Firms frequently compete across multiple segments. Such multimarket contact has been shown to deter aggressive competition, leading to “mutual forbearance.” Empirical support for this phenomenon derives mainly from studies on the direct effects of multimarket contact on a firm’s decision variables. The analysis in this article extends the existing literature by empirically considering both the direct effects of multimarket contact (i.e., how it affects a firm’s decision variables) and its strategic effects (i.e., how it affects a firm’s reactions to its competitors’ decision variables). The authors study the pricing and new product introduction decisions of firms in the personal computer industry. Consistent with prior research, the authors find that firms mutually forbear in price and new product introductions. More important, the authors find strong strategic effects that are asymmetric; namely, firms respond to competitive attacks by introducing new products but do not use price as a retaliatory weapon. Thus, firms isolate any competitive retaliation to only a single marketing variable. The results offer a deeper understanding of the influence of multimarket contact on firm behavior.

*Keywords: competitive strategy, pricing, new product introductions*

The Strategic Effects of Multimarket Contact: Mutual Forbearance and Competitive Response in the Personal Computer Industry

Firms within the same industry frequently compete against each other in distinct geographic markets, product categories, or market segments (Jayachandran, Gimeno, and Varadarajan 1999). The term “multimarket contact” (MMC) describes this scenario, and the resultant competition is termed multimarket competition. With MMC, competitive actions by a firm in one market can initiate reactions by a competitor in any, some, or all of the markets in which the firms compete—not just in the market under attack. When firms operate in two or more markets, the mutual recognition that their decisions are interdependent can affect competitive decisions—in particular, leading to what is termed “mutual forbearance.” The original idea that MMC encourages collusive behavior is credited to Edwards (1955). As Edwards stated in his 1965 Senate testimony (qtd. in Phillips and Mason 1992, pp. 395–96),

“When one large conglomerate enterprise competes with another, the two are likely to encounter each other in a considerable number of markets. The multiplicity of their contact may blunt the edge of their competition. A prospect of advantage from vigorous competition in one market may be weighed against the danger of retaliatory forays by the competitor in other markets. Each conglomerate competitor may adopt a live-and-let-live policy designed to stabilize the whole structure of the competitive relationship.”
Whether MMC increases or decreases interfirm rivalry is a question of central interest to managers and policy makers (Edwards 1955; Porter 1980). While some studies find no support for mutual forbearance, in general, the extant empirical literature has concluded that higher MMC is associated with mutual forbearance and can lead to market power, reduced competitive intensity, increased returns, and decreased rates of entry and exit (see the reviews in Golden and Ma 2003; Jayachandran, Gimeno, and Varadarajan 1999). In other words, firms tend to avoid attacking rivals they meet in multiple markets because of an increased possibility of retaliation across markets (Bernheim and Whinston 1990; Karnani and Wernerfelt 1985; Spagnolo 1999).

Implicit in Edwards’s testimony is that the direct and strategic effects of MMC must be significant for mutual forbearance to be sustainable over time. Here, the direct effects are related to how MMC affects a firm’s decision variables, and the strategic effects are related to how MMC affects a firm’s reactions to its competitors’ decisions. The strategic effects of MMC are important to understand because firms facing rivals in multiple markets are more likely to protect their positions by responding aggressively if attacked by competitive price cuts or more new product introductions (Chen 1996). In other words, the strategic effects of MMC constitute a mechanism to enforce mutual forbearance. As Porter (1980, p. 88) notes, “A central characteristic of competition is that firms are mutually dependent: firms feel the effects of each other’s moves and are prone to react to them.” Although the direct effects of MMC indicate the potential for mutual forbearance, evidence of strong strategic effects is also necessary to sustain any tacitly collusive behavior by signaling that deviations from mutual forbearance will be punished. Strong strategic effects would also be consistent with a hypercompetitive environment and might help explain how mutual forbearance can exist along with episodes of intense competition (e.g., Craig 1996; Gimeno and Woo 1996). We demonstrate that both the direct and the strategic effects of MMC must be analyzed to understand more completely how mutual forbearance can be sustained in a competitive market.

To date, researchers have empirically studied the direct relationship between MMC and firm-level performance (e.g., Baum and Korn 1996; Haveman and Nonnemaker 2000; Scott 1982), price (e.g., Evans and Kessides 1994; Gimeno and Woo 1996; Parker and Röller 1997), and marketing spending (e.g., Shankar 1999); in general, the extant literature has ignored the possible strategic effects of MMC. We extend the literature by considering (1) both the direct and the strategic effects of MMC and (2) the joint effects of MMC on pricing and new product introductions. We apply the idea of multimarket competition at the level of market segments in a single industry by developing a firm-in-market measure of MMC. We study the U.S. personal computer (PC) industry, a dynamic industry setting in which price and product decisions are key decision variables (e.g., Bayus, Erickson, and Jacobson 2003; Bayus and Putsis 1999; Putsis and Bayus 2001). We model a system of equations in which sales, price, and new product introductions are jointly endogenous. In agreement with the literature, we find that the direct effects of MMC are consistent with mutual forbearance in price and new product introductions. More important, we find strong and significant strategic effects of MMC. As we expected, PC firms with high MMC respond to competitive introductions of new products; surprisingly, these firms do not use price as a retaliatory weapon. This result indicates that firms in this industry isolate their competitive retaliations to only a single marketing variable. Together, these results suggest that high levels of MMC reduce firms’ incentives to enter into price wars or product competition but increase their incentive to respond to competitive attacks with increases in new product introductions. Notably, the results are consistent with Bernheim and Whinston’s (1990) theoretical discussion, in which they argue that firms may be able to maintain tacitly collusive outcomes in price competition (a variable with a relatively short decision horizon in which quick actions and reactions can lead to a downward spiral in profits) through their greater punishment ability in product competition (a variable with a relatively long decision horizon). The results are also in line with other research that finds asymmetric effects for marketing-mix variables; namely, firms may accommodate a rival in one marketing variable but retaliate in another variable (e.g., Gatignon, Anderson, and Helsen 1989).

**MMC**

In this section, we first briefly discuss the related MMC literature and develop hypotheses for the direct and strategic effects. We then describe our market segment–level measure of MMC.

**Theory and Hypotheses**

In general, MMC increases the scope of rivalry. In this case, aggressive actions in one market (e.g., price decreases, increases in new product introductions) may be met with retaliation in all the markets in which the firms simultaneously compete (Porter 1980). In particular, MMC increases the likelihood that deviations from a collusive arrangement in any one market will be severely punished (Karnani and Wernerfelt 1985). Under MMC, the incentive constraints across markets are pooled. Thus, any deviation from a tacitly collusive arrangement can be punished across markets (Bernheim and Whinston 1990; Spagnolo 1999). Although MMC may not affect the incentive for tacit collusion when markets are identical and firms exhibit constant returns to scale technology, under most other realistic conditions, MMC can facilitate tacit collusion by relaxing the incentive constraints governing tacit arrangements (Bernheim and Whinston 1990; Spagnolo 1999). For example, if demand growth rates vary across markets, firms can shift punishment power from rapidly to slowly growing markets, reinforcing the possibility of collusive arrangements. The resultant mutual forbearance between competitors has been empirically demonstrated in multiple settings, including the airline (e.g., Baum and Korn 1999; Evans and Kessides 1994; Gimeno and Woo 1996), manufacturing (Scott 1982), banking (e.g., Haveman and Nonnemaker 2000), software (Young et al. 2000), mobile telephone (e.g., Parker and Röller 1997), insurance (Greve 2008), and prescription drug (Shankar 1999) industries. Following this literature, we expect that the direct effects of MMC are consistent with mutual forbearance in price and new product introductions:

- $H_{1c}$: MMC is positively related to price.
- $H_{1d}$: MMC is negatively related to new product introductions.
The importance of competitive attacks and response is well established in the literature (e.g., Chen 1996; Gatignon, Anderson, and Helsen 1989; Shankar 1999, 2006). Attacks are rarely made with impunity, and thus possible retaliatory actions by competitors should be taken into account in assessing the merits of any strategic decision. With MMC, the potential of achieving an advantage in one market must be weighed against the danger of retaliation in all the markets in which a firm competes. Although a firm with greater MMC is less likely to initiate an attack (i.e., a direct effect), it is more likely to strongly counter a rival’s actions (Chen 1996). As MMC increases, a firm’s assets outside any focal market are increasingly at risk because of its rivals in the focal market. Thus, firms have a greater incentive to punish competitive attacks as their level of MMC increases. In other words, firms with high MMC have more to lose by not responding to rivals deviating from mutual forbearance than firms with low MMC. In support of this idea, Young and colleagues (2000) find that firms in the packaged software industry with high MMC have shorter response times to competitive moves (e.g., product introductions, marketing and promotion campaigns). Following this line of reasoning, we propose that the strategic effects of MMC are consistent with reactions to competitor attacks with price or new product introductions:

H_{2a}: MMC increases the effect of competitive price decreases on own price.

H_{2b}: MMC increases the effect of competitive new product introduction increases on own new product introductions.

Although the theory underlying mutual forbearance is built on competitive rivalry involving responses to marketing attacks, in practice firms may initiate changes in price or new product introductions that are nonthreatening. For example, Ramaswamy, Gatignon, and Reibstein (1994) identify two types of competitive reactions: retaliation (e.g., competing firms cut price or invest in new products) and cooperation (e.g., competing firms increase price or cut back on new product introductions). Because the literature is silent on the possible strategic effects of MMC when rivalry involves cooperation, we do not develop formal hypotheses here. Moreover, the data primarily involve noncooperative actions. However, to provide a more complete picture of the implications from MMC, we subsequently explore the strategic effects of MMC when firms increase price or decrease new product introductions.

**Measurement**

Conceptually, there is agreement that any measure of MMC should capture whether firms are competing in the same markets and the degree of their overlap (e.g., Karnani and Wernerfelt 1985). From an empirical perspective, however, researchers have proposed several measures of MMC (see the review in Gimeno and Jeong 2001). Although many measures are based on simple counts of the number of competitive contacts across markets, some researchers challenge this assumption, arguing that such measures might be large merely as a result of random contact (e.g., Baum and Korn 1996, 1999; Scott 1982). Because there is general agreement that some contacts are more important or salient than others, some proposed MMC measures control for the scope/size of the competing firms (e.g., Baum and Korn 1999; Chen 1996). There is also evidence that count-based measures have low discriminant validity; that is, count-based measures are highly correlated with the number of markets the firm competes in, firm size, and the number of competitors that are not in the homologous network of MMC (Gimeno and Jeong 2001). This may not be problematic if there is substantial variability in the number of markets across firms (e.g., as in the airline industry). However, when the industry comprises a relatively small number of distinct markets, there is significant concern that a count-based MMC measure will have low discriminant validity. Thus, we avoid simple count-based MMC measures in the empirical study.

The incentive constraints for tacit collusion across markets are pooled under MMC. That is, increasing MMC provides firms with more opportunities to compete against each other, and the benefits from tacit collusion across multiple markets are high. Correspondingly, because much is at stake across multiple markets, a high MMC also increases the potential benefits to a firm that deviates from a collusive arrangement. At the same time, MMC increases the potential intensity of retaliation from competitors across multiple markets (e.g., Bernheim and Whinston 1990; Jayachandran, Gimeno, and Varadarajan 1999). Therefore, in developing a measure of MMC, we need to balance the trade-off between potential benefits of tacit collusion (direct effects) and the potential strength of punishment across markets by competitors (strategic effects).

Accordingly, we propose a new MMC measure that is in the spirit of Chen (1996, p. 106), who defines market commonality as “the degree of presence that a competitor manifests in the markets where it overlaps with a focal firm.” Correspondingly, the MMC measure is a function of (1) the strategic importance for the focal firm of each of the markets shared with a competitor (captured by the percentage of the focal firm’s sales obtained in the market) and (2) the competitor’s market position in these markets (captured by the competitor’s market share in the market). The idea of strategic importance and the competitor’s market position is consistent with the purpose of the study—namely, to estimate potential benefits of MMC and possible strength of punishment from competitors.

It is possible to measure MMC at the dyad level (i.e., overall degree of MMC between two firms across all the markets), firm-in-market level (i.e., overall degree of MMC between a focal firm and its focal market competitors), and market level (i.e., overall degree of MMC among the firms serving a focal market) (Gimeno and Jeong 2001). For our empirical analysis, we develop dyad-in-market-level and firm-in-market-level measures (for further discussion on the different levels of measurement, see the Web Appendix at http://www.marketingpower.com/jmrjune10). Note that Chen’s (1996) measure was constructed at the dyad level to capture the overall degree of MMC. However, our dyad-in-market-level measure captures different dyads of MMC across markets. It captures the degree of MMC outside the focal market between two competing firms in a focal market. Different from Chen, our measure captures the MMC only outside the focal market to avoid muddled causality (Gimeno and Jeong 2001).

Let $M$ be the number of markets, $N_{mi}$ be the number of competing firms in market $m$ at time $t$, and $I_{int} = 1$ if firm $i$
is competing in market $m$ at time $t$. Then, firm $i$’s MMC with competitor $j$ in market $m$ at time $t$ is as follows:

\[
(1) \quad MMC_{ijmt} = I_{imt} \times I_{jmt} \sum_{k \neq m}^{M} \left[ \text{FirmShare}_{ik} \times \text{MarketShare}_{jkt} \right]
\]

\[
= I_{imt} \times I_{jmt} \sum_{k \neq m}^{M} \left[ \frac{\sum_{h=1}^{N} \text{SALES}_{hkt}}{\sum_{h=1}^{N} \sum_{ik} \text{SALES}_{hkt}} \right]
\]

Note that firm share captures the importance of market $k$ for firm $i$. Conversely, market share captures competitor $j$’s market position in market $k$. This dyad-in-market measure is summed across nonfocal markets. Key properties are that (1) it is asymmetric ($MMC_{ijmt} \neq MMC_{jimt}$), (2) it increases with the focal firm’s nonfocal market’s sales and competitor’s nonfocal market share, and (3) it is not necessarily increasing in the number of the markets shared with a competitor (for an example, see the Web Appendix at http://www.marketingpower.com/jmrjune10). This third property implies that the sheer number of markets may not be correlated with MMC. Thus, after we control for the number of markets a firm competes in (to account for potential demand and cost interdependencies), our measure will better reflect the strategic incentives associated with MMC than existing measures.

Considering the competitive situation in the PC industry, we assume that a focal firm’s action can affect all competitors. Thus, we summarize the dyad-in-market MMC across all competitors in the focal market, leading to a firm-in-market measure. To do this, we average such contact across all competitors in the market; this leads to the firm-in-market level MMC measure we use in the empirical estimations:1

\[
(2) \quad MMC_{imt} = \frac{\sum_{j=1}^{N} MMC_{ijmt}}{N_{mt} - 1}.
\]

**THE STUDY**

While previous studies have emphasized the direct effects of MMC on demand- or supply-side variables, we extend these studies by simultaneously considering the direct and strategic effects of MMC on demand (sales), supply (price), and new product introductions. Unlike previous studies involving MMC, we account for the endogeneity of the decision variables in our system of equations. We first describe the empirical setting for the study. We then discuss the model to be estimated, along with the associated estimation issues.

**Empirical Setting**

A PC is a general-purpose, single-user machine that is microprocessor based. It is capable of supporting attached peripherals and can be programmed in a high-level language (for historical reviews of the PC industry, see Steffens 1994). We analyze information from International Data Corporation’s (IDC) Processor Installation Census. IDC is the oldest among the various firms that track the computer industry and is widely recognized as providing an accurate picture of activity in this industry (Bayus and Putsis 1999; Chu, Chintagunta, and Vilcassim 2007; Putsis and Bayus 2001). The study population includes all major firms that sold a PC in the United States during the 1995–1999 period. For the purpose of this study, it is important that IDC collected information for five distinct customer market segments during this period: the home market, the large/medium business market, the small business/office market, the government market, and the education market. Annual firm-level data for the industry were constructed from the detailed market × product-level information in the IDC database. We define a firm’s product as a unique combination of product form (e.g., desktop, notebook), subbrand (e.g., Hewlett-Packard’s Pavilion), and microprocessor. This definition considers major product architectures that reflect serious investments in engineering and/or branding, while ignoring minor modifications of lesser consequence, such as whether a PC is outfitted with a particular sound or video card.

The data include information on 45 firms, 122 brands, and 927 products in five customer market segments. The large/medium business segment is defined according to number of employees (i.e., a business site is large if it has 500 or more employees and medium if it has 100–499 employees). The small business/office segment includes small businesses (a business site with 10–99 employees) and small offices (nonresidential business site with fewer than 10 employees). The government segment includes city, county, state, provincial, regional, military, and federal governmental agencies, but it excludes PC sales to government-owned commercial enterprises. The education segment reflects sales from education and instructional institutions covering K–12, college, university, and trade schools. The home segment is defined as all home purchases by individuals (not an organization), regardless of usage (home office, work-at-home, or consumer applications).

During the period 1995–1999, the large/medium business segment had a 35.9% share of the entire industry, followed by 28.8% for the home segment and 23.9% for the small business/office segment (see Table A1 in the Web Appendix at http://www.marketingpower.com/jmrjune10). The education and government segments had only 5.8% and 5.6% shares, respectively. Each market segment had a distinct competitive environment, and firms had a different emphasis and presence across markets. For example, Compaq, Dell, IBM, and Hewlett-Packard were focusing more on large/medium business segment during this time, while the home segment was more important for Gateway, NEC, and eMachine. Acer and Micron had a relatively bigger stake in the small business/office segment, while the education and home segments were Apple’s main customers. As a small firm, Premio specialized in the education segment, and DTK and Everex focused primarily on the government segment (see Table A1 in the Web Appendix). This general situation in which firms are strong in some segments and weak in others is conducive to the practice of mutual forbearance.
As Table 1 shows, in general, sales increased over the 1995–1999 period, with the education and large/medium business segments showing the fastest sales growth (average percentage changes are 18.11% and 13.53%, respectively). During this period, firms primarily decreased price and increased new product introductions (we observe relatively few cases in which prices were increased or new product introductions were decreased).

Model Development

We construct a system of three equations pertaining to market demand, price, and new product introductions. Our approach does not involve the use of fully structured models; instead, we follow the extensive research stream employing reduced-form models to study the role of MMC (e.g., see the reviews in Golden and Ma 2003; Jayachandran, Gimeno, and Varadarajan 1999). Although our approach does not allow for policy simulations, our model enables the exploration of a rich set of behaviors that may inform the development of new structural models in future studies (see Chintagunta et al. 2006). This seems particularly appropriate because the existing empirical literature is silent on the possible strategic effects of MMC.

Consistent with prior research (e.g., Bayus and Putsis 1999; Kekre and Srinivasan 1994), we use both time-series (i.e., t: time) and cross-sectional (i.e., i: firm, m: market segment) variations. Although time-series variation is more central to the research question, we use the mixture of cross-sectional and time-series data to obtain interfirm and intramarket variability. In our model, sales, price, and new product introductions are jointly endogenous (i.e., the variables appear in all three equations). In addition, competitive price and new product introductions appear in all three equations. For identification purposes, each equation has a different set of control variables. Thus, we study the following three-equation system (also see Figure 1):3

(3a) \[ \text{PRICE}_{imt} = \alpha_{0imt} + \alpha_{1imt} \times \text{SALES}_{imt} + \alpha_{2imt} \times \text{NEWPRODUCTS}_{imt} + \gamma \times \text{CPRICE}_{imt} + \gamma \times \text{CNEWPRODUCTS}_{imt} + \gamma \times \text{TECHAGE}_{imt} + \gamma \times \text{DESKTOP}_{imt} + \gamma \times \text{PHHI}_{imt} + \gamma \times \text{NUMMARKETS}_{imt} + \epsilon_{imt}, \]

(3b) \[ \text{NEWPRODUCTS}_{imt} = \beta_{0imt} + \beta_{1imt} \times \text{SALES}_{imt} + \beta_{2imt} \times \text{PRICE}_{imt} + \beta_{3imt} \times \text{CPRICE}_{imt} + \beta_{4imt} \times \text{CNEWPRODUCTS}_{imt} + \beta_{5imt} \times \text{PHHI}_{imt} + \beta_{6imt} \times \text{NUMMARKETS}_{imt} + \epsilon_{imt}, \] and

(3c) \[ \text{SALES}_{imt} = \gamma_{0imt} \times \text{PRICE}_{imt} + \gamma_{1imt} \times \text{NEWPRODUCTS}_{imt} + \gamma_{2imt} \times \text{CPRICE}_{imt} + \gamma_{3imt} \times \text{CNEWPRODUCTS}_{imt} + \gamma_{4imt} \times \text{DISTRIBUTION}_{imt} + \epsilon_{imt}, \]

where

\[
\begin{pmatrix}
\sigma_{\text{α}}
\sigma_{\text{β}}
\sigma_{\text{γ}}
\end{pmatrix}
\sim N\left(0, \Sigma_{\epsilon}\right).
\]

Detailed definitions of the variables are in Table 2; descriptive statistics and correlations are in the Web Appendix (http://www.marketingpower.com/jmrjune10).

In the price equation (Equation 3a), new products typically command a premium price because of newer technology and/or features. Previous research has also suggested that an increase in product line length (due to new products) lowers production efficiency and dilutes scale economies (e.g., Baumol, Panzar, and Willig 1982; Quelch and Kenny 1994). Consistent with this “supply effect,” a new product introduction can increase the firm’s costs by reducing scale

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Table 1

<table>
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<tr>
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<tbody>
<tr>
<td>Sales (×10^3 units)</td>
<td>Education</td>
<td>2077.49</td>
<td>2457.58</td>
<td>3021.42</td>
<td>3429.49</td>
<td>4035.86</td>
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<td></td>
<td>Government</td>
<td>2653.34</td>
<td>2610.40</td>
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<td>3386.08</td>
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<tr>
<td></td>
<td>Home</td>
<td>13,249.76</td>
<td>14,281.96</td>
<td>13,854.04</td>
<td>12,192.58</td>
<td>13,617.79</td>
<td>7.59%</td>
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<tr>
<td></td>
<td>Large business</td>
<td>12,985.06</td>
<td>16,990.50</td>
<td>20,651.16</td>
<td>21,388.63</td>
<td>20,990.87</td>
<td>13.53%</td>
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<tr>
<td></td>
<td>Small office</td>
<td>9766.21</td>
<td>12,906.93</td>
<td>13,852.80</td>
<td>15,432.90</td>
<td>17,617.79</td>
<td>7.59%</td>
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<td></td>
<td>Total</td>
<td>40,731.85</td>
<td>49,247.38</td>
<td>53,606.33</td>
<td>56,954.20</td>
<td>58,223.19</td>
<td>9.56%</td>
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<tr>
<td>Price (dollars)</td>
<td>Education</td>
<td>2133</td>
<td>2472</td>
<td>2186</td>
<td>1855</td>
<td>1581</td>
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<td>Government</td>
<td>2494</td>
<td>2475</td>
<td>2240</td>
<td>1971</td>
<td>1726</td>
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<tr>
<td></td>
<td>Home</td>
<td>2003</td>
<td>2086</td>
<td>1826</td>
<td>1783</td>
<td>1343</td>
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<td></td>
<td>Large business</td>
<td>2592</td>
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<td>2375</td>
<td>2140</td>
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<tr>
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<td>2346</td>
<td>2477</td>
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<td>2088</td>
<td>1734</td>
<td>-6.93%</td>
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<tr>
<td></td>
<td>Average</td>
<td>2272</td>
<td>2370</td>
<td>2171</td>
<td>1993</td>
<td>1630</td>
<td>-7.62%</td>
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</tr>
<tr>
<td>New products (number)</td>
<td>Education</td>
<td>—</td>
<td>4.91</td>
<td>7.36</td>
<td>4.73</td>
<td>5.23</td>
<td>8.25%</td>
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<tr>
<td></td>
<td>Government</td>
<td>—</td>
<td>4.11</td>
<td>6.65</td>
<td>4.50</td>
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<td>10.64%</td>
<td></td>
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<tr>
<td></td>
<td>Home</td>
<td>—</td>
<td>3.93</td>
<td>5.24</td>
<td>4.78</td>
<td>4.72</td>
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<td>—</td>
<td>3.66</td>
<td>6.00</td>
<td>4.25</td>
<td>4.72</td>
<td>15.28%</td>
<td></td>
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<tr>
<td></td>
<td>Small office</td>
<td>—</td>
<td>4.06</td>
<td>5.88</td>
<td>4.67</td>
<td>4.65</td>
<td>7.94%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>—</td>
<td>4.13</td>
<td>6.23</td>
<td>4.58</td>
<td>4.79</td>
<td>9.65%</td>
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</tbody>
</table>

Notes: Because the data begin in 1995, information on new product introductions is only available from 1996.
As a result, firms commonly exercise a skimming pricing policy with new products. Thus, we expect that NEWPRODUCTS will have a positive effect in the price equation (Equation 3a). Demand considerations suggest a positive effect for SALES (e.g., demand shocks lead to higher prices), while supply factors imply a negative effect due to scale economies and production efficiencies (e.g., Kekre and Srinivasan 1990). Prior work in the PC industry has found that the SALES coefficient in the price equation is negative (Bayus and Putsis 1999); thus, we expect that SALES will have a negative effect (i.e., higher sales imply lower costs and, thus, lower prices). To the extent that CNEWPRODUCTS is indicative of market growth, it should be positively related to price. Consistent with Stavins’s (1995) work in the PC industry, however, we expect that CNEWPRODUCTS will have a negative effect because increased product variety in a market implies a larger number of available substitutes (and pressure to decrease price). Demand considerations lead us to expect that CPRICE will have a positive effect because price changes will be matched by competitors in competitive industries (e.g., Leeflang and Wittink 1992). Prior work in the PC industry confirms this positive effect for CPRICE (Bayus and Putsis 1999). Furthermore, to capture any price differences across technology generations or product form, we include TECHAGE and DESKTOP as control variables. To control for possible demand and cost interdependencies from MMC, we also include a variable for the number of markets in which a firm competes (NUMMARKETS). Including this variable in the estimations suggests that the MMC measure captures the strategic implications of MMC on price (and new product) decisions.

Consistent with Putsis and Bayus (2001), who study the magnitude of product line changes (due to product introductions and withdrawals), we include SALES, PRICE, and CPRICE in the new product introduction equation (Equation 3b). Firms with high sales tend to depend on more new products and broader product lines to address increased heterogeneity in consumer preferences (e.g., Brander and Eaton 1984). Thus, we expect that SALES will have a positive effect in the new product introduction equation (Equation 3b). In addition, firms charging a price premium have a greater expected return to new products, suggesting that these firms will tend to introduce even more products (e.g., Bayus and Putsis 1999); thus, we expect PRICE to have a positive effect in the new product equation (Equation 3b). Moreover, because more new product introductions from a competitor increase the competitive pressure on the focal firm to offer a broader product line itself (e.g., Bayus and Putsis 1999), CNEWPRODUCTS should have a positive effect. We expect CPRICE to have a negative effect in the new product equation (Equation 3b) because a lower competitive price can also increase the competitive pressure to increase the product line. Furthermore, a niche strategy is suggested if most of the firm’s sales are due to relatively few product models (i.e., PHHI is high). In general, such firms with well-focused product lines do not introduce new products for fear of cannibalizing existing sales (i.e., PHHI will have a negative effect). As in the price equation, we control for the number of markets in which a firm competes by including NUMMARKETS (i.e., given limited firm resources, firms that compete in many markets may find it difficult to introduce new products in a specific focal market).
Consistent with economic theory, we expect that the effects of PRICE will be negative in the sales equation (Equation 3c). In addition, CPRICE should have a positive effect in the sales equation. We also expect NEWPRODUCTS to have a positive effect on firm sales and CNEWPRODUCTS to have a negative effect on firm sales. Finally, we expect a positive effect of DISTRIBUTION in the sales equation (see Lilien, Kotler, and Moorthy 1992). We considered the possible endogeneity of DISTRIBUTION (cf. Chu, Chintagunta, and Vilcassim 2007; Shankar 2006). However, in the data, the number of distribution channels for each firm does not significantly vary over time. In addition, on the basis of a Hausman test, we cannot reject the null hypothesis that DISTRIBUTION is exogenous.4

To estimate the direct effects of MMC on price and new product introductions, we include MMC in the price and new product introduction equations. This is consistent with the idea that any direct effects are more closely related to the static nature of MMC (i.e., whether MMC encourages firms to engage in collusive strategies). In terms of strategic effects, higher MMC can also affect competitive reactions (i.e., firm reactions when their competitors change prices and/or the number of new product introductions). Thus, we also specify the parameters of competitive reactions as functions of MMC (i.e., a random coefficient specification to account for possible heterogeneity across firms). This is consistent with the idea that any strategic effects are related to the dynamic nature of MMC (i.e., how firms react to the moves of its competitors). In addition, we control for any systematic changes over time and across markets by including fixed effects in the intercepts in Equation 3. The fixed effects capture average differences for each year (t) and customer segment (m). We also allow a common correlation among the observations from a single firm (i.e., common intrafirm correlation)5 to control for repeated observations and possible heterogeneity across firms (i.e., a random-effects specification).6

After adding both fixed and random effects in the price equation (Equation 3a), we model the intercept and the coefficient of CPRICE as follows:

\[
\alpha_{0\text{int}} = \alpha_{00} + \sum_{j=2}^{4} \alpha_{01\text{YEAR}} + \sum_{k=2}^{5} \alpha_{02\text{MARKET}}k + \alpha_{03}\text{MMC}_{\text{int}} + \theta_{\alpha_{0\text{int}}},
\]

where

\[
\theta_{\alpha_{0\text{int}}} \sim \mathcal{N}(0, \Sigma_{\alpha}).
\]

4 Because our product definition does not include branded variants, distribution should not directly affect PRICE or NEWPRODUCTS. We control for the possible effects of distribution by including SALES in the price and new product equations.

5 Although the error terms in Equations 3–6 all have the int subscript, these vary across firms. This allows a common correlation among the observations from a single firm, capturing possible heterogeneity across firms. Thus, all the errors are identifiable.

6 We do not include year and market fixed effects in the random slope equation because the effects of competitive reactions have little variation over time and markets after we control for firm heterogeneity and MMC.

In this specification, \( \alpha_{03} \) captures the direct effect and \( \alpha_{31} \) captures the strategic effect of MMC on price competition (\( \alpha_{30} \) represents the average effect of a competitor’s price on own price). In line with \( H_{1b} \) and \( H_{2b} \), we expect that \( \alpha_{01} \) will be positive and that \( \alpha_{30} \) and \( \alpha_{31} \) will have the same positive sign.

Similarly, for the new product introduction equation (Equation 3b), we model the intercept and the coefficient of CNEWPRODUCTS as follows:

\[
\beta_{4\text{int}} = \beta_{40} + \beta_{41}\text{MMC}_{\text{int}} + \theta_{\beta_{4\text{int}}},
\]

where

\[
\left( \theta_{\beta_{4\text{int}}} \right) \sim \mathcal{N}(0, \Sigma_{\beta}).
\]

Here, \( \beta_{03} \) captures the direct effect and \( \beta_{41} \) captures the strategic effect of MMC on product competition (\( \beta_{40} \) represents the average effect of a competitor’s new product introductions on its own product introductions). Consistent with \( H_{1b} \) and \( H_{2b} \), we expect that \( \beta_{01} \) will be negative, that \( \beta_{41} \) will be positive, and that \( \beta_{40} \) and \( \beta_{41} \) will have the same sign.

We also include fixed and random effects in the sales equation (Equation 3c):

\[
\gamma_{0\text{int}} = \gamma_{00} + \sum_{j=2}^{4} \gamma_{01\text{YEAR}} + \sum_{k=2}^{5} \gamma_{02\text{MARKET}}k + \theta_{\gamma_{0\text{int}}},
\]

where

\[
\theta_{\gamma_{0\text{int}}} \sim \mathcal{N}(0, \Sigma_{\gamma}).
\]

Thus, the full model consists of Equations 3–6. We summarize the model in Figure 1.

**Estimation Issues**

Estimation issues related to functional forms, endogeneity, and serial correlation arise in the context of our model. To choose an appropriate functional form for the system of equations, we compared a logarithmic specification (\( H_{1} \)) with a linear specification (\( H_{0} \)) using a nonnested PE test (Davidson and MacKinnon 1981; Greene 1997). The PE test strongly rejects the null hypothesis of a linear model at the .01 level. Thus, consistent with the related literature (e.g., Bayus and Putsis 1999), we employ a logarithmic specification.

We also confirmed that the instrumental variables in the three simultaneous equations are exogenous. Following Bayus and Putsis (1999), we treat the competitor variables as exogenous. Because of the relatively large number of firms in the market, these competitor variables are not likely to be substantially affected by any single firm. Nevertheless, competitor variables (e.g., CPRICE and CNEWPRODUCTS) are temporally lagged, as is MMC. Furthermore, all variables are mean centered around each firm’s mean to reduce multicollinearity and facilitate interpretation.
Given the time-series nature of the data, we also examined the residuals to test for the possibility of serial correlation. When we use residuals from the fixed- and random-effects specification, Breusch-Godfrey statistics for autoregressive models of order 1 and 2 (Greene 1997) indicate that there is no serial correlation. We expected this result given the relatively short average time series per firm (3.8 years) and our fixed-effects specification.

Again, the model consists of Equations 3–6 (i.e., Equations 4–6 are substituted into Equation 3). Because the model has both fixed and unknown random parameters (which leads to correlated and heterogeneous variance), ordinary least squares is no longer the best method; instead, generalized least squares is more appropriate. We use (restricted) maximum likelihood estimation to obtain reasonable estimates of the variance component because the variance structure is unknown (Bryk and Raudenbush 1992). To account for the endogeneity of the decision variables, we instrument the three endogenous variables (i.e., SALES, PRICE, and NEWPRODUCTS). Instruments include MARKET and YEAR dummies, lagged own decision variables, lagged competitive variables, and lagged decision variables × YEAR dummies. We tested several alternative specifications to ensure validity; following Davidson and MacKinnon (1993), we conducted a test of overidentifying restrictions, which indicated that we cannot reject the null hypothesis that the instruments are valid. Although we do not report the results here, the instrumental regressions represent the endogenous variables well. Details of the estimation approach are in the Web Appendix (http://www.marketingpower.com/jmrjune10).

**EMPIRICAL ANALYSES**

**General Estimation Results**

Following prior studies (e.g., Young et al. 2000), we test the hypotheses by considering the entire sample of competitive actions involving decreases and increases in price and new product introductions. Because the majority of our observations involve competitive attacks, we believe that this represents a relatively conservative approach. However, we also explore the hypotheses for cooperative actions with the limited data and show that the main conclusions do not change.

We report complete estimation results for several alternative models in the Web Appendix, Tables A3–A7 (http://www.marketingpower.com/jmrjune10). In general, the estimated models fit the PC industry well, and significant coefficients for the endogenous, competitor, and control variables are as we expected (for a summary of the results, see Figure 1). Consistent with the averages in Table 1, estimates for the YEAR dummies suggest that, in general, prices are declining and new product introductions are increasing over time. Estimates for the MARKET dummies suggest that there is some variation in average prices and new products across segments. The estimates of the variance parameters indicate that the average new product introduction level varies across firms and that firms are heterogeneous in their responses to competitor prices and new product introductions (see Table A3–A7 in the Web Appendix). Because we are interested in the effects of MMC, we summarize these estimates in Table 3.

For benchmarking purposes, we begin with the estimation results for a two-equation system involving only price and sales (see Table 3, Model 1). Consistent with $H_{1a}$, the coefficient estimate for the direct effects of MMC is positive and significant, indicating that PC firms with high MMC tend to avoid price competition (i.e., they engage in mutual forbearance). However, the negative strategic effects of MMC (i.e., the $\text{MMC} \times \text{PCPRICE}$ coefficient), together with the positive coefficient estimate for CPRI\$E, are not consistent with $H_{2a}$. Thus, our analysis without new product introductions as an endogenous variable implies that MMC does not increase the effect of competitive price on own price; firms with high MMC are not prone to initiate price competition, nor do they retaliate to price attacks by rivals. Although it seems that firms engage in mutual forbearance on price, it appears that the underlying tacit collusion is not enforced with the possibility of strong price retaliations.

Estimation results for the complete three-equation system in Table 3 (Model 2) provide a deeper understanding. The coefficient estimate of MMC in the price equation is positive but not significant. Because high MMC increases PCPRICE and decreases NEWPRODUCTS (which lowers price) at the same time, the direct effects of MMC might be suppressed with NEWPRODUCTS. We suspect that this coefficient’s standard error is inflated because of the high correlation between MMC and NEWPRODUCTS. A Wald test confirms that the estimates of MMC and MMC × CPRI\$E are not jointly zero. Without NEWPRODUCTS, MMC is significantly positive. Thus, we continue to find support for $H_{1a}$ from the price equation.

In agreement with $H_{1b}$, the coefficient estimate for the direct effects of MMC in the new product introduction equation is negative and significant, suggesting that firms engage in mutual forbearance in new product introductions as well. The positive and significant coefficient estimates for NEWPRODUCTS and the strategic effects of MMC (i.e., the $\text{MMC} \times \text{NEWPRODUCTS}$ coefficient) is consistent with $H_{2b}$, indicating that firms with high MMC protect their market positions from competitive attacks by responding with new products. We also note that CPRI\$E is negative and significant in the new products equation (and NEWPRODUCTS is not significant in the price equation), suggesting that competitive price attacks are met with increases in new product introduction.7

Together, these results imply that PC firms mutually forbear in price and new products but isolate their retaliatory actions to only new product introductions. When competitors deviate from tacit collusion, this shift of enforcement can lead to product competition but not necessarily to price competition. To explain this, we first note that price is a decision variable that enables short-term reactions. Therefore, when a firm cuts price, the competitor can also quickly drop its prices across segments, leading to a rapid, downward spiral in profits (Bernheim and Whinston 1990). The reluctance to respond to a competitor’s price cut when MMC is high could signal a decision to avoid damaging, tit-for-tat retaliatory price cuts across the segments in which the firms compete. In the absence of such retaliation, the

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7We note that modeling $\beta_5$ in Equation 3b as a function of MMC results in an insignificant coefficient estimate for CPRI\$E × MMC in the new products equation.
The Strategic Effects of Multimarket Contact

Table 3
SUMMARY OF KEY ESTIMATION RESULTS

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Price</th>
<th>New Product Introductions</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMC</td>
<td>.571 (.304)**</td>
<td></td>
<td>2.805 (.965)*</td>
</tr>
<tr>
<td>CPRICE</td>
<td>.482 (.099)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMC × CPRICE</td>
<td>−7.667 (2.367)*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model 2

| MMC | .219 (.307) | −10.770 (3.740)* | |
| CPRICE | .471 (.098)* | −2.178 (1.142)** | 2.843 (.965)* |
| CNEWPRODUCTS | .053 (.078) | 2.156 (.923)** | −1.904 (.812)** |
| MMC × CPRICE | −4.532 (2.396)** | | |
| MMC × CNEWPRODUCTS | | 64.030 (14.840)* | |

Model 3

| MMCincrease | 1.854 (.849)** | −17.275 (4.000)* | |
| MMCdecrease | .234 (.375) | −4.212 (6.289) | |
| CPRICEincrease | .667 (.178)* | −6.203 (1.603)* | 2.791 (1.502)** |
| CPRICEdecrease | 1.155 (.087)* | −.081 (1.271) | 1.870 (1.024)** |
| CNEWPRODUCTSincrease | .223 (.035)* | 3.843 (.587)* | .132 (.400) |
| CNEWPRODUCTSdecrease | .020 (.061) | 2.126 (.709)* | −.489 (.491) |
| MMCincrease × CPRICEincrease | −13.158 (7.916)** | | |
| MMCdecrease × CPRICEdecrease | −8.168 (2.839)* | | |
| MMCincrease × CNEWPRODUCTSincrease | | 63.169 (16.611)* | |
| MMCdecrease × CNEWPRODUCTSdecrease | | 19.365 (28.323) | |

Model 4

| MMCleader | −.450 (.490) | | −3.344 (5.653) |
| MMCfollower | .280 (.360) | | −11.087 (4.063)* |
| CPRICEleader | .774 (.119)* | | −1.602 (1.330) |
| CPRICEfollower | .333 (.105)* | | −2.629 (1.262)** |
| CNEWPRODUCTSleader | .050 (.088) | | 1.663 (1.037) |
| CNEWPRODUCTSfollower | .043 (.081) | | 2.487 (.948)* |
| MMCleader × CPRICEleader | −11.845 (3.438)* | | −.889 (.867) |
| MMCfollower × CPRICEfollower | 1.701 (3.088) | | |
| MMCleader × CNEWPRODUCTSleader | | | 83.710 (21.380)* |
| MMCfollower × CNEWPRODUCTSfollower | | | 44.510 (18.399)** |

Model 5

| MMChigh | .757 (.417)** | | −12.293 (5.418)** |
| MMClow | −.545 (.497) | | −10.925 (6.579)** |
| CPRICEhigh | .501 (.117)* | | −4.241 (1.423)* |
| CPRICElow | .446 (.122)* | | 1.538 (1.417) |
| CNEWPRODUCTShigh | .192 (.038)* | | 3.443 (.62) |
| CNEWPRODUCTSlow | .363 (.066)** | | 1.944 (.981)** |
| MMChigh × CPRICEhigh | −4.908 (3.886) | | .456 (6.27) |
| MMClow × CPRICElow | −8.197 (3.479)** | | |
| MMChigh × CNEWPRODUCTShigh | | 57.185 (17.316)* | |
| MMClow × CNEWPRODUCTSlow | | 34.392 (28.591) | |

*Significant at .01 level.
**Significant at .05 level.
***Significant at .10 level.

Notes: Standard errors are in parentheses.

...About whether MMC explicitly induces cooperative behavior in the marketplace when a competitor increases prices or decreases new product introductions.

To explore this issue, we also considered the direct and strategic effects of MMC for increases and decreases in competitive price and new product introductions. To do this, we split CPRICE, CNEWPRODUCTS, and MMC into the separate cases associated with increases and decreases in competitive price and new product introductions (e.g., CPRICEincrease = CPRICE for time t if CPRICE increased between t − 1 and t, and 0 if otherwise). Estimation results are in Table 3 (Model 3). Consistent with the results from Model 2, we find support for H1a, H1b, and H2b when competitors initiate attacks with price decreases or new product introduction increases. Firms mutually forbear in price (MMC coefficients are positive in the price equation) and firm that first implements a price cut has little reason to cut prices further; this can keep equilibrium prices at a higher level than what they would be if MMC was low. This could be reflected in the observed behavior when firms in high-MMC contexts react more softly to competitors’ price decreases.

Responses to Increases and Decreases in Price and New Product Introductions

Existing analyses of MMC have predominantly focused on the notion of punishment in response to price decreases by a competitor. Because a firm with high MMC reserves the right to retaliate across markets to unfriendly moves by a competitor, the central flavor of the arguments advanced in the literature has been that equilibrium prices are higher in markets with high MMC. The literature is relatively silent...
new product introductions (MMC coefficients are negative in the new product equation). Firms do not use price as a retaliatory weapon (the coefficient estimates of MMC × CPRICE are negative rather than positive). Instead, firms protect their market positions through actions with their new products (the coefficient estimates of CNEWPRODUCTS and MMC × CNEWPRODUCTS are positive).

We find that the strategic effects of MMC are relatively weak (or insignificant) for cooperative behavior (i.e., price increases or decreases in new product introductions). Specifically, the coefficient of MMC_increase × CPRICE_decrease is negative and significant at the .1 level. This implies that a firm responds to a competitor’s price increase with a smaller increase in own price when MMC is high. Likewise, the coefficient of MMC_decrease × CNEWPRODUCTS_decrease is not significant at the .1 level, suggesting that the level of MMC does not influence a firm’s response to competitive new product introductions. These findings suggest that the ability of MMC to deter cross-market rivalry in the context of competitive attacks is not necessarily mirrored by an ability to promote enthusiastic cross-market cooperation in the face of price increases or new product introduction decreases.

We advance a possible explanation for this finding. Focusing on pricing decisions, we first note that the accommodative stance associated with multimarket competition is predicated on the ability to mount a strong, cross-market retaliation to aggressive moves by a competitor. To mirror this concept for price increases, we must assume that a focal firm will respond to a rival’s price increase in one market (or segment) by increasing prices across all markets (or segments) in which the firms jointly compete. However, departing from the existing price configuration can lead to a lower profit for the focal firm from every market in which the firms jointly compete. In addition, unlike the case in which the firm could mete out a punishment to a competitor by retaliating across markets to an attack, the signaling implications of an increase in prices across the board are less clear. Specifically, a competitor’s price cut invariably hurts the focal firm’s profits. However, when a competitor increases prices, it typically increases the focal firm’s profits even when the focal firm simply maintains its existing prices. The focal firm can respond in a focused manner by only increasing prices in the market when the competitor has increased prices, but this isolates the response to one market. Accordingly, it is not clear that a higher level of MMC increases cooperative behavior across markets. Similar arguments apply for decreases in new product introductions.8 These findings highlight the need for further research to consider the implications of MMC separately across the competitive and cooperative domains.

Robustness Analyses

As a validity check of these findings, we conducted further analyses to demonstrate that firms in the PC industry isolate any competitive retaliation to only new product introductions. In line with the literature demonstrating heterogeneity in firm behavior by size (e.g., Shankar 2006), we also considered the direct and strategic effects of MMC for leaders and followers. Here, leaders are defined as the top ten firms in terms of sales (followers are all others). Because of their fewer resources and smaller size, followers are expected to be more interested in engaging in mutual forbearance than leaders. Conversely, leaders can more severely punish any competitive attacks by rivals. The estimates in Table 3 (Model 4) suggest that followers with high MMC are not likely to initiate product competition (the MMC_follower coefficient estimate is negative and significant in the new product introduction equation) but will retaliate in the face of competitive new product introductions (the MMC_follower × CNEWPRODUCTS_follower coefficient is positive and significant). Conversely, leaders tend to ignore product competition (in the new product introduction equation, the CNEWPRODUCTS_leader coefficient estimate is not significant, as is the MMC_leader coefficient estimate), but leaders with high MMC will strongly respond to competitor product forays into their positions (the MMC_leader × CNEWPRODUCTS_leader coefficient estimate is significantly greater than the MMC_low × CNEWPRODUCTS_leader coefficient estimate; Wald test statistic = 3.86, \( p < .05 \)). Competitive price has a greater effect on leaders than followers (the CPRICE_leader coefficient estimate is significantly greater than the CPRICE_follower coefficient estimate; Wald test statistic = 13.41, \( p < .01 \)), and MMC has little direct impact on pricing decisions. As the negative and significant MMC_leader × CPRICE_leader coefficient estimate suggests, leaders with high MMC are even significantly less likely than followers to respond to competitor price attacks. Overall, leaders in the PC industry tend to act with impunity in their pricing and product decisions, whereas followers with high MMC mutually forbear in new products and isolate their competitive responses to new product introductions. Followers are much less likely than leaders to initiate price or product competition, and leaders with high MMC are much more likely to punish attacks by rivals with their new product introductions.

We also considered the effects of MMC under different industry growth conditions (see Table 2). Estimation results for years in which industry sales growth was relatively high (1995–1997) and low (1997–1999) are in Table 3 (Model 5). When sales growth is high, firms have more to lose than when sales growth is low. Compared with periods in which growth is low, the potential future punishment looms larger in fast-growing periods than the present benefit of deviating from a tacitly collusive agreement. Thus, we expect that firms in high-growth conditions are interested in avoiding intense competition. The results suggest that firms in high-growth conditions mutually forbear in price (the MMC_high coefficient estimate in the price equation is positive and significant, but the MMC_low coefficient estimate is not) and new product competition (the MMC_high coefficient estimate in the new product introduction equation is smaller than the MMC_low coefficient estimate) but protect their market positions from competitive attacks by responding with new products (the CNEWPRODUCTS_high coefficient estimate in the new product equation is significantly greater than CNEWPRODUCTS_low; Wald test statistic = 3.33, \( p < .06 \); and MMC_high × CNEWPRODUCTS_high coefficient estimate is positive and significant). As we expected, firms engage in

8A parallel, cost-based explanation can also be suggested. Consistent with economic theory, a firm with high MMC and lower marginal costs will increase prices to a lesser extent in response to a competitor’s unilateral price increase.
mutual forbearance in price and new product introductions when sales are growing; however, when sales growth is relatively low, mutual forbearance cannot be sustained, because there is less to lose by deviating from tacitly collusive behavior.

In addition to the MMC measure we use in the analyses (i.e., Equation 2), we considered several alternative measures. These measures yielded results and conclusions that were consistent with those discussed in this section. Details of the alternative measures are in the Web Appendix (http://www.marketingpower.com/jmrjune10).

DISCUSSION AND CONCLUSIONS

Summary

Our analysis extends the existing literature by empirically considering both the direct effects of MMC (i.e., how MMC affects a firm’s decision variables) and the strategic effects of MMC (i.e., how MMC affects a firm’s reactions to its competitors’ decision variables). We study the price and new product introduction decisions of firms in the PC industry. To do this, we model a system of equations in which sales, price, and new product introductions are jointly endogenous. Consistent with prior research, we find that firms mutually forbear in price and new product introductions. More important, we find strong strategic effects of MMC that are asymmetric in price and product decisions; firms with high MMC respond with new product introductions if attacked but do not use price as a retaliatory weapon. Thus, firms isolate any competitive retaliation to only a single marketing variable. As Bernheim and Whinston (1990) note, firms may shift the enforcement of collusive outcomes from shorter-horizon variables (e.g., price) to longer-horizon variables (e.g., product development) because of greater anticipated punishment effects. Because prices are generally declining in the PC industry (see Table 2), retaliation to deviations from mutual forbearance with further (small) price reductions will be ineffective relative to the introduction of new computer products, which usually generates more customer excitement (Bayus, Erickson, and Jacobson 2003). We confirmed the robustness of this finding by considering the differential direct and strategic effects of MMC (1) on increases and decreases in competitive price and new product introductions, (2) for sales leaders and followers (only followers exhibit mutual forbearance and isolate their competitive response to new product introductions), and (3) in high- and low-industry-sales-growth conditions (only firms in high-growth situations engage in mutual forbearance and isolate their competitive response to new product introductions). The results are also in line with other research findings that have shown asymmetric effects for marketing-mix variables—that is, firms may accommodate a rival in one marketing variable but retaliate in another variable (e.g., Gatignon, Anderson, and Helsen 1989).

The findings fill some of the gaps in the literature on product line design and offer a deeper understanding for the PC industry. Published research discusses how firms design product lines in highly competitive environments characterized by stagnant sales and downward price pressures. In the PC industry, sales are positively related to product proliferation, while product proliferation is associated with higher prices (Bayus and Putsis 1999). Furthermore, although firms in the PC industry constantly introduce new products (Putsis and Bayus 2001), such introductions do not affect the (size-adjusted) profit rate of firms on a sustainable basis (Bayus, Erickson, and Jacobson 2003). Although the findings can be rationalized separately, taken together they raise questions about the merits of a product proliferation strategy in this industry. We provide a potential explanation for such behaviors in the PC industry in the context of MMC. When firms compete in multiple markets in which both price and new product introductions are considered strategic variables, we find that MMC encourages mutual forbearance in price and new products. In addition, MMC sets up a situation in which any deviations from mutual forbearance will be met with product competition. In the PC industry, firms tacitly maintain higher prices by competing with their new products.

Evidence from Other Industries

Because the PC industry is a highly competitive environment with rapidly eroding industry prices, there were few instances in the data when a firm increased its price. Because of exogenous pressures pushing prices down (e.g., competition in components such as central processing unit, memory, and so forth), firms in this industry may not have been able to compete freely on prices. Although we separately consider these effects for increases and decreases in marketing variables (Table 3, Model 3), it might still be questioned whether our asymmetric results for the strategic effects of MMC generalize to other industry settings: Do firms with high MMC isolate their competitive retaliation to a single marketing variable? Two case studies involving real market situations are noteworthy. Craig (1996) describes a situation in the Japanese beer industry in which firms did not compete on price but intensively competed in new product introductions throughout the 1980s. Although nonprice competition is the norm in this industry (and is supported by the Japanese government to ensure a steady stream of tax revenues), firms escalated their new product introductions as retaliation to competitive forays into their customer segments. As Gimeno and Woo (1996) note, high MMC may have been a factor in the Japanese beer wars by shifting direct price competition to rivalry in new product introductions. In addition, Collis (1991) presents the detailed case of product rivalry with little price competition in the pet food industry during the mid-1980 to mid-1990 period. As Jayachandran, Gimeno, and Varadarajan (1999) observe, the general situation in the pet food industry is consistent with firms practicing mutual forbearance. However, a single move by Quaker Oats into a rival’s market was met with a spiral of competitive retaliation of product entry into competitors’ markets. These qualitative examples raise the notion that, across industries, firms may indeed isolate any retaliation to competitive attacks to a single marketing variable.

Managerial Reactions

To gauge the beliefs of practicing managers, we obtained information from an e-mail survey of 24 managers (for the specific questions and response tabulations, see the Web Appendix at http://www.marketingpower.com/jmrjune10). Managers in the study were asked to react to two scenarios in the multimarket context. Each scenario involved two
firms that compete across five distinct markets, with each firm offering one product with a 50% market share in each market. The managers were alerted to the possibility that a decision by a firm to reduce (or increase) price or introduce/improve (or withdraw) a product in one market could invoke a reaction by the competitor across the multiple markets. To induce the notion of equilibrium, the managers were informed that the firms had learned to live with each other over time and that their prices and products have been at stable levels for the past year or so. In this setting, the managers were asked to react to an unexpected 25% price decrease and an unexpected 25% price increase by the competitor in one of the five markets. In the price reduction scenario (which is representative of a price attack by a competitor), 13 managers stated that they would only introduce new products and an additional 6 stated that they would combine new product introductions with a price decrease. In the price increase scenario (which is representative of accommodation by a competitor), 22 managers stated that they would also raise prices in the same market (18 stated that their price increase would be a little lower than the competitor’s increase). Together, these responses suggest that (1) retaliations to a price attack typically involve new product responses and (2) responses to a price increase are mainly constrained to price-based responses and specifically to price increases within the market in which the competitor increases price. Though exploratory in nature, these managerial responses are consistent with our conclusions for the PC industry.

Further Research

In practice, new product introductions may be a key variable to enforce mutual forbearance because firms can shield themselves from the downward spiral of price competition by isolating competitive battles on only product competition. Indeed, product line rivalry may bring firms into greater contact, leading to increased multimarket competition and an even higher likelihood of mutual forbearance (Jayachandran, Gimeno, and Varadarajan 1999). Thus, an aggressive response in new products to deviations from mutual forbearance may actually lead to higher MMC and an even stronger future bond between competitors that further supports tacit collusion across all marketing variables. Although we ensure one-way causality of the effects of MMC on a firm’s new products and price (MMC is lagged in our estimations), we do not consider the potential endogeneity of MMC. This is an important topic for further research.

More empirical studies of the strategic effects of MMC on multiple marketing decision variables need to be conducted in other industries before the results can be generalized. The empirical results show that explicitly considering the direct and strategic effects of MMC is worthwhile in better understanding the practice of mutual forbearance. Furthermore, analytical models of multimarket competition should ideally accommodate the findings by explicitly modeling the direct and strategic effects of MMC on multiple marketing decision variables. Likewise, empirical analyses should not stop at analyzing the direct effects of MMC alone; such analyses should consider the strategic effects of MMC across all elements of the marketing mix.

Several issues present worthwhile opportunities for further research. For example, our product definition considers only major product architectures that reflect serious investments in engineering and/or branding. Bergen, Dutta, and Shugan (1996) argue that manufacturers offer branded variants for the benefit of retailers. Thus, minor modifications of lesser consequences can be considered a part of channel strategy, not necessarily just a firm-level product decision. If both retailer- and manufacturer-level data with detailed product information are available, further research could investigate the effects of MMC on branded variants. In addition, knowledge about how managers actually incorporate the implications of MMC into the various marketing-mix decisions is relatively sparse (for a recent exception, see Stephan et al. 2003). These decision-making processes could be studied using in-depth interviews, surveys, experiments, and related research methodologies. Finally, further research could be directed at developing a more complete theory of MMC for the entire range of competitive rivalry involving retaliatory and cooperative behaviors.

REFERENCES

The Strategic Effects of Multimarket Contact


