

Measuring Unilateral Effects in Partial Acquisitions*

Duarte Brito[†]

Ricardo Ribeiro[‡]

Universidade Nova de Lisboa Universidade Católica Portuguesa

Helder Vasconcelos[§]

Faculdade de Economia do Porto and CEPR

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Abstract

To what extent does partial ownership unilaterally lessen competition and decrease consumer surplus? This paper proposes an empirical structural methodology to quantitatively answer this question. Because partial acquisitions that do not result in effective control present competitive concerns distinct from partial acquisitions involving effective control, we identify and distinguish two distinct rights: financial interest and corporate control. The empirical structural methodology can deal with differentiated products industries and can be used to examine the unilateral impact on prices, market shares, profits and consumer welfare of partial acquisitions involving only financial interests, control interests or both. Furthermore, it nests full mergers (100% financial and control acquisitions) as a special case. The general strategy models supply competition in a setting where partial ownership may or may not correspond to control and uses a Nash-Bertrand equilibrium assumption jointly with demand side estimates to recover marginal costs, which are then used to simulate the unilateral effects of actual and hypothetical partial acquisitions. We provide an empirical application of the methodology to several acquisitions in the wet shaving industry.

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[†]Universidade Nova de Lisboa. E-mail address: dmmcbrito@gmail.com

[‡]Department of Economics, Universidade Católica Portuguesa. E-mail address: rribeiro@porto.ucp.pt

[§]Department of Economics, Faculdade de Economia do Porto. E-mail address: hvasconcelos@fep.up.pt

1 Introduction

To what extent does partial ownership unilaterally lessen competition and decrease consumer surplus? This paper proposes an empirical structural methodology to quantitatively answer this question. In analyzing the competitive effects of partial ownership arrangements, we need to identify and distinguish two distinct rights: financial interest and corporate control. *Financial interest* refers to the right to receive the stream of profits generated by the firm from its operations and investments, while *corporate control* refers to the right to make the decisions that affect the firm. Firms sometimes have quite complex corporate financial and governance structures that distinguishes the two rights in voting and non-voting stock, with the nonvoting stock giving the holder financial interest with no corporate control.

Partial acquisitions that do not result in effective control present competitive concerns distinct from partial acquisitions involving effective control. The former type of acquisitions impacts the unilateral incentives of the *acquiring firm* to compete, but not those of the target firm, while the latter also impacts the *rival's* incentives to compete. In order to understand why this is the case, note that when a firm acquires a partial financial interest in a rival, it acquires a share of its profits. Even if the acquiring firm cannot influence the conduct of the rival, such acquisition can lessen competition by reducing the incentive of the *acquiring firm* to compete aggressively because it shares in the losses thereby inflicted on that rival. On the other hand, when a firm acquires a voting interest in a rival, it acquires the ability to influence the competitive conduct of the target firm. Such influence can lessen competition because it may be used to induce the *rival* to compete less aggressively against the acquiring firm.

This paper considers an empirical structural methodology to evaluate (quantitatively) the unilateral effects of actual and hypothetical partial acquisitions. The methodology can deal with differentiated products industries and can be used to examine the (unilateral) impact on prices, market shares, profits and consumer welfare of partial acquisitions involving only financial interests, control interests or both. Furthermore, it nests full mergers (100% financial and control acquisitions) as a special case. The general strategy models supply competition in a setting similar to O'Brien and Salop (2000), where partial ownership may or may not correspond to control and uses a Nash-Bertrand equilibrium assumption jointly with demand side estimates to recover marginal costs, which are then used to simulate the unilateral effects of actual and hypothetical partial acquisitions. A structural methodology to evaluate partial acquisitions in a differentiated products setting can prove a key advantage in competition policy issues and has not been, to our knowledge, examined in any academic

study.

We provide an empirical application of the methodology to several acquisitions in the wet shaving industry. On December 20, 1989, the Gillette Company, which had been the market leader for years and accounted for 50% of all razor blade units sales, contracted to acquire the wet shaving businesses of Wilkinson Sword in the United States (among other operations) to Eemland Management Services BV (Wilkinson Sword's parent company) for \$72 million. It also acquired a 22.9 percent of the nonvoting equity shares of Eemland for about \$14 million. On January 10, 1990, the Department of Justice instituted a civil proceeding against Gillette. The complaint alleged that the effect of the acquisition by Gillette may have been substantially to lessen competition in the sale of wet shaving razor blades in the United States. Shortly after the case was filed, Gillette voluntarily rescinded the acquisition of Eemland's wet shaving razor blade business in the United States, but went through with the acquisition of 22.9% nonvoting equity interest in Eemland. The Department of Justice approved the acquisition after being assured that this stake would be passive. On March, 22, 1993, the Warner-Lambert Company acquired Wilkinson Sword (full merger) for \$142 million to Eemland, that had put the razor blade company up for sale the year before. The sale was prompted after the European Commission, the executive arm of the European Community, in November ordered the Gillette Company to sell its stake in Eemland because of antitrust concerns. These two acquisitions (one involving a partial interest and another a full merger), and one additional hypothetical one, are evaluated below. The results suggest that price and quantity effects of the different acquisitions are relatively small.

This paper is organized as follows: Section 2 presents the supply side model used to evaluate the unilateral effects of partial acquisitions, Section 3 provides an illustrative empirical application and Section 4 concludes.

2 Supply

This section introduces the firm's objective function and the assumptions of the supply side of the model. We study the implications of partial acquisitions on competition in a setting similar to O'Brien and Salop (2000) where partial ownership may or may not correspond to control. Unlike O'Brien and Salop (2000), we provide a structural model that can be empirically estimated and used not just to simulate the equilibrium that would result from several partial acquisition counterfactuals, but also to analyze the corresponding change in consumer welfare.

2.1 The Setup

There are F firms, indexed by f , each of which produces some subset, Γ_f , of the J alternative products available in the market. There are also K shareholders, indexed by k , who can own shares in more than one firm. Let $\Theta \equiv \{1, \dots, K\}$ denote the set of shareholders, which can include not just owners that are external to the industry, but also owners from the subset $\mathfrak{S} \equiv \{1, \dots, F\}$ of firms within the industry that can engage in rival *cross-shareholding*.

The implications of partial acquisitions on competition depends critically on two separate and distinct elements: financial interest and corporate control. Financial interest refers to the right of the (partial) owner to receive the stream of profits generated by the firm from its operations and investments, while corporate control refers to the right of the (partial) owner to make the decisions that affect the firm.

In order to capture the two elements, we explicitly consider the distinction between voting and non-voting (preferred) stock. The non-voting stock gives the holder a share of the profits but no right to vote for the Board or participate in other decisions. That is, the shareholder has financial interest with no corporate control. In particular, we consider firm f 's total stock is composed of a percentage V_f of voting stock and a percentage $1 - V_f$ of preferred stock. Let $v_{kf} \geq 0$ and $\delta_{kf} \geq 0$ denote shareholder k 's holdings of voting and preferred stock in firm f , respectively. Hence, shareholder k holds a percentage $t_{kf} \equiv v_{kf}V_f + \delta_{kf}(1 - V_f)$ of firm f 's total stock.

2.2 Firm's Operating Profit

The profits generated by a multi-product firm f from its operations are defined over the subset Γ_f of products produced by the firm:

$$\pi_f = \sum_{j \in \Gamma_f} (p_j - mc_j) M s_j(\mathbf{p}) - C_f, \quad (1)$$

where $s_j(\mathbf{p})$ is the market share of product j , which is a function of the $J \times 1$ vector \mathbf{p} of prices for all products available in the market, M is the size of the market, mc_j is the marginal cost of product j , and C_f is the fixed cost of production of firm f .

2.3 Firm's Aggregate Profit

In an industry characterized by rival cross-shareholding, the aggregate profits of firm f includes not just the stream of profits generated by the firm from its operations, but also a share in its rivals' aggregate profits due to its ownership stake in these firms. We make the following assumption regarding the distribution of those profits among shareholders:

Assumption 1 *Each firm's aggregate profit is distributed among shareholders proportionally to the total stock owned, regardless of whether it be voting stock or preferred stock.*

Under Assumption 1, firm f receives a profit stream from its ownership stake in firm g that corresponds to the percentage t_{fg} of firm g 's total stock owned. The aggregate profit of firm f can, therefore, be written as:

$$\Pi_f = \pi_f(\mathbf{p}) + \sum_{g \in \mathfrak{S}/f} t_{fg} \Pi_g, \quad (2)$$

where the first term denotes the operating profit and the second term denotes the returns of equity holding by firm f in any of the other firms (the set \mathfrak{S}/f denotes the set \mathfrak{S} not including firm f). This set of F equations implicitly defines the aggregate profit for each firm.

Let \mathbf{D}^* denote the $F \times F$ direct shareholding matrix with zero diagonal elements, $t_{ff} = 0$, and off diagonal elements $t_{fg} \geq 0$ (if $f \neq g$) representing the percentage held by firm f on firm g 's total stock. In vector notation, the aggregate profit equation becomes:

$$\mathbf{\Pi} = \boldsymbol{\pi}(\mathbf{p}) + \mathbf{D}^* \mathbf{\Pi}, \quad (3)$$

where $\mathbf{\Pi}$ and $\boldsymbol{\pi}(\mathbf{p})$ are $F \times 1$ vectors of aggregate and operating profits, respectively. In order to solve for those profits explicitly, we make the following assumption regarding the shareholder structure of the firms in the market:

Assumption 2 *The rank of $(\mathbf{I} - \mathbf{D}^*)$ equals the number of firms in the market.*

Under Assumption 2, matrix $(\mathbf{I} - \mathbf{D}^*)$ is invertible, which implies it is possible to solve for the aggregate profit equation:

$$\mathbf{\Pi} = (\mathbf{I} - \mathbf{D}^*)^{-1} \boldsymbol{\pi}(\mathbf{p}), \quad (4)$$

where \mathbf{I} denotes the identity matrix.

2.4 Manager's Objective Function

O'Brien and Salop (2000) argue that "in a standard oligopoly model with no partial ownership interests, the owners of the firm typically agree on the strategy that the manager of the firm should pursue - maximize the profits of the firm. Barring any market imperfections that preclude efficient contracting between the owners and the manager, the owners will give the manager the incentive to maximize the profits of the firm. When multiple owners have partial ownership interests, however, they may not agree on the best course of action for the firm. For example, an owner of firm f who also has a large financial interest in rival firm g typically wants firm f to pursue a less aggressive strategy than the strategy desired by an owner with no financial interest in firm g . In this situation, where the owners have conflicting views on the best strategy to pursue, the question arises as to how the objective of the manager is determined. Ultimately, the answer turns on the corporate-control structure of the firm, which determines each shareholder's influence over decision-making within the firm." We make the following assumption regarding the objective of the manager of the firm:

Assumption 3 *The manager of the firm maximizes a weighted sum of the shareholder's returns.*

The formulation implied by Assumption 3 constitutes a parsimonious way to model shareholder influence since it includes a wide variety of plausible assumptions about the amount of influence each owner has over the manager of the firm. Under this formulation, a higher weight on the return of a particular owner is associated with a greater degree of influence by that owner over the manager. Different control scenarios then correspond to different sets of control weights for the different owners. Under Assumption 3, the objective function of the manager of firm f can therefore be written as follows:

$$\varpi_f = \sum_{k \in \Theta} \gamma_{kf} R_k, \tag{5}$$

where γ_{kf} is a measure of shareholder k 's degree of control over the manager of firm f , and R_k is the return of shareholder k .

In a setting where each firm's aggregate profit is, under Assumption 1, distributed among shareholders proportionally to the total stock owned (regardless of whether it be voting stock

or preferred stock) and each shareholder can have ownership stakes in more than one firm, the return of shareholder k can be written as:

$$R_k = \sum_{f \in \mathfrak{S}} t_{kf} \Pi_f. \quad (6)$$

Combining equations (5) and (6), the objective function of the manager of firm f becomes:

$$\varpi_f = \sum_{k \in \Theta} \gamma_{kf} \sum_{f \in \mathfrak{S}} t_{kf} \Pi_f. \quad (7)$$

Let \mathbf{C} and \mathbf{D} denote the $K \times F$ control weight and direct shareholding matrices with typical element γ_{kf} and t_{kf} , respectively. In vector notation, the objective function equation becomes:

$$\boldsymbol{\varpi} = \mathbf{C}' \mathbf{D} \boldsymbol{\Pi} = \mathbf{C}' \mathbf{D} (\mathbf{I} - \mathbf{D}^*)^{-1} \boldsymbol{\pi}(\mathbf{p}) = \mathbf{L} \boldsymbol{\pi}(\mathbf{p}), \quad (8)$$

where the second equality is obtained by simple substitution of the aggregate profit equation (4). Note that the $F \times F$ direct shareholding matrix \mathbf{D}^* constitutes in general, a submatrix of the $K \times F$ direct shareholding matrix \mathbf{D} , since the set of shareholders Θ , in addition to owners from the subset \mathfrak{S} of firms within the industry that can engage in rival cross-shareholding, typically includes also owners that are external to the industry. The last equality rewrites the objective function vector in terms of the $F \times F$ matrix $\mathbf{L} = \mathbf{C}' \mathbf{D} (\mathbf{I} - \mathbf{D}^*)^{-1}$ with typical element l_{fg} .

Having described the objective function of the manager of the firm, we now address the competitive setting:

Assumption 4 *Firms compete in prices. Furthermore, a pure-strategy Bertrand-Nash equilibrium exists, and the prices that support it are strictly positive.*

Let \mathbf{p}_f denote the set of prices controlled by firm f , i.e., the prices of the subset Γ_f of products produced by the firm. Following the objective function equation (4) and under Assumption 4, the manager of firm f solves:

$$\max_{\mathbf{p}_f} \varpi_f = \sum_{g \in \mathfrak{S}} l_{fg} \pi_g = \sum_{g \in \mathfrak{S}} l_{fg} \left\{ \sum_{j \in \Gamma_g} (p_j - mc_j) Ms_j(\mathbf{p}) - C_g \right\}. \quad (9)$$

The first-order conditions yield that the price p_j of any product $j \in \Gamma_f$ must satisfy the

following:⁵

$$l_{ff}s_j(\mathbf{p}) + \sum_{g \in \mathfrak{S}} l_{fg} \sum_{r \in \Gamma_g} (p_r - mc_r) \frac{\partial s_r(\mathbf{p})}{\partial p_j} = 0. \quad (10)$$

This set of J equations implies price-cost margins for each product. The markups can be solved for explicitly by defining a $J \times J$ matrix $\mathbf{\Omega}$ with the jr element given by $\Omega_{rj} = -l_{fg} \partial s_r(\mathbf{p}) / \partial p_j$ for $r \in \Gamma_g$ and $j \in \Gamma_f$. In vector notation, the first-order conditions become:

$$\mathbf{G}\mathbf{s}(\mathbf{p}) - \mathbf{\Omega}(\mathbf{p})(\mathbf{p} - \mathbf{mc}) = 0,$$

where $\mathbf{s}(\mathbf{p})$ and \mathbf{mc} are $J \times 1$ vectors of shares and marginal cost, respectively, and \mathbf{G} denotes a $J \times J$ diagonal matrix with diagonal elements $g_{jj} = l_{ff}$ for $j \in \Gamma_f$. This implies the following markup equation, from which the the corresponding marginal costs can be derived:

$$(\mathbf{p} - \mathbf{mc}) = \mathbf{\Omega}(\mathbf{p})^{-1} \mathbf{G}\mathbf{s}(\mathbf{p}) \Leftrightarrow \mathbf{mc} = \mathbf{p} - \mathbf{\Omega}(\mathbf{p})^{-1} \mathbf{G}\mathbf{s}(\mathbf{p}). \quad (11)$$

Let $\widehat{\mathbf{mc}}$ denote the marginal costs implied by the current ownership structure. Let also $\mathbf{\Omega}^{post}$ denote the matrix with the jr element given by $\Omega_{rj}^{post} = -l_{fg}^{post} \partial s_r(\mathbf{p}) / \partial p_j$ for $r \in \Gamma_g$ and $j \in \Gamma_f$, and \mathbf{G}^{post} denote the matrix with diagonal elements $g_{jj} = l_{ff}^{post}$ for $j \in \Gamma_f$, where l_{fg}^{post} represents the typical element of the matrix $\mathbf{L}^{post} = \mathbf{C}^{post} \mathbf{D}^{post} (\mathbf{I} - \mathbf{D}^{*post})^{-1}$ computed under the post-partial acquisition (control and total stock) shareholder's weights. Using the demand estimates, the marginal costs computed from equation (11) and the new post-partial acquisition structure, the predicted post-partial acquisition equilibrium price, \mathbf{p}^{post} , solves:⁶

$$\mathbf{p}^{post} = \widehat{\mathbf{mc}} + \mathbf{\Omega}^{post} (\mathbf{p}^{post})^{-1} \mathbf{G}^{post} \mathbf{s}(\mathbf{p}^{post}). \quad (12)$$

Note that the empirical structural methodology proposed relies on the ability to consistently estimate own- and cross-price elasticities required for every jr element of matrix $\mathbf{\Omega}$: $\Omega_{rj} = -l_{fg} \partial s_r(\mathbf{p}) / \partial p_j$.

Having described the supply side of the model and the empirical structural methodology that can be used to simulate the equilibria that would result from several partial acquisition counterfactuals, we move on to address an empirical illustration. However, before we do, we must note that although we derived the methodology under Assumption 4 of Nash-

⁵Under Assumption 4, a Nash equilibrium exists. Caplin and Nalebuff (1991) proved existence in a general discrete choice model, with single product firms. Anderson and de Palma (1992) proved existence for the nested logit model with symmetric multiproduct firms.

⁶Note that $\mathbf{\Omega}^{post}$ does not necessarily imply that price elasticities are invariant to the ownership structure in the industry, since elasticities may vary with price. In equilibrium the jr element of $\mathbf{\Omega}^{post}$ is given by $\Omega_{rj}^{post} = -l_{fg}^{post} \partial s_r(\mathbf{p}^{post}) / \partial p_j$.

Bertrand behaviour, in principle, the methodology idea is not constrained to that assumption. Furthermore, it is also not constrained to having the same assumption of firm behaviour before and after the post-partial acquisition.

3 Empirical Application

In this section, we present an illustration of the structural methodology used to evaluate the unilateral effects of partial acquisitions. We apply our framework to several acquisitions in the wet shaving industry. On December 20, 1989, the Gillette Company, contracted to acquire the wet shaving businesses of Wilkinson Sword trademark outside of the 12-nation European Community (which included the United States operations) to Eemland Management Services BV (Wilkinson Sword's parent company) for \$72 million. It also acquired a 22.9 percent of the nonvoting equity shares of Eemland for about \$14 million. At the time, consumers in the United States annually purchased over \$700 million of wet shaving razor blades at the retail level. Five firms supplied all but a nominal amount of these blades. The Gillette Company, which had been the market leader for years, accounted for 50% of all razor blade units sales. The next closest competitor was BIC Corporation (BIC brand) with 20%, followed by Warner-Lambert Company (Shick brand) with 14%, Wilkinson Sword Inc. with 3%, and American Safety Razor Company (Personna brand) with less than 1% of unit sales.⁷

On January 10, 1990, the Department of Justice instituted a civil proceeding against Gillette. The complaint alleged that the effect of the acquisition by Gillette may have been substantially to lessen competition in the sale of wet shaving razor blades in the United States. Shortly after the case was filed, Gillette voluntarily rescinded the acquisition of Eemland's wet shaving razor blade business in the United States. Gillette said it decided to settle the case to avoid the time and expense of a lengthy trial. However, Gillette still went through with the acquisition of 22.9% nonvoting equity interest in Eemland and of all worldwide assets and businesses of Wilkinson Sword trademark from Eemland, apart from the United States and the European Community. Because Eemland kept the Wilkinson Sword's United States wet shaving razor blades business, Gillette had become one of the largest, if not the largest, shareholder in a competitor. The Department of Justice allowed the acquisition provided that "Gillette and Eemland shall not agree or communicate an effort to persuade the other to agree, directly or indirectly, regarding present or future prices or other terms or conditions of sale, volume of shipments, future production schedules, marketing

⁷Source: United States v. The Gillette Company, 55 Fed. Reg. 28,312.

plans, sales forecasts, or sales or proposed sales to specific customers (...)."⁸ In other words, the Department of Justice approved Gillette's 22.9% stake in Wilkinson Sword after being assured that this stake would be passive. However, even when the acquiring firm cannot influence the conduct of the target firm, the partial acquisition may still reduce the incentive of the acquiring firm to compete aggressively because it shares in the losses thereby inflicted on that rival. We examine this question by quantifying the unilateral impact of partial acquisitions on prices, market shares, profits and consumer welfare of such acquisition.

On March, 22, 1993, the Warner-Lambert Company acquired Wilkinson Sword for \$142 million to Eemland, that had put the razor blade company up for sale the year before. The sale was prompted after the European Commission, the executive arm of the European Community, in November ordered the Gillette Company to sell its stake in Eemland because of antitrust concerns. A full merger constitutes the extreme case of a partial acquisition, which is nested in our empirical structural methodology. As an illustration we also examine this question and quantify the corresponding unilateral effects.

These two acquisitions, and one additional hypothetical one, are evaluated below. In this analysis, we make the following assumption regarding the measure of shareholder k 's degree of control over the manager of the firm:

Assumption 5 *The control weight each owner has over the manager of the firm equals the corresponding voting shares, i.e., $\gamma_{kf} = v_{kf}$.*

The paper proceeds by describing the data and performing some preliminary analysis. We then move on to describe the demand model, the estimation procedure and discuss the identifying assumptions. Finally, we present the demand estimation results that we use to compute the implied marginal costs and then simulate the unilateral effects of different acquisitions.

3.1 Data

We use scanner data collected from July 1994 to June 1996 from the Dominick's Finer Foods chain in the Chicago metropolitan area. The dataset covers 29 different product categories at the store level. It includes weekly sales, prices and retail profit margins (from which we can compute the wholesale cost) for each universal product code (UPC) and store of the

⁸In Proposed Final Judgment, United States v. The Gillette Company reprinted in 55 Fed. Reg. 12,567, 12571.

chain. We supplemented the data with ZIP code (*i*) demographic information obtained from the Decennial Census 2000, and (*ii*) industry structure obtained from the Business Patterns 1998 databases.

In order to investigate the implications of Gillette 22.9% nonvoting equity interest acquisition in Eemland and Warner-Lambert merger with Wilkinson Sword, we focus on the grooming category. In particular, on disposable razor products. These razors come in a limited number of package sizes, with the top four sizes accounting for an average, across supermarkets, of more than 99% of the total number of razors sold: 10 razors packages (44.1%), 5 razors packages (39.8%), 12 razors packages (11.1%) and 15 razors packages (4.9%). The choice set available to consumers is relatively limited. The median supermarket in the sample carries 12 different disposable razor products on a weekly basis. I define a product on the basis of two attributes: segment and brand so that, for example, Schick Slim Twin and Schick Slim Twin Women are classified as distinct products.

Disposable razor products are offered in two segments: men and women, with the latter accounting for an average, across stores, of 17% of the total number of razors sold at the store level. There are six competing brands in the market. Gillette is the dominant one with an average, across supermarkets, of 57.0% volume market share, followed by Dominick's Finer Foods private label (19.6%), Shick (13.3%) and BIC (9.8%). Personna and Wilkinson Sword have very residual shares: 0.3% and 0.1%, respectively. In contrast with the substantial brand concentration, at the product level the market is slightly more fragmented. Gillette Good News is the market leader with an average, across stores, of 13.7% volume market share. Table 1 details the volume market shares for the top-6 products, brands and package sizes.

An important question is obviously whether the dataset is representative of the whole population buying disposable razor products. In the Department of Justice's Proposed Final Judgement regarding Gillette 22.9% nonvoting equity interest acquisition in Eemland, the industry is characterized as follows: Gillette accounts for 50% of all razor blade units (...). The next closest competitor is BIC with 20%, followed by Warner-Lambert with 14%, Wilkinson with 3%, and American Safety Razor with less than 1% of unit sales. Because this industry characterization does not account for private labels, we must be cautious in a straightforward comparison with our dataset. However, it does suggest that our data is reasonably representative, although slightly overrepresenting Gillette and underrepresenting BIC and Wilkinson Sword.

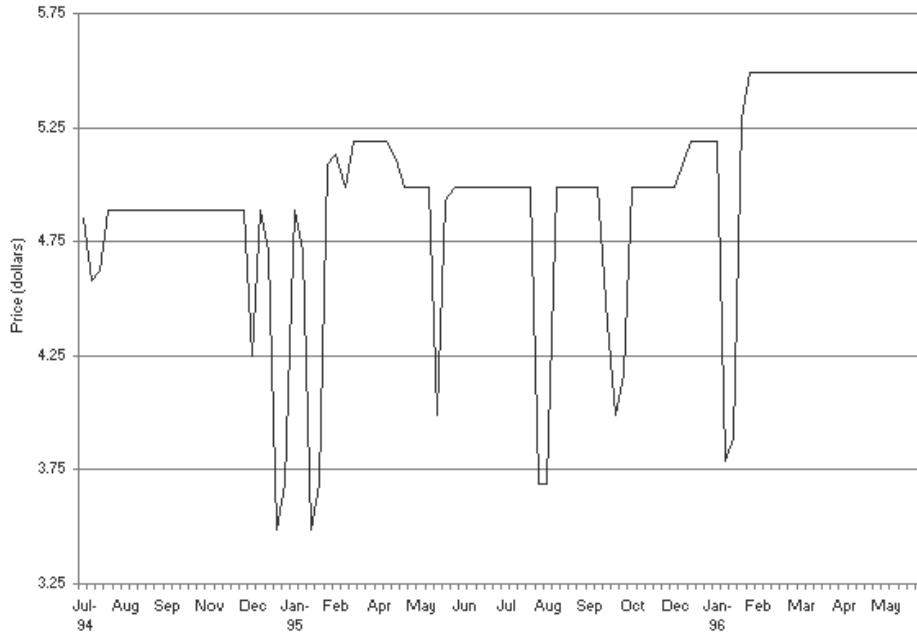
We now move on to describe the dataset in more detail. Table 2 presents summary

TABLE 1
*Volume Market Shares**

	Mean	Median	Std	Min	Max
Panel A: Package Size Level					
1. 10 Razors	44.056	44.493	4.738	28.246	55.362
2. 5 Razors	39.758	38.184	5.441	28.768	62.310
3. 12 Razors	11.079	11.202	2.100	6.412	16.216
4. 15 Razors	4.879	4.864	1.659	1.309	9.486
5. 3 Razors	1.163	1.137	0.500	0.058	1.899
6. 2 Razors	0.177	0.105	0.213	<0.000	1.332
Panel B: Brand Level					
1. G Gillette	57.003	58.023	5.773	37.505	66.520
2. PL Private Label	19.613	19.035	5.269	8.386	40.248
3. WL Schick	13.279	13.249	1.992	8.607	17.923
4. B BIC	9.829	9.304	2.536	5.257	17.123
5. ASR Personna	0.294	0.083	0.405	0.010	1.029
6. WS Wilkinson Sword	0.132	0.121	0.091	0.019	0.384
Panel C: Product Level					
1. G Good News	13.652	13.700	1.783	10.479	20.973
2. G Good News Plus	10.746	10.457	1.862	7.140	14.688
3. G Good News Pivot Plus	10.546	10.445	1.875	7.527	15.121
4. G Daisy Plus	9.213	8.774	3.463	1.516	18.290
5. G Good News Microtrac	6.683	6.564	1.418	3.617	10.782
6. PL Twin Blade	6.298	5.527	2.324	2.712	16.118

* Market shares denote the percentage ratio between each product or brand number of razors sold in each store and the total number of razors sold in the corresponding store. The statistics presented are computed across the number of stores each product or brand was ever sold. WL: Warner-Lambert, G: Gillette, B: BIC, WS: Wilkinson Sword, ASR: American Safety Razor, PL: Private Label.

FIGURE 1
Price Example: G Good News (10 razors)



statistics for the main UPC- and zip code-level variables. The median supermarket in the sample sells 2 packages of 5 men razors per week. Temporary price promotions are an important marketing tool in the pricing strategy of many nondurable goods and disposable razors are no exception. Prices in the sample display a classic high-low pattern: products have a *regular level* that remains constant for long periods of time with occasional temporary reductions. While this pattern is easy to spot, regular price levels are hard to define because they may change over time. Figure 1 displays, as an illustration, the price of Gillette Good News (10 razors) over the sample weeks at Dominick’s Finer Foods, Western Ave. store. The regular price level was \$4.89 from August 1994 to January 1995, \$4.99 from April 1995 to December 1995, and finally \$5.49 from February 1996 onwards.⁹ Following Dossche *et al.* (2010), we define a temporary price promotion as any sequence of prices that is at least 95 percent below the most left and the most right adjacent prices. Table 2 reports that the median supermarket sells 2 packages of 5 men razors per week at a regular (non-promoted) price of \$3.29, generating 38.72% of gross retail margin, and it performs a 23.12% promotion every 9 weeks.

Having described the store sales statistics, we now examine the characteristics of the surrounding (same zip code) median citizen and competitive environment. The median citizen is a white 40-year-old female with an household consisting of two members and an

⁹We can also identify two short-spanned time periods when the regular price level was \$5.19.

TABLE 2
*Summary Statistics**

	Mean	Median	Std	Min	Max
Panel A: UPC-Level Data					
Quantity (number of packages)	3.076	2.000	3.770	1.000	308.000
Price (\$)	3.323	3.290	1.402	0.290	6.390
Gross Retail Margin (%)	41.762	38.720	15.689	-97.570	74.910
Package Size (number of razors)	7.330	5.000	3.054	2.000	20.000
Women Segment	0.192	0.000	0.394	0.000	1.000
Promotion	0.119	0.000	0.324	0.000	1.000
Promotion Discount (%)	24.621	23.121	11.689	5.010	74.874
Duration from Last Promotion (weeks)	13.818	9.000	16.574	1.000	103.000
Panel B: ZIP Code-Level Data					
Age	41.526	40.000	19.250	10.000	79.000
Female	0.514	1.000	0.500	0.000	1.000
Household Size	2.659	2.000	1.554	1.000	9.000
Household Income (\$ 000's)	79.460	57.419	87.245	0.000	599.993
White	0.772	1.000	0.420	0.000	1.000
Potential Market (number of razors)	89,662	80,555	49,485	23,372	228,242
Number of Grocery Stores	9.609	7.000	8.655	1.000	46.000
Number of Convenience Stores	4.298	3.500	3.343	0.000	16.000
Number of Pharmacies	5.488	5.000	3.602	0.000	14.000

* UPC-level data statistics are based on 151,820 (store-week) observations. Demographic ZIP code-level data statistics are based on 100 simulated consumers for each of the 8,446 (store-week) markets under analysis. Potential Market and Competition ZIP code-level statistics are based on 84 store observations. Promotion Discount statistics are conditional on the store performing a promotion for the corresponding UPC and week.

annual income of 57,419 dollars. The potential market size is assumed to be proportional to the total number of male and female citizens over 9 years-old. The proportionality factor is assumed to 3 and 2 disposable razors per week for men and women, respectively. The median potential market is 80,555 razors per week, which 7 grocery stores, 3.5 convenience stores and 5 pharmacies compete for.

In an environment characterized by temporary price discounts, it is important to examine how consumers respond to price cuts. As Hendel and Nevo (2006) show, demand estimation based on temporary price reductions may mismeasure the long-run responsiveness to prices. This is of fundamental importance in a setting like ours that relies on the ability to consistently estimate own- and cross-price elasticities. Table 3 addresses this issue by comparing the percentage of weeks that a product was on promotion and the percentage of razors sold during those weeks. The results suggest that consumers do respond to temporary price discounts: the percentage of quantity sold on promotion is larger than the percentage of weeks that the promoted price is available.

TABLE 3
*Temporary Price Promotions Characterization**

Package Size	Quantity Sold on Promotion (%)	Weeks on Promotion (%)
2 Razors	7.947	2.049
3 Razors	0.000	0.000
5 Razors	19.448	11.780
6 Razors	0.000	0.000
10 Razors	25.800	13.184
12 Razors	17.037	12.750
15 Razors	11.082	8.196
20 Razors	0.000	0.000

* Quantity Sold on Promotion and Weeks on Promotion denote, respectively, the percentage of number of razors sold on promotion, and the percentage of weeks a promotion was offered. Figures are computed across all products and stores.

This is consistent with the hypothesis that consumers respond to temporary price cuts by accelerating (anticipating) purchases and hold inventories for future consumption (i.e. stockpile). The main alternative explanation that consumers simply increase their consumption in response to a price reduction is less valid in the wet shaving setting. As a consequence, stockpiling constitutes a feature of consumer behaviour that must be incorporated into the structural model.

3.2 Demand

The supply methodology outlined in the previous section relies on the ability to consistently estimate own- and cross-price elasticities. Here, we introduce the consumer’s utility function and the assumptions of the demand side of the model. We model consumer demand using the multinomial random-coefficients Logit model in the lines of McFadden and Train (2000), where consumers are assumed to purchase at most one unit of one of the products available in the market. We consider a differentiated products setting similar to Berry, Levinsohn, and Pakes (1995). The estimation approach allows for consumer heterogeneity and controls for price endogeneity.

3.3 The Setup

In each market $m = 1, \dots, M$, there are I_m consumers, indexed by i , each of which chooses among J_m product alternatives. In the estimation below a market will be defined as a week-

store combination. Let $j = 1, \dots, J_m$ index the inside product alternatives to the consumer in market m . The no purchase choice (outside alternative) is indexed by $j = 0$.

3.4 Consumer Flow Utility

The consumer flow utility is expressed in terms of the indirect utility from each of the available alternatives. We begin by specifying the indirect utility from choosing an inside alternative. The utility derived by consumer i from purchasing product j in market m is assumed to be of the form:

$$\begin{aligned} u_{ijm} &= \bar{u}_{ijm}(p_{jm}, y_{jm}, q_j, x_{jm}, w_m, \xi_{jm}) + \varepsilon_{ijm} \\ &= \phi(p_{jm}, y_{jm}) + \varphi(q_j) + \beta_i x_{jm} + \tau_i w_m + \xi_{jm} + \varepsilon_{ijm}, \end{aligned} \quad (13)$$

where p_{jm} denotes the price of product j in market m , y_{jm} denotes a K_y -dimensional vector of price promotion variables of product j in market m to account for dynamic influences of temporary price promotions, q_j denotes the number of disposable razors included (package size) in product j , x_{jm} denotes a K_x -dimensional vector of observed characteristics of product j in market m (observed by the consumer and the econometrician), w_m denotes a K_w -dimensional vector of observed characteristics of the competitive environment of each market m to account for variations in the shopping alternatives that consumers have for making their purchases, and ξ_{jm} denotes the mean utility derived from the unobserved characteristics of product j in market m (observed by the consumer, but unobserved by the econometrician), which may be potentially correlated with price. Finally, ε_{ijm} is a random shock to consumer choice. β_i denotes the parameters representing consumer i 's preference for the observed characteristics included in the vector x_{jm} , and τ_i denotes consumer i 's valuation of shopping alternatives.

The preliminary data analysis suggests that stockpiling constitutes a feature of consumer behaviour that must be incorporated into the structural model. We do so in $\phi(p_{jm}, y_{jm})$, which denotes the component of the utility function associated to price and temporary price promotions, following Khan and Jain (2005). We assume the following functional form:

$$\phi(p_{jm}, y_{jm}) = \alpha_i p_{jm} + \lambda_i^p p_{jm} y_{jm}^p + \lambda_i^c y_{jm}^c, \quad (14)$$

where the vector of price promotion variables, y_{jm} , is split between a vector of variables related to the *previous* price promotions, y_{jm}^p , and another related to the *current* price promotion, y_{jm}^c . In order to account for consumers response to temporary price promotion, y_{jm}^c

includes an *indicator for the presence of a temporary price promotion* and an interaction term between this indicator and the *depth of the current promotion*, with the expectation that higher discounts may induce stronger promotion responses.¹⁰ Furthermore, if a consumer responds to temporary price cuts by accelerating (anticipating) purchases and hold inventories for future consumption, then she may be less sensitive to price in more *immediate* subsequent weeks. As a consequence, we allow y_{jm}^p to include the *duration since the last promotion* and the *discount depth of the last promotion*. α_i denotes consumer i 's price sensitivity, λ_i^p captures the dynamic impact of temporary price promotions on consumer i 's price sensitivity, and λ_i^c denotes the parameters representing consumer i 's responsiveness to temporary price cuts.

Disposable razor products come in several package sizes and prices are nonlinear in size. $\varphi(q_j)$ denotes the component of the utility function associated to package size. We assume the following functional form:

$$\varphi(q_j) = \eta_{1i}q_j + \eta_{2i}q_j^2, \quad (15)$$

where η_{1i} and η_{2i} denote the parameters representing consumer i 's preference for size. Following McManus (2007), a linear specification for both price and package size would be inappropriate. If the marginal utility from increasing size is constant, then given that price schedules are typically concave in size, then (if the random shock is omitted from the model) all consumers with sufficiently high valuation to purchase a small size would prefer a larger size to the small one.

The estimation approach allows for general parameter heterogeneity. In particular, we allow for observed and unobserved heterogeneity in price sensitivity, α_i , and in (linear) size preference, η_{1i} :

$$\begin{pmatrix} \alpha_i \\ \eta_{1i} \end{pmatrix} = \begin{pmatrix} \alpha \\ \eta_{1i} \end{pmatrix} + \Pi D_i + \Sigma v_i, \quad (16)$$

where D_i is a vector of demographic variables and v_i is a vector of random-variables drawn from a normalized multivariate normal distribution. Π is a matrix of parameters that represent how price sensitivity and size preference vary with demographics, while Σ is a scaling matrix. We allow for the price sensitivity to depend on the *age*, *sex* and *race* of the consumer, as well as on the annual *household income*. We also allow for the package size preference to depend on *household size*.

We now move on to specify the indirect utility from not purchasing. The utility derived

¹⁰As discussed above, we followed Dossche *et al.* (2006) and define a temporary price promotion as any sequency of prices that is at least 95 percent below the most left and the most right adjacent prices.

by consumer i from this outside option in market m is assumed to be of the form:

$$\begin{aligned} u_{i0m} &= \bar{u}_{i0m}(\xi_{0m}) + \varepsilon_{i0m} \\ &= \xi_{0m} + \sigma_0 v_{i0} + \varepsilon_{i0m}, \end{aligned} \tag{17}$$

where ξ_{0m} denotes the mean utility derived from not purchasing in market m and ε_{i0m} is a random shock to consumer choice. Because utility is ordinal, the preference relation is invariant to positive monotonic transformations. As a consequence, the model parameters are identifiable up to a scalar, which implies that a normalization is required. The standard practice is to normalize the mean utility of the outside option, ξ_{0m} , to zero. v_{i0} allows for unobserved heterogeneity in the outside option.

Having described the indirect utility from the different alternatives available to the consumer, we now address her maximization problem: consumers are assumed to purchase one unit of the alternative that yields the highest utility. Because consumers are heterogeneous $(D_i, v_i, \varepsilon_{im})$, the set of consumers that choose product j in market m is given by:

$$A_{jm} = \{(D_i, v_i, \varepsilon_{im}) \mid u_{ijm} > v_{ilm} \forall l = 0, 1, \dots, J_m\}, \tag{18}$$

where $\varepsilon_{im} = (\varepsilon_{i0m}, \dots, \varepsilon_{iJ_m m})$. If we assume a zero probability of ties, the aggregate demand for product j at market m is just the integral over the mass of consumers in region A_{jm} :

$$q_{jm} = S \int_{A_{jm}} dP^*(D, v, \varepsilon) \Leftrightarrow s_{jm} = \int_{A_{jm}} dP^*(D, v, \varepsilon) = \int_{A_{jm}} dP_D^*(D) dP_v^*(v) dP_\varepsilon^*(\varepsilon) \tag{19}$$

where $P^*(D, v, \varepsilon)$ denotes the population distribution function of the consumer types $(D_i, v_i, \varepsilon_{im})$, S denotes the size of the market (potential market), and $s_{jm} = q_{jm}/S$ denotes the aggregate market share of product j in market m . We assume D , v and ε to be independent. The last equality is just a consequence of this assumption.

3.5 Estimation Procedure

We estimate the parameters of the demand model assuming the empirical distribution of demographics for $P_D^*(D)$, independent normal distributions for $P_v^*(v)$ and a Type I extreme value distribution for $P_\varepsilon^*(\varepsilon)$. The latter assumption allows us to integrate the ε 's analytically which implies that the unobserved product characteristics, ξ , constitute the only product-level source of sampling error. This gives an explicit structural interpretation to the error term and, thereby, circumvents the critique provided by Brown and Walker (1989) related

to the addition of add-hoc errors and their induced correlations.

3.5.1 Price Endogeneity

The pricing decision of firms takes into account *all* characteristics of a product. This introduces correlation between prices and product characteristics and, in particular, between prices and the unobserved product characteristics that constitute the structural error term of the demand model. As a consequence, instrumental variable techniques are required for consistent estimation. Controlling for market-invariant unobserved product characteristics by using fixed effects decreases the requirements on the instruments, since the correlation between prices and those market-invariant unobserved product characteristics is fully accounted for and does not require an instrument. In order to understand why this is the case, note that we can model $\xi_{jm} = \xi_j + \xi_m + \Delta\xi_{jm}$ and capture ξ_j and ξ_m by fixed effects. However, it does not completely eliminate the need for instrumental variable techniques since $\Delta\xi_{jm}$ are still expected to be correlated with prices.

3.5.2 Estimation and Identification

We estimated the parameters of the model by following the algorithm used by Berry, Levinsohn and Pakes (1995) and Nevo (2001). The general estimation procedure involves searching for the parameters that equate *observed* and *predicted* aggregated market shares at the store level.

We now provide an informal discussion of identification. We have already noted that because utility is ordinal, the preference relation is invariant to positive monotonic transformations. As a consequence, the model parameters are identifiable up to a scalar, which implies that a normalization is required. Without loss of generality, we normalize the mean utility of the outside option, ξ_{0m} , to zero. Given this restriction, the identification of the remaining parameters is standard given a large enough sample. The fixed effects ξ_j and ξ_m are identified from variation in market shares across the different products and markets, respectively. The taste parameters β , η_1 (the mean value) and η_2 are identified from variations in the observed product characteristics. The mean value of the price coefficient, α , is identified from variation in prices. The λ^p and λ^c parameters are identified from variation in promotion decisions, the corresponding discount (current and previous) and the duration from previous promotion. The competition environment coefficients are identified from variation in the number of grocery stores, convenience stores and pharmacies across zip codes.

The parameters in matrix Π are identified from variation in demographics across zip codes. Finally, the parameters in matrix Σ and σ_0 are identified from variation in market shares due to unobserved factors.

Because of price endogeneity, it will be appropriate to use instruments rather than the variation in the actual prices to empirically identify the model’s parameters. We instrument the price of product j in market m by *a)* the median of wholesale costs of product j across all the Dominick’s Finer Foods stores in the same week, *b)* the median of the wholesale costs for each disposable razor manufacturer firm across all the Dominick’s Finer Foods stores in the same week. The reason for this choice of instruments is the following: the data includes the gross retail margin that Dominick’s Finer Foods makes with each product j in market m , from which we can compute the corresponding wholesale cost. However, this wholesale cost does not correspond to the marginal cost, but instead to the average acquisition cost of the items in inventory. A wholesale price cut today only gradually lowers the average acquisition cost as old, higher priced inventory is sold off. For this reason, we chose to instrument price by the median of the wholesale costs across stores, with the expectation that the diversity of inventories across stores allow us to capture the true marginal cost.

3.6 Estimation Results and Counterfactuals

Table 4 presents the demand estimation results, with the different columns reporting distinct specifications that vary on both the covariates included and the estimation procedure. Specification (1) reports the results of an ordinary least squares multinomial Logit model regression that includes price, size, segment, and competition variables as covariates, while controlling for brand and time fixed effects that capture unobserved brand and time-specific characteristics. The coefficients on these different covariates are all of the expected sign and statistically significant. The price coefficient suggests that the average consumer is price sensitive, the coefficients on size are indicative that consumers value package size positively, but at a decreasing rate, the coefficient on women segment dummy variable seems to suggest that disposable razor products for women are relatively less valued than products for men, and finally, the coefficients on competition variables suggest that the utility of not purchasing is higher with more purchasing venues in an area, with pharmacies seeming relatively more important than grocery or convenience stores. Specification (2) controls for the dynamic influences of temporary price promotions. The coefficient on temporary price promotion dummy variable is positive and statistically significant suggesting that consumers do respond to price cuts. Furthermore, the coefficient on the interaction of the promotion

covariate with the corresponding depth also suggests that promotion effectiveness increases with the discount level. In order to examine the dynamic impact of temporary price promotions on the price sensitivity of consumers, we included price interaction parameters with the duration since the last promotion and the discount depth of the last promotion. The estimated coefficients are negative and statistically significant indicating that the more distant or deeper a promotion, the more price sensitive are consumers. This may reflect stockpiling behaviour because consumers are expected to engage in stockpiling the deeper a promotion and to be more price sensitive when they have low inventory levels, and inventories decrease with the time elapsed since the previous promotion. Finally, the comparison of the price coefficient in the two specifications is suggestive of an endogeneity issue. Prices are negatively correlated with promotional activities since promoted products sell at lower prices and, as a consequence, not including these controls overestimates price sensitivity.

Specifications (3) and (4) report the results of two-stage least squares multinomial Logit regressions that replicate specifications (1) and (2), respectively, using the instruments described above to account for the correlation between prices and unobserved product characteristics. The effect on the price coefficient is again suggestive of an endogeneity issue. Products with higher market-specific unobserved characteristics deviations sell at lower prices inducing a negative correlation that will overestimate consumer price sensitivity if not accounted for. We interpret the effects on the price coefficient as evidence that correcting for the endogeneity of prices matters.

In specification (5), we include price zone dummy variables in order to control for market-specific unobserved characteristics. Dominick's Finer Foods engages in third-degree price discrimination and varies prices across stores to exploit demand differences between store trading areas. 16 price zones are reported in the data. Controlling for the market-specific unobserved characteristics underlying the price zones, increases the absolute value of the price coefficient, which suggests that prices may be positively correlated with market-specific unobserved valuations that will underestimate consumer price sensitivity if not accounted for.

Finally, specification (6) reports the results for the full multinomial random-coefficients Logit model. The absolute value of the mean price coefficient increases substantially in comparison with the standard multinomial Logit model estimates, but becomes statistically insignificant. This result is unexpected and hard to interpret. The coefficient on the interaction of price with age is negative and statistically significant, suggesting that older consumers are more price sensitive. The remaining coefficients on the interaction between price and demographics are statistically insignificant. The standard deviations coefficients are also sta-

TABLE 4
*Demand Estimation Results**

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Standard						
Parameters						
Price	-0.315 (0.005)	-0.112 (0.006)	-0.115 (0.011)	-0.059 (0.012)	-0.064 (0.011)	-2.154 (2.404)
Size	0.656 (0.006)	0.540 (0.007)	0.488 (0.010)	0.494 (0.011)	0.493 (0.011)	0.052 (0.126)
(Size) ²	-0.025 (<0.000)	-0.021 (<0.000)	-0.018 (<0.000)	-0.019 (<0.000)	-0.019 (<0.000)	-0.030 (0.006)
Women Segment	-0.200 (0.008)	-0.237 (0.008)	-0.228 (0.008)	-0.247 (0.008)	-0.247 (0.008)	-0.261 (0.020)
Random						-1.166
Coefficients:						(0.665)
Demographic						0.246
Interactions						(0.592)
Price × Household Income						0.004
						(0.081)
Price × White						3.505
						(2.231)
Size × Household Size						0.297
						(0.071)

tistically insignificant, which suggests that most of the heterogeneity is due to demographics. The results also suggest that, once we allow for individual heterogeneity, consumers do not have a (linear) size preference statistically different from zero, but it increases significantly with household size. Finally, the promotion coefficient increases substantially, suggesting that consumer heterogeneity is important in separating the response to regular prices and temporary price promotions.

Table 5 reports a sample of estimated median own- and cross-price elasticities computed according to the estimates from specification (4) in Table 4. The price elasticities of demand are very small in absolute value. The average of the median of the estimates of the own-price elasticity is -0.310 , whereas the average of the median of the estimates of the cross-price elasticity is 0.000076 . This result is unexpected and hard to interpret.

We now move on to compute the marginal costs implied by counterfactual ownership structures. Following equation (11), the predicted marginal costs vary by product and market (here a store-week combination). Because the data under analysis ranges from July 1994 to June 1996 and we aim to perform counterfactuals about facts that occurred prior to 1994, we focus on the data for the first week of July of 1994 and computed the implied marginal costs of every product in each store for that week. After recovering the implied marginal costs, we used equation (12) to simulate counterfactual equilibrium prices, \mathbf{p}^{post} , for the following shareholder and cross-ownership structures:

- a) Baseline Case (counterfactual): The shareholder structure of Wilkinson Sword is independent of the remaining firms in the industry. This mimics the industry ownership structure before December 20, 1989.
- b) Case 1 (counterfactual): The Gillette Company acquires a 22.9% nonvoting equity interest in Wilkinson Sword. This mimics the industry ownership structure from December 20, 1989 to March 22, 1993.
- c) Case 2 (counterfactual): The Gillette Company acquires a 22.9% voting equity interest in Wilkinson Sword. This constitutes an hypothetical ownership structure and it is presented here to illustrate the differential impact of acquiring a voting and nonvoting equity interest.

TABLE 5
*Median Own- and Cross-Price Elasticities**

Product	1	3	4	7	8	9	13	15	16
1. WL Schick Slim Twin (5 razors)	-0.251	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
2. WL Schick Slim Twin (10 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
3. G Good News Microtrac (5 razors)	<0.000	-0.200	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
4. G Good News (3 razors)	<0.000	<0.000	-0.211	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
5. G Good News (5 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
6. G Good News (10 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
7. G Custom Plus (10 razors)	<0.000	<0.000	<0.000	-0.602	<0.000	<0.000	<0.000	<0.000	<0.000
8. G Daisy Plus (5 razors)	<0.000	<0.000	<0.000	<0.000	-0.300	<0.000	<0.000	<0.000	<0.000
9. G Daisy Plus (10 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	-0.509	<0.000	<0.000	<0.000
10. B Twin Select (10 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
11. B Lady Shaver (10 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
12. B Metal Shaver (5 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
13. WS Colors (5 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	-0.116	<0.000	<0.000
14. WS Ultra Glide Twin (5 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	-0.152	<0.000
15. ASR Personna Flicker (5 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
16. PL Twin Blade (5 razors)	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000	-0.167

* Figures denote the median price elasticities over the 8,362 markets. The elasticity in row *i* and column *j* represents the percentage change in market share of product *i* with a 1% change in price of product *j*. <0.000 denotes a cross-price elasticity positive, but inferior to 0.000. WL: Warner-Lambert, G: Gillette, B: BIC, WS: Wilkinson Sword, ASR: American Safety Razor, PL: Private Label.

TABLE 6
*Principal Shareholders and Subsidiaries**

	Shareholders		Subsidiaries	
	Total Stock	Voting Stock	Total Stock	Voting Stock
American Safety Razor Company				
Allsop Venture Partners III, LP	12.40	12.40		
Goldman Sachs Group, LP	7.80	7.80		
Scudder Stevens and Clarck	7.00	7.00		
Equitable*	14.40	14.40		
Grantham Mayo Van Otter	5.10	5.10		
Leucadia Investors, Inc.	4.10	4.10		
Mezzanine Capital and Income Trust 2001 PLC	2.00	2.00		
BIC Corporation				
Bruno Bich	77.70	77.70		
Warner-Lambert Company				
The Capital Group, Inc.	5.16	5.16		
Wilkinson Sword, Inc.			100.00	100.00
The Gillette Company				
Berkshire Hathaway, Inc.	10.90	10.70		

* 1994's Schedule 14A (proxy statement) information. Equitable denotes the cumulative ownership of Equitable Capital Partners, LP, Equitable Deal Flow Fund, LP, Equitable Capital Partners (Retirement Fund), LP, and The Equitable Life Assurance Society of the United States.

- d) Case 3 (1994 actual situation): Warner-Lambert Company acquires a 100% voting equity interest in Wilkinson Sword. This constitutes a full merger and mimics the industry ownership structure from March 22, 1993 onwards. Table 6 displays the shareholder and cross-ownership structure of the different firms according to 1994's Schedule 14A (proxy statement) information of each firm.

Table 7 reports the simulated percentage increase in equilibrium prices and quantities relative to the baseline case. The simulated equilibrium only examines the impact of different shareholder and cross-ownership structures. We consider the marginal cost of each product-store combination to remain constant, although the analysis is not constrained to this assumption. The counterfactual equilibrium is computed for each product and store in the first week of July of 1994. Table 7 displays the median impact for a sample of products across all Dominick's Finer Foods stores. The first counterfactual under analysis, presented in the first two columns, examines the impact on equilibrium prices and quantities of the 22.9% nonvoting equity interest acquisition in Wilkinson Sword by the Gillette Company (when compared with the baseline case). The simulated price increases are relatively low, but positive for many Gillette products. This suggests that even though Gillette only ac-

TABLE 7
*Simulated Percentage Change in Prices and Shares**

Product	WS acquired by					
	G 22.9% nonvoting		G 22.9% voting		WL 100% voting	
	<i>p</i>	<i>s</i>	<i>p</i>	<i>s</i>	<i>p</i>	<i>s</i>
WL Schick Slim Twin (5 razors)	0.000	0.000	0.000	0.000	0.137	-0.018
WL Schick Slim Twin (10 razors)	0.000	0.000	0.000	0.000	0.000	0.000
G Good News Microtrac (5 razors)	0.021	-0.004	0.021	-0.004	0.000	0.000
G Good News (3 razors)	0.027	-0.003	0.027	-0.003	0.000	0.000
G Good News (5 razors)	0.000	0.000	0.000	0.000	0.000	0.000
G Good News (10 razors)	0.000	0.000	0.000	0.000	0.000	0.000
G Custom Plus (10 razors)	0.011	-0.004	0.011	-0.004	0.000	0.000
G Daisy Plus (5 razors)	0.015	-0.003	0.015	-0.003	0.000	0.000
G Daisy Plus (10 razors)	0.007	-0.003	0.007	-0.003	0.000	0.000
B Twin Select (10 razors)	0.000	0.000	0.000	0.000	0.000	0.000
B Lady Shaver (10 razors)	0.000	0.000	0.000	0.000	0.000	0.000
B Metal Shaver (5 razors)	0.000	0.000	0.000	0.000	0.000	0.000
WS Colors (5 razors)	0.000	0.000	0.000	0.000	0.000	0.000
WS Ultra Glide Twin (5 razors)	0.000	0.000	0.000	0.000	0.000	0.000
ASR Personna Flicker (5 razors)	0.000	0.000	0.000	0.000	0.000	0.000
PL Twin Blade (5 razors)	0.000	0.000	0.000	0.000	0.000	0.000

* Figures are the median change for each product over 84 supermarkets in the first week of July of 1994. WL: Warner-Lambert, G: Gillette, B: BIC, WS: Wilkinson Sword, ASR: American Safety Razor, PL: Private Label.

quires a minority and nonvoting position in Wilkinson Sword, such acquisition blunts the incentive of Gillette to compete aggressively because it shares in the losses thereby inflicted on Wilkinson Sword. Note that this impact on the incentive to compete arises even when the acquiring firm cannot influence the conduct of the target firm. The second counterfactual, presented in the next two columns, examines the impact on equilibrium prices and quantities of a 22.9% *voting* equity interest acquisition in Wilkinson Sword by the Gillette Company (again, when compared with the baseline case). The simulated impacts are quantitatively very similar to the nonvoting case. Finally, the third counterfactual, presented in the last two columns, examines the impact on equilibrium prices and quantities of a 100% voting equity interest acquisition in Wilkinson Sword by the Warner-Lambert Company. The simulated price increases are again relatively low, but positive for some Warner Lambert products. Consistently with traditional merger analysis, this illustrates that a merger between firms selling differentiated products may diminish competition by enabling the merged firm to profit by unilaterally raising the price.

4 Conclusions

This paper considers an empirical structural methodology to evaluate (quantitatively) the unilateral effects of actual and hypothetical partial acquisitions. The methodology can deal with differentiated products industries and can be used to examine the (unilateral) impact on prices, market shares, profits and consumer welfare of partial acquisitions involving only financial interests, control interests or both. Furthermore, it nests full mergers (100% financial and control acquisitions) as a special case. The general strategy models supply competition in a setting similar to O'Brien and Salop (2000), where partial ownership may or may not correspond to control and uses a Nash-Bertrand equilibrium assumption jointly with demand side estimates to recover marginal costs, which are then used to simulate the unilateral effects of actual and hypothetical partial acquisitions. A structural methodology to evaluate partial acquisitions in a differentiated products setting can prove a key advantage in competition policy issues and has not been, to our knowledge, examined in any academic study.

We provide an empirical application of the methodology to several acquisitions in the wet shaving industry. The partial acquisition of 22.9% nonvoting equity interest in Wilkinson Sword by Gillette in 1989 and the full merger between Warner-Lambert and Wilkinson Sword in 1993. These two acquisitions (one involving a partial interest and another a full merger), and one additional hypothetical one, are evaluated below. The results suggest that price and quantity effects of the different acquisitions are relatively small.

This paper leaves many issues yet to be explored. The development of a framework that incorporates coordinated affects and allows consumers to be forward-looking in their product choices seem very interesting potential areas for future research.

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