The Real Product Market Impact of Mergers

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ABSTRACT

I document sources of value creation in mergers by analyzing novel data on the quality and price of goods sold by merging firms. When two competitors in a product market merge, their products converge in quality, and prices fall relative to the competition. These effects take two to three years to be fully realized and are stronger in mature, slow growth industries. Prices do not fall, however, when the acquirer is diversifying into a new product market. This direct evidence of real changes induced by merger activity is consistent with consolidation by related merging firms to achieve operational efficiencies and lower costs.

Why do firms merge, and what happens when they do? Synergies enable two entities to increase their combined value when brought together in the same firm and are commonly cited as motivation for pursuing acquisition activity. Synergies can take the form of greater revenues through channels such as market power or new product introductions, or cost reductions through efficiency gains from consolidating plants or suppliers. Existing studies infer that mergers do create value. Betton, Eckbo, and Thorburn (2008) survey the literature and conclude that the combined announcement effect for bidders and targets is positive. Operating performance also appears to improve post-merger (Healy, Palepu, and Ruback (1992), Andrade, Mitchell, and Stafford (2001)).

The empirical literature has struggled, however, to identify the sources of this value creation. The challenge is that traditional datasets are too coarse. Stock market reaction and firm operating performance cannot identify specific actions taken by complex firms. Thus, we do not learn *why* or *how* profits increase post-merger, a question often left to clinical research (see, for example, Kaplan (2000)). One large sample exception is Hoberg and Phillips (2010) who find through analysis of language used in 10-K's that increased product differentiation versus rivals and new product development in general accompanies increases in operating performance.

This paper aims to provide large sample, project-level evidence of synergies by shining a light on the actual products sold by merging firms. Meaningful operational changes will likely leave an imprint on finished goods. If dispersed manufacturing is consolidated into a single plant, products could become more similar. If costs are cut, there is room to lower prices. Do mergers allow firms to sell better or cheaper goods? To capture these product attributes, I compile data from *Consumer Reports* magazine on the quality—features, design, reliability—and price of over 9,000 brand name products in 20 consumer goods categories sold by 372 firms from 1980 to 2009.

Within this sample, I identify 88 mergers. I further supplement these product reviews with market share data from *Appliance* magazine to assess the real product market impact of acquisitions.

This setting enables two additional departures from the existing merger literature that hone the search for sources of value creation. First, *Consumer Reports* data introduces a unique approach to defining product markets and competitors. Accurate identification of rivals is critical in acquisition studies because it enables a difference-in-difference research design; factors affecting the entire industry can be controlled for, leaving only the impact of the merger. The question of which industry participants pair up can also plausibly be asked. Does a firm's position in its product space predict whether it is a buyer or seller? Firms in traditional studies using public firm datasets are grouped according to an industry measure such as Standard Industrial Classification (SIC) codes. Private and international firms are typically missing, and these industry definitions can be misleading[1]. Large sample work which improves on these proxies include research using census data for plant level detail[2], and text-based analysis of firms' own product descriptions[3]. These are still not direct measures of product lines and competitors. I rely on *Consumer Reports* as an expert to define markets. A firm's true rivals are those producing goods which a customer views as substitutes. *Consumer Reports* defines categories precisely this way. They review products whether sold by a public, private, or international firm. Their judgment and the resulting span of firms by industry cannot be replicated by the econometrician using large financial databases.

The second departure this study takes from traditional work is in the unit of analysis. Is a *firm* the appropriate level of aggregation for defining product markets? Firms are complex; the

[1] Ali, Klasa, and Yeung (2009) report that industry concentration measures using Compustat data are poor proxies for concentration measured using United States Census data, which includes private firms. They find a correlation of only 13% between the two measures.
[2] See, for example, Maksimovic and Phillips (2001) and Schoar (2002).
[3] See Hoberg and Phillips (2010).

textbook case of a firm producing a single widget is virtually non-existent today. Studying product markets at the firm level thus comingles multiple business lines and their respective competitor sets. Hence, conducting analysis at the *product line* level provides cleaner tests. By studying product lines, I am also able to track business lines of the acquirer and target separately before and after the merger, an attractive feature shared with studies which use establishment-level data[4]. With firm-level accounting or stock market data, it is difficult to disaggregate two businesses once they have been combined. The question of whether acquirer or target operations are affected differentially can be asked.

Before turning to merger analysis, I first report stylized facts on what firms sell. Companies which engage in more research and development sell higher quality products and charge more for them. Large firm goods have higher quality and lower prices—possibly the reason they grew to become large firms. Controlling for firm size, products sold by private firms are more expensive and lower quality than those of public firms, possibly because of difficulty responding to competitive threats from foreign manufacturers. Finally, different brand names sold by the same firm are more similar in quality than in price, suggesting firms use brands to segment markets by price with only minor changes in quality.

Moving to acquisition activity, I find product-level evidence of efficient consolidation after mergers. The first key result is that when two firms producing a common product merge, the quality of their brands converges. This finding is consistent with oft-cited plans to move production from two separate plants into one, or to consolidate purchases among fewer suppliers. Next, while the average quality *level* of their now more similar goods is unchanged, prices for both acquiring and

[4] See, for example, Maksimovic and Phillips (2001) and Schoar (2002) who study census data on individual plants that maintain independent operating metrics regardless of ownership.

target brands fall relative to the competition. This, too, is consistent with the existence of synergies and scale economies. If two manufacturing plans are reduced to one, firms can cut costs and lower prices. These changes take time to implement. Quality convergence and price decline are realized primarily over the first two to three years after the merger, leveling off thereafter.

One limitation in this study is I cannot formally determine whether acquisition activity *causes* these product changes. Would pricing have declined absent the merger? I address this concern in two ways. First, I show that the post-merger changes are not a continuation of a pre-merger trend. Second, I test a cross-sectional prediction. If the changes are brought about by consolidation of suppliers, sharing of parts and manufacturing facilities, or applying the most efficient designs, firms need to have these existing relationships, facilities, or skills to realize efficiencies. This is less likely to be the case for a firm diversifying into a new product line. Thus, brands acquired by firms already participating in the industry have greater potential for gains. I find that in diversifying mergers evidence of synergies and price declines disappears.

These product market outcomes vary by industry conditions and firm characteristics. In mature, slow growth industries, there is more product convergence and price cutting. This is consistent with greater need to improve product value to attract customers in times of slow growth. High growth industries can also have tighter capacity utilization, limiting the potential for consolidation. Relative price decline is greater following mergers between two firms with high market share. Thus, established players appear to focus more on improving products than exercising market power to squeeze consumers.

I also explore merger impact on product sales. Overall, there is no significant change to market share after an acquisition. Combined acquirer and target market share increases when firms

state sales growth as a goal in the merger announcement, giving credence to their words[5]. Although diversifying acquisitions showed no evidence of cost synergies, post-merger market share and distinct brand count are higher in these deals than when two industry participants join. This suggests that a cost borne by horizontal mergers is product market overlap, leading to brand pruning. Merger parties also prune the number of models sold on store shelves within a brand. This elimination of complexity is perhaps why market share remains constant despite offering better customer value.

This paper is related most directly to the literature on value creation in mergers. Rhodes-Kropf and Robinson (2008) model asset complementarity as a motive for mergers. Bringing these assets under the same roof allows synergies to bloom. Betton, Eckbo, and Thorburn (2008) provide and summarize evidence that the combined cumulative average abnormal stock return to bidders and targets is generally positive and significant. Healy, Palepu, and Ruback (1992) and Andrade, Mitchell, and Stafford (2001) determine that operating performance improves relative to industry peers subsequent to merger transactions.

Numerous papers, surveyed by Betton et. al. (2008), attempt to identify the source of merger gains by looking at returns to rivals upon merger announcement. Fee and Thomas (2004), Shahrur (2005), and Bhattacharyya and Nain (2011) examine returns to customers and suppliers. These studies conclude that greater efficiency through increased buying power and economies of scale, rather than exercise of market power, drive value creation. Hoberg and Phillips (2010) present evidence that new product introductions could be the source of synergies. Devos, Kadapakkam,

[5] Similarly, Bernile and Bauguess (2011) find that post-merger operating performance is related to management forecasts of synergies in deal announcements.

and Krishnamurthy (2009) find cutbacks in investment spending are the main driver of merger gains.

Kim and Singal (1993), Ashenfelter and Hosken (2008), and Focarelli and Panetta (2003) share this paper's focus on end products of merging firms by studying pricing of airlines, consumer products, and bank deposit rates, respectively. They find mixed evidence of both market power and cost efficiencies. This study covers a broader set of industries and includes the product quality dimension. Maksimovic and Phillips (2001) and Schoar (2002) study the impact of mergers on productivity, and Fee, Hadlock, and Pierce (2012) identify post-merger changes in advertising expenditures. Studies that consider the impact of mergers on product quality are rare. Hamilton and Ho (2000) study a sample of hospitals and do not find significant differences in patient mortality after acquisition.

This paper is also related to literature on product quality. Schmalensee (1979) surveys the early theoretical literature on determinants of product quality. Garvin (1988) provides a managerial treatment of the various dimensions of quality. Maksimovic and Titman (1991) develop a theory of the interaction between financial leverage and product quality. Empirically, Rose (1990), Phillips and Sertsios (2010) and Matsa (2011b) test the link between profitability, financial leverage, and quality in the airline and supermarket industries and generally find that financial distress leads to lower quality. Matsa (2011a), on supermarkets, and Bennett et al. (2012), on vehicle emission testing facilities, study the relationship between product market competition and quality. Aaker and Jacobsen (1994) and Tellis and Johnson (2007) identify a positive relationship between stock returns and product quality. From a marketing perspective, Mitra and Golder (2006) conclude that changes to objective quality, measured using *Consumer Reports* ratings, are reflected in changes to perceived quality, with a delay.

Lastly, I contribute to the literature on branding. Varadarajan et al. (2006) discuss factors that lead to brand retention in mergers. Bahadir et al. (2008) study determinants of brand value in acquisitions and find that targeted brands are attributed a higher value by acquirers when acquirers have diverse brand portfolios and strong brand management. Rao et al. (2004) discuss the relationship between brand strategies and firm valuation. Keller and Lehmann (2006) provide a general survey of the branding literature.

Section I describes the data and the research design. Section II provides empirical results on general determinants of product price and quality, Section III encompasses the merger analysis, and Section IV concludes.

I. Data description and research design

This paper asks whether acquisition activity leads to changes in the final goods produced by firms. If there are changes, what do they suggest about the sources of merger gains? The diversity of products, both in the market and within firms, presents great obstacles to defining and obtaining consistent data on measures of product market outcomes. I address this challenge by extracting data from *Consumer Reports* magazine. For over seventy years, Consumers Union, a New York-based, non-profit consumer advocacy group, has published *Consumer Reports*, which provides reviews and buying advice on a wide range of consumer products sold in the United States. Each issue of the monthly magazine reviews various product categories and provides prices, detailed quality rankings, and descriptions of a broad selection of specific models within each category. The magazine chooses which categories, items and brands to review by "gathering data about products and services, about consumer demand in the marketplace, and about what our subscribers plan to

purchase.[6]" The magazine's incentives are well aligned for an accurate definition of industries and competitors: the more relevant substitutes they identify in a product category, the better they serve their readers. Rigorous laboratory testing is then conducted by in–house experts. Objectivity is paramount. They accept no advertising or funding from manufacturers and purchase all test products themselves directly from stores or online, mimicking the customer shopping experience and thereby avoiding evaluating "gold-plated" models. Firms are not allowed to use good ratings in their advertising. Their ratings are credible. In July 2010, *Consumer Reports* published a negative review of the Apple iPhone 4. In response, Steve Jobs, Chairman and CEO of Apple, called a press conference specifically to respond to the report, stating "we were stunned and upset and embarrassed by the *Consumer Reports* stuff that came out this week[7]." Lastly, their ratings are consistent. The methodology and reporting system have stayed essentially the same since the magazine's inception.

Quality data from the magazine is reported as a ranking of all models reviewed (including ties), until later years when a one hundred point scale was implemented. To maintain consistency over the time series, I convert point scales to rankings. I order ranks so that higher numbers correspond to better quality. If a review covers 40 items, the best one receives, at least initially, a score of 40. *Consumer Reports* often reviews multiple models of the same brand to capture the full menu of choices for the consumer. Because model names change frequently, the unit of analysis is compacted to the brand. To operationalize this data I therefore average all models of the same brand into a single score. These scores are then normalized to lie between zero and one, resulting in a final quality rank variable. Three brands with averaged ranks 1, 2, and 3, for example, would be

[6] Taken from the *Consumer Reports* website.
[7] "Who's afraid of Steve Jobs?" *Bloomberg BusinessWeek*, July 26, 2010.

normalized to 1/6, 3/6, and 5/6, respectively. The normalization preserves relative quality rank distances and has the feature that being the best of a large group results in a higher score than being the best of a small group. Appendix A provides details and an illustration.

Pricing is available for all reviews over time, and therefore no simplification to rankings is needed. Using prices directly preserves the distance between ranks and hence more information[8]. Either manufacturer retail price or actual price paid by *Consumer Reports'* shoppers is provided. In a few cases, both prices were given; the correlation between them is 0.94. Operationalizing prices begins with the same first step—averaging all models in a brand. Because prices are not smooth like rankings, normalizing prices between zero and one would leave vulnerability to outliers. A category in which the most expensive product happened to cost twice as much as any other, for example, would push all others to a score between 0 and 0.5. Hence, to normalize, I divide all prices in a category and year by the median price. The top and bottom 1% of normalized prices are winsorized, resulting in the final price variable.

To capture the joint distribution of quality and price, I define a third variable, value, which equals quality rank minus normalized price rank. Note here that this normalized price rank is not price as defined above. It is constructed by converting actual prices into ranks and normalizing using the same process to operationalize quality. This is done so both quality and price are on the same zero to one scale. Hence, value can theoretically range from -1 to 1, with higher numbers indicating more quality per dollar. An item with poor quality rank of 0.2 yet high price rank of 0.8 has value of -0.6. This value measure assumes, simplistically, that price and quality have equal weight. The idea behind value is to measure "bang-for-the-buck"; cheap, low quality and expensive,

[8] Converting prices to rankings and applying the same normalization process used for quality ranks gives very similar results throughout the paper.

high quality items will rate similarly. Appendix A also provides examples of the price and value calculations.

Within a broad product category, items can be split into subcategories. A review of vacuum cleaners might comprise twenty "upright" and ten "canister" style vacuums. *Consumer Reports* ranks these categories separately. Thus one final adjustment is needed. After operationalizing upright and canister data separately using the above process, I combine scores for all a given product's subcategories, weighted by the number of items in each. For example, if Hoover vacuums have quality rank of 0.50 in the 20-item upright subcategory, and a rank of 0.25 in the 10-item canister subcategory, then Hoover's final vacuum quality that year would be (20 * 0.50 + 10 * 0.25) / 30 = 0.42.

The timing associated with these measures is the month and year of the magazine review; a February 2003 report indicates price and quality in that month. Although the goal of *Consumer Reports* is to provide timely reviews, there can be a delay between purchase of the products to be tested, to the actual testing, to the publication of the magazine. Hence, all results are also run (unreported) assuming reviews reflect model characteristics six months before the issue date. Results are substantively unchanged.

I now have a measure of the relative quality, price, and value of each brand within a product category each review year. Brands are linked to their ultimate parent firm each year using Lexis-Nexis, Capital IQ, firm 10K, internet, and industry source searches. The same firm can own multiple brands, and over time, the same brand can be owned by multiple firms. Branded consumer products are occasionally marketed and sold by one firm, but manufactured by a second. In these situations the brand is assigned to the firm with final sales responsibility, as the outsourcer sets price and quality through the selection and monitoring of their manufacturer. Interestingly, branded

products are not always sold by the firm bearing the same name, if one exists. Some Black & Decker branded appliances, for example, are sold by Applica, Inc., who pays fees and royalties to the Black & Decker Corporation. Applica dictates the design and pricing and is the residual claimant on sales and is thus assigned as the parent firm for those Black & Decker appliances.

The twenty product categories reviewed most frequently over the 1980–2009 time period compose the sample. Certain categories are omitted: those with products which are not clearly defined (e.g., computers with different memory specifications or pre-installed software), those for which quality is arguably more subjective (e.g., wines), and those that had great overlap with other categories (e.g., dryers, when washers are already included).

[Insert Table I here]

Table I provides summary statistics on the sample. There are 719 product-brand combinations within the 20 product categories. These correspond to 494 unique brand names, as the same brand can be present in multiple categories (e.g., General Electric washers and toaster ovens). Product category review frequency varies over the 1980-2009 time period. Vacuums are updated almost annually, while some products are only reviewed in the magazine approximately every five years. In total, over 9,000 items are evaluated. The products are sold by 372 unique parent firms: 43% are private, and 28% are headquartered outside the United States. Many, by inspection, operate in multiple industries.

These summary statistics highlight a departure this paper takes from the merger literature. Samples used in traditional work on product markets are usually built from large public firm datasets. Private and international firms are often missing, and firms are grouped by a broad

industry measure such as SIC codes. This paper, in contrast, relies on a third-party expert to define markets. *Consumer Reports* mimics the customer shopping experience and hence generates competitor lists without discriminating by parent firm data availability. Additionally, by performing analysis at the product level, I avoid the noise introduced by assuming the varied business lines of diverse firms can be summarized by a single industry code.

As an example of differences in sample and unit of analysis, a search in Compustat for firms with SIC code 3635 (Household Vacuum Cleaners) in 2008 produces zero firms. A search using NAICS code 335212 (Household Vacuum Cleaner Manufacturing) identifies one firm, a short-term contract manufacturer of floor care products for Royal Appliance and Electrolux. The vacuum industry is invisible to the econometrician using large financial datasets. In contrast, in 2008, *Consumer Reports* reviewed vacuum models sold in the United States by 20 different firms, ranging from privately held Dyson Ltd. and Bissell, to international Koblenz and Miele, to conglomerate Berkshire Hathaway (owner of the Kirby brand). Dyson and Berkshire Hathaway at the firm level would hardly be considered natural rivals, as vacuums are a small part of Berkshire's business. The power of this study comes from isolating and comparing only the relevant vectors along which firms compete.

It is important to note that the measures of quality, price, and value are *relative* to the competition. A challenge in pre- and post-merger analysis is identifying the counterfactual—if a change is seen, how much of that change can be attributed to the merger versus confounding factors[9]? Suppose prices increase after acquisitions. If merger activity tends to occur when raw materials costs are also increasing, then the relation between final good prices and mergers may be

[9] See Ashenfelter, Hosken, and Weinberg (2009) for a discussion of this issue.

spurious. By examining relative changes, this study is applying a difference-in-difference approach. Any factors affecting the industry as a whole should be removed from relative rankings.

II. General determinants of product market attributes

This study begins by exploring some basic features of product pricing and quality: how are they related to each other, and with what are these dimensions associated in the cross-section of firms? The analysis of merger impact follows.

A. Product attributes in the cross-section

Are product price and quality generally related? For each product category in each year I calculate the rank correlation between price and quality. Figure 1 shows that while price and quality are positively related, there is wide dispersion and the correlation is only 0.32. If buyers are well informed, this correlation should be high. Even in the presence of asymmetric information, high prices can serve as a signaling device for high quality. Advertising distortions can sever the link between objective quality and price, however. There is not a clear theoretical prediction for the strength of this relationship[10].

Do certain types of firms tend to sell higher quality or priced goods? In Table II, columns 1 through 3, I regress relative brand quality, price, and value on various firm characteristics. These financial measures are taken from Compustat and thus the sample here is limited to publicly traded firms for which all data is available. Firm size is measured as the log of sales. Research and development expenditure is taken as a percentage of sales. Leverage is defined as debt in current

[10] Caves and Greene (1996) provide a discussion from a marketing perspective.

liabilities plus long-term debt, divided by these debt measures plus the market value of equity. Operating margin is EBIT divided by sales. Tobin's *q* is approximated using the formula supplied by Chung and Pruitt (1994). These pooled OLS regressions include product category fixed effects. Standard errors are clustered by product-brand, as product and firm characteristics are both somewhat persistent over time. Column 1 shows that higher quality goods are sold by larger firms: the coefficient on *Firm size* is 0.027 and significant at 1%. The regression in column 2 suggests products sold by large firms are slightly less expensive, although this is not significant. Large firm products provide more value, consistent with higher quality and lower price. Offering better customer value could be a reason these firms became big. Better products are also sold by firms with higher R&D spending. A 1% increase in R&D as a percentage of sales is associated with a 1.7% increase in quality percentile ranking. These wares sold by high R&D firms are also more expensive, with a 1% increase in R&D as a percentage of sales resulting in prices higher by 2.1% than that of the median good. A causal link between R&D spending and higher quality and prices is plausible. *Leverage*, *Operating margin*, and *Tobin's q* are not significantly associated with either product dimension.

[Insert Table II here]

In columns 4 through 6 private firms are added and quality, price, and value are regressed against dummy variables indicating private firm and international status. Sales for many of the private firms are extracted from Capital IQ. The other variables, generally unavailable for private firms, are dropped. Products from foreign manufacturers are indistinguishable from those sold by U.S. firms. Private firm goods are significantly lower in quality, higher in price, and lower in value

for consumers. The coefficient of 0.124 on *Private* in the price regression is interpreted as prices higher by 12.4% of the price of the median item. This value is not a carryover of the earlier size result, driven by private firms being smaller on average than public firms, as *firm size* is included as a control and has the same direction and significance as in the public firm regressions.

Why do private firms appear to offer less attractive products? Digging deeper, I note that private firms are only worse in the later years of the sample. In column 7, I create a dummy variable, *Post-2000*, which marks the years in the 2000's. The interaction term *Private*Post-2000* is significantly negative for quality and value for domestic firms. What is different about the 2000's? One answer is that foreign competition has grown significantly[11]. I calculate the change in average foreign brand penetration from pre-2000 to post-2000. I split the 20 industries into those with above median increase in foreign competition and those below. Columns 10 and 11 of Table II show that the domestic private firm deterioration in value in the 2000's occurs entirely in those industries with large increases in foreign competition[12]. This raises the question why private firms may be more susceptible to foreign competition. It is possible that information aggregation from public markets increases awareness of more geographically distant threats and new inventions[13].

B. Product attributes within a firm

Firms often sell multiple brands and models within a product category. MTD Products markets both Cub Cadet and Troy-Bilt lawnmowers, for example. How similar are a given firm's offerings? Does a common characteristic define them? Within each product-year, I pair each brand with every other brand. Thus, a review article covering five distinct brands expands to become ten

[11] Regressing the share of foreign brands in a product category on indicators for the 90's and 00's with product fixed effects shows increasing foreign presence over time.
[12] The results are stronger for quality, omitted for brevity.
[13] See Subrahmanyam and Titman (1999).

brand-pairs: A with B, A with C, A with D, etc. For each brand-pair each year, I create the dummy variable *Samefirm* which equals one if the brands have the same parent company and zero otherwise. I also create the variable *Quality distance*, which is the absolute value of the difference in quality of the two brands. As quality normalizes between zero and one, *Quality distance* also varies between zero and one. The smaller this value, the closer in quality are these brands' products. *Price distance* and *Value distance* are generated the same way.

In Table III, columns 1 through 3, I regress the distance variables on *Samefirm* in a pooled univariate regression with product category fixed effects. Because quality, price, and value are persistent over time, standard errors are double clustered by each brand in the pair. The clustering is also necessary because a single brand appears multiple times through multiple pairings. Therefore, pairs share similar shocks. The coefficient on *Samefirm* when *Quality distance* is the dependent variable is -0.064 and highly significant (t-statistic of -6.28). Brands are six percentile points more similar in quality ranking when they are under the same corporate umbrella. Thus, firms have characteristic quality. They could have technologies, manufacturing processes, or quality reputation goals that place them in a particular niche. Perhaps all products emerge from the same plant. Pricing of brands in mergers also directionally becomes more similar—the coefficient on *Samefirm* is -0.035 when *Price distance* is the dependent variable—but not significantly. Taken together, the quality and price similarity results suggest when firms offer multiple brands in the same product category, they differentiate these brands more on pricing (perhaps through marketing strategy) than on the actual underlying goods. Driven primarily by quality, column 3 suggests a firm's various brands deliver approximately five percentile points more similar customer value.

[Insert Table III here]

A firm's brands exhibit common characteristics. But do brands actually change similarity when brought together or split apart? The pooled regressions include brand pairs that have always been housed in the same firm. Regressions 4-9 of Table III introduce product-brand-pair fixed effects[14]. Thus the coefficient on *Samefirm* is now identified only by those brand-pairs that experience periods of both common and separate ownership. This analysis serves as a preview to the impact on products of redrawn firm boundaries from mergers. Column 4 shows that two brands' quality levels do change and become more similar when brought under the same parent company. The magnitude is approximately six percentile points, the same as in the pooled regressions. There is no significant evidence of price convergence or divergence (column 5), although directionally, distance between brand prices increases. Value, in column 6, converges to a similar degree as before, but under this more stringent test, not significantly.

Does quality converge in a particular direction? I take an initial look at levels in columns 7 through 9. I define *Quality average, Price average*, and *Value average* which simply average the scores of the brands in the pair. Brand-pair fixed effects are still present in this specification. Average relative quality when two brands move under the same roof increases by 2%, though not significantly so. Relative pricing for merger brands combined, however, falls by 11%, with a *t*-statistic of -4.45. Thus bringing brands together is associated with declines in pricing. This translates, too, to better customer value.

[14] The Amana-Whirlpool air conditioner pair and the Amana-Carrier air conditioner pair would have separate fixed effects, for example.

III. Merger impact on product attributes

The previous section studied determinants of product quality and pricing in the entire sample. I turn now to focus on mergers and acquisitions.

A. The merger sample

There are 88 distinct deals in which at least one branded product in the sample is acquired by a new firm. Ownership changes within the same firm, e.g., leveraged buyouts, are not included. These 88 mergers involve 116 products lines, as a single merger can encompass multiple categories. For example, Maytag acquired microwave ovens, refrigerators, and washing machines (three product lines) when it purchased Magic Chef in 1986 (one merger). Further, the 116 product lines comprise 229 distinct product-brands. Maytag's purchase of Magic Chef's washing machine business (one product line) joined the Maytag brand with the Admiral and Norge brands (three product-brands). Some product-brands show up in more than one deal.

I classify the acquisition of a particular product line as *related* if both acquirer and target sell the product. Hoover and Dirt Devil both sold vacuums. A product line ownership change is *unrelated* if the acquirer was not previously in the business; Metromedia Group, primarily a movie studio, acquired Snapper lawnmowers in 1995.

Product line acquisitions are subsets of firm acquisitions. A single firm-level acquisition can involve multiple product line acquisitions, which themselves can all be related, all be unrelated, or a mixture. At the firm level, I will classify a deal as *related* if any product in my sample involved in the deal is sold by both acquirer and target. This categorization of deals is somewhat rough. This paper focuses on the product line, not the firm, as the unit of analysis. A clean mapping from relatedness of product lines to relatedness of firms cannot be drawn. I classify Whirlpool's 2006 acquisition of

Maytag as related because there exist products in the sample, white goods (e.g., washing machines), sold by both firms. Hoover vacuums were also part of the deal, however. Whirlpool had no experience with vacuums. Thus there is an unrelated component in this related merger. Nevertheless, it will be useful in some analyses to have a measure of relatedness at the firm-deal level.

[Insert Table IV here]

Table IV describes the merger sample. Panel A highlights the prevalence of private firms. Panel B details the product line and brand distribution. The time-series of the merger sample is displayed in Figure 2. There are fewer mergers in the early years, though some product categories were not covered until later years. Hence, the data are more dense in the 1990s and 2000s.

A.1. Announcement returns

Table V provides announcement return detail on the sample. The cumulative abnormal return (CAR) for U.S. public firms in the sample around the announcement period (-1, 1) is calculated by summing the 3-day abnormal returns over the CRSP value-weighted index. A 20-day (-10, 10) window around the announcement date is calculated as the market capitalization at the end of the event window minus the market capitalization at the start divided by the starting value. The abnormal (-10, 10) return is this raw return less the return on the index.

Targets experience a highly significant positive abnormal return of 13.2% over the shorter time period and 14.8% over the longer one. Acquirers experience a positive return, 1.3% over the announcement period and 3.4% (significant at 10%) over (-10, 10). Twenty deals involve both a

public U.S. acquirer and target. Their combined, market capitalization-weighted CAR is positive at 2.2% over the announcement period and 6.1% (significant at 5%) over 20 days. These merger returns are consistent with those found in large sample studies. Betton, et. al. (2008), find the average large sample target announcement (-1, 1) return as 14.6%, bidder as 0.73%, and combined as 1.06%, significantly positive for targets and combined.

The second half of Table V adds control variables. *International* is a dummy variable equal to one if a non-U.S. firm is involved. *Related merger* is as defined earlier—both firms sold a common product in my sample. Also included are indicators for a private bidder, private target, a full merger (as opposed to an asset sale), and *acquirer relative size*, which is the ratio of the market capitalization of the acquirer to that of the target. I find that acquirer returns are higher over the shorter window when they purchase private firms. Target returns are higher (and acquirer returns directionally lower) when targets sell themselves completely as opposed to partial divestiture. Finally, combined returns are higher when the target is small relative to the acquirer. Taken as a whole, these results are consistent with more value being created when firms make smaller, targeted, bolt-on acquisitions. Relatedness did not affect returns in this sample; value creation appears to occur equally in diversifying deals.

[Insert Table IV here]

A.2. Which firms merge, and with whom?

Within an industry, can product characteristics predict which firms will be buyers or sellers? I create a measure of ex-ante price and quality for each pairing of competitors by choosing the most recent price and quality rankings prior to the merger close date. If a firm sells multiple brands in a

product category, these brands are averaged. Thus for each product line in a deal, I now have the average price and quality for the acquirer and target, separately, heading into the merger. The mean ex ante quality of acquirers is 0.45 with a standard deviation of 0.23; for targets these numbers are 0.49 and 0.24. The mean normalized ex ante price is 0.52 goods of acquirers and 0.54 for those of targets. Both measures are normalized to lie between zero and one. Acquirers and targets are both spread across the quality and price spectrum, and thus a product line's quality and price level does not predict whether it eats or is eaten.

I next explore product trends. Are improving or deteriorating firms more likely to merge? For each acquirer and target, I calculate the change between the two most recent *Consumer Reports* reviews before the merger date. If a brand had recently improved from 0.3 to 0.4, this would show up as a change of 0.1. The means of these changes for acquirers and targets, quality and price, all lie between (-0.05, 0.05) with large confidence bands. Trends also do not predict who merges.

While product characteristics in isolation do not predict merger activity, they may influence which firms make better matches. Suppose a firm purchases one of its competitors. In an industry with many players, how does it choose who to buy? Research has looked at how acquirers and targets compare along financial measures and their relatedness to other firms[15], but scant evidence exists at a micro or product market level. In Figures 3a and 3b I plot acquirer and target product line ex-ante quality and price, respectively. Figure 3a reveals two things. First, it confirms visually that high and low quality product lines are equally likely to be buyers, as there are approximately as many acquirers with quality above 0.5 as below. Similarly, targets are both high and low quality. The joint distribution of acquirer and target, however, suggests a negative relationship between the

[15] See, for example, Jovanovic and Rousseau (2002), Rhodes-Kropf and Robinson (2008), and Hoberg and Phillips (2010).

quality levels of the two parties. The correlation between acquirer and target ex-ante quality rank is -0.35 and is significantly different from zero at the 5% level—there are relatively fewer low-low and high-high pairings. A firm with a reliable or feature-rich product tends to acquire firms or divisions with more basic, lower quality goods, and vice versa. No pattern is apparent in Figure 3b. The correlation between ex-ante price levels is -0.14 and not significant.

This quality result hints at potential within-industry merger drivers. One possibility is that at the product level, firms may seek to buy access to new technologies or better quality production processes (low quality buying high), or apply their already superior methods to a needy target (high buying low). Alternatively, firms may prefer to acquire new goods which have a different quality reputation, allowing them to segment the market and avoid sales cannibalization. The former motivation would suggest quality convergence post-merger to a higher level (with lower brands moving toward higher brands); the latter does not have this prediction. I return to this issue when post-merger results are analyzed.

A.3. Which industries have more mergers?

Table IV revealed high variation in the number of deals by product category. Why do some industries have more mergers than others? I explore the role of industry environment using my comprehensive identification of competitors by product line. Studies such as Klepper and Graddy (1990) suggest industries pass through life-cycle stages: a pattern of initial high growth, followed by maturity, followed by a slowing or decline phase. Hence, I compile deal counts at the industry-decade level to account for shifts; the number of coffee maker deals in the 1990's is a sample data point.

To capture the industry environment, additional data is required. *Appliance* magazine tallies annual unit shipments for various consumer goods, covering 60% of the product categories in the main sample from 1984 through 2008 [16]. Using this data, I define the variable *Industry growth* for available product categories as the average annual growth rate of unit shipments each decade. In Table VI column 1, I regress the number of deals on the number of existing firms at the start of the decade, the average percentage of firms headquartered outside the U.S. during the decade, and *Industry growth*. Unsurprisingly, the more firms there are, the more mergers. The degree of foreign penetration has a strong negative effect on the number of deals. This is consistent with the findings in Erel, Liao, and Weisbach (2012) in which cross-border mergers are more difficult to pull off due to greater cultural and geographic distance. There are more mergers in mature industries—where industry growth is low—but this is not a strong effect. Column 2 eliminates industry growth, opening the sample to more product categories, and the results are similar. Using brand share instead of firm share also leaves the conclusions unchanged.

[Insert Table VI here]

B. Post-merger product similarity

I turn to explore direct evidence of changes to actual goods produced. A key feature of this paper's research design is the ability to perform analysis at the product line as opposed to aggregate firm level. This permits cleaner isolation and measurement of effects. Of the 229 product-brands involved in mergers, I begin by analyzing the subset of 144 that either acquire, or are acquired by,

[16] *Appliance* gathers this data from "surveys of appliance OEMs, industry suppliers, market analysts, confidential sources, and *Appliance* magazine estimates."

counterparts for whom I also have quality and price data in the same market. This corresponds closely to those products involved in "related" firm deals defined earlier. Some of the remaining 85 product-brands were targets of acquirers in the industry but not covered in *Consumer Reports*. Often, these are foreign manufacturers without a product for sale in the United States. A majority of the 85 product-brands are those acquired by firms with no prior experience in those products. These will be analyzed separately, as diversifying deals may have different motivation and outcomes.

I once again pair each acquiring brand with each target brand in a given deal to generate the variables of interest. If firm 1 with brand A acquired firm 2 with brands B and C, I define the *Quality distance* of each pair each year as the absolute value of the difference in quality between A and B, and A and C, separately. *Price distance* and *Value distance* are defined analogously. For each merger, I also record the month and year the deal closes. A dummy variable, *Post-merger*, equals one when the review of a pair of brands is found in a magazine issue dated after the deal close date. For each acquisition, I keep only the data for the five years before and after the closing date. Years outside this range are less likely to be impacted by the acquisition event.

Table VII explores product similarity before and after a merger. In column 1, I regress *Quality distance* on *Post-merger* and a fixed effect for each product-brand pair. Standard errors are double clustered by each product-brand in the pair. The coefficient on *Post-merger* is -0.083 and significant at the 1% level. Thus two brands are on average eight percentile points closer in quality ranking in the five years after the merger than in the five years before. This is consistent with firms being active. Consolidating suppliers, moving manufacturing from two separate plants to the same plant, or imparting a common manufacturing philosophy or technique could lead to convergence in quality. For example, by using a common supplier, both brands now share the reliability of component parts produced by that supplier. In column 2, the dependent variable switches to *Price*

distance. There is no evidence that firms push the prices in their new brand portfolio closer together or farther apart. Brand customer value also maintains the pre-merger distance.

[Insert Table VII here]

In columns 4 through 6, the *Post-merger* variable is disaggregated into ten year dummies: years one to five before the merger, and years one to five after. All magazine reviews in a one-year window surrounding the acquisition close date (six months before to six months after) are assigned to year zero and omitted from the regressions. Hence, the *Merger year+1* dummy, for example, captures magazine issues dated 7 to 18 months after the deal close date. With product-brand pair fixed effects, regressing the distance variables on these dummies creates demeaned average effects for each year. The coefficients for *Quality distance* in column 4 are positive for each year before the acquisition, near zero for *Merger year+1*, and negative thereafter. Figure 4a displays the year-by-year changes graphically. The *y*-axis measures the constant term plus the year dummy coefficient. The average quality rank distance between merging brands shrinks from approximately 35 to less than 25 percentile points from five years before to five years after joining. The post-merger convergence does not appear to be the continuation of an obvious trend and achieves maximum effect in two years. Column 5 of Table VII and Figure 4b show year-by-year price differences and reveal no pattern. Firms do not appear to bring newly acquired brand pricing in line with existing brand pricing.

C. Post-merger quality and price levels

While products brought under the same corporate roof appear to converge in quality, what happens to quality, price, and value levels? Does quality converge upwards or downwards? I begin with the same sample of up to five years of pre- and post-acquisition brand-pair observations. The variables Q*uality average*, *Price average*, and *Value average* average the rankings of each brand pair. Column 1 of Table VIII regresses *Quality average* on the *Post-merger* dummy variable. The coefficient is positive but near zero. Thus although the two brands become more similar in quality, they do not become better or worse. This lends little support to the idea that a high quality manufacturer buys a low quality target to impart its superior methods, or that a poor manufacturer tries to improve quality via acquisition. The earlier finding that low quality pairs more often with high quality, and vice versa, is thus more likely explained by firms seeking to supplement their portfolios with offerings which will not overlap with and cannibalize existing sales.

[Insert Table VIII here]

While average quality is unchanged post-merger, relative selling prices fall significantly. The coefficient on *Post-merger* in column 2 is -0.072 with a *t*-statistic of -2.22. Thus if the products involved in the merger sold on average at the median industry price pre-merger, their prices fall afterwards to 7.2% below the median. This result supports the synergy through efficiencies and cost-cutting hypothesis. If firms are consolidating suppliers or moving production and shutting excess capacity, as increasing product similarity from Table VII might suggest, costs can fall, allowing prices to fall. The year-by-year progression in average quality and price levels can be seen numerically in columns 4 and 5 and graphically in Figures 5a and 5b. Post-merger, it takes about

three years for price declines to be fully realized, and again, this does not appear to be the continuation of a pre-merger trend. Average quality level appears to increase steadily over the five years after the deal, but this is not statistically significant. Taken together, and confirmed by the coefficients on *Value average*, these results suggest M&A activity leads to better deals for consumers.

D. Separate acquirer and target impact

The results thus far have been for brands combined. A feature of this dataset is I can continue to track bidder and target separately after the merger. This contrasts with firm-level analysis where the new resulting firm has only a single stock price and set of financials. Is the effect on acquiring and target brands the same? In Table IX I run the quality, price, and value level regressions for acquirers and targets separately. As before, only data points five years before and after the deal close date are retained. Table VIII showed no change to the average combined quality level after a merger. Columns 1 and 4 of Table IX extend this finding to both bidder and target of these deals as well, as both coefficients on *Post-merger* are close to zero. Table VIII found average prices relative to the industry median to fall for merger parties. Columns 2 and 5 of Table IX show that this effect manifests more in the acquired brand (10% vs. 4% decline). Firms appear less willing to cut pricing on their "home" brands.

[Insert Table IX here]

An open question is whether the post-merger convergence in brand quality and decline in price were caused by the merger. The lack of a pre-merger trend helps mitigate this endogeneity concern, but stories remain. Perhaps manufacturers that were already planning to become more

similar in reliability or feature content make good partners. Perhaps product price declines follow financial distress, and distressed firms make easier targets. There could be fundamental changes to supply such as foreign entry which force firms to merge and simultaneously lower prices. While I do not have an instrument for acquisitions, I explore a cross-sectional prediction to address this concern. Healy, Palepu, and Ruback (1992) find evidence that mergers between firms with high business overlap show greater post-merger improvement in operating performance than those between unrelated firms. Using text-based analysis of 10-K reports, Hoberg and Phillips (2010) find that mergers between firms with more similar product market language result in higher profitability and more new product introductions. Suppose quality convergence and price declines are driven by operational synergies and economies of scale arising from plant or supplier consolidation. This requires both target and acquirer to have had plants or suppliers beforehand and predicts stronger effects in related mergers.

The analysis thus far has relied on a sample of brands which are joined in related acquisitions. I now append 45 product-brand targets of firms which did not previously participate in those product markets. I call these unrelated product acquisitions[17]. Metromedia Group, for example, primarily a movie studio, acquired Snapper lawnmowers in 1995. An "acquisition" here is still defined at the product line level; a single firm-level acquisition can involve multiple product-brand acquisitions, which themselves can all be related, all be unrelated, or a mixture. As an example, Goodman Global purchased the Amana division from Raytheon in 1997, receiving Amana air conditioners, refrigerators, and microwave ovens. Goodman at the time was a maker of air

[17] Selling the same product is not the only definition of relatedness. As pointed out in Rhodes-Kropf and Robinson (2008), a firm with a product but no distribution might realize great synergies with a firm with distribution and no product. Similarly, a final good producer and its upstream supplier might realize cost savings by joining forces. Selling the same good is one simple way to observe relatedness.

conditioning equipment only. Thus, this single firm-level deal generated three product line acquisitions: two unrelated (refrigerator, microwave) and one related (air conditioner). Note that these 45 product-brands are all targets. There are no unrelated acquirers in the sample. I see when a vacuum maker is bought by a non-vacuum maker, but do not record each time a vacuum maker purchases non-vacuumers.

The first half of Table IX showed that price declines were quite strong in target brands of related mergers, so the overall effects of synergies should be visible focusing only on targets. The sample in columns 7 through 9 is these unrelated targets. There are no significant changes to these brands, as the coefficients on P*ost-merger* are essentially zero for quality, price, and value. Columns 10 through 12 combine related and unrelated targets and include an indicator variable for related mergers interacted with *Post-merger*[18]. The coefficient on the interaction term is -0.10 and significant at 5% for the price regression. Hence price declines in the target only appear when similar companies join forces. This is consistent with actions being taken to lower costs only when units are taken over by a firm that has relevant experience and scale to leverage.

This is not necessarily an indictment of diversification. Although the acquired product is not changing in unrelated deals, there may be other benefits for the acquiring firm such as additional growth. However, the evidence suggests that any potential benefit is less likely to come through the cost efficiency channel. Recall from Table V that announcement returns were not significantly different between related and diversifying deals. Different types of mergers can exploit different complementarities.

[18] The variable *Related* alone drops out of the regressions because relatedness is constant for each product-brand and each has a fixed effect.

E. Planned synergies

Are these apparent synergies consistent with what firms say they will do? I search LexisNexis and read a sample of acquisition announcement news articles. Table X summarizes reasons given for acquisitions into three broad categories and corresponding subcategories. An attempt was made to keep subcategories mutually exclusive, but there is likely some overlap. It is also important to keep in mind that firms do not need to detail plans in public statements, nor follow through with what is said. Given these caveats, cost reduction activities were mentioned in 60% of all deals. In particular, nearly half of acquirers announced plans to close plants and consolidate production. This is consistent with convergence in product quality and passing on of lower costs in the form of lower prices. Supplier consolidation and elimination of marketing and administrative positions were mentioned less frequently. Most deal announcements (80%) explicitly cite growth. Diversifying into a new product line, a new niche within an existing product line, and access to new customers through geography or distribution capability are each mentioned about 30% of the time. Access to or transfer of technological capabilities is a part of 14% of acquisitions. Increased market power is almost never discussed, although it could be unwise to do so publicly. Financial motivation, such as a bargain price or acquiring a target for its excess cash or tax losses, is rarely mentioned as a reason.

[Insert Table X here]

The last two columns of Table X split the 88 acquisitions into related and unrelated. Recall that I classify a deal as related if any product in my sample involved in the deal is sold by both acquirer and target. There are interesting differences between related and unrelated acquisitions.

Cost reductions are cited much more frequently for related deals, 75% to 26%. This could be because more redundancy is generated when two similar businesses join. Revenue enhancement comes through adding new brands and niches to an existing product line in related mergers and through diversification for unrelated ones. This suggests heterogeneity across deals in the channel of value creation and is consistent with the findings in Table VIII that price reductions are only seen when related firms merge. Overall, there is congruence between stated firm intentions and actual product changes.

F. Cross-sectional differences in post-merger product outcomes

This section explores whether the average post-merger effects uncovered vary for some types of mergers in the cross-section. Industry structure can alter merger motivation and outcomes. Studies such as Klepper and Graddy (1990) suggest industries pass through life-cycle stages: a pattern of initial high growth, followed by maturity, followed by a slowing or decline phase. Are mergers undertaken for different reasons in different industry environments? Maksimovic and Phillips (2008) find that the impact of organizational form, for example, varies over long-run industry life-cycle stages. Product market concentration can also affect merger outcomes. As noted by Hart (1983) and others, in competitive markets firms might have stronger incentives to improve economic efficiency. Product quality might be higher when competition is strong (Spence 1975).

To capture the industry environment, additional data is required. *Appliance* magazine tallies market shares and units for 60% of the product categories in the main sample. Share data for most products is available from 1984 through 2008. Using this data, I define the variable *Industry growth* for each product category as the cumulative annual growth rate of unit shipments over all available years of data. To capture product market concentration, I calculate each industry's Herfindahl-

Hirschman Index (HHI)[19]. The median market share across all years and product categories is 10%. If both target and acquirer have market share 10% or higher in the year prior to the merger close year, I set a dummy variable *big_big* equal to one for that deal. I define and set *big_small* equal to one if one firm is above 10% and one below. These variables permit testing of differential effects depending on the market presence of merging parties.

Additional firm characteristics which could impact post-merger product outcomes include the relative positioning of target and acquirer. Quality may react differently if a high-quality manufacturer buys a low-quality brand. The variable *Acq-Targ quality difference* calculates the difference between acquirer and target brand quality in the most recent year available before the merger close year. *Acq-Targ price difference* and *Acq-Targ value difference* are defined analogously. I also include the target's private firm status and whether the deal involves firms headquartered in different countries[20]. International deals could make integration more difficult; conversely, international deals may be undertaken specifically to consolidate plants or suppliers.

Table XI shows that post-merger quality converges less (retains greater distance) in fast-growing industries. Price levels also decline less and customer value is lower when growth is high. In high growth industries, manufacturing or supplier capacity may be more scarce, leaving fewer opportunities to consolidate plants or suppliers. This may lead to less cost cutting and reduced ability to lower prices. In addition, firms can achieve growth in high growth industries by simply maintaining share. Growth in mature industries, however, comes only at the expense of competitors. Thus merging to be able to offer better relative customer value may be a more urgent need.

[19] The Herfindahl-Hirschman Index is calculated by summing the squares of participant market shares expressed as fractions and can range from 0 to 1.0. The share data each year includes an "Others" category which ranges from 1% to 30%. I assume "Others" comprises firms with market share equal to that of the smallest identified firm.
[20] Erel et al. (2011) study factors impacting cross-border mergers.

Prices fall, and value increases more relative to competitor offerings post-merger when merging firms are both large. Quality is directionally higher. This suggests market share position can affect merger motivation or outcomes. Why firms with greater market presence see greater product improvement after an acquisition is an open question. Smaller firms may acquire to gain share, while established players focus on improving products. One prediction, that the merger of larger firms creates more market power and leads to them raising prices, does not hold. This is consistent with literature cited earlier identifying efficiencies over market power as the key driver of value in mergers.

The coefficients for the interaction of *post-merger* with the ex-ante difference in acquirer and target quality, price, and value are all positive, significantly at 10% for price, in the level regressions in columns 4-6. This provides suggestive evidence that who buys whom matters—product characteristics tend weakly to converge to that of the acquirer. If the acquirer is higher price because they are higher cost, and they prefer to shut down and relocate employees from the target plant rather than their own, the price result would obtain.

Industry competitiveness as measured by the HHI does not affect the degree to which quality or price levels change after a merger. The predicted direction is unclear. More competition can provide greater incentives to cut costs or improve quality after undertaking a merger. In a more competitive environment, however, firms may already be operating more efficiently, leaving less room for further cost reductions. There is also again no support for the prediction that higher industry concentration leads to more participant market power and thus higher post-merger pricing. One caveat, however, is that as my product attributes are relative to the competition, I cannot say whether industry price levels overall rise after mergers.

[Insert Table XI here]

G. Merger impact on market share, brand count, and item count

I turn attention from products to sales. Combined market share of brands in a given product category becomes the dependent variable. For diversifying deals, in which the acquirer was not previously in the industry, combined share simply equals target share. Table XII shows that total share is 0.5% lower in the five years post-merger than in the five years before, though this result is not significant. This is consistent with Mueller (1985) and Pesendorfer (2003) who find that market share tends to fall after mergers. This result may seem puzzling given that post-merger, products are cheaper without loss in quality. Later analysis of the number of brands and models offered by merging firms will provide some clarity. Additional independent variables are as defined in Table XI with two additions: *high foreign entry* marks those industries that experienced an above median increase in foreign penetration in the latter half of the sample (the same variable used to split the sample in Table II, columns 10-11). *Geog_dist* captures management's stated intention to grow share. It is a dummy variable equal to one if either "access to new geographic markets" or "leverage distribution" were cited as reasons for the merger as documented in Table X. Additional geographic markets expand the reach of brands. If one brand is sold in the east and one in the west, a merger will allow both brands to have a presence in both regions. Leveraging distribution also provides additional places for brands to be sold and includes, for example, gaining access to a network of retail stores. The positive coefficient on *post-merger*geog_dist* in columns 2 and 3 shows that firms' stated plans do appear to materialize. Bernile and Bauguess (2011) also find that management forecasts of synergies in deal announcements are informative about post-merger operating performance. Column 3 shows that post-merger market share declines more in related mergers.

There is greater possibility of product line overlap here. This is also consistent with the possibility that firms purchase rivals to eliminate competition. A diversifying acquirer could have no such motivation.

[Insert Table XII here]

To provide color on changes to market share, I examine the number of brands offered. Do mergers drive brand consolidation or new brand introduction and innovation? The number of brands sold by a firm in a product line is determined by tallying the number of unique names which appear in *Consumer Reports* reviews surrounding the merger close date. One complication, however, is that after a merger, a brand slated to be dropped is unlikely to be taken off the shelves immediately. There could still be advertising to leverage or product in the supply chain. To provide time for brands to be dropped, I throw out the two years immediately following each merger. The number of pre-merger brands thus equals the unique name count from four years before to the close date, while post-merger brands count the unique names which appear in years two through six. The result is two data points for each product-merger: a before count and an after count for the combined firms.

In Column 4 of Table XII the number of brands is regressed on the *post-merger* dummy and a product-merger fixed effect. As with market share, there is no significant change to the number of brands. Column 6 reveals that new brands emerge when private firm targets are acquired. If private firms are more capital constrained, a deeper-pocketed owner can facilitate costly new brand development. Brand count also falls more when related firms merge, providing a mechanism for the fall in market share in related firm deals as brands that overlap are pruned. This is consistent with

Varadarajan et al. (2006), who note that in horizontal mergers, redundancy between acquirer and target brands leads to cannibalization, increasing the propensity for brand deletion. This also suggests that a potential avenue of value creation for diversifying firms could be brand extensions. Post-merger brand count can increase if these firms introduce a brand from their existing business into the new product market[21]. High industry concentration also leads to brand reduction. With fewer competitors, there is perhaps less need to maintain multiple overlapping brands. Lastly, mergers involving an international firm consistently lead directionally to higher market shares and brand counts. Foreign brand sales in the U.S. may derive particular benefit from a local partner.

Lastly, I peer within brands to examine the number of distinct models offered. All prior analysis in the paper had averaged all of a brand's models into a single score for the brand. This obscures the fact that, for example, in 2000, *Consumer Reports* reviewed six Hoover vacuums but only one Kirby vacuum. Some brands cover more of the product space. I return to the raw *Consumer Reports* data and construct a new variable for each brand: *item share*. This counts the number of distinct models reviewed for each brand within a product category each year and divides by the total number in that category each year. Column 7 of Table XII shows that after a merger, the new parent sells fewer combined models. Column 8 shows this is especially prevalent in mergers between two major players (highly significant negative coefficient on *post*big_big*) or even one major player (negative coefficient on *post*big_small*). These deals undoubtedly have more overlap. It is only the mergers between two small brands where the model lineup does not shrink. Thus, combined firms appear to be pruning offerings within a brand, and this provides another mechanism for sales deterioration post-merger despite better value for customers.

[21] See Czellar (2003) for a discussion of brand extension strategies.

As an illustration of this strategy, imagine if before merging, Maytag sold washing machine models A, B, and C, and Whirlpool sold X, Y and Z. Independently, these brands sell 6 washing machines. After Maytag and Whirlpool merge, however, they might eliminate overlap and drop to 4 models—the 4 best or most profitable. If customers who would have purchased the discontinued models do not fully switch to other Maytag or Whirlpool products, sales will decline. Yet, by pruning the unprofitable models and reducing variety and complexity, firms may be better off with slightly lower total combined sales.

The threat of foreign entry may also dampen share gains post-merger. In columns 2 and 3 of Table XII, market share falls directionally more in industries with recent increases in overseas competition. The number of models offered increases, however, as can be seen in column 8. Firms may be merging defensively, putting more products on shelves to stave off new competition.

IV. Conclusion

Existing research, relying primarily on stock returns and financial statements, has found that mergers appear to create value. This paper provides direct evidence of sources of this value creation. I introduce a dataset from *Consumer Reports* magazine which provides visibility into the quality and pricing of a large sample of consumer products over time. Shining a light on product attributes reveals telltale signs of operational synergies. I find that when two manufacturers of a given product merge, the quality of their products converges. Though goods become more similar, they do not consistently increase or decrease in quality level. Prices, however, fall relative to that of their competition. These product market changes take two to three years to reach full effect. Taken

together, these results are consistent with merging firms exploiting economies of scale to lower costs and hence lower prices. These effects are stronger in slow growth industries, where there is likely more scope for consolidation. A causal link from acquisitions to these product changes is supported by a lack of similar pre-merger trends and the finding that an acquirer new to a product market does not lower prices. A diversifying buyer is less likely to have scale economies to pursue. Diversifying firms do, however, hold higher market share and retain more brand names post-merger. There is likely heterogeneity across deals in the nature of complementarities to exploit.

Besides taking a product focus, this paper introduces two additional key departures from existing merger literature. First, firms are vast and changing collections of diverse projects. Extracting and only comparing specific product lines from firms eliminates this complexity. Second, customer-driven definition of product markets breaks the reliance on coarse industry codes and results in clean and accurate identification of rivals.

Understanding operational details of what happens in acquisitions helps inform puzzles in the literature. Why must firms actually merge to enact these changes? Grossman and Hart (1986) and Hart and Moore (1990), in their property rights theories of the firm, put forth the idea that incomplete contracts necessitate redrawing firm boundaries. It is plausible that product convergence through jointly holding up suppliers, moving into the same plant, or sharing trade secrets requires coordinated ownership to maximize the benefits. Why do we see industry clustering in mergers? If a firm's rivals are able to cut costs and lower prices by joining forces, perhaps that firm needs to do the same to remain competitive. These results also help inform the merger enforcement literature; at least for this sample of completed deals, consumers do not appear to be worse off.

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Appendix A: Variable definitions

1. Quality

Consumer Reports ranks models in product categories according to quality. The following steps, illustrated using an example, are taken to normalize rankings across products and years.

Step 1: Raw rankings as presented in magazine, ordered so that higher numbers correspond to better quality (*q1*). A single brand may be represented by multiple models (Brands A and E here).

Step 2: Average all models for each brand to determine overall brand quality (*q2*).

Step 3: Rescale so that the lowest brand has rank = 1, the highest brand has rank = number of distinct brands, and the distance between brands is preserved:

$$q3 = \left[\frac{q2 - min}{max - min} \right](count - 1) + 1$$

Step 4: Normalize to between zero and one. This normalization has the feature that the more brands there are, the higher the value of the best brand and the lower the value of the worst brand—the worst out of 30 should have a lower score than the worst out of 5 because there is more certainty that the former is a bad product.

$$q4 = \frac{2 * q3 - 1}{2 * count}$$

Example: going from raw quality to normalized quality

Step 1		Step 2		Step 3		Step 4	
	q1		***q2***		***q3***		***q4***
Brand A	7	Brand A	5.5	Brand A	4.56	Brand A	0.81
Brand B	6	Brand B	6	Brand B	5	Brand B	0.90
Brand C	5	Brand C	5	Brand C	4.11	Brand C	0.72
Brand A	4	Brand D	3	Brand D	2.33	Brand D	0.37
Brand D	3	Brand E	1.5	Brand E	1	Brand E	0.10
Brand E	2						
Brand E	1						
		min	1.5				
		max	6				
		count	5				

2. Price

Actual prices are reported by *Consumer Reports* (*p1*). All models in a brand each year are averaged (*p2*). To normalize, I divide all prices in a category and year by the median price (*p3*).

Example: going from raw price to normalized price

Step 1		Step 2		Step 3	
	p1		*p2*		*p3*
Brand A	50	Brand A	40	Brand A	1.14
Brand B	60	Brand B	60	Brand B	1.71
Brand C	20	Brand C	20	Brand C	0.57
Brand A	30	Brand D	15	Brand D	0.43
Brand D	15	Brand E	35	Brand E	1.00
Brand E	40				
Brand E	30	*Median*	35		

3. Value

Value is designed to capture the tradeoff between price and quality. As a first approximation, quality and price are treated as if they hold equal weight. Value equals quality rank minus price rank. Quality rank is as defined in this appendix. Price rank is not as defined above; because it uses percentage of medians, the scales are different. Hence, the price rank used in the Value calculation applies the exact process used for quality rank. As both quality rank and price rank therefore have range (0, 1), Value has range (-1, 1).

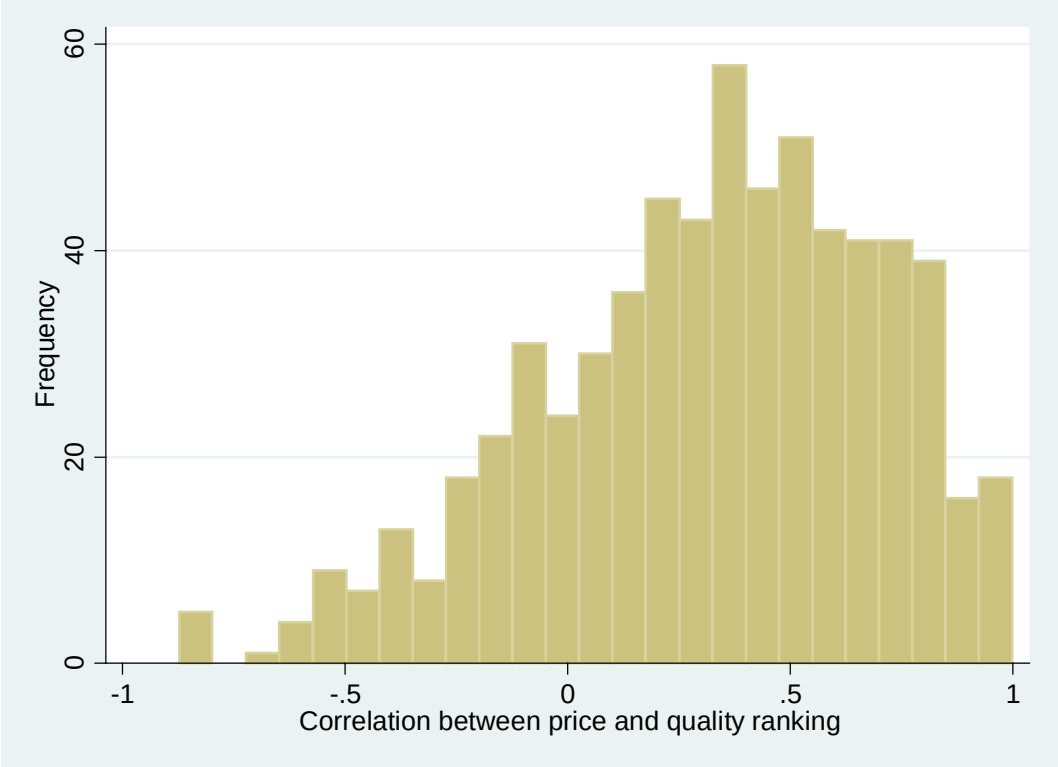

Figure 1: Distribution of rank correlations. This histogram plots the correlations between price and quality rank for each product subcategory each year.

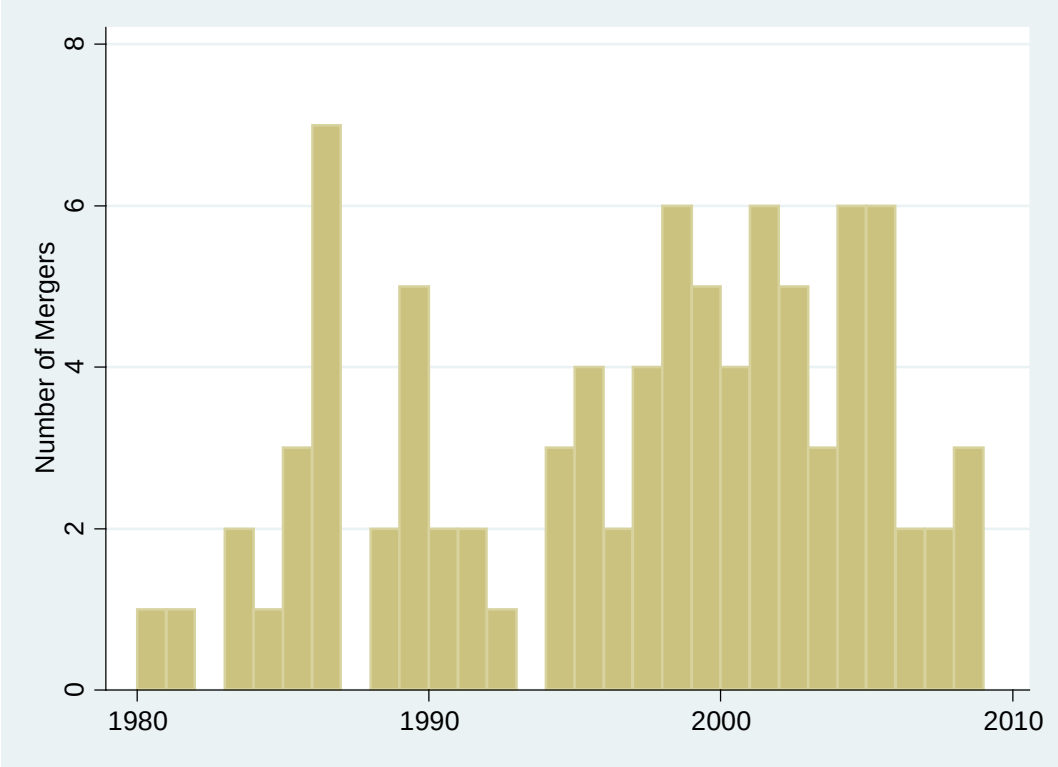

Figure 2: Distribution of mergers over time. This histogram plots the closing date years of the mergers in the sample.

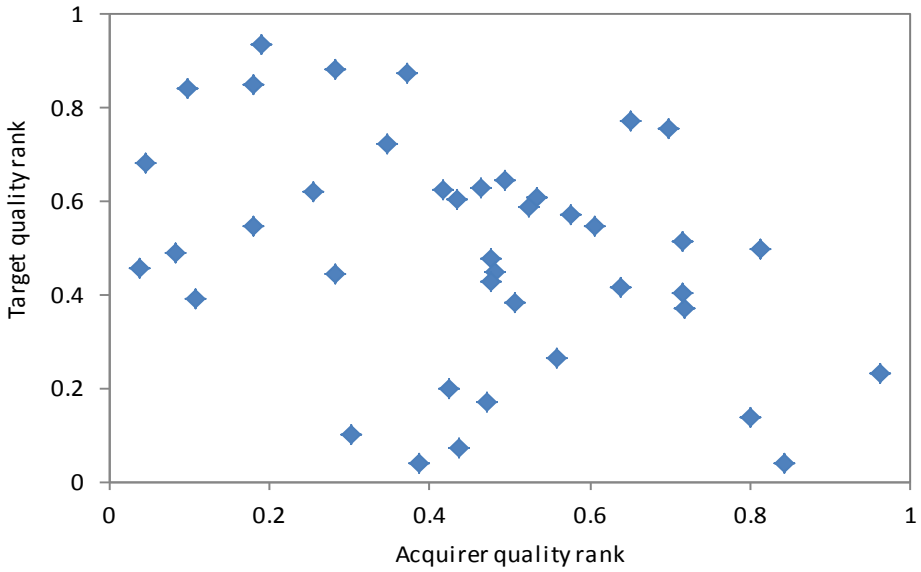

Figure 3a: Merger product quality pairings. This figure plots ex-ante acquirer and target quality rankings in mergers. Axes are the average of the most recent, pre-merger close date rankings of all brands for the acquiring/target firm in a given product category. Quality rank ranges from 0 (worst among all industry participants that year) to 1 (best).

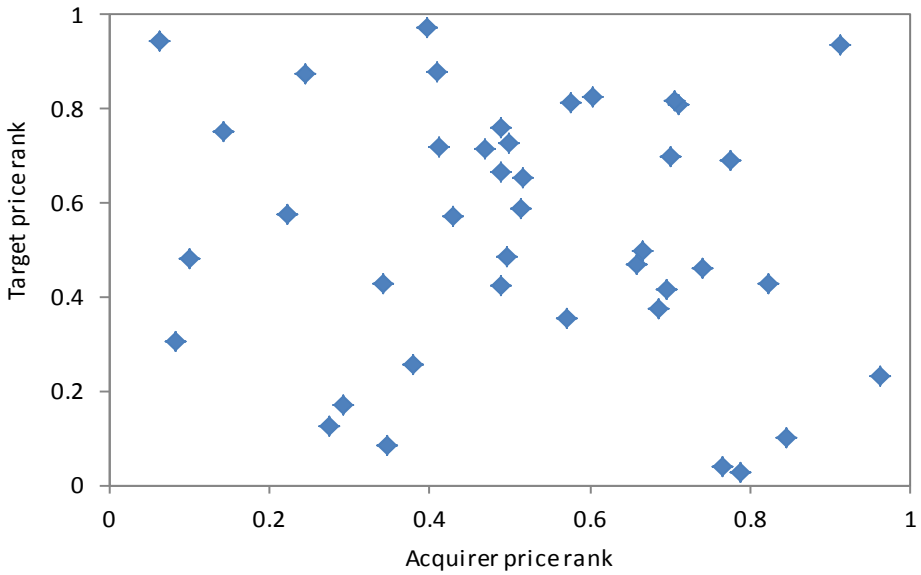

Figure 3b: Merger product price pairings. This figure plots ex-ante acquirer and target price rankings in mergers. Axes are the average of the most recent, pre-merger close date rankings of all brands for the acquiring/target firm in a given product category. Price rank ranges from 0 (cheapest among all industry participants that year) to 1 (most expensive).

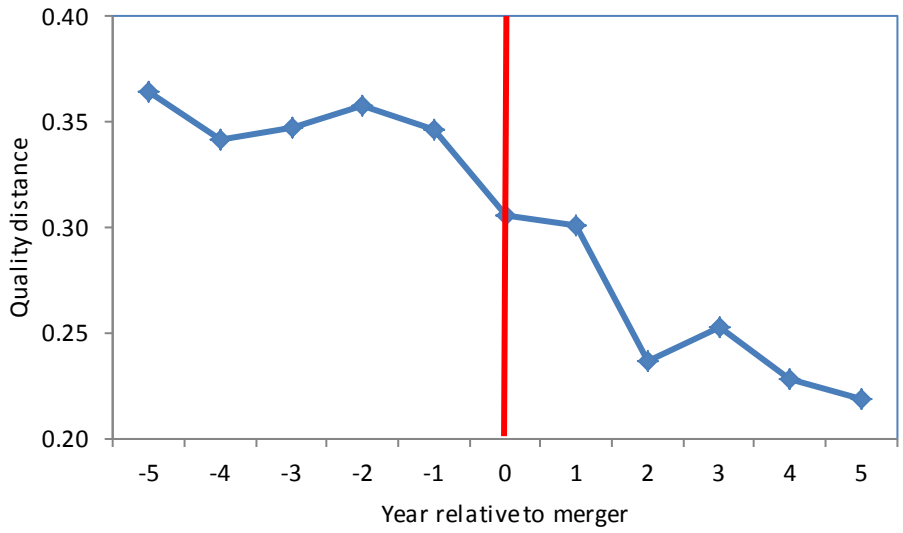

Figure 4a: Brand pair quality distance around merger date. This figure plots the data reported in Table VII, column 4. For two brands within a product group that are brought together by acquisition, the y-axis measures the coefficients, plus the constant term, from a regression of the absolute value of the difference in quality between the two brands on dummies for the year relative to the merger.

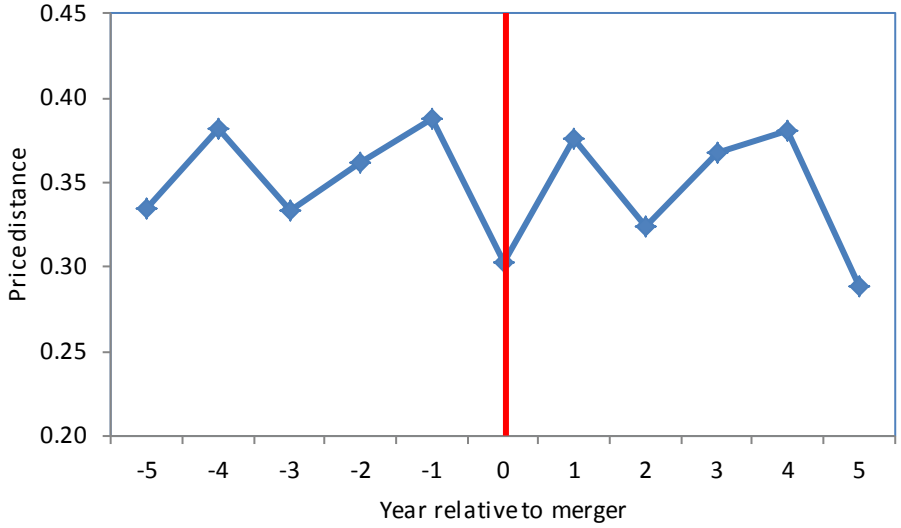

Figure 4b: Brand pair price distance around merger date. This figure plots the data reported in Table VII, column 5. For two brands within a product group that are brought together by acquisition, the y-axis measures the coefficients, plus the constant term, from a regression of the absolute value of the difference in price between the two brands on dummies for the year relative to the merger.

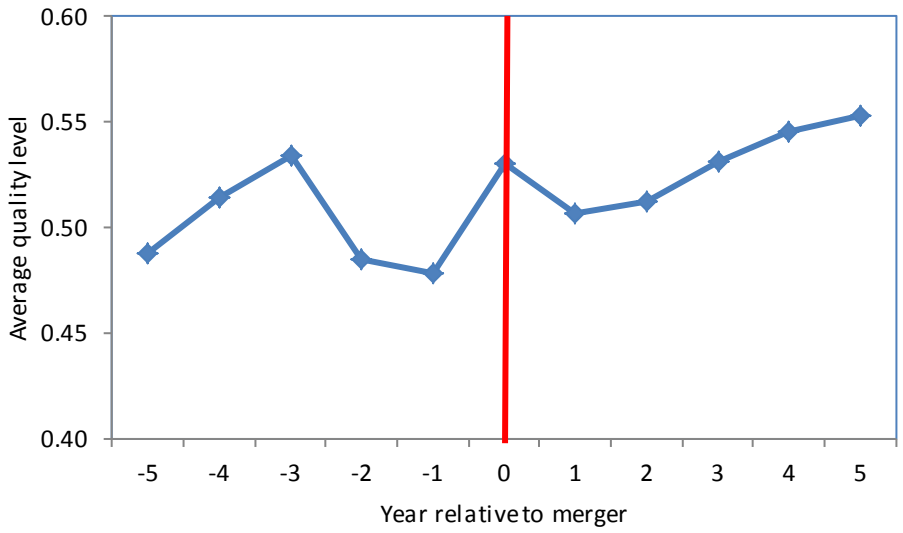

Figure 5a: Average brand pair quality level around merger date. This figure plots the data reported in Table VIII, column 4. For two brands within a product group that are brought together by acquisition, the y-axis measures the coefficients, plus the constant term, from a regression of the average relative quality of the two brands on dummies for the year relative to the merger. Relative quality can range between zero and one for a given product.

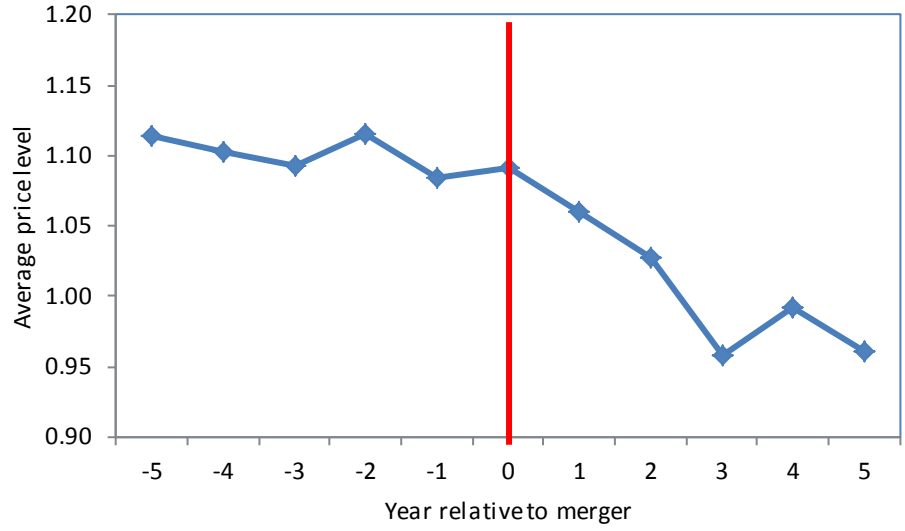

Figure 5b: Average brand pair price level around merger date. This figure plots the data reported in Table VIII, column 5. For two brands within a product group that are brought together by acquisition, the y-axis measures the coefficients, plus the constant term, from a regression of the average relative price of the two brands on dummies for the year relative to the merger. Relative price for a brand is the average price of its products divided by the median price in the product category that year.

Table I

Sample Summary Statistics

This table provides a summary of the *Consumer Reports* product reviews used in the sample. Reviews are from magazine issues dated between 1980 and 2009. Brands refers to product brand names. Firms are the ultimate owners of the brand with sales responsibility. Product reviews refer to the number of individual model-years evaluated. Total (unique names) is lower than Total due to overlap of brands and firms across product categories.

Product	# Brands	# Firms	Product reviews
Air conditioner	34	28	620
Bicycle helmet	32	21	162
Coffee maker	41	48	312
Cordless phone	33	33	442
Drill	22	23	431
Food processor	34	34	178
Gas grill	50	49	379
Interior paint	35	27	514
Lawnmower	61	45	865
Lawn tractor	30	26	325
Microwave oven	43	32	641
Monitor	38	23	192
Printer	34	30	543
Refrigerator	32	20	829
Tire	30	15	400
Toaster oven	28	32	115
Toilet	20	22	134
Treadmill	41	29	169
Vacuum	52	50	1,243
Washing machine	29	23	565
Total	719	610	9,059
Total (unique names)	494	372	
% Firms private		43%	
% Firms international		28%	

Table II

Cross-sectional Determinants of Product Quality, Price, and Value

This table presents results from OLS regressions of product quality, pricing and value on parent firm characteristics. An observation is a brand name within a product category in a given year. The dependent variable *Quality* is the normalized ranking of a brand's average features, ease-of-use, reliability, and performance compared to its industry competitors according to *Consumer Reports* magazine. A higher number corresponds to better quality. *Price* is average brand price divided by the industry median. *Value* is normalized quality rank minus normalized price rank; the higher this number, the more quality per dollar. *Firm size* is the log of sales. *R&D% sales* is research & development expenditures divided by sales. *Leverage* is defined as debt in current liabilities plus long-term debt, divided by these debt measures plus the market value of equity. *Operating margin* is EBIT divided by sales. *Tobin's q* is (market value of equity + preferred stock + short and long-term debt)/total assets. The sample split, increase in foreign penetration, calculates the change in average share of foreign brands in a product category from pre-2000 to post-2000. High value refers to an above median increase in foreign penetration. Standard errors are clustered by product-brand. T-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

Sample: Increase in foreign penetration	All	All	All	All	All	All	All	All	All	High	Low
Sample: manufacturers	All	All	All	All	All	All	Domestic	Domestic	Domestic	Domestic	Domestic
	Quality	Price	Value	Quality	Price	Value	Quality	Price	Value	Value	Value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Firm size	0.027***	-0.016	0.028***	0.019***	-0.008	0.021***	0.019**	-0.011	0.026***	0.029***	0.020*
	(3.60)	(-1.31)	(3.59)	(2.98)	(-0.70)	(3.56)	(2.42)	(-0.76)	(3.60)	(2.93)	(1.93)
R&D % sales	1.69***	2.10***	-0.627								
	(2.57)	(2.87)	(-1.12)								
Leverage	0.011	-0.082	0.068								
	(0.23)	(-1.36)	(1.29)								
Operating margin	-0.210	-0.129	0.127								
	(-0.97)	(-0.53)	(0.70)								
Tobin's *q*	0.011	-0.018	0.022								
	(0.48)	(-0.73)	(0.98)								
International				-0.006	-0.010	-0.008					
				(-0.29)	(-0.23)	(-0.35)					
Private				-0.039*	0.124**	-0.073**	0.010	0.109	-0.017	0.035	-0.088
				(-1.67)	(1.97)	(-2.52)	(0.28)	(1.36)	(-0.35)	(0.53)	(-1.24)
Post-2000							0.017	0.033	0.005	0.015	-0.010
							(1.04)	(1.17)	(0.03)	(0.56)	(-0.33)
Private*Post-2000							-0.087**	-0.027	-0.082*	-0.141**	-0.008
							(-2.25)	(-0.39)	(-1.70)	(-2.27)	(-0.01)
Product fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,774	1,774	1,774	3,133	3,133	3,133	2,115	2,115	2,115	1,148	967

Table III

Product Characteristics When in the Same Firm

This table examines the characteristics of branded goods produced by the same firm versus different firms within an industry. The unit of observation is a pair of brands in a given product, in a given year. The dependent variable *Quality distance* measures the absolute value of the difference in quality ranking of the two brands in each pair. *Price distance* and *Value distance* are defined similarly. *Quality average, Price average,* and *Value average* average the pair's scores. *Samefirm* is an indicator variable equal to one if the two brands share the same parent firm in a given year. Columns 1 through 3 are pooled regressions with product category fixed effects. Columns 4-9 add fixed effects for each product-brand-pair in each category. Standard errors are double-clustered by each brand in the pair in all specifications. T-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

	Quality distance	Price distance	Value distance	Quality distance	Price distance	Value distance	Quality average	Price average	Value average
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Samefirm	-0.064***	-0.035	-0.045***	-0.064**	0.046	-0.054	0.020	-0.110***	0.142***
	(-6.28)	(-1.52)	(-3.40)	(-2.44)	(0.95)	(-1.46)	(1.29)	(-4.45)	(4.74)
Product fixed effects	Y	Y	Y	N	N	N	N	N	N
Product-brand-pair fixed effects	N	N	N	Y	Y	Y	Y	Y	Y
Observations	23,702	23,702	23,702	23,702	23,702	23,702	23,702	23,702	23,702

Table IV
Merger Sample Description

This table provides descriptive statistics on the sample of mergers. The mergers close between 1980 and 2009. A single acquisition can involve multiple product lines, and a product line can include multiple brands. If a brand in a product category is involved in more than one merger, either as an acquirer or target, it will be counted more than once in the "Number of brands involved" totals.

Panel A: Distribution across firm types

	Public target	Private target
Public acquirer	34	24
Private acquirer	14	16

Panel B: Distribution across product categories and brands

Product	Number of acquisitions	Number of brands involved
Air conditioner	2	4
Bicycle helmet	2	4
Coffee maker	12	17
Cordless phone	4	6
Drill	5	8
Food processor	5	7
Gas grill	11	15
Interior paint	4	9
Lawnmower	12	27
Lawn tractor	9	20
Microwave oven	6	19
Monitor	2	4
Printer	1	2
Refrigerator	5	19
Tire	1	3
Toaster oven	7	8
Toilet	7	9
Treadmill	5	9
Vacuum	10	19
Washing machine	6	20
Total	116	229

Table V

Announcement Returns

This table regresses announcement returns on deal characteristics. Returns over the (-1, 1) period are calculated by summing the 3-day abnormal returns over the CRSP value-weighted index. The 20-day (-10, 10) excess return is the market capitalization at the end of the event window minus the market capitalization at the start divided by the starting value, less the return on the index. Combined returns are created by weighting the target and acquiring firm returns by their market capitalizations two days before the announcement date. *International* is a dummy variable equal to one if either acquirer or target is a non-U.S. firm. *Related merger* equals one if both firms sold a common product in the sample. *Full merger* equals zero for partial asset sales and one otherwise. *Acquirer relative size* is the ratio of acquirer to target market capitalization. T-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

Excess announcement returns	Constant	Private target	Private acquirer	Inter-national	Related merger	Full merger	Acq relative size	Obs
Acquirer [-1, 1]	0.013							37
	(0.98)							
Acquirer [-10, 10]	0.034*							37
	(1.67)							
Target [-1, 1]	0.132***							38
	(3.51)							
Target [-10, 10]	0.148***							38
	(3.18)							
Combined [-1, 1]	0.022							20
	(1.25)							
Combined [-10, 10]	0.061**							20
	(1.97)							
Acquirer [-1, 1]	-0.000	0.055**		-0.028	0.026	-0.024		37
	(-0.01)	(1.97)		(-0.46)	(0.90)	(-0.55)		
Acquirer [-10, 10]	0.105	0.028		-0.092	-0.006	-0.089		37
	(1.54)	(0.64)		(-0.99)	(-0.13)	(-1.29)		
Target [-1, 1]	0.032		0.059	-0.082	0.039	0.155		38
	(0.32)		(0.52)	(-0.83)	(0.48)	(1.52)		
Target [-10, 10]	0.023		0.134	-0.102	-0.027	0.246**		38
	(0.19)		(0.99)	(-0.86)	(-0.27)	(2.03)		
Combined [-1, 1]	0.029				-0.013	-0.023	0.003**	20
	(0.65)				(-0.36)	(-0.49)	(2.42)	
Combined [-10, 10]	0.087				-0.048	-0.039	0.004*	20
	(1.07)				(-0.74)	(-0.45)	(1.87)	

Table VI

Industry Merger Frequency

This table explores drivers of merger frequency. The unit of observation is one industry-decade. The dependent variable is the number of deals in a product category in a decade. *Number of firms/brands* counts the unique firms/brands selling a product reviewed by *Consumer Reports* at the start of each decade. *Foreign firm/brand share* calculates the average share of firms/brands headquartered outside the United States during each decade. *Industry growth* is the average annual percentage change in units of the product category sold in the United States each decade. *, **, *** indicate significance at 10%, 5%, 1%.

	Dependent variable: industry-decade mergers			
	(1)	(2)	(3)	(4)
Number of firms	0.132*	0.079		
	(1.81)	(1.52)		
Foreign firm share	-2.92**	-2.48**		
	(-2.15)	(-2.40)		
Number of brands			0.083	0.074*
			(1.32)	(1.75)
Foreign brand share			-3.51**	-2.74***
			(-2.49)	(-2.59)
Industry growth	-5.50		-2.66	
	(-1.08)		(-0.53)	
Observations	33	55	33	55

Table VII

Brand Quality and Price Similarity Post-Merger

This table examines the impact of mergers on the similarity of products involved in the merger. The unit of observation in these OLS panel regressions is a pair of brands in the same product category brought together by merger, limited to five years before and five years after the merger close date. The dependent variables are as defined in Table III. *Post-merger* is an indicator variable equal to 1 when the data for a pair of brands is from an issue of *Consumer Reports* dated after the merger close date. The *Merger year* variables are indicators for the date relative to the merger close date, where *Merger year+1* encompasses 7 to 18 months after deal close. Year zero, 6 months before to 6 months after the deal close date, is omitted. Standard errors are double clustered by each product-brand in the pair. T-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

	Quality distance	Price distance	Value distance	Quality distance	Price distance	Value distance
	(1)	(2)	(3)	(4)	(5)	(6)
Post-merger	-0.083***	0.002	-0.018			
	(-2.79)	(0.03)	(-0.54)			
Merger year -5				0.058	0.031	-0.024
				(1.44)	(0.45)	(-0.28)
Merger year -4				0.036	0.079	0.019
				(0.56)	(0.78)	(0.25)
Merger year -3				0.041	0.030	-0.042
				(0.54)	(0.46)	(-0.36)
Merger year -2				0.052	0.059	-0.093
				(0.89)	(1.12)	(-1.37)
Merger year -1				0.040	0.085	-0.029
				(0.92)	(1.61)	(-0.49)
Merger year +1				-0.005	0.073	-0.015
				(-0.13)	(1.51)	(-0.25)
Merger year +2				-0.069*	0.021	-0.123*
				(-1.68)	(0.48)	(-1.82)
Merger year +3				-0.053	0.065	-0.012
				(-1.02)	(0.81)	(-0.17)
Merger year +4				-0.078	0.078	-0.114*
				(-1.11)	(1.02)	(-1.91)
Merger year +5				-0.087	-0.014	-0.046
				(-1.07)	(-0.14)	(-0.68)
Constant	0.342***	0.350***	0.320***	0.306***	0.303***	0.351***
	(21.75)	(12.97)	(17.81)	(9.37)	(9.19)	(7.43)
Product-brand pair fixed effects	Y	Y	Y	Y	Y	Y
Observations	428	428	428	428	428	428

Table VIII

Brand Quality and Price Levels Post-Merger

This table examines the impact of mergers on the quality, price, and customer value levels of products involved in the merger. The unit of observation in these OLS panel regressions is a pair of brands in the same product category brought together by merger, limited to five years before and five years after the merger close date. The dependent variables are as defined in Table III. *Post-merger* and the *Merger year* variables are as defined in Table VII. Standard errors are double clustered by each product-brand in the pair. T-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

	Quality average	Price average	Value average	Quality average	Price average	Value average
	(1)	(2)	(3)	(4)	(5)	(6)
Post-merger	0.011	-0.072**	0.097***			
	(0.42)	(-2.22)	(2.58)			
Merger year -5				-0.042	0.023	-0.108**
				(-0.91)	(0.40)	(-2.24)
Merger year -4				-0.016	0.012	-0.037
				(-0.22)	(0.18)	(-0.48)
Merger year -3				0.004	0.001	-0.039
				(0.06)	(0.03)	(-0.66)
Merger year -2				-0.045	0.024	-0.064
				(-0.88)	(0.39)	(-1.06)
Merger year -1				-0.052	-0.007	-0.022
				(-1.25)	(-0.12)	(-0.55)
Merger year +1				-0.023	-0.031	0.012
				(-0.64)	(-0.44)	(0.24)
Merger year +2				-0.018	-0.063	0.063
				(-0.35)	(-1.08)	(0.87)
Merger year +3				0.001	-0.133***	0.093
				(0.02)	(-2.61)	(1.45)
Merger year +4				0.015	-0.099	0.135**
				(0.32)	(-1.60)	(2.01)
Merger year +5				0.023	-0.130	0.146**
				(0.38)	(-1.62)	(1.99)
Constant	0.509***	1.091***	-0.042**	0.530***	1.091***	-0.011
	(37.20)	(63.90)	(-2.13)	(17.28)	(25.65)	(-0.30)
Product-brand pair fixed effects	Y	Y	Y	Y	Y	Y
Observations	428	428	428	428	428	428

Table IX

Acquiring, Target, and Diversifying Brands

This table examines merger impact on targets and acquirers separately and explores whether post-merger effects on products depend on whether the acquisition was related or diversifying. The unit of observation in these OLS panel regressions is a single product-brand, limited to five years before and five years after the merger close date. *Related* is a dummy variable equal to one if the targeted product-brand's acquiring firm sold the same product prior to the acquisition and zero otherwise. Standard errors are clustered by product-brand and t-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

	Acquirer brands in related mergers			Target brands in related mergers			Target brands in unrelated mergers			All target brands		
	Quality	Price	Value	Quality	Price	Value	Quality	Price	Value	Quality	Price	Value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post-merger	-0.020	-0.037	0.025	-0.000	-0.101***	0.092**	-0.011	0.006	-0.038	-0.014	0.003	-0.041
	(-0.63)	(-1.52)	(0.82)	(-0.01)	(-3.31)	(2.44)	(-0.18)	(0.15)	(-0.54)	(-0.24)	(0.07)	(-0.57)
Post-merger * Related										0.010	-0.104**	0.124
										(0.16)	(-2.11)	(1.64)
Product-brand fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	388	388	388	442	442	442	206	206	206	648	648	648

Table X
Planned Synergies

This table reports the frequency of various reasons given by management for mergers from a reading of news articles around the announcement date. Related deals are those in which both acquirer and target sold at least one product in the sample.

	All deals	Related	Unrelated
Cost efficiencies	60%	75%	26%
Consolidate/close plants	45%	57%	19%
Consolidate suppliers	9%	13%	0%
Reduce SG&A	24%	30%	11%
Revenue enhancement	80%	85%	67%
Diversification	25%	11%	56%
Expand existing product category	30%	43%	0%
Access to new geographic markets	27%	36%	7%
Leverage distribution	31%	31%	30%
Technology transfer	14%	18%	4%
Market power/eliminate competitor	1%	2%	0%
Financial	7%	5%	11%
Observations	88	61	27

Table XI

Post-Merger Product Changes: Cross-Sectional Effects

This table looks for differential effects on post-merger product characteristics in the cross-section. The unit of observation in these OLS panel regressions is a pair of brands in the same product category brought together by merger, limited to five years before and five years after the merger close date. *Industry growth* is the cumulative annual growth rate of unit shipments in each product category over all years of available data in *Appliance* magazine. *HHI* is the Herfindahl-Hirschman Index for each product-year. *Crossborder* equals one if acquiring and target firms are headquartered in different countries. *Big_big* equals one if both acquiring and target firm have market share in a particular product category and year greater than or equal to 10%, and *Big_small* equals one if one is above and one below. *Acq-Targ quality difference* is the difference between acquirer and target brand quality in the most recent year available before the merger close year; price and value analogues are defined similarly. Remaining variables are as defined in Table VII. Standard errors are double clustered by each product-brand in the pair. T-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

	Quality distance	Price distance	Value distance	Quality average	Price average	Value average
	(1)	(2)	(3)	(4)	(5)	(6)
Post-merger	0.008	0.101	0.077	0.000	-0.049	0.156
	(0.10)	(0.63)	(0.39)	(0.00)	(-0.53)	(1.52)
Post * Private target	0.004	0.011	-0.123	-0.010	-0.100	0.072
	(0.03)	(0.09)	(-0.78)	(-0.11)	(-0.83)	(0.56)
Post * Industry growth	2.51**	-1.46	1.48	-1.34	2.41***	-4.39**
	(2.12)	(-0.95)	(0.51)	(-0.78)	(2.60)	(-2.51)
Post * HHI	-0.607*	0.448	-0.356	0.154	0.208	-0.266
	(-1.70)	(0.91)	(-0.48)	(0.57)	(0.50)	(-0.69)
Post * Crossborder	-0.142	-0.096	-0.062	0.053	0.029	0.047
	(-1.61)	(-0.62)	(-0.45)	(0.69)	(0.37)	(0.41)
Post * Big_big	0.047	-0.206	-0.020	0.084	-0.192***	0.235***
	(0.58)	(-1.43)	(-0.18)	(1.08)	(-2.59)	(2.58)
Post * Big_small	0.009	-0.131	0.024	-0.022	-0.084	0.050
	(0.06)	(-1.08)	(0.19)	(-0.21)	(-0.68)	(0.30)
Post * Acq – Targ quality diff	-0.010			0.048		
	(-0.13)			(0.96)		
Post * Acq – Targ price diff		0.196*			0.130*	
		(1.86)			(1.74)	
Post * Acq – Targ value diff			-0.116			0.020
			(-1.19)			(0.36)
Constant	0.322***	0.340***	0.315***	0.519***	1.083***	-0.024
	(19.44)	(17.49)	(11.03)	(38.84)	(71.66)	(-1.17)
Product-brand pair fixed effects	Y	Y	Y	Y	Y	Y
Observations	299	299	299	299	299	299

Table XII

Merger Impact on Market Share, Brand Count, and Item Count

This table explores merger impact on market share and the number of brands and distinct items offered. The dependent variable in columns 1-3, *Market share*, is the combined market shares of all brands in a product category belonging to both acquirer and target firms. For deals in which the acquirer was not previously present in the industry, *market share* simply equals the share of the target firm. *Number of brands* takes two values per merger: a count of all unique brand names by product that appear in *Consumer Reports* reviews for acquirer and target firms in years [-4, 0] relative to merger close date, and the number of unique names appearing in years [2, 6] afterwards. The two years post-merger are not counted to allow time for brands to be dropped. *Item Share* is the fraction of models reviewed in a given issue belonging to each brand. *Geog_dist* is a dummy equal to one if either "Access to new geographic markets" or "leverage distribution" (from Table X) was cited as a reason for the merger. Other variables are as defined in Table XI. All regressions include product-merger fixed effects. Errors are clustered by product-merger in the market share and item share regressions. T-statistics are in parentheses. *, **, *** indicate significance at 10%, 5%, 1%.

Merger sample:	All	Related	All	All	Related	All	All	Related	All
	Market share	Market share	Market share	Number of brands	Number of brands	Number of brands	Item share	Item share	Item share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-merger	-0.52	-0.698	1.77	0.011	0.616	1.13**	-0.015***	0.012	0.022
	(-0.91)	(-0.30)	(0.97)	(0.11)	(0.78)	(2.36)	(-3.60)	(0.52)	(0.92)
Post * Private target		-2.64	-1.08		0.495	0.457		-0.025	-0.017
		(-1.60)	(-0.75)		(1.08)	(1.64)		(-1.36)	(-0.96)
Post * Geog_dist		4.39***	2.55*		0.736	0.312		0.033	0.004
		(2.58)	(1.89)		(1.32)	(1.05)		(1.17)	(0.24)
Post * Industry growth		-35.6	-37.8		-9.66	-7.31		-0.419**	-0.373*
		(-0.98)	(-1.03)		(-1.11)	(-1.26)		(-2.21)	(-1.78)
Post * HHI		-0.639	0.944		-2.79	-3.39**		0.004	-0.094
		(-0.08)	(0.17)		(-0.84)	(-2.04)		(0.04)	(-0.96)
Post * Crossborder		1.19	1.08		0.623	0.493		-0.001	0.003
		(0.80)	(0.97)		(1.19)	(1.42)		(-0.05)	(0.21)
Post * High foreign entry		-2.12	-1.70		-0.338	-0.122		0.027*	-0.002
		(-1.23)	(-1.36)		(-0.76)	(-0.47)		(1.75)	(-0.20)
Post * Big_big		-0.961			-0.607			-0.063***	
		(-0.51)			(-0.62)			(-2.90)	
Post * Big_small		1.30			-0.321			-0.035*	
		(0.78)			(-0.62)			(-1.67)	
Post * Related			-2.07*			-0.581**			-0.006
			(-1.93)			(-2.04)			(-0.60)
Observations	454	285	454	176	56	104	634	311	456