New Products, Sales Promotions and Firm Value, With Application to the Automobile Industry

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NEW PRODUCTS, SALES PROMOTIONS AND FIRM VALUE, WITH APPLICATION TO THE AUTOMOBILE INDUSTRY

Year after year, managers strive to improve financial performance and firm value by marketing actions such as new product introductions and promotional incentives. The current study investigates the short-term and long-term impact of such marketing actions on financial metrics, including top-line, bottom-line and stock market performance. The authors apply multivariate time series models to the automobile industry, where both new product introductions and promotional incentives are considered important performance drivers. Interestingly, while both marketing actions increase top-line firm performance, their long-term effects strongly differ for the bottom line. First, new product introductions increase long-term financial performance and firm value, but promotions do not. Second, investor reaction to new product introduction grows over time, indicating that useful information unfolds in the first two months after product launch. Third, product entry in a new market yields the highest top-line, bottom-line and stock market benefits. Managers may use these results to justify new product efforts and to weigh short-term and long-term consequences of promotional incentives.

For most firms, successful new products are engines of growth (Cohen, Eliashberg and Ho 1997). Several frameworks, including the product-life cycle and the growth-share matrix, postulate the need for new products that generate future profitability and prevent the obsolescence of the firm's product line (Cooper 1984, Chaney, Devinney and Winer 1991). Indeed, Arthur D. Little consultants conclude from a *Fortune* poll that innovative companies achieve the highest shareholder returns (Jonash and Sommerlatte 1999). At the same time, new-product failure rate is high - ranging from 33% to over 60% - and has not improved in the last decades (Boulding, Morgan and Staelin 1997, McMath and Forbes 1998, Wind 1982). Moreover, even commercially successful new products may not financially benefit the firm because of high development and launch costs and fast imitation by competitors (e.g. Bayus et al. 1997; Chaney et al. 1991).

By contrast, sales promotions are effective demand boosters that do not incur the risks associated with new products (Blattberg and Neslin 1990). Sales promotions are relatively easy to implement, and tend to have immediate and substantial effects on sales volumes (Hanssens, Parsons and Schultz 2001, Chapter 8). Consequently, it is not surprising that the relative share of promotions in firms' marketing budgets continues to increase (Currim and Schneider 1991). On the other hand, sales promotions rarely have persistent effects on sales, which tend to return to pre-promotion levels after a few weeks or months (Dekimpe, Hanssens and Silva-Risso 1999; Nijs et al. 2001; Pauwels et al. 2002; Srinivasan et al. 2000). Consequently, their effectiveness in stimulating long-run growth and profitability for the promoting brand is in doubt (Kopalle, Mela and Marsh 1999).

What are the long-run financial consequences, if any, of these two distinctly different marketing actions? This is an important question raised by many CEOs and CFOs (Marketing

Science Institute 2002). It is also a difficult question because there are several metrics of financial performance, including revenue (top-line performance), profit (bottom-line performance) and firm value (performance in investor markets). In addition, it is difficult to distinguish between the short-run and the long-run effects of marketing actions.

Research in this area has focused mainly on the revenue and profit effects of new products, for instance demonstrating their benefits in the PC industry (Bayus et al. 2003). In terms of investor impact, we know that new-product announcements generate small excess stock-market returns for a few days (Eddy and Saunders 1980; Chaney, Devinney and Winer 1991) and that additional excess returns can be created when the new product is launched in the market (Kelm et al. 1995). As for sales promotions, their effect on revenues is typically positive, albeit short-lived (Srinivasan et al. 2001), while their profit impact is often negative (Abraham and Lodish 1990). We do not know if investors react to firms' promotion strategies, nor do we know how such reaction, if present, compares to the effects of new-product introductions.

In this study, we compare and contrast the effects of new-product introductions and sales promotions on the top-line, bottom-line and investor performance of the firm. We choose the automobile industry as a case in point, because of its economic importance and its reliance on both new-product introductions and sales promotions. Indeed, the automobile business represents over 3% of the US Gross Domestic Product (J. D. Power and Associates, 2002a) and accounts for one of every seven jobs in the US domestic economy (Tardiff 1998). Ever since consumers became interested in car styling in the 1920s, manufacturers have invested in innovation in the form of product-line changes (Menge 1962, Farr 2000). However, the costs of such styling changes can be substantial, from up to $100 million in the late 1950s to up to $4 billion in recent years (Sherman and Hoffer 1971, White 2001). Moreover, their success is far from certain, even

with extensive marketing research, as product development starts several years before public launch (Farr 2000).

Research has shown that, overall, styling changes tend to increase sales but often do not pay off financially (Sherman and Hoffer 1971; Hoffer and Reilly 1984). However, these conclusions do not consider entry into new categories (e.g. SUVs), nor do they account for potential long-term benefits to top-line performance (e.g. from repeat purchases or replacement sales), bottom-line performance (e.g. from spreading the development costs over multiple vehicles) or firm value (e.g. from spill-over benefits of successful new products to the manufacturer's image).

As for sales promotions, car manufacturers (especially the big three American companies) are increasingly using these incentives to boost sales and optimize capacity utilization in a tough market environment (Business Week 2002). However, concerns over the long-term profitability of such actions continue (Wall Street Journal 2003). Recently, Chrysler's CEO Dieter Zetsche told the *Financial Times* that his forecasted sales gain of 1 million cars in the next 5-10 years "will be driven by 12 new-product introductions in the next three years rather than by low pricing" (J. D. Power and Associates, 2002b).

The paper is organized as follows. We first examine how new products and promotions affect financial performance and valuation over time and specify a comprehensive model to quantify these relationships. Next we discuss the marketing and financial data sources and estimate the models. We formulate conclusions, cross-validate the empirical results and discuss their marketing strategic implications.

Research framework and methodology

We begin by considering how new-product introductions and promotional incentives influence top-line performance (firm revenue), bottom-line performance (firm income) and stock-market performance (firm value). We formulate requirements for a model that aims to capture the long-term effects of these marketing actions on the performance variables. Finally, we show how a vector-autoregressive (VAR) model satisfies these requirements and detail the empirical estimation steps.

Short-term and long-term performance effects of marketing

The top-line performance of new products has been studied extensively in the diffusion-of-innovation literature (e.g. Mahajan and Wind 1991). Among its major findings are that revenue from new products may take considerable time to materialize, and that revenue levels depend on several factors, including the degree of product innovation. In addition, new-product introductions may have a *persistent* effect on revenues, as opposed to price promotions, which typically produce only *temporary* benefits (Nijs et al. 2001, Pauwels et al. 2002, Srinivasan et al. 2000). Therefore, the assessment of new product and promotional effects on revenue should distinguish short-term ('immediate' or 'same-week') effects, and long-term effects, which could be temporary ('adjustment', 'dust-settling') or persistent (permanent).[1]

Bottom-line financial performance may benefit from new-product introductions through increased demand, increased profit margin and lower customer acquisition and retention costs (Bayus et al. 2003). Geroski et al. (1993) note that a new product can have a temporary effect on a firm's financial position due to the specific product innovation, or could have a permanent effect because it transforms competitive capabilities. However, such long-term profit benefits

can be jeopardized by several factors, even when top-line performance increases (Shermann and Hoffer 1971). Development and production costs are considerable, notably in the automobile industry where new-car platforms cost over one billion dollars (Wall Street Journal 2002c). New-product launch consumes considerable marketing resources, especially for a major innovation. Similarly, the profitability of promotional incentives is far from certain (Abraham and Lodish 1990, Srinivasan et al. 2001).

The firm-valuation (stock price) implications of marketing activities have not received much research attention to date. In general, we know from the efficient-market hypothesis that stock prices follow random walks: the current price reveals all the known information about the firm's future earnings prospects, and shocks (surprises) that alter earnings expectations are incorporated immediately (Fama and French 1992). Therefore, the stock market may not react to new-product introductions because the firm's current valuation already incorporates the launch, because it was pre-announced or leaked, or because the company is known to be an innovator and is expected to produce a steady flow of new products. Instead, the stock market will react to the extent that the new-product introduction updates the forecasts of the firm's future returns (Ittner and Larcker 1997). If investors consider the new-product introduction favorably (i.e. expectations are exceeded), the stock price will increase to reflect the expected net sum of future, discounted cash flows resulting from the new product (Wittink et al. 1982, p.3).

However, the efficient-market perspective also acknowledges that investors will not always correctly and immediately forecast the firm's future returns (e.g. Ball and Brown 1968). While investors have expectations of the firm's general capability in new-product introductions, the market success of any specific introduction is usually in doubt (Wittink et al. 1982; Wall Street Journal 2002a). Specifically, investors need to correctly assess two major uncertainties: the

probability of new-product success and the level of profits associated with the product (Chaney et al. 1991). On the one hand, the stock market may overreact to a product introduction that eventually does not turn out to be a financial success (ibid). On the other hand, investors may underreact as they focus on current rather than on future revenue streams (Michaely, Thaler and Womack 1995). Therefore, one should not expect that investors are fully able to predict the total over-time financial effects of new-product introductions at the time of launch. Instead, investors will update their evaluation of these introductions over time. Helpful information will be contained in early success measures such as low 'days to turn' and high initial satisfaction ratings, indicating high product popularity in the target market and the absence of major technical problems. Therefore, the short-term investor reaction may be adjusted over time until it stabilizes in the long run, as the new-product's performance becomes so predictable that it loses its ability to further adjust stock prices.

A similar argument can be developed with respect to promotion effects on valuation. Given promotions' positive revenue effects on manufacturers, we may expect some positive investor reaction behavior in the short run. On the other hand, since promotion effects on sales are typically short-lived, it is not clear a priori if this positive investor reaction will persist, dissipate or turn around.

Finally, we recognize that dynamic *feedback* loops may exist among marketing variables, among performance variables and between marketing and performance variables. Marketing actions such as new- product introductions and promotional incentives are often related over time (Dekimpe and Hanssens 1999; Pauwels 2003). Successful new-product introductions can increase a brand's price premium and make promotions redundant. In contrast, a prolonged absence of successful new-product introduction may force a company to use promotional

incentives in order to "move product" (Wall Street Journal 2002a). Similarly, revenue performance may act as an intermediate variable between marketing actions and firm value. For example, successful new products lead to higher revenues and profits that, in turn, can be used to further launch new products (Kemp et al. 2003). Likewise, lackluster revenue performance may prompt some companies to engage in aggressive rebate tactics in an effort to boost sales (USA Today 2002).

Model requirements

Based on these considerations, we maintain four criteria for our model of dynamic interactions among marketing and performance variables. First, the model should provide a flexible treatment of both short-term and long-term effects (Dekimpe and Hanssens 1995). Second, the model should be robust to deviations from stationarity[2], in particular the presence of random walks in stock prices, which can lead to spurious regression problems (Granger and Newbold 1986). Third, the model should provide a forecasted, expected baseline for each performance variable, so that we may capture the impact of unexpected events as deviations from this baseline. Both econometric models and survey methods have been shown to perform well in generating these expectations (Fried & Givoly 1982, Cheng et al. 1992). Consequently, our model will use econometric-model based forecasts, while controlling for changes in analyst earnings expectations. Finally, the model should allow for various dynamic feedback loops among marketing and business performance variables.

In summary, the study of the longitudinal impact of new-product introductions and promotional incentives requires a carefully designed system of equations that accounts for the time-series properties of performance and marketing variables and for their dynamic interactions.

Vector-Autoregressive Model Specification

Vector-autoregressive (VAR) models are well suited to measure the dynamic performance response and interactions between performance and marketing variables (Dekimpe and Hanssens 1999). Both performance variables and marketing actions are endogenous, i.e. they are explained by their own past and the past of the other endogenous variables. Specifically, VAR models not only measure direct (immediate and lagged) response to marketing actions, but also capture the performance implications of complex feedback loops. For instance, a successful introduction will generate higher revenue, which may prompt the manufacturer to reduce sales promotions in subsequent periods. The combination of increased sales and higher margins may improve earnings and stock price, and thereby further enhance the over-time effectiveness of the initial product introduction. Because of such chains of events, the full performance implications of the initial product introduction may extend well beyond the immediate effects.

VAR models are specified in levels or changes, depending on the order of integration of the data. Our unit-root tests (Enders 1995) reveal evolution in performance variables[3], but stationarity for new-product introductions and sales promotions. Consequently, the VAR model for each brand j in category k from firm i, is specified as

$$\begin{bmatrix} \Delta VBR_{i,t} \\ \Delta INC_{i,t} \\ \Delta REV_{i,t} \\ NPI_{ijk,t} \\ SPR_{ijk,t} \end{bmatrix} = C + \sum_{n=1}^{N} B_n \times \begin{bmatrix} \Delta VBR_{i,t-n} \\ \Delta INC_{i,t-n} \\ \Delta REV_{i,t-n} \\ NPI_{ijk,t-n} \\ SPR_{ijk,t-n} \end{bmatrix} + \Gamma \times \begin{bmatrix} \Delta S\&P500_t \\ \Delta Construct_t \\ \Delta Exchange_t \\ \Delta EPS_{i,t} \end{bmatrix} + \begin{bmatrix} u_{VBRi,t} \\ u_{INCi,t} \\ u_{REVi,t} \\ u_{NPIijk,t} \\ u_{SPRijk,t} \end{bmatrix}$$

with B_n, Γ vectors of coefficients, $[u_{VBRi,t}, u_{INCi,t}, u_{REVi,t}, u_{NPIijk,t}, u_{SPRijk,t}]' \sim N(0, \Sigma_u)$, N the order of the VAR system based on Schwartz' Bayes Information Criterion (SBIC), and all variables are

expressed in logarithms or their changes (Δ). In this system, the first equation explains changes to firm value[4], operationalized as the ratio of the firm's market value to book value (*VBR*) (Miller and Modigliani 1961). This variable reflects a firm's potential growth opportunities and is used frequently for assessing a firm's ability to achieve abnormal returns relative to its investment base (David et al. 2002). The second and third equations explain the changes in, respectively, bottom-line (*INC*) and top-line financial performance (*REV*) of firm *i*. The fourth and fifth equations model firm *i*'s marketing actions, i.e. new-product introductions (*NPI*) and sales promotions (*SPR*) for brand *j* in product category *k*.

Turning to the exogenous variables in this dynamic system, we control for seasonal demand variations in the vector C (Labor Day weekend, Memorial Day weekend and the end of each quarter), and for fluctuations in the overall economic and investment climate (S&P 500, Construction Cost index[5] and dollar-Yen exchange rate). Finally, we account for the impact of stock-market analyst earnings expectations (*EPS*) (Ittner and Larcker 1997).

Note that the VAR-forecasted baseline of market-to-book ratio includes changes to the S&P500 index. This index is the sole predictor of a firm's stock price in the 'market model' used by event studies to calculate excess returns (Eddy and Saunders 1980, Chaney et al 1991). By contrast, our model develops a more refined forecasted baseline, which also includes changes to the Construction Index and to the firm-specific earning forecasts and financial performance. One could argue for an even more extensive VAR model specification, e.g. to simultaneously include competitive product-introduction and promotion variables. However, we wish to avoid over-parameterization effects on our estimates (Abadir et al. 1999; Pesaran and Smith 1998), and we aim to balance completeness and parsimony. Permanent effects in the VAR models are possible

whenever performance variables are evolving, and the Schwarz Bayesian Information Criterion suggests lag lengths that balance model fit and complexity.

VAR models have been used extensively in both the marketing and the finance literatures. For example, they were used to assess the short-term and long-term performance effects of marketing activity such as advertising, distribution, non-price and price promotions, store-brand entry and product line extensions (Bronnenberg et al. 2000, Dekimpe and Hanssens 1999, Nijs et al. 2001; Pauwels 2003; Pauwels et al. 2002, Pauwels and Srinivasan 2002, Srinivasan et al. 2001). In finance, VAR models have been used to study relationships within and between stock markets (Eun and Shim 1989), the relations between capital flows and equity returns (Froot and Donohue 2002), the over-time impact of monetary policy on stock-market returns (Thorbecke 1997), and the effect of credit interruptions on the economy (Mason et al. 2000).

Long-run impact of marketing actions: impulse-response functions

The VAR model estimates the *baseline* of each endogenous variable and forecasts its future values based on the dynamic interactions of all jointly endogenous variables. Based on the VAR-coefficients, impulse-response functions track the over-time impact of unexpected changes (shocks) to the marketing variables on forecast deviations from baseline for the other endogenous variables. This conceptualization closely reflects previous studies on market performance (e.g. Dekimpe and Hanssens 1999), financial performance (e.g. Srinivasan et al. 2001) and stock prices (e.g. Erickson and Jacobson 1992). As argued recently by Mizik and Jacobson (2003), "when an unanticipated change in strategy occurs, the markets react and the new stock price reflects the long-run implications such change is expected to have on future cash flows" (o.c., p. 21).

To derive the impulse-response functions of a marketing action, we compute two forecasts, one based on an information set without the marketing action, and another based on an extended information set that accounts for the marketing action. The difference between these forecasts measures the incremental effect of the marketing action. This model feature is especially attractive in our investigation of stock-market performance, as investors react to shocks, i.e. deviations from their expectations. In finance, these expectations are obtained from econometric forecasting models based on the firm's past financial performance records, and the shocks are obtained as the model forecast errors (e.g. Cheng and Chen 1997). The VAR model is a sophisticated version of such an econometric forecast. In addition, the dynamic effects are not a priori restricted in time, sign or magnitude. We adopt the generalized, simultaneous-shocking approach (Dekimpe and Hanssens 1999) in which the information in the residual variance-covariance matrix of the VAR model is used to derive a vector of *expected* instantaneous shock values. Since we estimate a model in logarithms, the short-run and long-run performance-impact estimates are elasticities (Nijs et al. 2001). Finally, we follow established practice in marketing research and assess the statistical significance of each impulse-response value by applying a one-standard error band (e.g. Nijs et al. 2001), as motivated in Pesaran, Pierse and Lee (1993) and Sims and Zha (1999).

Relative importance of marketing actions: forecast error variance decomposition

While impulse-response functions trace the effects of a marketing change on performance, forecast-error variance decomposition (FEVD) determines the extent to which these performance effects are due to changes in each of the VAR variables (Hamilton 1994). Thus, the variance decomposition of firm value provides information about the relative importance of past firm

value, bottom-line and top-line performance, new product introductions and promotions, in determining deviations of firm value from baseline expectations. Of particular importance is the comparison of the short-run and the long-run FEVD. For example, this comparison could reveal that the initial movements in stock price are attributed mainly to promotion shocks, but that over time, the contribution of new-product introductions gradually becomes stronger. Moreover, FEVD also addresses the role of the intermediate performance metrics (revenue and profit). In our context, new-product introductions may affect firm value *only indirectly* through top-line and bottom-line performance (in which case all firm value forecast deviations are attributed to these performance variables), or have a direct effect above and beyond this performance impact. As an example in marketing, Hanssens (1998) used FEVD on channel orders and consumer demand data to show that sudden spikes in channel orders have no long-term consequences for the manufacturer, *unless* movements in consumer demand accompany them. For a detailed overview of all VAR modeling steps, see Enders (1995) and Dekimpe and Hanssens (1999).

Data Description

Our data come from four major sources, J.D. Power & Associates (JDPA) for weekly sales and marketing, CRSP and COMPUSTAT for firm performance, and I/B/E/S for earnings forecasts (Ittner and Larcker 1997). We describe these databases in turn and summarize our variable operationalization and data sources in table 1.

--- Insert Table 1 about here ---

Marketing databases: J.D. Power & Associates

Sales transaction data are available from J.D. Power & Associates for a sample of dealerships in the major metropolitan areas in the US. We use data from California dealerships, containing every new car sales transaction of a sample of 1,100 dealerships from October 1996 through December 2001. The detailed data for this region are representative of other US regions, whose data periods are shorter. Each observation in the JDPA data contains the transaction date, the manufacturer, model year, make, model, trim and other car information, the transaction price, and sales promotions, operationalized as the monetary equivalent of all promotional incentives per vehicle. These are retail transactions, i.e., sales or leases to final consumers, excluding fleet sales[6]. Moreover, this dataset is at the detailed 'vehicle' level, defined as every combination of model year, make and model (e.g., 1999 Honda Accord, 2000 Toyota Camry), body type (e.g., convertible, coupe, hatchback), doors (e.g., 2 door, 4 door, 4 door extended cabin), trim level (e.g., for Honda Accord, DX, EX, LX, etc.), drive train type (e.g., 2WD, 4WD), transmission type (automatic, manual), cylinders (e.g., 4 cylinder, V6), displacement (e.g., 3.0 or 3.3 liters) (Scott Morton, Zettelmeyer and Silva-Risso 2001).

The vehicle information is aggregated to the brand level, representing a company's presence in a certain category. For example, Chevrolet, GMC and Cadillac are the three General Motors brands in the SUV category.

A second source of JDPA data is expert opinions on the innovation level of each vehicle redesign or introduction. In line with the JDPA (1998) guidelines, these experts rate such innovativeness on the 5-point scale presented in Table 2.

--- Insert Table 2 about here ---

Our innovation scale ranges from mere trimming and styling changes (levels 1 and 2) to 'design' and 'new benefit' innovations (levels 3 and 4) to brand entry in a new category (level 5). An example of level 1 is the 2002 Toyota 4Runner with minor exterior styling changes, of level 2 is the 1999 Ford Explorer with minor updates to interior and exterior, of level 3 is the 1998 Isuzu Rodeo with a major change to vehicle platform, of level 4 is the 2001 Ford Explorer with a major change to a new platform and with additional 'third-row' seating and, of level 5 is the 2001 Acura MDX. We compared the JDPA classification with the scales used in earlier automobile studies in economics (Sherman and Hoffer 1971, Hoffer and Reilly 1982). While all three approaches converge on most innovation levels, the JDPA scale is more informative in that it acknowledges the introduction of new consumer benefits and it includes new brand entry (the first time a brand enters an automobile category). Furthermore, when there are no visible changes between model years, an innovation value of zero is assigned[7]. These expert ratings operationalize our variable 'new-product introduction', timed at the moment of their launch in the market.

Since innovation is vehicle-specific and our models are estimated by brand, the innovation variable needs to be converted to the brand level. We define innovation at the brand level as the *maximum* innovation level for all the brand's vehicle changes in that particular week[8]. We consider 41 brands in six major product categories: SUVs, minivans, mid-size sedans, compact cars, compact pickups and full-size pickups. Table 3 shows that, during the period of observation (October 1996 to December 2001), some of these categories experienced an abundance of major and minor new-product introductions (SUVs and full-size pickups) or a dominance of major introductions (minivans). Other categories saw a more moderate amount of product innovation

(mid-size and compact cars) and yet others were characterized mainly by minor product improvements (compact pickups).

--- Insert Table 3 about here ---

Financial databases: CRSP, COMPUSTAT and I/B/E/S

Our measure of firm value is based on the comprehensive data set of firm market capitalization and daily market indices (S&P500) of the NYSE obtained from the Center for Research in Security Prices (CRSP). The CRSP database covers stocks traded on the major U.S. stock exchanges, the New York Stock Exchange, the American Stock Exchange and NASDAQ. Following financial convention, we use Friday closing prices to compute weekly firm market capitalization (Mizik and Jacobson 2003).

For firm-specific information and quarterly accounting information such as book value, revenues and net income, we use the Standard and Poor's 1999 COMPUSTAT database. The quarterly variables income and revenue are allocated to quarter weeks in proportion to the retail sales level generated in each week, as obtained from the JDPA database (i.e. we assume that revenue and income generated in a given week are proportional to unit sales in that week). Additionally, the COMPUSTAT dataset also provides monthly indices of the Construction Cost Index and the Consumer Price Index (CPI). The CPI is used to deflate all monetary variables. Finally, the I/B/E/S database provides quarterly analyst' earnings forecasts for the six major manufacturers in this study, Chrysler, Ford, General Motors, Honda, Nissan and Toyota, representing about 86% of the U.S. car market.

--- Insert Table 4 about here ---

Recall that our unit of analysis for the marketing variables is the brand level in each of six product categories. Table 4 provides a listing of the brands in the study along with the descriptive statistics for the measures that form the basis of our analysis. A casual inspection of table 4 does not reveal any obvious association between the number of major and minor new-product introductions and the market capitalization to book-value ratio. This relationship needs to be assessed longitudinally, while controlling for exogenous factors influencing the general stock market and the specific industry, as in our vector-autoregressive models.

Results

The 41 estimated VAR models (one for each brand), with the number of lags selected by the SBIC, showed good model fit (R^2 ranges from 0.25 to 0.57 and the F-statistic ranges from 3.06 to 14.37)[9]. We first review our results on the performance impact of new-product introductions and sales promotions. Next, we discuss how these effects emerge over time and we demonstrate the interactions between new-product introductions and promotions. Finally, we examine the robustness of our finding across categories and innovation levels.

Impact of new-product introductions on financial performance and firm value

Table 5 shows short-term (same-week) and long-term elasticities of brand-level product introductions and promotions on firm-level performance, as sales-weighted averages[10] over all 41 brands for six categories and six companies.

--- Insert Table 5 about here ---

As we relate total corporate performance to a new-product introduction for one brand in one category, the reported elasticities are logically small in magnitude, in line with previous research

(Kelm et al. 1995), yet statistically significant. Overall, new-product introductions have a positive short-term and long-term impact on the firm's top-line, bottom-line and stock-market performance. Moreover, this impact persists over time.

First, our firm revenue results confirm previous findings of strong sales effects of new-product introductions, both within the car industry (Hoffer and Reilly 1984; Sherman and Hoffer 1971) and in other categories (e.g. Booz, Allen and Hamilton 1982; Kashani 2000). Interestingly, we find that these top-line benefits materialize relatively quickly, in 6 to 10 weeks, possibly because the automobile industry is very product driven and its end users are highly involved in the category (Farr 2000, JDPA 2002).

Second, the bottom-line impact of new-product introductions follows a similar over-time pattern as the top-line impact, but with lower elasticities. This demonstrates the crucial importance of new-product introduction *costs* in this industry. This observation is consistent with Bayus and Putsis' (1999) research on product proliferation in the PC industry, and may thus generalize to other industries with substantial innovation costs.

Third, the average *short-term* firm value impact of new-product introductions is low compared to the top-line and bottom-line benefits. One explanation for this finding is that investors already incorporated the firm's product introduction in their valuation (e.g. Ittner and Larcker 1997). In contrast, the *long-term* firm value effects are typically higher, indicating that relevant new information unfolds as time progresses. Figure 1 illustrates the over-time impact of new-product introductions for the Honda Odyssey (minivan category) to the valuation of the Honda corporation. After a small initial (short-term) gain, the effect grows and stabilizes at its persistent (long-term) positive value in about two months.

--- Insert Figure 1 about here ---

Impact of sales promotions on financial performance and firm value

The effects of promotional programs on market and financial performance are very different from those of new-product introductions. Table 5 shows that incentive programs have uniformly positive effects in the short run: top-line, bottom-line and stock-market performance all increase. In other words, investor reaction mirrors consumer reaction to incentive programs, which is strong, immediate and positive (Blattberg et al. 1995). However, these beneficial effects are short-lived for all but firm top-line performance, as both long-term bottom-line and firm value elasticities are *negative.* As detailed in the validation analysis, this negative long-run elasticity represents the majority of all brands in our analysis.

A plausible explanation for the sign switch in income and investor reaction between the short run and long-run is *price inertia* or habit formation in sales promotions: the short-run success of promotions makes it attractive for managers to continue using them (Krishna et al. 2001, Srinivasan, Pauwels and Nijs 2003). In addition, since promotions are known to stimulate consumer demand only temporarily (Srinivasan et al. 2001), they will have to be repeated lest the company is willing to sacrifice top-line performance. While such repetitive use of incentives is indeed able to maintain, even grow, their initial revenue effects – whence the positive long-run revenue elasticity -, profit margins are being eroded and bottom-line performance and firm value suffer in the long run (Wall Street Journal 2002b). This dynamic behavior is the opposite of the positive feedback loop or "virtuous cycle" for new-product introductions, in which positive consumer and investor reaction stimulate further new-product introduction efforts (Kashani, Miller and Clayton 2000).

Growing importance of new-product introductions for firm value

As the firm value effects of new-product introductions and promotions are intriguing, we further investigate their importance in explaining firm value, above and beyond their bottom-line effects. Figure 2 shows the results of forecast error variance decomposition of firm value, accounting for all performance and marketing variables.

--- Insert Figure 2 about here ---

While sales promotions are initially more important, an increasing percentage of the forecast deviation variance in firm value is attributed to new-product introduction. On average, the ability of product introduction to explain firm value forecast deviations is 8 times higher after two quarters than it is in the week of product launch.

Together with the increasing elasticity findings illustrated in Figure 1, this result pattern implies that new-product introduction in-and-of itself is a fairly high-entropy signal to investors: while their immediate reactions are not strong, these reactions are gradually adjusted as emerging consumer acceptance information helps investors update their expectations (Kelm et al. 1995)[11]. Moreover, the demonstrated direct effect of new-product introductions on firm value implies that investors look beyond their current bottom-line effects. In other words, investors reward firm innovativeness in the form of a premium in firm valuation above and beyond the new-product's impact on top-line and bottom-line performance. This finding implies that investors show foresight beyond the extrapolation of firm profits. For example, they may reward the spillover benefits of successful introductions on the manufacturer's image and reputation (Sherman and Hoffer 1971), possibly in the expectation that this image will enhance consumer acceptance of the firm's future new-product introductions.

Interactions between new-product introductions and promotional incentives

Because new-product introductions and promotional incentives have such different long-term effects on firm value, we investigate their interaction in firms' decision making. We capture these dynamic interactions by examining the impulse response of promotional incentives to new-product introductions (see Table 6).

--- Insert Table 6 about here ---

Interestingly, new-product introductions have a negative and persistent impact on the use of incentives. Since sales promotions are long-run value deterrents (cfr. supra), this finding supports the important strategic conclusion that a policy of aggressive new-product introductions acts as an antidote for excessive reliance on consumer incentives. As an illustration, consider the major redesign of the Honda Odyssey in 1999: it had a persistent beneficial effect on the margins for this vehicle, which continues to enjoy strong sales virtually without promotional incentives (White 2001).

Result robustness across product categories and innovation levels

Finally, we assess the robustness of our findings 1) across product categories and 2) across innovation levels. First, are the short- and long-term firm value effects of new-product introductions and promotional incentives robust across product categories? Table 7 shows the frequency of positive stock-market performance effects of new-product introductions for the 41 automobile brands in our analysis.

--- Insert Table 7 about here ---

The short-term firm value effects show both negative and positive values across categories, collaborating our interpretation that new-product introductions are high-entropy signals to

investors. Still, the short-term effects of new-product introductions are positive for the most part, as no product category shows a dominance of negative effects. The long-run effects of new-product introductions show a predominantly positive effect on firm value in each of the six categories. Over the total sample, new-product introductions have a positive long-run impact on market capitalization for 81% of all brands.

The short-term effects of promotion incentives vary among categories, with SUVs, minivans and premium midsize cars showing a negative impact, and premium compact cars, compact pick-up and full-size pick-up trucks showing a positive impact. Overall, half of all brands show positive short-term promotion effects. In the long run, this is only true for 43% of the brands.

Second, does the general pattern of our findings hold across innovation levels? To answer this question, we re-estimate our model for each brand in which we substitute the introduction variable by variables measuring each innovation level[12]. Table 8 shows the detailed breakdown of the performance impact of only styling changes (innovation level 1), minor sheet-metal changes (level 2), major sheet-metal changes (level 3), all new sheet metal and/or new platform (level 4) and new market entry (level 5).

---- Insert Table 8 about here ---

Consistent with the new-product literature (Cooper 1993, Holak and Lehmann 1990, Montoya-Weiss and Calantone 1994), we observe a virtually linear relationship between the innovation level and its short-term revenue impact. Long-term revenue performance follows a similar pattern, with low impact for mere trim changes and a high impact for new-market entries, but little difference among the intermediate innovation levels.

The results for bottom-line performance are more complex. The short-term income impact shows a U-shaped relationship with innovation level: partial sheet metal changes (intermediate

innovation levels 2 and 3) have a lower income impact than mere styling changes, while major updates and especially new brand entries yield the greatest income benefits. In the long term, we even observe negative average income effects for innovation levels 3 and 4. These results reflect and extend previous findings of negative financial returns to new-car models (Sherman and Hoffer 1971) and demonstrate the crucial importance of new-product introduction costs in this industry.

Finally, the stock market performance impact shows a similar U-shaped relation with innovation level, but with a preference for new-market entries over minor updates. These results again support our interpretation that investors look beyond current financial returns and consider spill-over innovation benefits in the more distant future, which may include improved manufacturer's image, increased revenues from opening up whole new markets, and reduced costs from applying the innovation technology to different vehicles in the manufacturer's fleet (Sherman and Hoffer 1971). Indeed, Booz, Allen and Hamilton (1982) argue that new-to-the-world products and new product lines (our highest innovation category) offer the highest benefit potential, but face manager reluctance as they also pose a major risk, in contrast to incremental innovations. Therefore, investors appear to appreciate new-market entries as a signal of confident and bold management.

Implications

Our central result is that, above and beyond the impact of the firm's earnings and the general investment climate, product introductions have positive and growing effects on firm value. In contrast, sales promotions diminish long-term firm value, even though they have positive effects on revenues and, in the short run, on profits. Thus the investor community

rewards new-product introductions and punishes discounting, above and beyond the readily observable financial performance of the firm. Table 9 summarizes these findings.

---- Insert Table 9 about here ---

Are the reported elasticities economically relevant? Table 10 reports the size of the monetary effects on market capitalization in dollars[13]. New-product introductions typically generate tens of millions of dollars of long-term firm value, and in several cases several hundred million dollars (up to $302 million). The reverse is true for promotions, which subtract tens or even hundred of millions of dollars of firm value, up to $324 million in our calculations. These magnitudes are especially sizeable considering that both product introduction and sales promotions are not isolated events in the auto industry. They occur relatively frequently and as such they can account for substantial up- or downward movement in auto companies' stock prices.

---Insert Table 10 about here ---

Our results in Table 10 highlight the differences across firms and categories, and can be related to firms' product strategies and category growth trends. For instance, in the period 1996-2001 Ford, under Jack Nasser, saw a shift in emphasis from quality of manufacturing to customer service and cost reductions. The former included service improvements offered by the dealers and improvements in the interface to the consumers through ventures such as Ford Direct. Cost reductions were achieved through price discounts from Ford's suppliers and manufacturing-related cost savings. In contrast, Chrysler stressed innovative, appealing design during this time period, under Bob Lutz as its design chief. For example, Chrysler introduced the highly successful Dodge Durango and Jeep Liberty in the SUV category and the PT Cruiser in the small-cars category during this period. Our results in Table 10 do indeed reflect the success

of Chrysler's innovation-focused product strategy in contrast to Ford's - Chrysler has higher positive effects of new-product introductions on firm value relative to Ford in all but one category.

Turning to category trends, the SUV category, for example, experienced a 12.3 % annual growth rate from 1996 to 2001, while the small-cars category and the mid-size sedan category decreased in size by 1% and 0.6% annually, respectively. Our results in Table 10 reflect these market trends since the high-growth SUV category typically has higher effects of new-product introductions relative to the other lower-growth auto categories.

Our findings have several important implications for new-product and promotion strategies. First, and foremost, in order to boost the long-term market capitalization of their companies, executives should *focus on new-product introductions* and resist relying on sales promotions. While consumer incentives may yield a short-term performance lift and/or prevent severe sales erosion while new product projects are in the pipeline, they do not provide a viable long-term answer to the manufacturer's challenges in this industry (Wall Street Journal 2002b).

Second, while investors in the short run often view product introduction favorably, their reactions unfold over time, so *market acceptance* of the introduction is an important component in determining its long-run impact on firm value. This finding supports the argument that innovative firms need to pay special attention to appropriating new-product introduction rewards in the marketplace in order to enhance stock returns (Kelm et al 1995; Mizik and Jacobson 2003, Pardue et al. 2000). In this regard, entries into new markets (i.e. innovation level 5) are the most valued by investors.

Third, managers need not always incur the high development and launch costs associated with major product innovations. Indeed, the U-shaped relation between innovation level and

long-term firm valuation suggests that firms can benefit from "pulsing" innovations, i.e. providing minor improvements to their new-market entries as opposed to engaging in continuous intermediate-level innovation. This finding corroborates the argument in favor of fast new-product development and launch, followed by fine-tuning the product based on market feedback (Smith and Reinertsen 1991). A recent study of many categories even indicated that "incremental innovations can be drivers of brand growth in their own right," if they represent added consumer benefits and are introduced more frequently than the competition (Kashani 2000). As a recent case in point, consider Ford's decision to return Lincoln to profitability based on relatively minor changes with lower development costs (aimed at positioning Lincoln as an 'American luxury' brand), instead of making the major leap towards a global luxury brand at substantially higher costs (Wall Street Journal, 2002c). This move is "quite possibly, exactly what Lincoln's customers - and Ford investors- would prefer" (White 2001).

This study has some limitations that provide interesting avenues for future research. First, our data period (1996-2001), while substantial, covers only a fraction of the full history of the automobile industry and does not feature major innovations that occurred before 1996. Indeed, important breakthroughs and new-to-the-world products such as four-wheel traction and minivans may achieve considerably higher long-term benefits than even the 'new-market entries' in our data period. In the same vein, we focused on new-product introductions and did not examine process innovations. Second, we analyzed only one industry, albeit one in which new-product introductions and sales promotions play a major role in marketing strategy. A validation of our results in other industries is an important area for future research. Third, this research has assessed the average performance impact of new-product introductions, but leaves the explanations of differences in effects across firms and categories for future studies. Moreover,

future work could address the importance of the relative innovativeness of a company versus competitive offerings in explaining the observed performance results. Finally, researchers may investigate consumer acceptance ratings that are available prior to launch and thus may help predict the performance impact of specific introductions. Likewise, knowledge of when management realizes the failure of a new-product introduction may shed light on managerial action to remedy the situation, including either more new products or more promotions.

In conclusion, the marketing literature to date has provided a number of insights on the benefits and risks of new-product introductions for consumers and firms. This research adds an important dimension: the investor community rewards innovative firms by their willingness to pay a premium in valuation, and this premium gradually increases for several weeks after the new-product launch. Furthermore, innovation policy acts as an antidote against firms' dependence on sales promotions, which have a depressing effect on firm value. In the words of GM's CFO John Devine (JDPA 2002), "in terms of driving profits in the U.S., it's about getting products right."

Table 1 Measures, operationalization and data sources

Measure	*VAR variable*	*Endogeneity*	*Operationalization*	*Temporal aggregation*	*Data sources*
1. Firm value	$VBR_{i,t}$	Endogenous	The ratio of the firm i's market value to book value (defined as market value to book equity) for firm i	Weekly	CRSP
2. Top-line performance	$REV_{i,t}$	Endogenous	The revenues of the firm i	Weekly (quarterly data allocated in proportion to the retail sales level in each week)	COMPUSTAT J.D. Power transactions
3. Bottom-line performance	$INC_{i,t}$	Endogenous	The earnings of the firm i	Weekly (quarterly data allocated in proportion to the retail sales level in each week)	COMPUSTAT J.D. Power transactions
4. Product innovation	$NPI_{ijk,t}$	Endogenous	The brand innovation variable is defined at the 'brand level' as the maximum of the innovation variable for all 'vehicle' transactions for brand j in category k in a particular week	Weekly	J.D. Power expert opinion J.D. Power transactions
5. Sales promotions	$SPR_{ijk,t}$	Endogenous	The monetary equivalent of all promotional incentives for brand j in category k in a particular week.	Weekly	J.D. Power transactions
6. S&P 500	$S\&P500_t$	Exogenous	The S&P 500 index	Weekly	CRSP
7. Construction Cost Index	$CONSTRUCT_t$	Exogenous	The construction cost index	Weekly	CRSP
8. Earnings forecasts	$EPS_{i,t}$	Exogenous	Quarterly earnings forecasts for firm i	Quarterly	I/B/E/S
9. Dollar-Yen exchange rate	$Exchange_t$	Exogenous	The dollar $/Yen ¥ exchange rate	Weekly	Federal Reserve's Foreign Exchange (FX)

Table 2 JDPA expert rating scale on innovation level for car model changes

Innovation scale	*Innovation Level Description*
0	No visible change
1	only styling change, affecting grille, headlight and taillight areas
2	minor changes affecting sheet metal in front and rear quarter areas and minor changes to interior, but not to the instrument panel
3	major changes affecting exterior sheet metal and considerable change to interior, including instrument panel
4	all new sheetmetal including the roof panel, e.g. new platform or change from rear-wheel to front-wheel drive
5	new entry into the market

Table 3 New product introductions in six car categories

Category	*Major innovations (Levels 3-5)*	*Minor innovations (Levels 1-2)*	*Total*
Sport Utility Vehicle	88	51	139
Minivan	24	4	28
Mid-size sedan	21	16	37
Small cars	23	22	55
Compact pick-up	19	29	48
Full-size pick-up	70	32	112
Total	245	154	399

Table 4 Characteristics of the six leading car manufacturers Oct. 1996-Dec. 2001

Characteristic	*Chrysler**	*Ford*	*General Motors*	*Honda*	*Nissan*	*Toyota*
Brands	Dodge, Jeep Chrysler	Ford Lincoln	Chevrolet, Cadillac GMC, Buick, Saturn	Honda Acura	Nissan Infiniti	Toyota Lexus
Number of models	15	16	30	9	9	19
US Market share	15%	21%	28%	8%	4%	10%
Market capitalization ($ M)	48310	52475	41770	36100	15360	119140
Market capitalization to Book value	1.91	2.36	1.90	2.29	1.51	2.16
Quarterly firm earnings ($ M)	845	1612	988	559	-108	1079
Quarterly firm revenue ($ M)	29120	39520	43355	12792	13065	26780
# major introductions (Levels 3-5)	38	77	64	23	15	28
# minor introductions (Levels 1-2)	29	36	29	19	9	28
Sales promotions per vehicle ($)	633	382	632	24	200	113

* Chrysler's merger into Daimler-Chrysler (October 1998) is accounted for in the Chrysler VAR model by including dummy variables (see Nijs et al. 2001 for a similar treatment of exogenous variables).

Table 5 Impact of product introduction and rebates on performance and firm value* (Mean values)

	New-product introductions		*Sales promotions*	
	Short-term	*Long-term*	*Short-term*	*Long-term*
Top-line Performance				
Firm revenue	2.39	4.30	1.48	7.94
Bottom-line Performance				
Firm income	0.37	0.60	1.09	-1.28
Firm value				
Market capitalization-to-book value ratio	0.02	1.14	0.12	-0.78

* elasticity estimates multiplied by 1000 for readability.

Table 6 Number of brands with negative interactions between marketing actions

	Short-term	*Long-term*
SUV	58%	58%
Minivan	67%	75%
Premium Midsize	50%	75%
Premium compact	36%	78%
Compact pickup	20%	60%
Full-size pickup	62%	75%

Table 7 Percentage of brands with positive firm value elasticity

Category	*New Product introduction*		*Promotional Incentives*	
	Short-term	***Long-term***	***Short-term***	***Long-term***
SUV	58%	92%	42%	50%
Minivan	67%	100%	17%	17%
Premium Midsize	67%	83%	17%	17%
Premium compact	71%	57%	86%	57%
Compact pickup	80%	80%	60%	40%
Full-size pickup	50%	75%	75%	75%
Average	66%	81%	50%	43%

Table 8 Performance impact of introduction levels (Mean)*

*New-product introductions***	*Level 1*	*Level 2*	*Level 3*	*Level 4*	*Level 5*
Revenue ST impact	2.47	3.04	3.27	4.67	6.02
Revenue LT impact	2.32	6.83	5.65	5.68	10.45
Income ST impact	0.70	0.38	0.35	0.88	2.09
Income LT impact	0.41	2.61	-0.40	-4.99	0.69
Firm Value ST impact	-0.01	1.27	-0.45	-1.06	1.19
Firm Value LT impact	1.84	1.53	0.87	-2.31	3.46

*elasticity estimates multiplied by 1000 for readability

**ST -short-term impact; LT-long-term impact

Table 9 Summary of Findings

Impact of	*Short-Term*	*Long-Term*
New-product Introductions on firm top-line performance	+	++
New-product Introductions on firm bottom-line performance	+	++
New-product Introductions on firm value	+	++
Promotions on firm top-line performance	+	++
Promotions on firm bottom-line performance	+	-
Promotions on firm value	+	-
New-product introductions on the use of promotions	-	-

\+ significant positive impact

\- significant negative impact

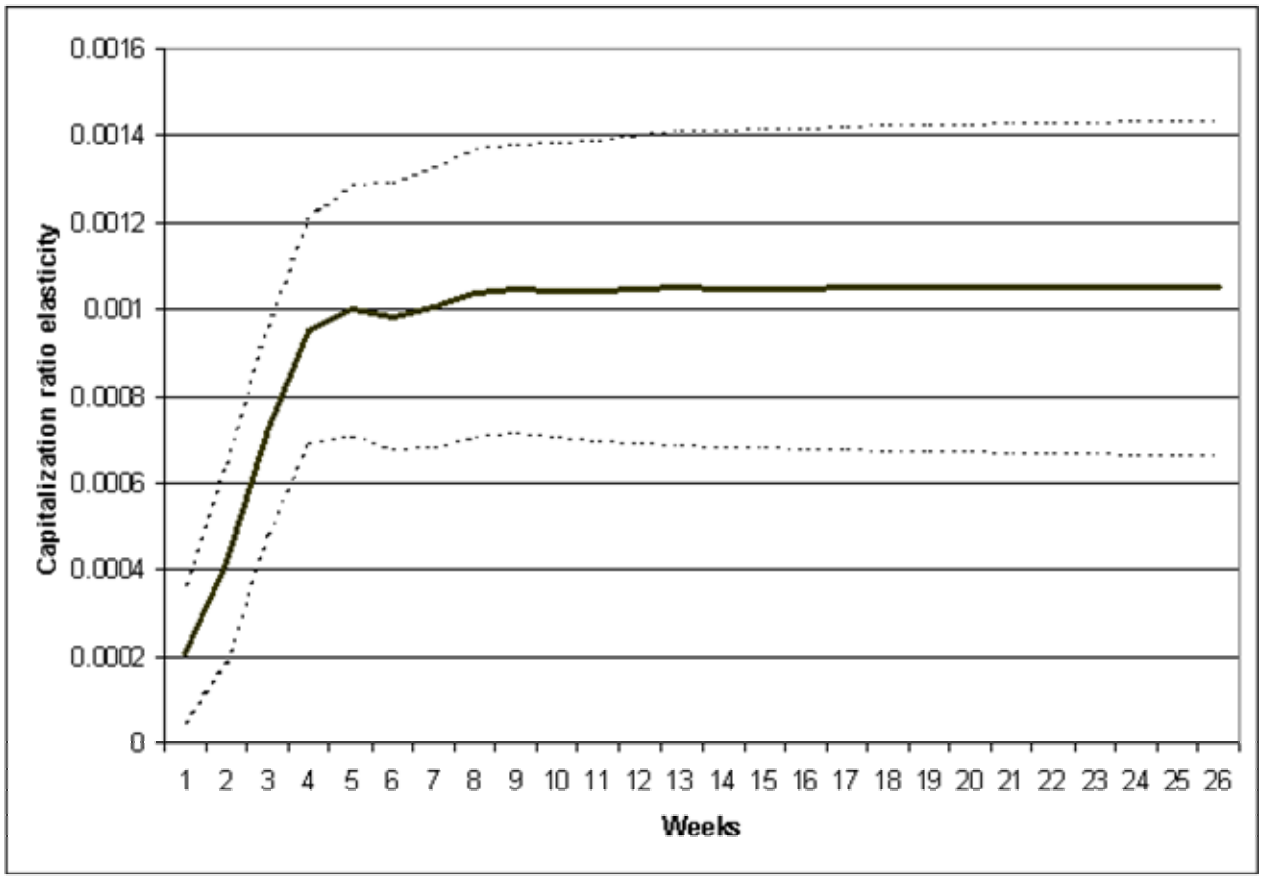
++ intensified positive impact

Table 10 Monetary Impact of new-product introductions and rebates on firm value*

	Chrysler	*Ford*	*GM*	*Honda*	*Nissan*	*Toyota*
New-product introductions						
SUV	302	65	49	102	201	200
Minivan	36	34	36	32	2	184
Mid-size sedan	34	10	132	7	4	154
Small cars	115	30	59	60	-29	73
Compact pick-up	17	58	138	--	32	25
Full size pick-up	47	41	13	--	--	259
Rebates						
SUV	-148	-26	-72	-36	-39	-92
Minivan	-200	-64	-67	-37	-44	-24
Mid-size sedan	-45	-324	-32	-25	-7	-91
Small cars	-64	-58	-24	35	28	37
Compact pick-up	-65	-43	-93	--	32	61
Full size pick-up	-157	-20	-76	--	--	-35

* median impact in millions of dollars.

Figure 1 Over-time elasticity of Odyssey introductions on Honda's market-to-book ratio*



* Computed as the impulse response of the log of the marketing variable on the log of the performance variable

Figure 2 Market Capitalization Forecast Error Variance Decomposition*

* Past market-to-book ratio, income and revenue explain the remaining variance

References

Aaker, David (1991), *Managing Brand Equity: Capitalizing on the Value of a Brand Name*, NY: The Free Press.

Abadir, Karim M., Kaddour Hardi and Elias Tzavalis (1999), "The influence of VAR dimensions on estimator biases,"*Econometrica*, 67, 163-181.

Abraham, Magid and Leonard M. Lodish (1990), "Getting the Most Out of Advertising and Promotion," *Harvard Business Review*, May-June, 50-60.

Adams, Marjorie and Joseph Lacugna (1994), "And Now for Something Completely Different: 'Really' New Products," *Marketing Science Report* No. 94-124. Cambridge, MA: Marketing Science Institute.

Ayers, Doug, Robert Dahlstrom and Steven J. Skinner (1997), "An Exploratory Investigation of Organizational Antecedents to New Product Success," *Journal of Marketing Research*, 34 (February), 107-116.

Ball, Ray and Phillip Brown (1968),"An empirical evaluation of accounting income numbers,"*Journal of Accounting Research* 6 (Autumn), 159-178.

Bayus, Barry, Gary Erickson and Robert Jacobson (2003), "The Financial Rewards of New-product introductions in the Personal Computer Industry," *Management Science*, 49(2), February, 197-210.

----, Sanjay Jain and Ambar Rao (1997), "Too Little, Too Early: Introduction Timing and New Product Performance in the Personal Digital Assistant Industry," *Journal of Marketing Research*, 34 (February), 50-63.

---- and William P. Putsis, "Product proliferation: an empirical analysis of product line determinants and market outcomes," *Marketing Science*, (18), 137-153.

Bell, David R., Jeongwen Chiang, and V. Padmanabhan (1999), "The decomposition of promotional response: An empirical generalization," *Marketing Science*, 18 (4), 504-526.

Blattberg, Robert C. and Scott A. Neslin (1990), *Sales Promotion, Concepts, Methods and Strategies,* Englewood Cliffs, New Jersey: Prentice Hall.

----, Richard Briesch and Ed Fox (1995), "How Promotions Work," *Marketing Science*, 14 (3), G122-132.

Booz, Allen and Hamilton (1982), *New Product Management for the 1980s,* Booz, Allen & Hamilton, New York.

Boulding, William, Ruskin Morgan and Richard Staelin (1997), "Pulling the Plug to Stop the New Product Drain," *Journal of Marketing Research*, 34 (February), 164-176.

Bowman, Douglas and Hubert Gatignon (1995), "Determinants of competitor response time to new-product introduction," *Journal of Marketing Research*, 32, 42-53.

Bronnenberg, Bart J., Vijay Mahajan, and Wilfred Vanhonacker (2000), "The emergence of market structure in new repeat-purchase categories: A dynamic approach and an empirical application," *Journal of Marketing Research*, 37 (1), 16-31.

Business Week (1993), "Flops," August 16, 76-82.

Business Week (2002a), "Retailers Costly Discount Binge," December 17, 12.

---- (2002b), "For GM, Sweet Deals are Smarter than they look," August 26, 44.

Chandon, Pierre, Brian Wansink and Gilles Laurent (2000), "A Benefit Congruency Framework of Sales Promotion Effectiveness," *Journal of Marketing*, 64 (October), 65-81

Chaney, Paul, Timothy Devinney and Russ Winer (1991), "The impact of new-product introductions on the market value of firms," *Journal of Business*, 64 (4), 573-610.

Cheng, Agnes C.S. and Charles J.P. Chen (1997), "Firm Valuation of Advertising Expense: An Investigation of Scaler Effects," *Managerial Finance*, 23(10), 41-61.

----, W. Hopwood and J. McKeown (1992), "A Specification Analysis for the Unexpected Earnings Response Regression Model," *The Accounting Review*, July, 579-598.

Cohen, Morris A., Jehoshua Eliashberg and Tech H. Ho (1997), "An Anatomy of a Decision-Support System for Developing and Launching Line Extensions,"*Journal of Marketing Research*, 34 (February), 117-129.

Cooper, Robert (1984), "How New Product Strategies Impact on Performance," *Journal of Product Innovation Management*, 1, 5-18.

---- and Elko J. Kleinschmidt (1990), "New Products: The Key Factors in Success," *Monograph, American Marketing Association*, Chicago.

---- and ---- (1993), "The impact of Product Innovativeness on Performance," *Journal of Product Innovation Management,* 10, 90-111.

Currim, Imran and Linda Schneider (1991), "A Taxonomy of Consumer Purchase Strategies in a Promotion Intensive Environment," *Marketing Science*, 10 (Spring), 91-110.

David, Julie Smith, Yuhchang Hwang, Buck K.W. Pei and J. Hal Reneau (2002), "The Performance Effects of Congruence Between Product Competitive Strategies and Purchasing Management Design," *Management Science*,8(7) July, 866-885.

De Bondt, Werner F.M. and Richard Thaler (1985), "Does the Stock Market Overreact?," *Journal of Finance*, 40 (3), 793-805.

Dekimpe, Marnik G. and Dominique M. Hanssens (1995), "The persistence of marketing effects on sales," *Marketing Science*, 14 (1), 1-21.

---- and ---- (1999), "Sustained spending and persistent response: A new look at long-term marketing profitability," *Journal of Marketing Research*, 36 (November), 397-412.

----, ---- and Jorge Silva-Risso (1999), "Long-run effects of price promotions in scanner markets," *Journal of Econometrics*, 89, 269-291.

Dess, Gregory S. and Richard R. Robinson (1984), "Measuring Organizational Performance in the Absence of Objective Measures," *Strategic Management Journal*, (3) 5, 265-273.

Dickey, D.A. and W.A. Fuller (1979), "Distribution of the estimators for autoregressive time series with a unit root," *Journal of the American Statistical Association*, 74, 427-431.

Doyle, Peter (2000), *Value-Based Marketing: Marketing Strategies for Corporate Growth and Shareholder Value*. New York: John Wiley & Sons, Ltd, 357 pp.

Eddy, Albert A. and George B. Saunders (1980), "New Product Announcements and Stock Prices," *Decision Sciences*, 11 (1), 90-97.

Enders, Walter (1995), *Applied Econometric Time Series*, New York: John Wiley.

Erickson, Gary and Robert Jacobson (1992), "Gaining Comparative Advantage Through Discretionary Expenditures: The Returns to R&D and Advertising," *Management Science***,** 38 (September), 1264-1279

Eun, Cheol S. and Sangdai Shim (1989), "International transmission of stock market movements,"*Journal of Financial and Quantitative Analysis*, 24(2), pp. 241-256.

Fama, Eugene F. (1965), "Random Walks in Stock Market Prices," *Financial Analysts Journal*, September-October, p.4.

---- and Kenneth R. French (1992), "The Cross-Section of Expected Stock Returns," *Journal of Finance*, 47 (June), 427-465.

Farr, Max (2000), "Automobile Industry," Hoover's Online. February.

Franses, Philip-Hans (1998), *Time Series Models for Business and Economic Forecasting*, Cambridge University Press, Cambridge, U.K.

Fried, Dan and Dov Givoly (1982), "Financial Analysts Forecasts of Earnings: A Better Surrogate for Earning Expectations," *Journal of Accounting and Econometrics*, 85-107.

Froot, Kenneth and Jessica T. Donohue (2002), "The Persistence of Emerging Market Equity Flows," *NBER working paper* w9241.

Gatignon, Hubert and Thomas Roberston (1985), "A prepositional Inventory for New Diffusion Research," *Journal of Consumer Research*, 11 (March), 849-867.

---- and Jean-Marc Xuereb (1997), "Strategic Orientation of the Firm and New Product Performance," *Journal of Marketing Research*, 34 (February), 77-90.

Geroski, Paul, Steve Machin and John Van Reenen (1993), "The Profitability of Innovating Firms," *RAND Journal of Economics*, 24 (2), 211.

Goldenberg, Jacob, Donald R. Lehmann and David Mazursky (1999), "The Primacy of the Idea Itself as a Predictor of New Product Success," *Marketing Science Institute*, Report 99-110.

Granger, Clive and Paul Newbold (1986), *Forecasting Economic Time Series*, Academic Press.

Hamilton, James (1994), *Time series analysis*, Princeton University Press, Princeton, NJ

Hanssens, Dominique M. (1998), "Order Forecasts, Retail Sales and the Marketing Mix for Consumer Durables," *Journal of Forecasting*, 17, 327–346.

----, Leonard J. Parsons & Randall L. Schultz (2001), *Market Response Models, 2nd Edition*. Boston: Kluwer Academic Publishers.

Hoffer, George E. and Robert J. Reilly (1984), "Automobile styling as a shift variable," *Applied Economics,* 16, 291-297.

Holak, Susan and Donald R. Lehmann (1990), "Purchase Intentions and Dimensions of Innovation: an Exploratory model," *Journal of Product Innovation Management*, 7, 59-73.

Horsky, Dan and Patrick Swyngedouw (1987), "Does it pay to change your company name? A stock market perspective, "*Marketing Science*, 6, 320-325.

Hultink, Erik, Abble Griffin, Henry Robben and Susan Hart (1998), "In search of generic launch strategies for new products," *International Journal of Research in Marketing*, 15, 269-285.

Ittner, Christopher and David F. Larcker (1997), "Product development Cycle Time and Organizational Performance,"*Journal of Marketing Research*, 34 (February), 13-23

---- and ---- (1999), "Are Nonfinancial Measures Leading Indicators of Financial Performance? An Analysis of Customer Satisfaction," *Journal of Accounting Research*, vol. 36, 1-35.

J.D. Power and Associates (2002a), "GM Expresses New Confidence, "*Powergram*, April 24.

---- (2002b), "Zetsche outlines sales plan," *Powergram*, April 30.

Johansen, Søren and Katarina Juselius (1990), "Maximum Likelihood estimation and inference on cointegration – with applications to the demand for money, " *Oxford Bulletin of Economics and Statistics,* 52 (2), 169-210.

Jonash, Ronald and Tom Sommerlatte (1999), *The Innovation Premium*, Reading, MA: Perseus Books.

Kalyanaram, Gurumurthy, William T. Robinson and Glen L. Urban (1995), "Order of Entry: Established Empirical Generalizations, Emerging Empirical Generalizations, and Future Research," *Marketing Science* 14, G212-221.

Kashani, Kamran (2003), "The path to growth: the power of brand innovation," *Innovation Europe*, 2003, p. 56-58.

Kashani, Kamran, Miller, Joyce and Clayton, Tony (2000), "A virtuous cycle: Innovation, consumer value, and communication: key findings for policy-makers and chief executives," Lausanne, International Institute for Management Development.

Keller, Kevin L. (1998), *Strategic Brand Management*, Upper Saddle River, NJ: Prentice-Hall

Kelm, Kathryn M., V.K. Narayanan and George E. Pinches (1995), "Shareholder Value creation during R&D and Commercialization Stages," *The Academy of Management Journal*, Volume 38, 3 (June), 770-786.

Kleinsmidt, E.J. and R.G.Cooper (1991), "The Impact of Product Innovativeness on Performance," *Journal of Product Innovation Management*, 8 (December), 240-251.

Kopalle, Praveen, Carl F. Mela, and Lawrence Marsh (1999), "The Dynamic Effect of Discounting on Sales: Empirical Analysis and Normative Pricing Implications," *Marketing Science*, 18, 3, 317-332.

Krishna, Aradhna, Mela, Carl and Joel Urbany (2001), "Inertia in Pricing," Working paper, University of Notre Dame, IN.

Lyons, John D, Brad Barber and Chih-Ling Tsai (1999), "Improved methods for tests for long-run abnormal stock returns,"*Journal of Finance*, 54 (10), 165-201.

Mahajan, Vijay and Jerry Wind (1991), "New Product Models: Practice, Shortcomings, and Desired Improvements," Report Number 91-125, *Marketing Science Institute*, Cambridge, MA.

Marketing Science Institute (2002), *Research Priorities 2002-2004,* Cambridge, MA.

Mason, Joseph, Ali Anari and James Kolari (2000), "The Stock of Closed Bank Deposits, Duration of Credit Channel Effects, and the Persistence of the US Great Depression," Working Paper.

McMath, Robert and Thom Forbes (1998), *What Were They Thinking?* New York: Business-Random House.

Menge, John A (1962), "Style change costs as a market weapon," *Quarterly Journal of Economics,* 76, 632-647.

Michaely Roni, Richard Thaler and Kent Womack (1995), "Price Reactions to Dividend Initiations and Omissions: Overreaction or Drift?,"*Journal of Finance*, 50 (June), 573-608.

Miller Merton and Franco Modigliani (1961), "Dividend Policy, Growth and Value of Shares," *Journal of Business*, October, 411-433.

Mizik, Natalie and Robert Jacobson (2003), "Trading Off Between Value Creation and Value Appropriation: The Financial Implications of Shifts in Strategic Emphasis," *Journal of Marketing*, 67, 1 (January), 63-76.

Moenart, Rudy K., William E. Souder, Arnoud De Meyer and Dirk Deschoolmeester (1994), "R&D-Marketing Integration Mechanisms, Communication Flows, and Innovation Success," *Journal of Product Innovation Management*, 11(1), 31-45.

Montoya-Weiss, M.M. and Roger J. Calantone (1994) "Determinants of new product performance: A review and meta analysis," *Journal of Product Innovation Management* (11), 397-417.

Moore, Geoffroy (1995), *Inside the Tornado*, New York: Harper Business.

Moorman, Christine (1995), "Organizational Market Information Processes: Cultural Antecedents and New Product Outcomes," *Journal of Marketing Research*, 32 (August), 453-470

Moorman, Christine and Anne Miner (1997), "The Impact of Organizational Memory on New Product Performance and Creativity," *Journal of Marketing Research*, 34 (February), 91-106.

Nijs, Vincent, Marnik Dekimpe, Jan-Benedict. E.M. Steenkamp, and Dominique M. Hanssens (2001), "The category demand effects of price promotions," *Marketing Science*, 20 (1), 1-22.

Ostlund, Lyman (1974), "Perceived innovation attributes as predictors for innovativeness," *Journal of Consumer Research*, 1, 23-29.

Pardue, J. Harold, Eric Higgins and Tim Biggart (2000), "The Impact of New Product Announcements on Firm Value in Information Technology Producing Industries: An examination of industry-level evolutionary Eras," *The Engineering Economist*, 45 (2) 144-157.

Pauwels, Koen (2003), "How dynamic consumer response, dynamic competitor response and expanded company action shape long-term marketing effectiveness", Social Science Research Network, Tuck School of Business Working Paper No 03-19, **http://papers.ssrn.com/sol3/papers.cfm?abstract_id=405123**

----, Dominique M. Hanssens, and S. Siddarth (2002), "The long-term effects of price promotions on category incidence, brand choice and purchase quantity," *Journal of Marketing Research*, vol. 34 (November), 421-439.

---- and Shuba Srinivasan (2003), "Who benefits from store brand entry?," *Marketing Science*, forthcoming.

Pesaran, Hashem M., Richard G. Pierse and Kevin C. Lee (1993), "Persistence, Cointegration and Aggregation: A Disaggregated analysis of Output Fluctuations in the US Economy," *Journal of Econometrics*, 56 (March), 8.

---- and Ron P. Smith (1998), "Structural Analysis of Cointegrating VARs," *Journal of Economic Surveys*, 12, 471-506

Powers, Keiko, Dominique Hanssens, Hser Yih-ing, and Anglin M. Douglas (1991), "Measuring the long-term effects of public policy: The case of narcotics use and property crime," *Management Science*, 37 (6), 627-644.

Scott Morton, Fiona, Florian Zettelmeyer and Jorge Silva-Risso (2001), "Internet Car Retailing," *Journal of Industrial Economics,* Vol. XLIX, 4, December.

Sherman, Roger and George Hoffer (1971), "Does automobile style change pay off?" *Applied Economics*, (3), 153-165.

Sims, Christopher A. and Tao Zha (1999), "Error Bands for Impulse Responses," *Econometrica*, Vol. 67 (5), 1113-1156.

Smith, Preston G. and Donald G. Reinertsen, *Developing products in half the time,* Van Nostrand Reinhold, New York.

Song, Michael and Mark Parry (1997), "The Determinants of Japanese New Product Successes,"*Journal of Marketing Research,* 34 (February), 64-76.

Srinivasan, Shuba and Frank M. Bass (2001), "Diagnosing competitive responsiveness: Disentangling retailer-induced and manufacturer-induced reactions," paper presented at the MSI conference, Cambridge, MA, May.

----, Koen Pauwels, Dominique M. Hanssens and Marnik Dekimpe (2001), "Do promotions benefit retailers, manufacturers, or both?" *Marketing Science Institute*, Report 01-120.

----, Koen Pauwels and Vincent Nijs (2003), "Price Inertia in Marketing Decision Making: Extent and Financial Consequences," paper presented at the MSI conference, Edmonton, July.

----, Peter Popkowski Leszczyc, and Frank M. Bass (2000), "Market share response and competitive interaction: The impact of temporary, evolving and structural changes in prices," *International Journal of Research in Marketing*, 17 (4), 281-305.

Srivastava, Rajendra K., Tasadduq A. Shervani and Liam Fahey (1998), "Market-based assets and shareholder value: A framework for analysis," *Journal of Marketing*, 62 (January), 2-18.

Tardiff, Joseph (1998), "Motor Vehicles and Motor Vehicle Equipment," US Industry Profiles, New York: Gale Research, 394-401.

Thorbecke, Willem (1997), "On Stock Returns and Monetary Policy," *Journal of Finance* 52 (June): 635–54.

Urban, Glen and John Hauser (1980), *Design and Marketing of New Products.* Englewood Cliffs, N.J.: Prentice-Hall.

USA Today (2002), "Incentives likely to stay as auto sales fall," Wednesday October 2. p. 3B

Wall Street Journal (2003), "GM's Deep-discounting Strategy Helps Auto Maker Regain Ground," January 17, p A1.

---- (2002a), "U.S. Auto Sales Accelerated 13%, Driven by Deals," September 4, p B5.

---- (2002b), “While Auto Makers Sputter, Their Dealers Go Full Throttle,” September 9, p A1.

---- (2002c), November 19, “Revving up Lincoln-Mercury,”page B4.

White, Joseph B. (2001), “Ford and GM Work to Restore Prestige of Lincoln and Cadillac,” *The Wall Street Journal*, Eyes on the Road, December 3.

Wind, Yoram J. (1982), *Product Policy: Concepts, Methods, and Strategy*. Reading, MA: Addison-Wesley.

Wittink, Dick R., A. Ryans and N. Burus (1982), “New Products and Security Prices,” *Working Paper,* Ithaca, N.Y, Cornell University.

Zivot, Eric and Donald W. K. Andrews (1992), “Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis,” *Journal of Business and Economic Statistics*, 10 (3), 251-270.

[1] Persistent (permanent) effects are defined as the difference between baseline performance before the marketing action and baseline performance after the action's effects have stabilized. See Pauwels et al. (2002) for a detailed explanation of these time frame distinctions

[2] Stationary variables fluctuate as temporary deviations around a fixed mean or trend. Evolving variables such as random walks have a unit root, i.e. they fluctuate without reversion to a fixed mean or trend. For technical definitions and applications in marketing, see e.g. Dekimpe and Hanssens (1995).

[3] We also performed a cointegration test for the existence of a long-run equilibrium among these evolving variables. The test result was negative. Detailed results are available upon request to the first author.

[4] Other measures of firm value include return on assets, return on sales and return on equity. However, these measures focus on the short term, they are not risk-adjusted and their typical level of temporal aggregation makes it harder to make the link to specific new-product introductions. Furthermore, since accounting measures are based on historical data, they do not adequately reflect future expected revenue streams (Kalyanaram, Robinson and Urban 1995).

[5] While inclusion of the transportation index appears more relevant than the construction index, the big six car manufacturers account for much of the variation in this index, which could cause an endogeneity bias. We performed a sensitivity analysis with the transportation index and found similar results.

[6] A major source of fleet sales is vehicles sold to rental car companies, which are often affiliated with or owned by a car manufacturer. For this reason, including fleet sales could contaminate our measures.

[7] As stated earlier, we investigate only the launch of new or updated products (which may incorporate process innovations), not process innovations by themselves.

[8] For example, if Toyota offers two redesigned SUV models in a particular week, with innovation levels 1 and 3, the new- product introduction variable takes on the value of 3 for the Toyota brand in the SUV category in that week.

[9] Detailed results are available from the first author upon request.

[10] We follow Pauwels et al. (2002) in adopting static weights (i.e. average share across the sample) to compute the weighted prices, rather than dynamic (current-period) weights.

[11] This emerging consumer acceptance information about the new product could include vehicle sales, days-to-turn, product reviews, advertising efforts, consumer awareness, etc… The determination of the exact nature of this information is beyond the scope of this study

[12] As our innovation variables are not continuous, we validate our VAR results by estimating ordered probit models for the 5-point innovation scale and probit models for the 5 innovation-level dummy variables Comparison of the probit coefficients with the VAR innovation equations yields high correlations (respectively 0.78 for the major/minor innovation models and 0.87 for the 5-point innovation scale models). We conclude that our main results are robust to the nature of the innovation scale.

[13] We derive the dollar metric of incremental impact on market capitalization using the estimated elasticities and the end-of-the-observation period values of the brand's marketing variables (innovation level and rebate) and market capitalization-to-book value ratio (Dekimpe and Hanssens 1999, footnote 11).