile, but those by firms with poor investment opportunities are not. Specifically, Chen and Ho (1997) find a significantly positive relation between a firm's Tobin's q , a proxy for the firm's investment opportunities, and its share-price response to a new product announcement.

C. Free Cash Flow

The availability or lack of free cash flow can also be an important consideration in

determining the value-enhancing potential of new product investments. Jensen (1986) argues that managers endowed with free cash flow will invest wastefully, rather than pay it out to shareholders. Chen and Ho (1997) suggest that new product investments might be one such use of this free cash flow. Therefore, the potential agency costs of new product investments can be higher for firms with high free cash flow. On the other hand, new product investments by low-free-cash-low firms increase the chance that the firm will seek new external financing. New external financing provides monitoring, and the firm's willingness to undergo such monitoring can be a favorable signal (Szewczyk et al., 1996). Therefore, the free cash flow theory predicts that the market response to a new product announcement will be inversely related to the firm's level of free cash flow. However, the pecking order theory would seem to suggest the opposite relation. Thus, considering the two theories together, the relation between the firm's level of free cash flow and the product announcement abnormal return would be ambiguous.

D. Debt Ratio

Jensen (1986) suggests that researchers can consider a firm's debt ratio as an alternative measure of free cash flow. Firms with more free cash flow choose higher levels of debt in their capital structure as a credible pre-commitment to pay out the excess cash flow, thus lowering the expected costs of free cash flow. Jensen's theory suggests a positive relation between the market response to corporate announcements of investment decisions and the announcing firm's debt ratio. Szewczyk et al. (1996) and Chen and Ho (1997) find evidence that supports this prediction for corporate R&D expenditures and capital expenditures, respectively. In contrast, Chen and Ho (1997) do not find a significant relation between abnormal return and debt ratio for their sample of product strategies.

E. Firm Size

Small firms need product innovation to survive in the market, but large firms introduce new products only to stay on top of the market (Porter, 1980; and Chaney et al., 1991). Thus, new products should be more highly valued for small firms than for large firms. In addition, large firms' new product introductions might have less unanticipated information than those of small firms as information production and dissemination is a positive function of firm size (Atiase, 1985; Chaney et al., 1991; Kelm et al., 1995; and others). Therefore, firm size should be inversely related to the market valuation of new product introductions. Kelm et al. (1995) report supporting evidence but Chaney et al. (1991) find mixed support.

F. Technological Opportunities

Chaney et al. (1991) argue that firms in more technologically based industries have greater technology opportunities and require new product innovations to stay alive. They hypothesize that the value of an innovation should be higher for firms in more technologically based industries. They find some evidence that supports this hypothesis. In contrast, Kelm et al. (1995) argue that investors typically expect new product announcements by firms in R&D-intensive industries and by firms with high R&D intensity relative to their industry rivals. Thus, the intensity of the market reaction to announcements by these firms will be smaller. Their results show that investors respond positively to new product announcements

by firms in less-technology-intensive industries. However, they find that the firm's R&D intensity is not a significant factor.

G. Patent

A patent is a temporary legal monopoly granted to inventors for the commercial use of an invention. The potential impact of patents on firm value has received much attention in recent years. Hall (1999) surveys the empirical literature that relates firm value to R&D and patent measures. She concludes that the market value of a firm is related to its knowledge assets, and that patent measures contain information about this value above and beyond that conveyed by R&D measures.

Previous studies on the market response to new product introductions have not examined the potential impact of the announcing firm's patents. Patents might be important in explaining the announcement effects, especially when we consider how competitors react. We would expect that new products backed by patents should be more valuable to the product announcing firm, since competitors would be less able to come up with a matching (i.e., strategic complements) response. However, Silverman (1999) highlights that patent data have limitations of their own. Much of a firm's technical knowledge may remain unpatented either because it is unpatentable or because a firm may choose to keep their knowledge private by not patenting an innovation. There is also variation in the economic value embodied in individual patents. Further, patents might not reflect all the protected property rights incorporated in a new product because certain companies, such as software companies, also rely on copyrights and trademarks to protect their property rights.

H. Single- or Multiple-Product Announcements

Chaney et al. (1991) report that firms introducing multiple products experience more wealth gains than those announcing a single product. Other things being equal, firms introducing more products are likely to have more R&D expenditures, patented inventions and skilled labor (Acs and Audretsch, 1988). They are also likely to be more competitive in the product market and seize more market share especially when the total market is growing very slowly (Hendricks and Singhal, 1997). Thus, multiple-product announcers can appropriate much of the benefits associated with the new products.

I. Announcement Frequency

Chaney et al. (1991) argue that factors that expand the information set available to investors about the product or firm should be negatively related to the size of the market impact seen at the time of product announcement. If a firm has a history of making frequent product announcements, then the information value of a new product announcement is likely to be low. The empirical evidence is mixed. Although Chaney et al. (1991) show that the frequency of new product announcements is negatively related to the announcement-period return, Kelm et al. (1995) find the opposite result.

J. Interest Rates

Since the cost of capital depends on the level of interest rates, firms are expected to reduce their level of investment as expected interest rates rise. Furthermore, rising interest rates can

imply a decline in product demand, thereby leading to a reduced cash stream of earnings from the product innovation. Chaney et al. (1991) find that higher risk-free rate of interest has a negative impact on the market reaction to new product introductions.

To summarize, the specification of the complete relation that we test in this study is as follows:

Announcement-period Abnormal Return

$$= \beta_0 + \beta_1 CSM$$

$$+ \beta_2 \text{Tobin's } q + \beta_3 \text{Free Cash Flow} + \beta_4 \text{Debt Ratio} + \beta_5 \text{Firm Size}$$

$$+ \beta_6 \text{R\&D Intensity} + \beta_7 \text{High-Technology Industry} + \beta_8 \text{Patent}$$

$$+ \beta_9 \text{Multiple-Product Announcement} + \beta_{10} \text{Announcement Frequency}$$

$$+ \beta_{11} \text{Interest Rate} + \text{error term}$$

II. Sample and Descriptive Statistics

In this section, we first describe the sample design. Then, we describe how we measure abnormal stock return and operationalize a firm's competitive strategy. The control variables and sample characteristics are then described in detail.

A. Sample Design

We collect a sample of initial announcements of new product introductions by firms listed on either the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX) from *Dow Jones News Retrieval Service (DJNRS)* database over the period from January 1991 to December 1995. The *DJNRS* database provides news-service articles and selected stories from *The Wall Street Journal*, *Dow Jones News Wire*, and *Barron's*. We select the words and phrases and their synonyms, commonly used to describe new product introductions as keys for a database search routine. Examples are "introduce," "new product," "unveil," "launch," "received approval," "to market," "test market," "begin selling," along with other pertinent words and phrases. We include both new products and product updates as in Chaney et al. (1991). Also, we identify the information on the firms and the products, as well as other information (such as marketing information) from the news contents.

To be included in the final sample, the new product announcements have to meet the following criteria: 1) to avoid any confounding events that could distort the measurement of the valuation effects, the announcing firms should not have other announcements five days before and after the initial announcement date; 2) daily stock return information must be available from CRSP (Center for Research in Security Prices); and 3) companies' financial information must be available from the Compustat files. The final sample comprises 384 announcements by 101 companies.

B. Measuring Abnormal Stock Returns

Standard event-study methods are employed to examine stock price responses to announcements of new product introductions. Day 0 is defined as the initial announcement date. The abnormal return is calculated as the difference between the actual return and an expected return generated by the market model. We use the value weighted CRSP index as a proxy for market returns and estimate the parameters of the market model using the data over a period from 200 to 60 days before the announcement date. The significance tests are conducted using the *t*-statistic as well as the Wilcoxon *z*-statistic.⁴ We use the two-day (-1,0) announcement-period

⁴We also perform significance tests using the *z*-statistic as described in Dodd and Warner (1983) and obtain similar results.

abnormal return as the dependent variable in the cross-sectional analysis.

C. Operationalizing a Firm's Competitive Strategy

We follow Sundaram et al. (1996) to operationalize the nature of a firm's competitive interaction by constructing an empirical competitive strategy measure (*CSM*). We need three elements to calculate the *CSM*: 1) the announcing firm's net income, 2) the announcing firm's net sales, and 3) its rivals' net sales, where the net income is a proxy for profit and net sales a proxy for output. The set of rivals are defined as all the firms with the same four-digit primary Standard Industrial Classification (SIC) code in Compustat except the announcing firm (as in Sundaram et al., 1996, and others). We obtain seven years (i.e., 28 quarters) of data on quarterly net income and quarterly net sales, up to and including the quarter prior to the announcement quarter, from Compustat. We measure announcing firm's marginal profit by the ratio of change in its net income (Dp^A) to change in its own net sales (DS^A). The *CSM* is the correlation coefficient between Dp^A/DS^A and the change in the rivals' net sales (DS^R) over the period of 28 quarters prior to the announcement quarter. If the *CSM* is negative, the competition is in strategic substitutes. If the *CSM* is positive, the competition is in strategic complements. If the *CSM* is equal to zero, the competition is in neither strategic substitutes nor strategic complements.⁵

D. Control Variables

Data are obtained on the firm and industry characteristics from the Compustat files. We estimate investment opportunities (Q) by a simple measure of Tobin's q : the ratio of the market to book value of the firm's assets, where the market value of assets equals the book value of assets minus the book value of common equity plus the market value of common equity. This measure is widely used in previous studies, such as Denis (1994), Perfect and Wiles (1994), Barclay and Smith (1995a and 1995b), Chen and Ho (1997), and Holderness, Kroszner, and Sheehan (1999).⁶ The q variable is the average q ratio for the three fiscal years prior to the announcement, which is similar to that used in Lang et al. (1989 and 1991), Szweczyk et al. (1996), and Chen and Ho (1997). A three-year average gives a better estimate of a firm's true q (Lang et al., 1989). We regard high- q firms as firms with good investment opportunities and low- q firms as firms with poor investment opportunities.

Free cash flow (*FCF*) is defined as operating income before depreciation minus interest expense, taxes, preferred dividends, and common dividends, divided by book value of total assets, for the fiscal year prior to the announcement (as in Lehn and Poulsen, 1989; Lang et al., 1991; and others). Debt ratio (*DEBT RATIO*) is the book value of total debt divided by the book value of total equity for the fiscal year prior to the announcement.⁷ The firm size variable (*SIZE*) is the logarithm of book value of total assets for the fiscal year prior to the announcement.⁸

A firm's R&D intensity (*RDI*) is defined as the intensity of the firm's R&D effort (R&D per

⁵The *CSM* should be a measure of how an announcing firm's rivals behave. However, as noted by Sundaram et al. (1996), due to data difficulties in identifying competitor profits, the actually implemented *CSM* is a measure of how the announcing firm itself behaves. Sundaram et al. (1996) argue that firms' strategies to compete can reasonably be assumed to be symmetric.

⁶Other studies, such as Lang et al. (1989 and 1991), use the theoretical Tobin's q (defined as the ratio of the market value of a firm to the replacement costs of its assets) as a proxy for investment opportunities. Because of data availability, we use this simple measure of q . Chung and Pruitt (1994) show that at least 96.6% of the variability of Tobin's q is explained by this simple measure of q .

⁷We obtain similar results when we measure debt ratio as the book value of total debt to the book value of total assets.

⁸The results are similar when we use market capitalization to measure firm size.

dollar of net sales) divided by its industry's for the fiscal year prior to the announcement (as in Kelm et al. 1995). We use a dummy variable (*HILO*), which equals one if the announcing firm is in a high-technology industry and zero otherwise, as a proxy for technology opportunities at the industry level (as in Chan, Martin, and Kensinger, 1990). We can classify 281 announcements as those made by firms in high-technology industries.

We measure a firm's stock of patents (*PATENT*) by the depreciated patent stock of the firm in the year of announcement.⁹ Following Hall, Jaffe, and Trajtenberg (2000), we use a declining balance formula and a depreciation rate of 15% as follows: $PS_t = 0.85PS_{t-1} + P_t$, where PS_t is the patent stock in year t , and P_t is the number of patent applications in year t that are ultimately granted. We do not have patent information for individual products because new product announcements do not normally mention the patents embodied in the products. We use the announcing firm's patent count as our measure because it has been widely used as a proxy for a firm's technological assets (Deng et al., 1999; Hall, 1999; McGahan and Silverman, 2001; and others).

The patent data are obtained from the recently available NBER patents citations data file (Hall, Jaffe, and Trajtenberg, 2001a).¹⁰ The NBER patents data are for the years from 1967 to 1996. Hall et al. (2000) discuss the potential truncation bias in the patent measures using the NBER patents data file because of the time lag between the application date and the grant date, which is typically about 2 years. Thus, the number of patent applications in the last few years of the NBER data file could be understated because of missing observations consisting of patents that may have been applied for but not yet been granted. Since the sample period extends from 1991 to 1995, the patent stocks of firms that made new product announcements in the later years in the sample period could be understated.¹¹

We create a dummy variable, *MULTIPLE*, which equals one for multiple-product announcements and zero for single-product announcements (as in Chaney et al. 1991). There are 121 multiple-product announcements in the sample. We determine the announcement frequency (*FREQ*) by the number of new product announcements made by an announcing firm within 12 months prior to the announcement date.¹² The interest rate variable (*INTEREST*) is the average of 90-day Treasury bill rates for the announcement year (as in Chaney et al. 1991). These data are obtained from the US Department of Commerce.¹³

⁹The results are unchanged when we use the firm's depreciated patent stock in the year prior to the announcement. Also, we use a dummy variable that equals one if *PATENT* is greater than the sample median, and zero otherwise. The results are similar.

¹⁰The authors are grateful to Bronwyn H. Hall for generously sharing her clean data set with us.

¹¹Hall et al. (2000) also discuss the truncation problem in their citation-adjusted patent measures because of the long citation lag between patent applications and subsequent patent citations. This problem is more acute in the sample because the sample period falls in the last few years of the NBER patents data file. Because of this problem, we do not use citation-adjusted patent stock as our variable.

¹²The results are similar when we measure announcement frequency by the number of new product announcements over the 5-year sample period of the study, which is similar to the measure used by Chaney et al. (1991) and Kelm et al. (1995).

¹³We also examine the significance of several other control variables used in previous studies: year dummies, the announcing firm's systematic risk (beta), product newness, entry timing, industry concentration, and industry R&D intensity. We estimate beta using daily stock returns and the CRSP value-weighted market returns for days -200 to -60. Product newness is one if the product is a high-newness product, and zero if it is an update (as in Chaney et al., 1991). Entry timing equals one if the announcing firm is the first mover, and zero otherwise (as in Lee, 1995). Industry concentration is measured by the Herfindahl index, which is the sum of the squared fraction of industry sales by all firms in the 4-digit SIC industry for the fiscal year prior to the announcement (as in Hendricks and Singhal, 1997). Industry R&D intensity is defined as the R&D expenditures by all firms in the 4-digit SIC industry divided by industry net sales (as in Kelm et al., 1995). We find that these additional control variables have no significant explanatory power and that the conclusions in this study remain unchanged. These results are available upon request.

E. Sample Characteristics

Table I presents sample distributions by year, summary statistics, and announcement-period abnormal returns. Panel A shows that the sample is roughly evenly distributed across years except for 1995, which accounts for 31% of the sample. Panel B presents summary statistics for the *CSM* and several control variables used in this study. The mean (median) *CSM* in the sample of new product introductions is 0.04 (0.06), indicating that the average sample firm competes in strategic complements.¹⁴ In contrast, the average (median) *CSM* of -0.02 (-0.02) in Sundaram et al.'s (1996) sample of R&D spending implies that their average sample firm competes on the basis of strategic substitutes. There is also considerable cross-sectional variation in the *CSM* in the sample. The standard deviation is 0.18 and the range is 0.75 (from -0.28 to 0.47). Panel C shows that for the overall sample, the two day (-1, 0) average and median cumulative abnormal returns for the firms announcing new product introductions are, respectively, 0.59% and 0.28%, both significant at the 1% level. Thus, shareholders of the sample firms on average experience significant wealth gains from new product investments similar to those found by Woolridge (1988), Chaney et al. (1991), Kelm et al. (1995), and Chen and Ho (1997).

We also investigate the average *CSM* for each industry in the sample as shown in Table II. The industry average *CSM* ranges from -0.28 (computer peripherals) to +0.47 (plastic materials and synthetics). However, as noted by Sundaram et al. (1996), interpretation of this industry classification is limited because many of the industries have small sample sizes.

III. Stock Price Response for the Announcing Firms and the *CSM*

In this section, we investigate stock price response for the announcing firms and the *CSM*. First, we analyze subgroups based on *CSM*. Then, the cross-sectional regression analyses are studied in detail.

A. Analysis of Subgroups Based on the *CSM*

In Table III, the sample is divided into three subgroups based on the *CSM*: 1) firms competing in strategic substitutes (SS), 2) firms competing in strategic complements (SC), and 3) firms competing on the basis of neither strategic substitutes nor complements. In Panel A, Sundaram et al.'s (1996) classification method is followed by defining the SS group as the sample firms with *CSM* values less than -0.05, the SC group as those with *CSM* values greater than 0.05, and the neither-SS-nor-SC group as those with *CSM* values falling within ± 0.05 . The results in Panel A show that the SS group experiences a significantly positive mean announcement effect (0.87%). The mean announcement effect of the SC group is positive (0.23%) but insignificant. The mean difference in abnormal returns between the SS and the SC groups is 0.64% and is significant at the 5% level using a one-tailed test. This result is robust to possible deviations from nonnormality, since it also holds for the nonparametric Kruskal-Wallis test statistic. Note that the distinction between the SS and the SC groups is obscured by the neither-SS-nor-SC group, which experiences a significantly positive announcement effect.

To test the robustness of the results, we also use ± 0.04 and ± 0.03 as the cut-off *CSM* values to define the three subgroups.¹⁵ We report the results in Table III, Panels B and C, respectively. The results in Panel B are similar to those in Panel A. In Panel C, the results are

¹⁴227 firms in the sample have *CSM* > 0 and 157 firms have *CSM* < 0.

¹⁵We have also used ± 0.02 , ± 0.01 , and 0.00 as the cut-off *CSM* values in the sensitivity analysis. The conclusions in the study remain unchanged.

Table I. Sample Distribution, Summary Statistics, and Announcement-Period Abnormal Returns

This table presents sample distribution by year, summary characteristics for the competitive strategy measure (*CSM*), and for the several control variables used in this study, and the announcement-period abnormal returns. Our sample comprises 384 new product announcements made between 1991 and 1995 by 101 firms listed on either the NYSE or AMEX. This sample is collected from the *Dow Jones News Retrieval Service (DJNRS)* database. In Panel B, *CSM* is defined as the coefficient of correlation between: a) ratio of change in firm's quarterly net income to change of firm's quarterly net sales and b) change in the rest-of-industry's quarterly net sales, over the period of 28 quarters prior to announcement quarter. Tobin's *q* is the average ratio of the market value of assets to the book value of the firm's assets for the three fiscal years before the announcement, where the market value of assets equals the book value of assets minus the book value of common equity plus the market value of common equity. Free cash flow is defined as operating income before depreciation minus interest expense, taxes, preferred dividends, and common dividends, divided by book value of total assets, for the fiscal year prior to the announcement. Debt ratio is the book value of total debt divided by the book value of total equity for the fiscal year prior to the announcement. Firm size is the book value of total assets for the fiscal year prior to the announcement. R&D intensity is the intensity of the firm's R&D effort (R&D per dollar of net sales) divided by its industry's for the fiscal year prior to the announcement. Patent stock is the stock of patents of the announcing firm in the year of the announcement. Announcement frequency is the number of new product announcements made by an announcing firm within 12 months prior to the announcement date. We measure interest rate by the average of 90-day Treasury bill rates for the announcement year. In Panel C, two-day (-1, 0) announcement-period abnormal returns are estimated for the firms that announce new product introductions, using the standard market model procedure with parameters estimated for the period 200 days to 60 days before the announcement. Data are obtained from the *DJNRS* database, the CRSP and Compustat files, and the US Department of Commerce.

Panel A. Sample Distribution by Year

Year	No. of Announcements	% of Sample
1991	67	17.5
1992	49	12.8
1993	78	20.3
1994	72	18.8
1995	118	30.6
Total	384	100.0

Panel B. Summary Statistics

Variables	Mean	Median	Standard Deviation
Competitive Strategy Measure	0.04	0.06	0.18
Tobin's <i>q</i>	1.76	1.44	0.94
Free Cash Flow	0.08	0.09	0.05
Debt Ratio	0.91	0.62	1.49
Firm Size (\$ millions)	8,341	10,509	5,928
R&D Intensity	1.02	0.93	0.54
Patent Stock	1,142	372	1,598
Announcement Frequency	1.93	1.00	2.42
Interest Rate	0.05	0.04	0.01

Panel C. Two-Day Announcement-Period Abnormal Returns of Announcers

Mean	0.59%
<i>t</i> -statistic	2.57***
Median	0.28%
<i>p</i> -value for the Wilcoxon <i>z</i> -statistic	0.002

***Significant at the 0.01 level, using a two-tailed test.

Table II. Average Industry Competitive Strategic Measure

This table presents the average industry competitive strategic measure (*CSM*) for 384 new product announcements made by 101 different firms from 39 industries during the 1991 to 1995 period. Each industry group is defined as all the firms with the same four-digit primary SIC code in Compustat. *CSM* is measured by the coefficient of correlation between: a) ratio of change in firm's quarterly net income to change of firm's quarterly net sales and b) change in the rest-of-industry's quarterly net sales, over the period of 28 quarters prior to announcement quarter. A negative correlation indicates strategic substitutes, and a positive correlation indicates strategic complements.

Industry	No. of Announcements	% of Sample	Average CSM
Food and Kindred Products (2000)	4	1.04	0.03
Grain Mills Products (2040)	4	1.04	-0.19
Sugar and Confectionery Products (2060)	4	1.04	-0.08
Beverages (2080)	16	4.17	0.08
Paper Mills (2621)	4	1.04	0.09
Misc. Converted Paper Products (2670)	6	1.56	0.09
Newspaper (2711)	14	3.65	0.19
Chemicals and Allied Products (2800)	3	0.78	-0.04
Plastics Materials and Synthetics (2820)	2	0.52	0.47
Plastics Materials and Resins (2821)	2	0.52	-0.13
Pharmaceuticals Preparations (2834)	54	14.06	0.02
Diagnostics Substances (2835)	2	0.52	0.26
Toilet Preparations (2844)	1	0.26	0.13
Petroleum Refining (2911)	6	1.56	-0.08
Misc. Nonmetallic Mineral Products (3290)	3	0.78	-0.17
Cutlery, Handtools and Hardware (3420)	5	1.30	0.15
Computer and Office Equipment (3570)	74	19.27	0.11
Electronic Computer (3571)	29	7.55	0.00
Computer Storage Devices (3572)	2	0.52	0.13
Computer Peripherals (3577)	2	0.52	-0.28
Calculating/Accounting Equipment (3578)	1	0.26	-0.15
Office Machines (3579)	2	0.52	-0.02
Electronic/Other Elect. Equipment (3600)	20	5.21	-0.03
Household Audio/Video Equipment (3651)	16	4.17	0.09
Telephone and Telegraph Apparatus (3661)	5	1.30	-0.09
Radio/TV Communication Equip. (3663)	14	3.65	0.11
Semiconductors (3674)	7	1.83	-0.12
Motor Vehicles and Car Bodies (3711)	19	4.95	0.03
Motor Vehicles Parts (3714)	1	0.26	0.07
Aircraft (3721)	1	0.26	-0.06
Guided Missiles (3760)	1	0.26	-0.17
Instruments and Related Products (3825)	1	0.26	-0.18
Surgical and Medical Instruments (3841)	2	0.52	-0.11
Electromedical Equipment (3845)	7	1.83	-0.05
Ophthalmic Goods (3851)	3	0.78	0.06
Photographic Equipment/Supplies (3861)	21	5.47	0.14
Telephone Communication not Radio (4813)	23	5.99	-0.06
Hotels and Motels (7011)	2	0.52	0.01
Motion Pictures and Video Production (7819)	1	0.26	0.28
Total	384	100.00	0.04

Table III. Average Announcement-Period Abnormal Returns of Announcers Stratified by the Competitive Strategy Measure

This table presents the two-day (-1, 0) average announcement-period abnormal returns for the firms that announce new product introductions, classified by the competitive strategy measure (*CSM*). We estimate the announcement-period abnormal returns using the standard market model procedure with parameters estimated for the period 200 days to 60 days before the announcement. *CSM* is measured by the coefficient of correlation between: a) ratio of change in firm's quarterly net income to change of firm's quarterly net sales and b) change in the rest-of-industry's quarterly net sales, over the period of 28 quarters prior to announcement quarter. In Panel A, strategic substitutes (SS) firms are defined as those with $CSM < -0.05$, strategic complements (SC) firms as those with $CSM > +0.05$, and firms that are neither SS nor SC as those with $-0.05 \leq CSM \leq +0.05$. In Panels B and C, ± 0.04 and ± 0.03 are used as cut-off values, respectively. For each cell, we report the mean abnormal return and, in parentheses, the *t*-statistic and the number of observations. For comparison of means, we report the mean difference and, in parentheses, the *t*-statistic assuming unequal variances and the *p*-value for the nonparametric Kruskal-Wallis statistic. The results are similar with the assumption of equal variances.

Strategic Substitutes (SS)	Neither SS Nor SC	Strategic Complements (SC)	Mean Difference (SS - SC)
<i>Panel A. Cut-Off Values = ± 0.05</i>			
0.87% (3.03***, 127)	1.12% (2.43***, 56)	0.23% (1.23, 201)	0.64% (1.84**, 0.05)
<i>Panel B. Cut-Off Values = ± 0.04</i>			
0.96% (3.14***, 133)	0.62% (1.66**, 45)	0.25% (1.42, 206)	0.71% (1.97**, 0.04)
<i>Panel C. Cut-Off Values = ± 0.03</i>			
0.95% (3.20***, 137)	0.46% (1.15, 38)	0.29% (1.60, 209)	0.66% (1.92**, 0.05)
***Significant at the 0.01 level, using a one-tailed test.			
**Significant at the 0.05 level, using a one-tailed test.			

also similar to those in Panels A and B, except that the announcement effect for the neither-SS-nor-SC group becomes insignificant.

In summary, the results in Table III generally support the theoretical predictions for the role of strategic competition in explaining the wealth effect of new product announcements. The announcement effect on the share prices for the announcing firms competing in strategic substitutes is significantly positive, but for those competing in strategic complements, the announcement-period return is not significant. Further, the announcement effect is significantly more favorable for the announcing firms competing in strategic substitutes than for those competing in strategic complements.

B. Cross-Sectional Regression Analyses

Table IV presents cross-sectional regression analyses of the announcement-period abnormal returns for the sample against the *CSM* and control variables. Model 1 includes the *CSM* as the only explanatory variable. Model 2 includes only the control variables, but excluding *PATENT*. Model 3 includes all the control variables. Model 4 combines Models 1 and 2, and Model 5 combines Models 1 and 3. The *t*-values are computed with heteroskedasticity-consistent standard errors (White, 1980). The number of observations varies because of data unavailability.

Table IV. Regressions of Announcement-Period Abnormal Returns

This table presents regression analyses of the two-day (-1, 0) announcement-period abnormal returns for the firms that announce new product introductions against the competitive strategy measure (*CSM*) and control variables. The announcement-period abnormal returns is estimated using the standard market model procedure with parameters estimated for the period 200 days to 60 days before the announcement. *CSM* is measured by the coefficient of correlation between: a) ratio of change in firm's quarterly net income to change of firm's quarterly net sales and b) change in the rest-of-industry's quarterly net sales, over the period of 28 quarters prior to announcement quarter. *Q* is the average ratio of the market value of assets to the book value of the firm's assets for the three fiscal years before the announcement, where the market value of assets equals the book value of assets minus the book value of common equity plus the market value of common equity. *FCF* is the operating income before depreciation minus interest expense, taxes, preferred dividends, and common dividends, divided by book value of total assets, for the fiscal year prior to the announcement. *DEBT RATIO* is the book value of total debt divided by the book value of total equity for the fiscal year prior to the announcement. *SIZE* is the logarithm of book value of total assets for the fiscal year prior to the announcement. *RDI* is the intensity of the firm's R&D effort (R&D per dollar of net sales) divided by its industry's for the fiscal year prior to the announcement. *HILO* equals one if the announcing firm is in a high-technology industry, and zero otherwise. *PATENT* is the stock of patents of the announcing firm in the year of the announcement. *MULTIPLE* equals one for multiple-product announcements, and zero for single-product announcements. *FREQ* is the number of new product announcements made by an announcing firm within 12 months prior to the announcement date. *INTEREST* is the average of 90-day Treasury bill rates for the announcement year. We compute the *t*-value in parentheses using heteroskedasticity-consistent standard errors (White, 1980). The number of observations varies across regressions because of data unavailability.

Independent Variables	Models				
	1	2	3	4	5
<i>INTERCEPT</i>	0.218 (3.81)***	1.135 (1.74)*	1.334 (1.83)*	1.15 (1.78)*	1.441 (2.00)**
<i>CSM</i>	-0.584 (-2.02)**			-0.687 (-2.14)**	-0.577 (-1.75)*
<i>Q</i>		0.205 (2.82)***	0.237 (2.75)***	0.197 (2.73)***	0.229 (2.66)***
<i>FCF</i>		-0.020 (-1.65)*	-0.024 (-1.72)*	-0.023 (-1.75)*	-0.028 (-1.96)**
<i>DEBT RATIO</i>		0.050 (1.22)	0.051 (1.11)	0.041 (0.95)	0.038 (0.82)
<i>SIZE</i>		-0.109 (-2.36)**	-0.141 (-2.58)***	-0.109 (-2.34)**	-0.148 (-2.74)***
<i>RDI</i>		0.330 (2.45)**	0.307 (2.28)**	0.321 (2.34)**	0.300 (2.28)**
<i>HILO</i>		-0.038 (-0.25)	-0.105 (-0.58)	-0.078 (-0.50)	-0.143 (-0.79)
<i>PATENT</i>			0.000 (0.69)		0.000 (0.96)
<i>MULTIPLE</i>		0.019 (0.15)	0.015 (0.11)	0.071 (0.54)	0.063 (0.46)
<i>FREQ</i>		0.021 (2.48)**	0.019 (1.78)*	0.023 (2.83)***	0.019 (1.82)*
<i>INTEREST</i>		-0.167 (-2.75)***	-0.148 (-2.36)**	-0.158 (-2.65)***	-0.142 (-2.29)**
<i>N</i>	384	329	288	329	288
Adjusted <i>R</i> ²	0.007	0.078	0.083	0.086	0.087
<i>F</i> -value	3.51*	4.17***	3.59***	4.18***	3.49***

***Significant at the 0.01 level, using a two-tailed test.

**Significant at the 0.05 level, using a two-tailed test.

*Significant at the 0.10 level, using a two-tailed test.

Model 1 shows that the *CSM* is significantly negatively related to the announcing firms' cumulative abnormal returns. The result is again consistent with the theoretical prediction that the announcement effect is more favorable for firms competing in strategic substitutes than for those competing in strategic complements.

Models 2 and 3 show that several control variables are significant in explaining the wealth effect associated with new product introductions. The announcement-period abnormal returns are significantly positively related to the announcing firm's investment opportunities (*Q*), R&D intensity (*RDI*), and announcement frequency (*FREQ*), and are significantly negatively related to the announcing firm's free cash flow (*FCF*), size (*SIZE*), as well as interest rates (*INTEREST*). These relations are consistent with the theoretical predictions in the literature except for announcement frequency and the announcing firm's R&D intensity, where the expected relation is negative. Chaney et al. (1991) suggest that the information content of a new product announcement is likely to be low when a firm has a history of making frequent product announcements. However, we find that announcements by frequent announcers are associated with higher abnormal returns than those of less frequent announcers. This result, which is similar to the finding in Kelm et al. (1995), is consistent with the notion that frequent announcers are able to capitalize on follow-on investment projects and generate future investment opportunities.¹⁶ With regard to the firm's R&D intensity, Kelm et al. (1995) argue that the market reaction to announcements by firms with high R&D intensity relative to their rivals should be smaller because investors typically expect new product announcements by these firms. However, they do not find significant results in their study. In contrast, the market values those products that are announced by firms with high R&D intensity more highly. This evidence is consistent with the view that R&D spending is an important source of intangible capital and product differentiation (Chauvin and Hirschey, 1993; and others). The combined results on announcement frequency and the firm's R&D intensity suggest that the market places a significant premium on new products rolled out by firms that are known to be leaders in product innovations and in creating valuable follow-on technological opportunities.

We do not find a significant relation between abnormal return and *DEBT RATIO*. This result is similar to the finding in Chen and Ho (1997). We also find that *HILO* and *PATENT* are not significant. The single-/multiple-product (*MULTIPLE*) dummy variable is also not significant. In contrast, Chaney et al. (1991) find some evidence of more favorable market reactions to announcements of multiple products.

Models 4 and 5 show that the *CSM* is still significantly negatively related to the announcing firms' cumulative abnormal returns when we include the control variables in the regression. The relations between the announcement effect and the control variables remain unchanged. The overall results in Table IV support the notion that the nature of competitive interaction in an industry is an important consideration in assessing the wealth effect of corporate product strategies.

IV. Stock Price Response for Industry Rivals and the *CSM*

We also examine the two-day (-1, 0) announcement-period abnormal returns for the rival firms pooled into an equally weighted portfolio that have the same four-digit primary SIC

¹⁶Smit and Ankum (1993) suggest that an investment strategy can encompass a sequence of tactical investment projects, of which several may yield a low return when considered in isolation, but they are valuable in generating options to invest in follow-on projects for future commercial exploitation. Kasanen (1993) also suggests that firms can create value by "spawning" investment opportunities and that a collection of projects linked together through cross-spawning can be worth more than the sum of the individual projects.

Table V. Industry Rivals' Average Abnormal Returns over the Announcement Period

This table presents the two-day (-1, 0) average announcement-period abnormal returns for industry rivals pooled into an equally weighted portfolio that have the same four-digit SIC code in Compustat. The announcement-period abnormal returns is estimated using the standard market model procedure with parameters estimated for the period 200 days to 60 days before the announcement. Since competitor returns data are unavailable for 21 announcements, the size of the total competitor sample is reduced to 363. Panel A shows the results for the total rival sample. Panel B classifies the rivals' announcement period abnormal returns by the competitive strategy measure (*CSM*) and the own-firm announcement effect (*FCAR*). *CSM* is measured by the coefficient of correlation between: a) ratio of change in firm's quarterly net income to change of firm's quarterly net sales and b) change in the rest-of-industry's quarterly net sales, over the period of 28 quarters prior to announcement quarter. We define the SS group as $CSM < 0$ and the SC group as $CSM \geq 0$. For each cell, we report the mean abnormal return and, in parentheses, the *t*-statistic and the number of observations.

<i>Panel A. Total Rival Sample</i>		
Average Abnormal Return	<i>t</i>-Statistic	<i>N</i>
-0.15%	-2.23**	363
<i>Panel B. Analysis of Subsamples Stratified According to the CSM and Announcers' Cumulative Abnormal Returns (FCAR)</i>		
	Strategic Substitutes (SS)	Strategic Complements (SC)
<i>FCAR</i> > 0	-0.21% (-1.87**, 85)	-0.07% (-0.62, 129)
<i>FCAR</i> < 0	-0.13% (-0.96, 52)	-0.21% (-1.49, 97)

**Significant at the 0.05 level, using a one-tailed test.

code in Compustat (as in Sundaram et al., 1996). Table V presents the results. Since competitor returns data are unavailable in the case of 21 announcements, the size of the total competitor sample is reduced to 363. Panel A shows that, on average, industry rivals experience a small but significantly negative abnormal return of -0.15% for the two-day announcement-period. The results suggest that for the sample as a whole, industry rivals suffer wealth loss when announcing firms introduce new products.

In Panel B, we further classify the rivals' announcement-period abnormal returns by the *CSM* and the own-firm announcement effect (*FCAR*), where we follow Sundaram et al.'s (1996) classification method by defining the SS group as $CSM < 0$ and the SC group as $CSM \geq 0$.¹⁷ When the competition is in strategic substitutes and when announcing firm's abnormal return is positive, the rivals experience a significant average loss of -0.21%. Furthermore, when the own-firm announcement effect is positive, the rivals' announcement effect for the SS group is lower (more negative) than that for the SC group. The overall results in Table V generally support the theoretical prediction for the role of the strategic competition in explaining the wealth effect of new product announcements on industry rivals: when the market regards the own-firm's new product introduction as value-enhancing, the rivals competing in strategic substitutes experience a less favorable announcement effect than those competing in strategic complements.¹⁸

¹⁷The conclusions remain unchanged when we use $\pm 0.01 \sim \pm 0.05$ as the cut-off *CSM* values.

¹⁸Note that Table V, Panel B, also shows that when the own-firm effect is negative, strategic substitutes interaction elicits a better announcement effect for the rivals.

V. Concluding Remarks

This study examines the role of strategic interaction in determining the wealth effect of new product introductions. Announcing firms competing in strategic substitutes have a positive announcement effect, but those competing in strategic complements have an insignificant announcement effect. We also show that the announcement effect of a new product introduction is significantly negatively related to the competitive strategy measure. These results hold after controlling for other variables that could affect the announcement effect. Also, industry rivals generally experience small, but significant, wealth loss when the announcing firm's abnormal return is positive and the competition is in strategic substitutes. The overall evidence suggests that the nature of competitive interaction in an industry is an important consideration in assessing the wealth effect of new product strategies. ■

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