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Barbarians at the Store? Private Equity, Products, and Consumers

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ABSTRACT

We investigate the effects of private equity firms on product markets using price and sales data for an extensive number of consumer products. Following a private equity deal, target firms increase retail sales of their products 50% more than matched control firms. Price increases—roughly 1% on existing products—do not drive this growth; the launch of new products and geographic expansion do. Competitors reduce their product offerings and marginally raise prices. Cross-sectional results on target firms, private equity firms, the economic environment, and product categories suggest that private equity generates growth by easing financial constraints and providing managerial expertise.

PRIVATE EQUITY (PE) FIRMS ARE increasingly significant investors, raising more than $3 trillion in capital in the 2012 to 2017 period alone, in pursuit

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of a simple goal: acquire businesses and exit with gains.[1] How they attempt to achieve these gains, however, remains an open question. Prior studies suggest that PE firms improve total factor productivity (Davis et al. (2014)) and managerial practices (Bloom, Sadun, and Reenen (2015), Bernstein and Sheen (2016)), focus patenting activity (Lerner, Sorensen, and Stromberg (2011)), increase employee safety (Cohn, Nestoriak, and Wardlaw (2021)), and reduce agency problems (Edgerton (2012)). Yet, companies exist to sell goods and services and the direct effect of PE on target firm products has received little academic attention.

In this paper, we use microlevel retail scanner data to study PE's strategies in the consumer product market.[2] We focus on the following basic questions: When a PE firm acquires a consumer goods manufacturer, what happens to its product prices and sales? Does the product mix change? Does geographic availability expand or contract? And why had targets not implemented these changes before? Addressing these questions helps reveal whether and how PE firms attempt to create wealth. We find that, in the years following the deal, PE targets in our sample increase retail sales of their products by 50% on average compared to matched control firms.[3] Price increases do not drive this sales growth—the launch of new products and geographic expansion do. Several cross-sectional analyses suggest that PE firms achieve such growth by easing financial constraints and providing managerial expertise.

We compile monthly store-level prices and unit sales for nearly two million unique consumer products sold in nearly 43,000 locations in the United States between 2006 and 2016. This sample covers over 50% of grocery and drug store sales and over 30% of mass merchandiser sales in the United States. The data are remarkably detailed. For example, we can see that in the first week of August 2008, 24 cans of Del Monte French-style green beans were sold in a particular store in Chicago at an average price of $1.15 per can. We link each product to its parent company. PE firms acquired 236 of these companies over our sample period. Most of these firms (222) were privately owned at the time of the acquisition. These companies are the manufacturers of goods sold within retailers; we do not study the acquisitions of retail chains themselves as, for example, in Chevalier (1995a, 1995b). Compared to these studies that investigate deals from the 1980s and 1990s, our sample from 2006 to 2016 reflects the recent increase in growth equity deals as opposed to more traditional leveraged buyouts (LBOs).

[1] Bain & Company (2018) report that PE firms raised $701 billion globally in 2017, reaching a total level of over $3 trillion in the 2012 to 2017 period.

[2] A series of articles published by *The New York Times*, entitled "This is Your Life, Brought to You by Private Equity" 12/24/16, highlights the growing influence of PE firms on the day-to-day purchases of millions of consumers.

[3] In this paper, for simplicity, we refer to PE targets' "revenues" or "sales." In practice, we only observe the retail sales of the products they sell in our sample. These sales differ from firm total sales for two reasons. First, our sample only covers 91 U.S. retail chains. Products not sold through these chains are not captured. Second, we only observe the price that customers pay at retail, not the price that target firms receive from retailers and wholesalers.

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We test for changes in product prices and sales, innovation, and availability after a PE deal by first matching each PE target with a similar counterfactual at the time of the PE event. We go beyond the firm-level match commonly used in the literature; the granularity of our data allows us to improve precision by comparing product lines and even products within the same store. Each of these treatment-control pairs represents a cohort. We stack cohort-level observations and run a generalized difference-in-differences estimation.

We begin by documenting that in the five years postdeal PE targets increase revenues of their products sold through our sample's retailers by 50% on average compared to matched control firms. Price increases do not drive this growth. The average price of products increases by about 5% in target firms relative to competitors. Further, this increase is primarily a composition effect derived from either the introduction of new products or expansion into richer areas, as the price of an existing product in a particular store increases by only about 1% relative to its direct competitors in the same store.

We instead find that volume growth drives revenue growth. PE targets increase the number of unique products offered by 11% more than matched untreated firms following the deal. Some of this increase occurs through expansion into new (for the firm) consumer categories, such as a green bean seller branching out to cauliflower. In addition, PE target products expand to new stores (+25%), retail chains (+10%), and ZIP codes (+14%).

Firms that compete with PE targets are affected by PE deals. Specifically, they marginally increase prices following a deal by less than half of 1%. This evidence is consistent with typical oligopoly models of rivals' behavior when one firm raises prices (e.g., Hotelling (1929)). Competing firms' product variety falls slightly, perhaps crowded out by the new offerings from target firms given finite shelf space.

How do PE firms enable this growth? Why were target firms not undertaking these actions on their own before the deal? To address these questions, we further investigate our results by target firm type, PE firm type, time period, and industry (product category) structure. First, we study the effects of PE on public versus private targets. PE firms achieve high growth, innovation, and geographic expansion only in private targets. In contrast, public targets raise prices, reducing sales for existing products. This evidence is consistent with PE firms providing access to capital or managerial expertise for private firms (Boucly, Sraer, and Thesmar (2011), Bloom, Sadun, and Reenen (2015)) and reducing agency costs for public firms (Jensen (1986)). Second, we find that most of the growth occurs in small and young targets, perhaps because PE relaxes financial constraints. Third, we find indeed that PE firms that are classified as having a growth equity style do indeed produce most of the gains in growth in our sample. We also examine PE deals separately during and after the late-2000s financial crisis. PE targets achieve more growth in both periods and are able to sustain higher prices in poorer economic conditions compared to counterfactual firms. Fourth, turning to industry structure, we find that PE targets introduce more products in more fragmented categories and achieve higher sales growth in product categories where they have stronger market share. PE

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targets also grow more in categories that are popular with high-income consumers. Last, we document that PE firms alter target company strategy by increasing acquisitions, advertising expenses, and retail price volatility. Overall, this evidence suggests that PE achieves growth by pulling several operational levers: relaxing financial constraints, strategically adjusting prices to economic conditions, focusing innovation and geographic expansion in product categories of relative strength, and promoting investment.

An important caveat in interpreting our results is that we cannot unambiguously conclude that PE firms cause target firms to increase sales, product innovation, and geographic expansion, as "PE treatment" is not randomly assigned. PE firms might target firms and brands that are expected to grow faster in the future. In other words, PE firms might simply be good at selecting promising targets rather than actively changing them. In this case, our growth results might reflect PE firms' selection abilities rather than their treatment effects. The standard approach used in the literature to address this endogeneity concern is to match treated firms with similar (in the predeal period) untreated firms in the same industry. This at least attempts to minimize the role of industry trends. A problem with this approach is that standard industry codes are coarsely defined, and firms in the same broad industry can sell very different products. Thus, matched firms might differ along many unseen characteristics. The granularity of our data potentially reduces this concern: we employ as counterfactuals not only similar firms, but also similar product categories and similar products themselves in the same store. For example, we compare a can of green beans sold by a target firm with a can of green beans sold by an untreated firm in the same location. The ability to control for the exact product and place removes a tremendous amount of error in matching relative to relying on firms that share nothing more than a standard industry code. Nonetheless, we cannot rule out the possibility that one specific brand of green beans has a different future trajectory than another. Thus, our research design helps mitigate—but not eliminate—the role of selection effects in explaining our results.

Our work contributes to the empirical literature on the effects of PE on corporate performance and behavior. Chevalier (1995a, 1995b) studies the pricing and market expansion behavior of supermarket LBOs and their competitors. These papers differ from ours along several dimensions. First, we do not study retail chains themselves; instead, the PE targets in our sample are manufacturers of consumer products that are then sold within supermarkets, drug stores, and mass merchandisers. Our price and sales data are thus at the individual product level, not the overall store level, and we are able to investigate product innovation and geographic expansion. Moreover, we provide evidence on PE deals completed in the 2000s in contrast to the supermarket deals of the 1980s, an important comparison given evidence that PE strategies have evolved significantly over the past few decades (see, for example, Guo, Hotchkiss, and Song (2011)). Our result that PE firms spur growth complement the evidence in Boucly, Sraer, and Thesmar (2011) that French target firms increase profitability, sales, debt issuance, and capital expenditures

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compared to control firms. Our evidence that PE deals significantly impact product markets also relates to studies that document the extensive influence of PE on various firm stakeholders by, for example, reducing work-related injuries (Cohn, Nestoriak, and Wardlaw (2021)), increasing employee technological human capital (Agrawal and Tambe (2016)) and improving sanitation and food safety (Bernstein and Sheen (2016)), and negatively impacting student outcomes in for-profit higher education (Eaton, Howell, and Yannelis (2019)) and patient health in nursing homes (Gupta et al. (2021)). Last, other studies document that PE creates value for its investors (Robinson and Sensoy (2013) and Harris, Jenkinson, and Kaplan (2014)). Our results on the mechanisms (Section VI) shed light on how PE firms might create this value—by both alleviating financing constraints and providing managerial expertise on how to manage growth. The remainder of the paper is organized as follows. In Section I, we develop our hypotheses. In Section II, we describe our data. In Section III, we present our empirical methodology. In Section IV, we introduce our main results. Then, we investigate competitor response (Section V) and the mechanism behind our results (Section VI). Finally, in Section VII, we conclude.

I. Hypotheses Development

What happens in the product market after acquisitions by PE firms? A popular view in the media is that businesses suffer under PE ownership. To generate cash flows, "you can expand the company, but more likely you slash costs, close divisions, cut staff, curtail marketing, eliminate research and development and more. In other words, cutting to the bone."[4] If PE firms follow such a strategy, target companies may trim product offerings and raise prices to boost short-term cash flow.[5] Scaling back investment could also be optimal for firms facing agency problems such as empire building (e.g., Jensen (1986)), in which case the added leverage and incentive alignment typical in some PE buyouts can impose discipline. If lower prices stem from an overinvestment in market share, PE firms could raise prices. If firms are selling too many products in too many places, PE could prune product offerings and distribution. Liquidity constraints imposed by increased leverage could also lead to higher prices (Chevalier and Scharfstein (1996)).

An alternative and more recent stance on the role of PE predicts post-deal product market expansion. Surveying PE firms, Gompers, Kaplan, and Mukharlyamov (2016) find that in target firms, revenue growth is pursued more aggressively than cost cutting. Analyzing data from 839 French PE deals, Boucly, Sraer, and Thesmar (2011) find that PE firms do indeed appear to infuse capital and relax credit constraints, as target firms grow faster and become more profitable than their peers, particularly when capital might be most dear ex ante. Bloom, Sadun, and Reenen (2015) suggest that PE firms

[4] "The Glory Days of Private Equity Are Over," by Andy Kessler, *Wall Street Journal*, 3/29/15.
[5] Kosman (2009) devotes an entire chapter to "Lifting Prices" in his book *The Buyout of America*.

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bring better management practices to target firms. If these mechanisms are at work, we expect to see increased growth. Implications for pricing, however, are unclear: new or better products might be more expensive, while leaner manufacturing or more skillful bargaining with retailers could lead to lower prices.

These contrasting effects can coexist in the cross-section of target firms. Agency theories might better describe dynamics in more mature industries and for publicly traded firms (Jensen (1986)), while capital constraints may be more relevant for private, young, or small firms (Farre-Mensa and Ljungqvist (2016) and Hadlock and Pierce (2010)). Bloom, Sadun, and Reenen (2015) find that private firms are more in need of managerial expertise than public firms. Davis et al. (2014) document employment growth following private firm buyouts but contraction after public deals. Boucly, Sraer, and Thesmar (2011) find stronger growth results for private-to-private deals. To test these different cross-sectional predictions, we repeat our main analyses separately for private and public target firms (Section VI.B).

We also examine whether the effects of PE vary with economic conditions (Section VI.E). Bernstein, Lerner, and Mezzanotti (2019) study U.K. PE-backed companies during the financial crisis. Compared to control firms, PE targets decreased investments less and increased market share more. The authors attribute these findings to the ability of PE firms to raise capital or provide strategic and operational guidance in difficult times.

How do competitors react to the entry of PE firms? Chevalier (1995b) finds that, following the LBO of a supermarket chain, local market prices rise if rival firms are also highly leveraged, while they decline in markets where competitors have low leverage and are concentrated. Similarly, Goolsbee and Syverson (2008) find that incumbent airlines cut fares when facing potential entry, and Gerardi and Shapiro (2009) find that competition negatively impacts price dispersion in the airline industry. We investigate competitor reactions in terms of prices and product innovation in Section V.

II. Data Description

A. Nielsen Retail Scanner Data

We combine PE firm deals and retail store scanner data in our analyses. Product market data come from the Nielsen Retail Scanner database from the Kilts Center for Marketing - Chicago Booth. This database tracks all purchases made in the United States from January 2006 to December 2016 at 42,928 stores from 91 U.S. retail chains. Almost all major chains are present in our data, but their identities are anonymized. The largest chain in the sample has 10,129 stores. The sample covers roughly 50% of total U.S. grocery and drug store sales and 30% of U.S. mass merchandiser sales. The stores are spread across the United States, covering 98% of media designated market areas (DMAs). Nielsen tracks weekly average prices and units sold at each store for close to two million unique consumer products.

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The Nielsen data identify products by name and Universal Product Code (UPC). The data are very granular. For example, Table I lists all products available under the category "Canned Green Beans" in a specific grocery store in Austin, Texas, in December 2007. Seventeen green bean products are sold in the store, differing in brand (e.g., Del Monte, General Mills), type (e.g., organic, French style), and size (e.g., 8oz, 14.5oz). We exclude UPCs that do not identify unique products (e.g., private-label products, products temporarily sold in different size). For each product-week-store triple, we know the average price, units sold, and total revenue. Table II provides summary statistics. The average product is sold in 571 stores and an average store carries about 19,000 products. Nielsen groups items into mutually exclusive product categories such as "Vegetables-Beans-Green-Canned," "Fabric Softeners-Liquid," or "Vacuum and Carpet Cleaner Appliance." These product categories should be thought of as highly specific industry definitions. Panel B of Table II shows that there are 1,127 different product categories, with each product category containing on average 21 produced by four firms.

We match each UPC to its parent firm. The GS1 organization oversees the management of UPCs. Manufacturers buy from GS1 the right to use a UPC company prefix that corresponds to the first six to nine digits of its products' UPCs. Firms are required to disclose their name and address when buying a company prefix. Using the GS1 Data Hub, we exactly match 82% of the UPCs in the data to a GS1 company prefix. We map the remaining UPCs to companies by assuming that UPCs in the same firm share the first eight digits. In Panel C of Table II, we summarize sample firm characteristics. Across over 52,000 firms in our sample, the average firm sells 10.2 products in 2.9 product categories through nine retail chains spanning 1,346 stores.

The data also allow us to precisely identify competitors, market structure, and plausible counterfactuals. We aggregate the data at the monthly level to make the data set more manageable and to smooth consumption peaks (e.g., Black Friday).[6] The monthly frequency allows us to accurately capture when firms introduce new products, discontinue products, and expand into new markets.

Despite the richness of the data, we do not have two important pieces of information. First, while we observe the prices paid by consumers—the sum of the wholesale price and retailer markup—we cannot say with certainty which of these two price components drives our results. That said, regardless of whether PE firms are changing wholesale prices or influencing retailers to change margins, the ultimate effect on consumers is the same. Second, we do not observe manufacturing costs and markups, and thus, we cannot draw direct conclusions about the profitability or optimality of firms' decisions before or after the PE deal.

[6] The Nielsen data record weekly sales from Sunday morning to Saturday night. If the beginning or the end of the month is not on a Sunday, we assign a prorata of the weekly units sold and sales to each corresponding month.

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Table I

Example of Product Category: Canned Green Beans

This table lists canned green bean products available in a specific grocery store in Austin, TX, in the month of December 2007.

UPC	Product Details	Firm Name	Size (Oz.)	Unit Sold	Sales	Av Price
2400016286	Cut Green Beans	Del Monte Foods Inc.	14.5	109.43	101.88	0.92
2400016287	Cut Green Beans (No Salt)	Del Monte Foods Inc.	14.5	86.14	81.68	0.92
2400016289	French Style Green Beans	Del Monte Foods Inc.	14.5	51.00	49.89	0.94
2400016293	Whole Green Beans	Del Monte Foods Inc.	14.5	37.29	39.15	1.05
2000011197	Cut Green Beans	General Mills, Inc.	14.5	30.43	30.12	0.99
2400001546	French Style Green Beans	Del Monte Foods Inc.	28.0	16.71	21.90	1.31
3470001219	Cut Italian Green Beans	Sager Creek Vegetable Co.	28.0	11.29	18.96	1.68
3470001211	Cut Italian Green Beans	Sager Creek Vegetable Co.	16.0	21.57	18.34	0.85
3470001211	Cut Italian Green Beans	Sager Creek Vegetable Co.	14.5	21.57	18.34	0.85
2400039364	Pickled Green Beans with Dill Flavor	Del Monte Foods Inc.	14.5	15.29	18.05	1.13
2000011196	French Style Green Beans	General Mills, Inc.	14.5	17.29	17.11	0.99
2400001830	Cut Green Beans	Del Monte Foods Inc.	28.0	5.57	7.30	1.31
2400016290	French Style Green Beans (No Salt)	Del Monte Foods Inc.	14.5	7.14	7.04	0.95
2400001393	Cut Green Beans	Del Monte Foods Inc.	8.0	8.14	5.94	0.73
2400000087	Cut Green Beans (No Salt)	Del Monte Foods Inc.	8.0	3.71	2.71	0.73
2400016292	French Style Green Beans with Onions	Del Monte Foods Inc.	14.5	1.00	1.05	1.05
2400039201	Organic Cut Green Beans	Del Monte Foods Inc.	14.5	0.29	0.49	1.73

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Table II
Summary Statistics

This table presents summary statistics for all variables and data used in the paper. Panel A provides an overview of the number of products, stores, firms, and PE deals in the overall Nielsen data. Panel B summarizes characteristics of the product categories in the Nielsen data. We calculate the Hirfindahl-Hirschman index (HHI) for each of the 1,123 product categories each month. Panel C summarizes firm characteristics in the overall Nielsen data. Panel D focuses on product characteristics split by treatment status.

Panel A. Overall Nielsen Data

	N
Products	1,977,481
Stores per Product	571
Products per Store	18,909
Firms	52,205
PE Deals	236
Private Target Deals	222
Public Target Deals	14
Stores	42,928
Chains	91
Three-Digit ZIP	877
Counties	276
Designated Market Areas	206
States	49

Panel B. Product Category Characteristics

	Mean	Median	S.D.
Number of Categories	1,127	–	–
Number of Products per Category	20.80	8.07	38.04
Number of Stores per Category	30,123	36,762	12,821
Number of Firms per Category-Store	4.43	2.00	5.94
Herfindahl-Hirschman Index (HHI)	0.60	0.57	0.34

Panel C. Firm Characteristics

	Mean	Median	S.D.
Number of Products per Firm	10.22	3.00	41.22
Number of Stores per Firm	1,345.82	62.00	4,177.03
Number of Chains per Firm	8.83	3.00	14.78
Number of Categories per Firm	2.87	1.00	6.42

Panel D. Product Characteristics in Our Sample by Treatment

	Control Group			Treated Group		
	Mean	Median	S.D.	Mean	Median	S.D.
Price	5.33	3.99	5.16	5.19	3.76	5.34
Monthly Units Sold per Store	8.51	1.00	42.26	8.62	1.00	39.40
Monthly Sales per Store	20.42	4.96	106.36	19.64	4.99	81.67

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B. Private Equity Data

We obtain data on PE deals from Capital IQ and Preqin. From Capital IQ, we select all "closed," North American, majority-stake transactions classified as "Leveraged Buyout," "Management Buyout," "Secondary Buyout," or "Going Private Transaction." We do not include venture capital deals. From Preqin, we collect all North American PE portfolio companies. We keep only those deals closed between 2007 and 2015, as we require at least one year of product market data before and after each deal and the Nielsen data span 2006 to 2016. To link PE targets with firms in the Nielsen/GS1 database, we begin with fuzzy match algorithms based on company name and state. We then manually check each deal to make sure that the firms are correctly identified. We also buttress this process using a "top-down" approach, whereby we collect the largest PE deals from Capital IQ and manually check if any belong in the sample. This procedure ensures that we do not miss any large, important deals.[7] We end up with a sample of 236 PE deals, of which 222 are acquisitions of private firms and 14 are public.

To address the representativeness of our sample, in the Internet Appendix, we compare our deals with the universe of PE deals in Capital IQ during our sample period and with the PE deals in consumer products (see Internet Appendix Table IA.I).[8] We find that our deals appear to be larger in size and involve older firms compared to the average PE deal in Capital IQ and in consumer goods. We provide more details on this comparison in the Internet Appendix Section II.

Figure 1 shows the number of deals over time. Deals are more frequent between the PE boom of the mid-2000s and 2007 and less frequent during the financial crisis starting in 2008. Table IA.III lists the most frequent PE buyers in our sample, identified using the category *Buyers* in Capital IQ and *Investors* in Preqin. Table IA.IV lists the PE targets with the highest average sales in our sample. The three largest are Del Monte, The Nature's Bounty, and Pabst Brewing Company. These are not necessarily the targets with the greatest deal value, but rather those with the greatest presence in the consumer product categories and retailers we analyze.

III. Empirical Methodology

A. Research Design

PE firms do not randomly select companies. As shown in Table IA.V in the Internet Appendix, they are more likely to target product categories that are less concentrated and more popular among high-income consumers, firms that are larger, and products that are cheaper than competitors.[9] While a comprehensive study of the characteristics of firms and products taken over by PE is

[7] Expanded details on sample formation are in the Internet Appendix, Section I.

[8] The Internet Appendix may be found in the online version of this article.

[9] We provide more details on how we identify category concentration and popularity among high-income consumers in Section VI.F.

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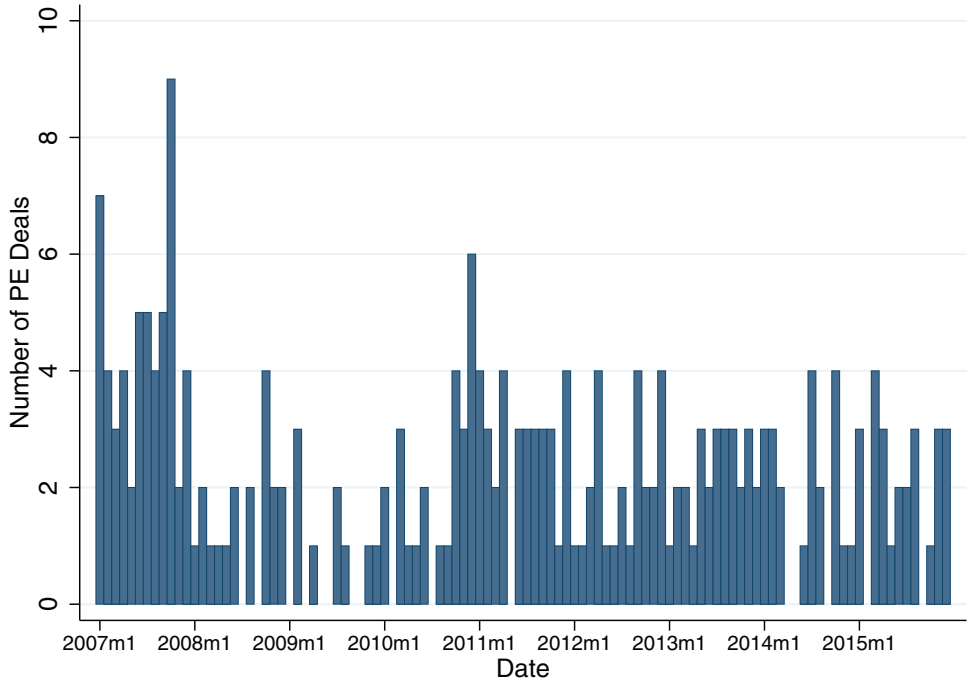


Figure 1. Private equity deals over time. This figure shows the monthly number of PE deals in our sample from January 2007 to December 2015. (Color figure can be viewed at wileyonlinelibrary.com)

beyond the scope of this study, we use a matching strategy that controls for relevant observable trends. An advantage of our setting is that our detailed data allow us to match each treated unit with a very similar counterfactual.

Our matching strategy does not completely solve endogeneity problems. While we control for predeal observable characteristics, there could be unobserved characteristics that explain differences in postevent outcomes. Also, even if we could match on all predeal characteristics, a firm could still be targeted because it is expected to change in the future. We find evidence that alleviates the first concern: after the match, treated and control groups are also similar on observable variables that we do not use in the matching procedure (see Table IA.VI). The granularity of the data helps with the second concern. We are able to compare, for example, two cans of green beans likely on the same store shelf. While it is possible that one brand has a different future trajectory than another (e.g., improved quality or buzz from an advertising campaign), matching with such specificity certainly reduces the scope of variation (e.g., we control for a sudden increase in green bean popularity).

An additional concern related to our empirical strategy is that both the treated firms/product categories/products and their control units could react to the treatment (the PE deal). In other words, if competitors react to the

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entry of PE, then our comparison of treated versus control units does not cleanly capture the effects of PE firms. To address this concern, in Section V, we examine whether competitors change behavior when facing a PE competitor. We compare the prices of the same competitor product in stores in which it faces PE entry versus stores in which it does not.

B. Matching Procedure

We match each PE target, product line, or store-UPC with a close competitor chosen based on observable characteristics at the time of the PE deal. We define each resulting treated-control pair as a cohort and then stack all cohort observations. Finally, we run a difference-in-differences regression specification on the stack of cohorts.

We match each of the 236 treated firms and 1,835 treated firm-categories with a similar counterfactual based on four variables measured at the time of the PE deal: monthly sales, number of unique UPCs sold, number of stores in which they sell, and growth in monthly sales. The first three variables are measured in the most recent predeal month, while growth in sales is computed from 12 months before the deal to the most recent predeal month. In the firm-level analyses, 220 control firms are matched to only one treated firm, six control firms to two treated firms, and one control firm to four treated firms.

We also perform analyses at the individual product level. For each product store—for example, Del Monte 14.5 oz. French Style Green Beans sold in a particular store in Austin, Texas—we select a matched product in the same store and same product category at the time of the PE deal. We choose the particular green bean item (UPC) with the closest distance based on average price and units sold during the most recent month predeal, and growth in price and units sold from 12 months ago to the most recent month predeal. We match with replacement each treated unit with the closest control using the Abadie and Imbens (2006) distance metric.[10]

To address concerns of survivorship bias, we require that both treated and control units be in the sample at least one year before and one year after the deal. We also investigate whether treated or control firms are more likely to disappear postdeal. Focusing on deals from 2008 to 2011, for a potential two full years before and five years after the deal, Figure IA.1 in the Internet Appendix shows that the drop-out rate of PE targets and matched controls is very low. Furthermore, PE targets are less likely to drop compared to control firms, with this difference becoming especially large in years 3 to 5 postdeal.[11]

[10] For each of the four matching variables, we compute the difference between treated and control and then divide this difference by the variable's standard deviation to normalize the scale. We then compute the overall distance by summing the four scaled differences.

[11] To the extent that PE targets that are more successful than their control firms are dropped from our analyses because their match disappears, this evidence would suggest that we are potentially understating the effects of PE, especially in the three to five years postdeal.

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The matched control product categories and individual UPCs become the object of our analyses when we investigate the response of competitors in Section V.

C. Econometric Specification

Our main empirical analysis employs a stacked cohort generalized diff-in-diff strategy. Essentially, we take the difference in outcome for each treated unit i (firm, product category, or product) after the PE deal relative to before and compare it with the difference in outcome of its matched control unit within the same cohort c:

$$y_{i,c,t} = \beta(d_{i,c} \times p_{t,c}) + \alpha_{i,c} + \delta_{t,c} + u_{i,c,t}. \tag{1}$$

All regressions are estimated from 24 months before the event to 60 months afterward. We choose the prewindow to have enough periods to test parallel pretrends and the postwindow to allow enough time for any PE effects to emerge. The unit-cohort fixed effect $\alpha_{i,c}$ ensures that we compare the outcome within the same unit in the period before versus after the deal. The time-cohort fixed effect $\delta_{t,c}$ ensures that the treatment unit is compared only with the matched control at each point in time. The variables $d_{i,c}$ and $p_{t,c}$ are indicator variables that identify treated units and whether the time period is after the PE deal, respectively. The coefficient β represents the diff-in-diff effect of the PE deal on the outcome variable relative to a matched counterfactual. Standard errors are double-clustered at the firm and month level to adjust for heteroskedasticity, serial correlation, and cross-sectional correlation in the error term (Bertrand, Duflo, and Mullainathan (2004)).

To test whether treatment and control units have parallel pretrends and learn how quickly PE firms implement change, we also estimate the effect of PE month-by-month using

$$y_{i,c,t} = \sum_{k=-24}^{60} \beta_k(d_{i,c} \times \lambda_{t,k,c}) + \alpha_{i,c} + \delta_{t,c} + u_{i,c,t}, \tag{2}$$

where $\lambda_{t,k,c}$ is an indicator variable equal to 1 if time t is equal to k and 0 otherwise. Standard errors are again double-clustered at the firm and month level. Given the large number of fixed effects and observations, all regressions in the paper are estimated using the fixed-point iteration procedure implemented by Correia (2014).

IV. The Effect of Private Equity on Target Firms

A. Sales and Prices

What happens to the sales and pricing of goods sold by consumer products firms acquired by PE? We start by analyzing these variables at the firm level. Each target firm is matched to an untreated firm as described in

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Section III.B. Panel A of Table III reports estimated coefficients of regressions of each firm's log sales, sales-weighted average log price, and log units sold on *After*, a dummy variable that equals 1 for firm-month observations after the PE deal closing date for target firms. We find that retail revenues relative to a matched firm increase dramatically. The coefficient on *After* is 0.406, translating to a 50% increase in sales in the years following the deal.[12] This result is consistent with papers that document growth following PE deals (e.g., Boucly, Sraer, and Thesmar (2011)). This growth is driven primarily by a 43% increase in units sold. The average price per firm increases by 5%. We compute average product prices by dividing total revenues by units sold for each firm-month. This is a very rough price measure—it blends all categories, products, and stores into a single number for each firm and is therefore subject to composition effects. While it could well capture overall trends in pricing for single-category firms, the average price per firm is not likely informative for firms that sell both cheap and expensive items.

To better understand price dynamics and what ultimately drives changes in sales and units, we begin to "peel the onion." Specifically, we break the unit of analysis down from the firm to the firm-category level. In other words, instead of treating Del Monte as a single entity, we now analyze separately their green bean, canned peach, and spaghetti sauce businesses. This sharpens the analysis in two ways. First, it increases the quality of the match, as individual product lines can be matched more precisely than entire firms—Del Monte and General Mills do not participate in exactly the same product categories. Second, it allows us to separate changes in existing product categories from changes in the category mix. The 236 PE treated firms in our sample range from operating in a single Nielsen-defined product category (e.g., Noosa Yoghurt, LLC only sells products in the "Yogurt-Refrigerated" category in our sample) to operating in 101 categories for American Roland Food Corp.

In Panel B of Table III, we regress the logs of nationwide revenues, units sold, and average prices for a firm in a particular product category on the variable *After*. This breakdown at the product category level mimics the firm-level results. With the added precision of comparing only product categories, not entire firms, we find that average prices of PE-owned firms increase by 3% relative to matched firms. Sales increase by 23% and units sold increase by 18%. All are statistically significant at the 1% level. These point estimates for units and revenues at the category level are a little smaller than at the firm level. This could be a sign that the larger categories of PE targets are growing the most, or that PE targets are expanding to new categories. We explore this question in the next section.

Figure 2 plots the trend in log sales and average log prices over time with a 90% confidence interval. While sales show no obvious pretrend, prices appear to be on an increasing trend even before the deal happens. In Table IA.VII, we investigate more formally the timing of PE effects on sales, prices, and units sold by interacting our treatment variable with each of the two years before

[12] Throughout the text, we exponentiate the coefficients for regressions with logged dependent variables when reporting magnitudes.

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Table III

Private Equity, Sales, and Prices

This table presents OLS coefficient estimates from regressions of logs sales, average monthly log prices, and logs units sold on *After*, a dummy variable equal to 1 for postdeal months for target firms (Panel A), firm-categories (Panel B), or product-stores (Panel C) that underwent a PE deal during our sample period. We use the Abadie and Imbens (2006) distance metric to match each treated unit with the closest untreated unit. In Panels A and B, we match on sales, unique UPCs sold, and store locations, during the most recent predeal month and on growth in monthly sales from 12 months before the deal to the most recent predeal month. In Panel C, we match store-products using average price and units sold during the most recent predeal month, and on growth in price and units sold from 12 months ago to the most recent predeal month. The unit of analysis is unique at the firm-month-cohort level in Panel A, at the firm-product category-month-cohort level in Panel B, and at the product-store-month-cohort level in panel C. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Within Firm

	Sales	Average Prices	Number of Units Sold
After	0.406***	0.053***	0.355***
	(3.59)	(2.86)	(3.43)
Adjusted R^2	0.876	0.933	0.893
Number of Observations	31,596	31,596	31,596
Firm-Cohort FE	Yes	Yes	Yes
Date-Cohort FE	Yes	Yes	Yes

Panel B. Within Firm-Category

	Sales	Average Prices	Number of Units Sold
After	0.211***	0.032***	0.169***
	(3.58)	(3.76)	(3.14)
Adjusted R^2	0.868	0.918	0.884
Number of Observations	224,454	224,454	224,454
Firm-Category-Cohort FE	Yes	Yes	Yes
Date-Category-Cohort FE	Yes	Yes	Yes

Panel C. Within Product-Store

	Sales	Price	Number of Units Sold
After	0.013	0.011**	0.002
	(0.76)	(2.35)	(0.15)
Adjusted R^2	0.637	0.797	0.773
Number of Observations	880,331,932	880,331,932	880,331,932
Product-Store-Cohort FE	Yes	Yes	Yes
Date-Store-Cohort FE	Yes	Yes	Yes

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Figure 2. Time trend of total sales and average price. This figure plots the coefficient estimates for regressions following equation (2), in which the dependent variables are total sales in Panels A and C and average price in Panels B and D. The unit of analysis is a firm-month-cohort in Panels A and B and a firm-category-month-cohort in Panels C and D. The coefficient estimate at time t represents the difference in the outcome variables between target firms/firm-categories and matched control firms/firm categories t months away from the PE deal closing date. The estimation period runs from −24 months to +60 months around the date of the closing of the PE deal. The closing date is indicated by the vertical line. Dotted lines show the 90% confidence interval. (Color figure can be viewed at wileyonlinelibrary.com)

and four years after the year of the deal. The omitted category is the year of the deal (i.e., 12 months following the deal). In this analysis, we confirm that sales and units sold are essentially flat in the two years before the deal. Prices, in contrast, appear to be on a slightly increasing trend even before the deal. This evidence highlights the fact that PE firms might be more likely to select targets with prices that are already growing (as also documented in our selection analysis in Table IA.V).

After a PE deal, we find small price increases and large units-sold increases at the product category level. Because multiple paths could generate these results, distinguishing between them is important for understanding PE growth strategies. The relative increase in average nationwide category-level prices

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could be due to existing products being marked up. Alternatively, the composition of goods sold within a category may have shifted towards more expensive varieties (e.g., premium organic products), or the firm may be growing share in markets or retailers that simply charge more (e.g., New York City). Similarly, there are different paths to the increase in firm-category units sold: PE targets could be gaining share within a store or could be expanding to new stores.

To peel the onion further, we zoom in to the individual product-store level. Instead of comparing a PE target and control firm's green bean sales nationally, we now compare a PE target's 16oz can of Italian-style green beans in a particular supermarket in Austin, Texas with a can of Italian-style green beans manufactured by another firm but sold in the same store. In other words, we use likely store shelf neighbors as counterfactuals. This comparison allows us to distinguish changes to existing products from composition and location effects.

The unit of observation is a specific UPC in a specific store month. A cohort is defined as a treated-matched control pair of products within the same store and product category. We regress the logs of sales, price, and units on *After*, product-cohort fixed effects, and cohort-time fixed effects.

In Panel C of Table III, we find a 1% increase in price post-PE for a given treated product relative to a competing product in the same store over the following five years. This 1% increase for existing products implies that the average category price increase of 3% reported in Panel B is due largely to a composition effect: adding or shifting consumer tastes to products that are more expensive or expanding to locations with higher grocery store prices. Results on revenues and units sold differ substantially from the results in Panels A and B: both *After* coefficients are essentially zero. This means that existing products are not gaining share within their current stores. Some combination of selling new products or selling in new places must therefore be driving unit and revenue increases at the firm and category level. We explore product innovation and geographic availability next.

B. Product Line Development

Do PE firms change the pace of new product introduction? Do they expand into new industries? Lerner, Sorensen, and Stromberg (2011) and Amess, Stiebale, and Wright (2015) find that after an LBO, firms increase their patenting activity and produce more influential patents, suggesting either a relaxation of financial constraints or reduced agency problems. While patents capture the early stages of innovation, our data allow us to study the end result with the release of new products.

Mimicking the price and sales analyses, we first address these questions at the overall firm level. We match each of the 236 firms acquired by PE with a non-PE-owned firm with the closest sales, number of products, number of stores, and growth in sales. The unit of analysis is a firm-month. Table IV illustrates the effect of PE on product innovation. The variable *Number of*

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Table IV
Private Equity and Product Innovation

This table presents OLS coefficient estimates from regressions of innovation variables on *After*, a dummy variable equal to 1 for post-PE deal months for target PE deals during our sample period. *Number of Products* is the log number of unique UPCs a firm or firm-category sells nationwide in month t. *New products* is the number of products introduced by the firm or firm-category in month t, while *Discontinued Products* is the number of products dropped in month t. *Number of Categories* is the log number of product categories, out of 1,127 categories defined by Nielsen, in which a firm sells at time t. Each cohort is a pair of treated-untreated firms (Panel A) or firm-categories (Panel B). Treated and control firms are matched as described in Table III. The unit of analysis is unique at the firm-month-cohort level in Panel A and at the firm-category-month-cohort level in Panel B. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). t-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Within Firm

	Number of Products	New Products	Discontinued Products	Number of Categories
After	0.104***	0.393**	0.159	0.051**
	(3.12)	(2.06)	(1.11)	(2.22)
Adjusted R^2	0.942	0.514	0.739	0.950
Number of Observations	31,596	31,596	31,596	31,596
Firm-Cohort FE	Yes	Yes	Yes	Yes
Date-Cohort FE	Yes	Yes	Yes	Yes

Panel B. Within Firm-Category

	Number of Products	New Products	Discontinued Products
After	0.025**	0.048**	0.034*
	(2.13)	(2.41)	(1.77)
Adjusted R^2	0.920	0.530	0.727
Number of Observations	224,454	224,454	224,454
Firm-Category-Cohort FE	Yes	Yes	Yes
Date-Category-Cohort FE	Yes	Yes	Yes

Products is the log number of unique UPCs a firm sells nationwide in month t. The variable *New products* is the number of products introduced by the firm in month t, where a new product is a UPC that appears for the first time in the Nielsen database. The variable *Discontinued Products* is the number of products dropped by the firm in month t, meaning that the UPC never reappears in the sample again. To ensure that we accurately measure introductions and discontinuations in product lines, we exclude from our analyses products that appear in the first six months of a firm's appearance in our sample. Similarly, we exclude products that disappear in the last six months of a firm's presence in our data. The rationale for the latter filter is that a product (UPC) that sold, say, in November 2016 but not December 2016 (the end of our sample) may not have been permanently discontinued; it is possible that the product simply

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did not sell any units in December but returned to stores later in 2017. A six-month buffer on both ends gives us more confidence that a product classified as discontinued or new is truly discontinued or new. Last, the variable *Number of Categories* is the log number of product categories in which a firm sells products at time t. Nielsen defines a total of 1,127 product categories.

In Panel A of Table IV, we compare the product portfolios of PE targets relative to those of control firms. Column (1) shows that, relative to matched firms, PE-treated firms expand their number of distinct UPCs by 11% after the deal. Columns (2) and (3) show that this expansion is achieved with greater churn—more frequent introduction and discontinuation of products. However, the coefficient on *New Products* is significant and more than double that on *Discontinued Products*, resulting in a net increase in product variety. We also find that treated firms are more likely to expand into new product categories. Column (4) shows that the number of product categories that a PE target is increased by 5% after the deal. It thus appears that PE targets both create new varieties in existing product categories and enter into new product categories.

To confirm this interpretation, in Panel B, we run analyses at the firm-category level. We compare each treated firm-category with the same category of an untreated competitor. We find that within a category, PE targets increase their product portfolio by 2.5% relative to their pre-PE ownership days. Moreover, both product introductions and discontinuations increase at a faster rate. Given that existing products do not see a decline in sales (see Table III), the new products do not cannibalize existing goods. Figure 3 shows that product innovation occurs gradually over the years following the PE deal and that there are no significant pretrends. We confirm the results of this graphical analysis more formally in Table IA.VII.

Overall, PE firms appear to engage in more creative destruction within their product lines, with introductions of new products outpacing discontinuations, resulting in greater product variety. We also find evidence of expansion into new product categories. Since average category-level prices increase for treated firms, the new products must be slightly more expensive. The increase in the number of products for sale helps explain how overall units sold grow for treated firms despite no change in existing product units sold at the store level.

C. Geographic Availability

PE targets increase units sold and revenues more than competitors. In the previous section, we show that the introduction of new products contributes to this result. In addition, PE firms may facilitate geographic expansion.

We define *Number of Stores* as the log number of stores that a firm sells during month t, *Number of Chains* as the log number of retail chains that a firm sells to during month t, and *Number of ZIP Codes* as the log number of ZIP codes of the stores that a firm sells during month t. We report results at the firm level in Table V, Panel A, and at the firm-category level in Panel B. The variable *After* is a dummy indicating a postdeal firm-month or firm-category-month for target firms. Column (1) shows that the number of physical stores in which treated firms sell their products increases by 25%

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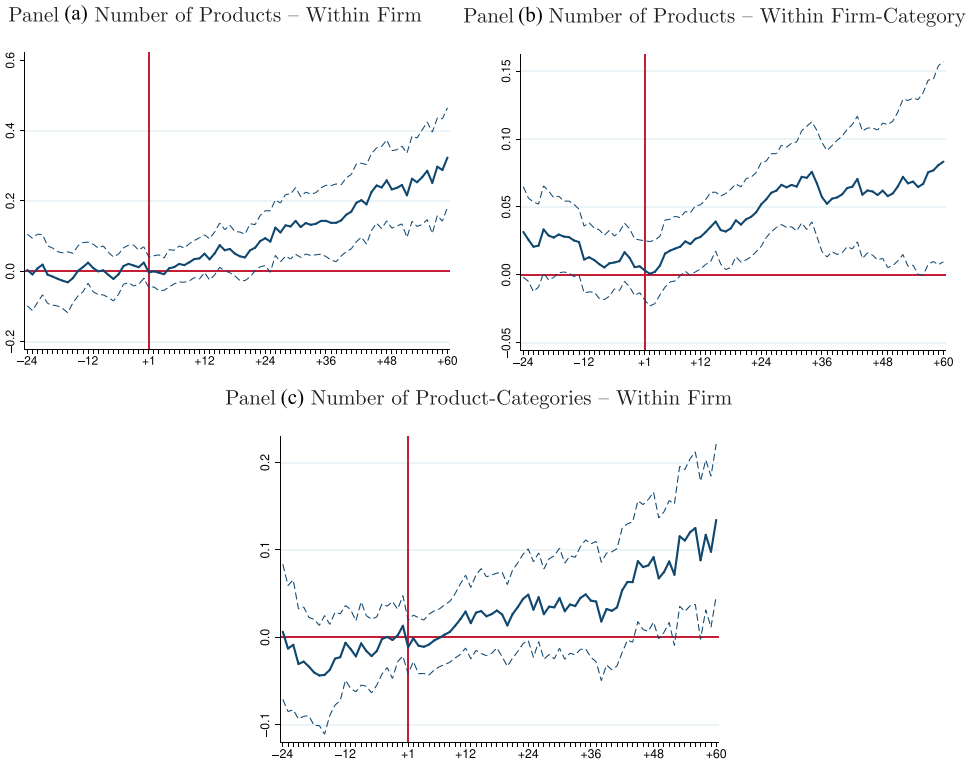


Figure 3. Time Trend of Product Innovation. This figure plots the coefficient estimates for regressions following equation (2), in which the dependent variables are number of products in Panels A and B and the number of product categories for Panel C. The unit of analysis is a firm-month-cohort in Panels A and C, and a firm-category-month-cohort for Panel B. The coefficient estimate at time t represents the difference in the outcome variables between PE firms/firm-categories and matched non-PE firms/firm-categories t months away from the PE deal closing date. The estimation period runs from −24 to +60 months around the closing date of the PEdeal. The closing date is indicated by the vertical line. Dotted lines show the 90% confidence interval. (Color figure can be viewed at wileyonlinelibrary.com)

after the deal, relative to matched untreated firms. This result can obtain by selling to more stores within the same retail chain or by entering new retail chains. Column (2) shows that PE targets increase the number of retail chains that they sell to by 10% postdeal. Column (3) shows that PE firms expand to 14% more three-digit ZIP codes. We obtain similar results when we rerun the analyses for counties, DMAs, and states (see Figure IA.2 in the Internet Appendix for a graphical illustration of these results). The results at the firm-category level in Panel B are similar. Figure 4 shows that this expansion occurs steadily over the years following the deal. A formal analysis of the timing of the PE effects in Table IA.VII suggests that, at least at the firm-category level, target firms were possibly experiencing a decline in geographic expansion in the years before the deal.

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Table V

Private Equity and Geographic Availability

This table presents OLS coefficient estimates from regressions of the log number of stores, log number of retail chains, and the log number of three-digit ZIP codes in which a target firm or firm-category is present each month on *After*, a dummy variable equal to one post-PE deal months for firms (Panel A) or firm-categories (Panel B) that underwent a PE deal during our sample period. Each cohort is a pair of treated-untreated firms (Panel A) or firm-categories (Panel B). Treated and control firms are matched as described in Table III. The unit of analysis is unique at the firm-month-cohort level in Panel A and the firm-category-month-cohort level in Panel B. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Within Firm

	Number of Stores	Number of Chains	Number of ZIP Codes
After	0.223***	0.098***	0.129**
	(3.07)	(3.28)	(2.47)
Adjusted R^2	0.907	0.951	0.899
Number of Observations	31,596	31,596	31,596
Firm-Cohort FE	Yes	Yes	Yes
Date-Cohort FE	Yes	Yes	Yes

Panel B. Within Firm-Category

	Number of Stores	Number of Chains	Number of ZIP Codes
After	0.130***	0.052***	0.095***
	(2.93)	(2.92)	(2.89)
Adjusted R^2	0.889	0.920	0.882
Number of Observations	224,454	224,454	224,454
Firm-Category-Cohort FE	Yes	Yes	Yes
Date-Category-Cohort FE	Yes	Yes	Yes

Overall, Table IA.VII documents that most of our main results are significant starting from the first year postdeal and that the effects of PE increase linearly over time. The only notable exception is average prices, for which the effect is statistically significant only in years 2 and 3.

By extending our analyses up to five years postdeal, we may also capture growth after PE firms' exit. To address this concern, we repeat our main analyses, stopping at PE firms' effective time of exit if earlier than five years. We report the results in Tables IA.XI, IA.XII, and IA.XIII. All of our results are robust to using the alternative sample period.

V. Competitor Response

The results thus far focus on what happens to PE-treated goods relative to those of matched competitors. Competitors, however, do not necessarily stand still. In this section, we investigate how competition responds to PE entry.

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Figure 4. Time trend of geographic availability. This figure plots the coefficient estimates for regressions following equation (2), in which the dependent variables are number of stores in Panels A and B, the number of retail chains in Panels C and D, and the number of three-digit ZIPs in Panels E and F. The unit of analysis is a firm-month-cohort in Panels A, C, and E, and a firm-category-month-cohort in Panels B, D, and F. The coefficient estimate at time t represents the difference in the outcome variables between PE firms/firm-categories and matched non-PE firms/firm-categories t months away from the PE deal closing date. The estimation period runs from −24 to +60 months around the date of the closing of the PE deal. The closing date is indicated by the vertical line. Dotted lines show the 90% confidence interval. (Color figure can be viewed at wileyonlinelibrary.com)

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Together with the relative changes documented in Section IV, these results paint a more comprehensive picture of the overall effects of PE on products and, ultimately, consumers.

A. Competitor Response: Prices

Prices of existing products taken over by PE increase by about 1% relative to matched products (Table III, Panel C). This result is consistent with PE firms keeping prices constant, while competitors reduce prices in an effort to run highly leveraged targets out of business. Alternatively, competitors may also be increasing prices. Ultimately, whether rivals match PE price increase behavior—as typical oligopoly models would predict—or whether they engage in predation is an empirical question.

To identify the price response of competitors to PE entry, we exploit geographic variation in a given competitor's exposure to a PE deal. As an example, assume that Del Monte, a PE takeover target, sells green beans in store A but not in store B. General Mills, which is not PE owned, sells green beans in both stores. We compare the price response of General Mills in store A, which faces PE competition, to its response for the same products in store B, which does not. We attribute a differential price response following the deal to the PE firms' entrance. The identifying assumption is that absent the deal, the price of this particular green bean product of General Mills would have moved similarly in both stores.

The control firms in previous regressions now become the objects of interest. We first extract from the same-store analysis of Table III the same non-PE products and store locations that compete with a PE target. We then identify the stores in which these non-PE products are sold absent the PE competitor. To keep the computation feasible, we randomly select 10 of these stores, and among these, we select the closest match in terms of price level and growth to the non-PE product that does face a PE rival. These two product stores form a cohort.

In Table VI, *After* is an indicator variable equal to one for non-PE products after a competitor' PE deal, in stores where the newly PE-owned product is sold. As in the previous same-store product analysis, we include product-cohort fixed effects and time-cohort fixed effects. In Panel A, column (1), the coefficient on *After* is 0.4% and significant, suggesting that PE induces direct store competitors to marginally raise prices.

A problem for our identifying assumption would arise if pricing trends in stores with PE competition are systematically different from trends in stores without PE. For example, PE products could be sold in chains or in geographic areas experiencing differential price changes. We address these possibilities in columns (2) and (3). In column (2), we require that all 11 stores (10 that sell only the non-PE product and one that also sells the PE entrant) from which the product-store cohorts are drawn are part of the same retail chain. In column (3), we require that all of the stores used to define the cohorts are in the same DMA. The coefficients on *After* in these regressions are 0.4% and 0.3% and still

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Table VI
Competitor Response

This table presents evidence from product-stores (Panel A) or firm-categories-stores (Panel B) for the competitors of firms that were acquired by a PE firm. In Panel A, we present OLS coefficient estimates from regressions of the average monthly log prices on *After*, a dummy variable equal to 1 for post-PE deal months in which the competitor's product was competing in the same store-category with at least one product that underwent a PE deal during our sample period. Each cohort thus comprises a treated product sold in a store with PE competition and a matched control product—with the same UPC—sold in different stores without PE competition. In practice, for each treated product, we randomly select 10 of these stores without PE competition. Among these 10 stores, we then choose the closest match based on the level and growth in the product-store price before the deal, using the Abadie and Imbens (2006) distance metric. In column (1), we randomly choose 10 among all U.S. stores to select the match. In column (2), we choose the 10 stores within the same retail chain of the treated product. In column (3), the 10 stores are from the same DMA of the treated product. In Panel B, we present OLS estimates from regressions of the log number of products on *After*, a dummy variable equal to 1 if the treated firm-category was competing with at least one product in the same category that underwent a PE deal during our sample period. Each cohort thus comprises a treated firm-category sold in a store with PE competition and the same firm-category from 10 different stores without PE competition. In column (1), we randomly choose the 10 stores from among all the U.S. stores. In column (2), we choose the 10 stores within the same retail chain of the treated firm-category. In column (3), the 10 stores are from the same DMA of the treated firm-category. The unit of analysis is unique at the product-store-month-cohort level in Panel A and at the firm-category-store-month-cohort level in Panel B. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Prices—Within Product-Store

	Full Sample	Same Chain	Same DMA
After	0.004***	0.004***	0.003***
	(6.06)	(8.57)	(5.69)
Adjusted R^2	0.987	0.991	0.988
Number of Observations	6,647,108	5,713,080	5,269,109
Product-Store-Cohort FE	Yes	Yes	Yes
Date-Cohort FE	Yes	Yes	Yes

Panel B. Number of Products—Within Firm-Category-Store

	Full Sample	Same Chain	Same DMA
After	−0.015***	−0.010***	−0.021***
	(−10.14)	(−4.30)	(−10.19)
Adjusted R^2	0.924	0.957	0.937
Number of Observations	25,200,128	12,724,588	12,191,146
Firm-Category-Store-Cohort FE	Yes	Yes	Yes
Date-Cohort FE	Yes	Yes	Yes

significant. We thus conclude that PE entry leads competitors to marginally raise prices in stores where they directly compete.[13]

[13] Price changes could be driven by the manufacturer (General Mills in our example) or the individual retail store manager; Levy et al. (1997) note that both impact final retail pricing. However,

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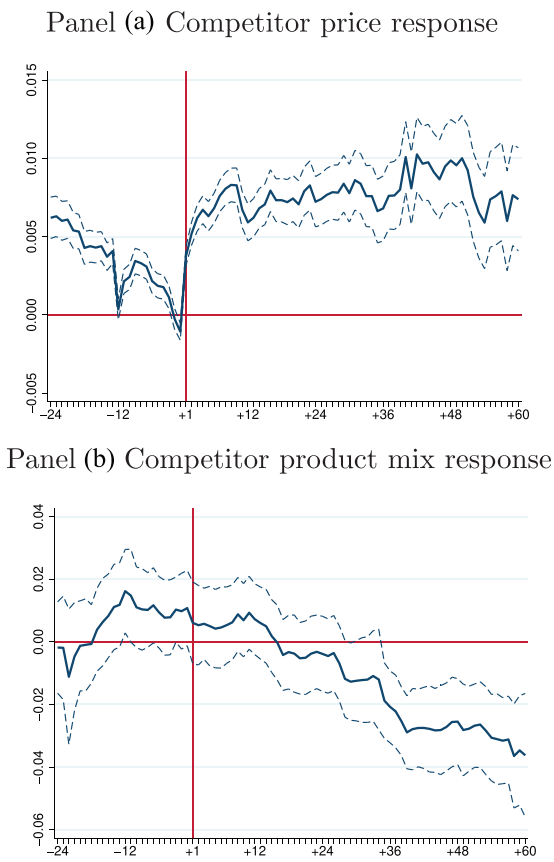


Figure 5. Trend in Competitor Response. This figure plots the coefficient estimates for regressions following equation (2), in which the dependent variables are average monthly prices in Panel A and number of products in Panel B. The coefficient estimate at time t represents the difference in the outcome variables between treated product-stores/firm-category-stores and matched controls t months away from the PE deal closing date. This sample only includes product-stores/firm-category-stores for control firms that did not go through a PE deal. In Panel A, each cohort comprises a treated product that is sold in a store category in which a PE deal occurred and the best match (with the same UPC) selected from 10 random stores across the United States in which there is no PE competitor. In Panel B, each cohort comprises a firm-category in which the PE deal occurred and the average of the same firm-category from 10 random stores across the United States in which there is no PE competitor. The estimation period runs from −24 to +60 months around the PE deal closing date. The closing date is indicated by the vertical line. Dotted lines show the 90% confidence interval. Regressions are estimated using the fixed point iteration procedure implemented by Correia (2014). (Color figure can be viewed at wileyonlinelibrary.com)

Figure 5 plots the price response from column (1) over time. Price responses for columns (2) and (3) are depicted in Figure IA.3. Interestingly, the price change happens very quickly. Added to the relative price increase of

regardless of whether the manufacturer or the retailer is responsible for higher competitor prices when PE is present, it is still ultimately the PE deal that instigated the change.

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approximately 1% for PE-owned goods, the results in Panel A suggest that the overall PE price increase experienced by consumers could be 1.3% to 1.4%.

B. Competitor Response: Product Mix and Availability

PE targets boost product introduction and thus increase variety. To see how competitors respond, we analyze whether, after the deal, there is a change in the number of products these competitors sell in stores where they compete with the PE firms versus stores where they do not. As an example, say that General Mills, which is not PE-owned, sells 10 varieties of green beans in stores A and B prior to the PE deal of competitor Del Monte, while Del Monte sells green beans in store A but not store B. What happens to General Mills' green bean variety in store A versus store B after the PE deal? Our identifying assumption is that any difference in General Mills' store A variety is due to the presence of PE. The unit of analysis is now a firm's entire product category within a store, not a specific product, since we want to count the number of products in the product category. For each store in which a non-PE firm competes with a PE in a given category, we select 10 random stores in which the non-PE firm does not compete with PE. We form cohorts using all 11 firm-category stores, one treated by a PE entrant and 10 untreated. We use all 10 control stores because it is not obvious how to identify the best match and because we want to mitigate noise in the measurement of product variety using one single store.

We present the results in Table VI, Panel B. In column (1), we find that a PE target competitor shrinks the number of product offerings by 1.5%. We find similar results in column (2) where all 11 stores in each cohort are from the same retail chain and in column (3) where all cohort members are from the same DMA. Unlike with prices, where competitors respond (marginally) in the same direction as their PE rival and likely shelf neighbor, product variety responds in the opposite direction. Given that shelf space is finite, more aggressive PE product introduction appears to crowd out competitors.

Our findings are at odds with evidence in Chevalier (1995b) that competitors enter and expand into the LBO grocery chain's markets after the deal. However, Chevalier investigates retail chains, while we focus on manufacturers that sell in these chains. In addition, Chevalier's sample is heavily influenced by publicly traded firms, whereas most of our firms are private. In Section VI.B, we split our analyses by public and private firms and find results for public firms at the product-store level that are more consistent with evidence in Chevalier (1995b). Finally, supermarket LBOs from the 1980s were undertaken as a takeover defense.[14] Decades later, the factors motivating PE deals appear starkly different (see our evidence from press releases in Section VI.A).

[14] "The vast majority of the leveraged buyouts were not the result of unconstrained decisions by managers and shareholders. All four of the biggest deals (and many of the smaller ones) were undertaken to thwart the unwanted takeover attempts of the Haft family" (Chevalier (1995b)).

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VI. Mechanisms

PE deals result in marginally higher prices but significantly higher sales, primarily through aggressive introduction of new products in new locations. How do PE firms achieve these results? Why are they needed? In this section, we investigate the potential mechanisms by examining cross-sectional and time-series variation in PE impact. Knowing where and when PE is most effective can provide clues as to their particular skills and strategy. First, we read the deal press releases and classify deals according to their stated intent. Second, we study the effects of PE on public versus private targets and on firms more likely to be financially constrained. Third, we investigate heterogeneity in PE firms in their focus on growth deals. Fourth, we analyze PE effects under different economic conditions, specifically during and after the financial crisis. Fifth, we focus on heterogeneity at the product-category level. We examine PE effects in product categories where target firms have high versus low market power, in product categories with high versus low barriers to entry, and in categories popular among high-income versus low-income consumers. Sixth, we test the effects on additional strategy and investment levers. That is, we study whether target firms change acquisitiveness, advertising intensity, or price adjustment frequency. Finally, we examine acquisitions of firms by operating companies (i.e., traditional takeovers) to examine whether our results are specific to PE acquisitions or occur whenever there is a change in ownership.

A. Private Equity Deal Press Releases

A starting point for understanding how PE firms achieve results is to investigate their stated plans and strategies. Gompers, Kaplan, and Mukharlyamov (2016) survey PE firms to understand how they attempt to create value. In the same spirit, we collect and analyze the press release announcements of the deals in our sample. With the caveats that PE firms strategically manage their press and likely overstate positive outcomes (e.g., growth) and downplay negative ones (e.g., layoffs), announcements can still offer insights into the range of strategies employed.

We are able to find informative press releases for 148 deals. We summarize the stated reasons for the deals in Table VII. Reasons are not mutually exclusive. Most press releases (86%) generically mention growth; some specifically detail new product development, acquisitions, or access to distribution. Capital infusion and human capital are mentioned as well. Motivations related to cost cutting and financial engineering are not often present. There is no mention of PE as a takeover defense, as, for example, in the case of supermarket LBOs in Chevalier (1995a). Overall, the stated strategies are consistent with our growth results.

B. Public versus Private Targets

Public and private firms may be at different points in their life cycles. They could also have different needs and face different challenges. Private firms

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Table VII
Mechanism: Press Releases

This table shows the number (and percentage) of press releases that mention a specific reason for the PE deal. Out of 236 deals, we are able to find press releases that mentioned specific reasons for 148 deals. Reasons are not mutually exclusive and one press release could mention multiple reasons. We compute percentages out of the total number of informative press releases (148).

Reason	Number of Deals	(%)
Expansion Plans/General Growth	127	(86%)
Financial Capital for Growth	50	(34%)
Industry Experience/Expertise	48	(32%)
New Products	39	(26%)
Acquisitions	25	(17%)
Distribution	21	(14%)
New Management/CEO	18	(12%)
Cost Efficiencies	7	(5%)
Access To Talent	2	(1%)

are more likely to be small and financially constrained (Farre-Mensa and Ljungqvist (2016)), while public firms are usually larger and more mature and could be subject to greater agency and overinvestment problems (Jensen (1986)). In Table VIII, we run our sales and price, product innovation, and geographic availability tests separately on public and private PE target firms. Of the 236 treated firms, 222 are private and 14 are public. We classify as public-to-PE those deals in which an entire public firm is sold to PE. We do not include in this category the sales of divisions of public firms. We find that the impact of PE is not the same for public and private targets.

In Panel A, the results for private targets match those for the pooled sample (Table III) at the firm level: post-PE prices increase by 5%, while sales and units dramatically increase by 52% and 45%. For public firms, however, although the coefficients have the same sign, the magnitudes of the increases in sales and units sold are much smaller and not statistically significant. At the firm-category level, the results for private firms are again consistent with the full-sample results—significant growth in sales and units and a 4% increase in prices. Public firm sales and units within a product category fall postdeal relative to controls. These coefficients are not statistically significant. Public firm deals thus do not appear to generate the same growth results. The within-product-store analyses for the full sample (Table III) document no change in existing product sales and units and a marginal 1% increase in prices. These results mask significant differences between public and private firms. Panel A shows that for private firms, existing products increase sales postdeal by 6%—a result that is statistically significant at the 1% level. An increase in units sold, not price, drives this result. This finding is consistent with the fact that private targets spend more on advertising after the deal (see Section VI.G). Public firms, in contrast, raise prices by 2% and see revenues fall by 6%.

In Table IV, we find that, in the full sample, product offerings expand within existing categories and into new ones after a PE deal. In Table VIII,

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Table VIII

Mechanisms: Public versus Private Targets

This table presents OLS coefficient estimates from regressions of, in Panel A, logs sales, average monthly log prices, and log units sold on *After*, a dummy equal to 1 for the post-PE deal months in which the firm, firm-category, or product-store underwent a PE deal during our sample period. In Panel B, we focus on product innovation and in Panel C geographic availability. Public targets are those deals in which the target was a public company before the PE acquisition. Each cohort is a pair of treated-untreated firms, firm-categories, or product-stores in which the treated unit is matched to an untreated unit using the same methodologies followed in the previous tables. The unit of analysis is unique at the firm-month-cohort, firm-category-month-cohort, or product-store-month-cohort level. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Sales, Pricing, and Units

		Public Target			Private Target		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm	Sales	0.214	(0.53)	2,088	0.420***	(3.54)	29,508
	Average Prices	0.046	(0.94)	2,088	0.053***	(2.73)	29,508
	Units Sold	0.119	(0.36)	2,088	0.372***	(3.41)	29,508
Within Firm-Category	Sales	−0.074	(−0.43)	24,820	0.247***	(4.09)	199,634
	Average Prices	−0.014	(−0.72)	24,820	0.038***	(4.16)	199,634
	Units Sold	−0.059	(−0.40)	24,820	0.198***	(3.55)	199,634
Within Product-Store	Sales	−0.063*	(−1.95)	307,133,126	0.055***	(5.01)	554,415,032
	Prices	0.020**	(2.27)	307,133,126	0.007	(1.39)	554,415,032
	Units Sold	−0.059**	(−2.09)	307,133,126	0.035***	(4.67)	554,415,032

(*Continued*)

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Table VIII—*Continued*

Panel B. Product Innovation

		Public Target			Private Target		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm	Number of Products	0.060	(0.47)	2,088	0.107***	(3.09)	29,508
	New Products	1.766	(1.12)	2,088	0.296*	(1.78)	29,508
	Discontinued Products	−0.424	(−0.43)	2,088	0.201	(1.48)	29,508
	Number of Categories	−0.078	(−0.90)	2,088	0.060**	(2.53)	29,508
Within Firm-Category	Number of Products	−0.008	(−0.22)	24,820	0.029**	(2.36)	199,634
	New Products	0.181	(1.51)	24,820	0.032**	(1.98)	199,634
	Discontinued Products	0.043	(0.65)	24,820	0.032*	(1.69)	199,634

Panel C. Geographic Availability

		Public Target			Private Target		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm	Number of Stores	0.205	(0.98)	2,088	0.224***	(2.93)	29,508
	Number of Chains	−0.080	(−1.43)	2,088	0.110***	(3.49)	29,508
	Number of ZIP Codes	0.057	(0.37)	2,088	0.134***	(2.44)	29,508
Within Firm-Category	Number of Stores	−0.116	(−0.97)	24,820	0.161***	(3.52)	199,634
	Number of Chains	−0.086	(−1.61)	24,820	0.069***	(3.96)	199,634
	Number of ZIP Codes	−0.096	(−1.11)	24,820	0.119***	(3.50)	199,634

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Panel B, we split these innovation results by public and private firms. For private firms, postdeal behavior mimics the full-sample findings: the number of products grows by 11% and categories grows by 6%. There is scant evidence, however, that public firms more frequently introduce new products or enter new product categories relative to controls in the postdeal period; the signs on the coefficients are mixed and the results are not statistically significant.

In Panel C, we revisit geographic expansion. Private firms drive the strong growth in market penetration in the overall sample (Table V), registering higher growth rates across stores, ZIP codes, and chains relative to matched firms postdeal. The results hold at both the firm and the firm-category levels. Public firms again show mixed results with no statistical significance.

This divergence in results between public and private firms suggests the existence of both growth and agency motives for PE deals. Access to financing, managerial expertise, or business connections can help younger, and private firms expand their product lines. *The New York Times* notes that "business owners with a product to sell often dream of winning shelf space in the Wal-Marts and Targets of the world. But…it is a challenge to get shelf space in any store."[15] Public firms, in contrast, may be overinvesting in market share by charging prices that are too low. Our results of growth for private targets and higher prices for pubic firms are consistent with other studies. For example, Davis et al. (2014) document that employment grows following private firm buyouts while it declines after public deals. Boucly, Sraer, and Thesmar (2011) similarly find stronger growth for private target firms. This variation in deal outcomes can also perhaps explain the negative portrayal of PE in the media: layoffs and contraction are associated with the most visible, well-known targets.

C. Financial Constraints

Higher growth for private target firms suggests that PE firms could provide capital for growth. To investigate this possibility further, we repeat our main analyses after splitting our sample based on the likelihood that target firms are financially constrained. Firm size and age could be used to identify financially constrained firms (Hadlock and Pierce, 2010). We first define "age" as the difference between the year a firm is founded (from Capital IQ) and the year of the deal. We define "size" as the total dollar value of all sales of the firm's products in the Nielsen data set during the month of the deal. Adapting the approach in Hadlock and Pierce (2010), we define the "Size and Age" (SA) index as "high" if the target firm is in the top half of both the age and size distributions, "low" if the firm is in the bottom half of both the age and size distributions, and "medium" otherwise.

In Panel A of Table IX, we investigate the effects of PE on sales, units, and prices. Relative sales and units increase substantially more for firms with high

[15] "Getting Your Product Onto Retail Shelves," by Eilene Zimmerman, *The New York Times*, 10/20/2010.

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Table IX

Mechanisms: Financial Constrains—Size and Age (SA) Index

This table presents OLS coefficient estimates from regressions of, in Panel A, logs sales, average monthly log prices, and log units sold on *After*, a dummy equal to 1 for the post-PE deal months if the firm, firm-category, or product-store underwent a PE deal during our sample period. In Panel B, we focus on product innovation and in Panel C, we study geographic availability. Each cohort is a pair of treated-untreated firms, firm-categories, or product-stores in which the treated unit is matched to an untreated unit using the same methodologies followed in the previous tables. The unit of analysis is unique at the firm-month-cohort, firm-category-month-cohort, or product-store-month-cohort level. The SA index is defined as "high" if the firm is in the top half of both the age and size distributions, as "low" if the firm is in the bottom half of both the age and size distributions, and as "medium" otherwise. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Sales, Pricing, and Units

		High SA Index (Least Constrained)			Medium			Low SA Index (Most Constrained)		
		After	*t*-Stat	Obs.	After	*t*-Stat	Obs.	After	*t*-Stat	Obs.
Within	Sales	−0.063	(−0.56)	7,766	0.481***	(2.79)	17,160	0.711***	(2.97)	6,456
Firm	Average Prices	0.014	(0.74)	7,766	0.097***	(3.35)	17,160	−0.016	(−0.39)	6,456
	Units Sold	−0.054	(−0.50)	7,766	0.377**	(2.37)	17,160	0.719***	(3.43)	6,456
Within	Sales	0.205***	(2.72)	91,562	0.202**	(2.17)	114,474	0.561**	(2.47)	14,470
Firm-Category	Average Prices	0.036***	(2.95)	91,562	0.023*	(1.77)	114,474	0.074**	(2.13)	14,470
	Units Sold	0.162**	(2.44)	91,562	0.167*	(1.93)	114,474	0.470***	(2.67)	14,470
Within	Sales	0.0215	(0.69)	459M	0.008	(0.57)	391M	−0.037	(−1.05)	7M
Product-Store	Average Prices	0.013**	(2.37)	459M	0.011	(1.40)	391M	−0.021	(−1.65)	7M
	Units Sold	−0.001	(−0.04)	459M	0.007	(0.76)	391M	−0.02	(−1.28)	7M

(*Continued*)

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Table IX—*Continued*

Panel B. Product Innovation

		High SA Index (Least Constrained)			Medium			Low SA Index (Most Constrained)		
		After	*t*-Stat	Obs.	After	*t*-Stat	Obs.	After	*t*-Stat	Obs.
Within Firm	N. of Products	0.028	(0.75)	7,766	0.113**	(2.27)	17,160	0.160*	(1.98)	6,456
	New Products	0.440	(0.87)	7,766	0.338	(1.51)	17,160	0.467	(1.61)	6,456
	Discont. Products	0.475	(1.05)	7,766	−0.003	(−0.02)	17,160	0.148	(0.92)	6,456
	N. of Categories	0.087***	(2.65)	7,766	0.034	(0.96)	17,160	0.037	(0.74)	6,456
Within Firm-Category	N. of Products	0.017	(1.18)	91,562	0.021	(1.15)	114,474	0.188***	(4.34)	14,470
	New Products	0.046*	(1.74)	91,562	0.039	(1.51)	114,474	0.164	(1.19)	14,470
	Discont. Products	0.050	(1.30)	91,562	0.015	(0.89)	114,474	0.083	(1.15)	14,470

Panel C: Geographic Availability

		High SA Index (Least Constrained)			Medium			Low SA Index (Most Constrained)		
		After	*t*-Stat	Obs.	After	*t*-Stat	Obs.	After	*t*-Stat	Obs.
Within Firm	N. Stores	0.050	(0.91)	7,766	0.151	(1.39)	17,160	0.602***	(3.52)	6,456
	N. Chains	0.090***	(2.84)	7,766	0.060	(1.37)	17,160	0.204***	(2.78)	6,456
	N. ZIP Codes	0.044	(1.33)	7,766	0.086	(1.12)	17,160	0.350**	(2.60)	6,456
Within Firm-Category	N. Stores	0.121**	(2.22)	91,562	0.123*	(1.77)	114,474	0.459**	(2.59)	14,470
	N. Chains	0.040	(1.59)	91,562	0.068***	(2.67)	114,474	0.108*	(1.83)	14,470
	N. Zip Codes	0.092**	(2.13)	91,562	0.082	(1.63)	114,474	0.374***	(2.69)	14,470

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financial constraints versus firms with low financial constraints. For example, at the firm-category level, the effect of PE firms on sales is twice as strong for targets with a low SA index versus targets with a high SA index. The effects on units sold are roughly three times as strong. Average prices at the firm-category level also increase twice as much for financially constrained firms, suggesting that these firms might be more likely to expand into more expensive products or geographies. The analyses at the product-store level support this interpretation. For existing products, PE has a negative effect on prices for low-SA firms (statistically insignificant, t-statistic $= -1.65$). For high-SA firms, we find instead that postdeal prices increase by 1.3% (t-statistic $= 2.37$). This latter result is consistent with the earlier finding that PE firms tend to raise prices on existing products for public firms (see Table VIII) that are less likely to be financially constrained.

In Panel B, we investigate the effects of PE on product innovation. We find that PE firms are more likely to enter new product categories if target firms are nonfinancially constrained (high SA index). Nonetheless, the analyses at the firm-category level reveal that product innovation in existing product categories is concentrated among low-SA/financially constrained target firms.

In Panel C, we present results for geographic availability. Consistent with our previous findings, target firms that are financially constrained increase their geographic reach in new stores, chains, and ZIP codes three to four times more than nonconstrained target firms.

Overall, the evidence supports the view that PE firms help their targets by alleviating financial constraints and providing capital for growth.

D. Private Equity Firms with Growth Focus

We now turn our attention to heterogeneity in PE firms. Given our strong growth results, we investigate the effects on consumer products of those PE firms with expertise in growth deals. For our sample of PE firm deals,[16] we first collect information from Capital IQ on transaction types and stages of the target companies in which they invest. We then define a PE firm as having growth expertise if "*growth capital*" is mentioned in the description of the typical transaction types in which the company invests. Many PE firms are classified in Capital IQ as being involved in multiple transaction types (e.g., "*growth capital*," "*buyout*," or "*turnaround*"). To be clear, in our definition of growth PE, we do not require that PE firms specialize only in growth capital. For those deals that involve multiple PE firms, we aggregate information from PE firms at the deal level. In our main analyses in Table X, we define deals as executed by "growth PE firms" if at least one PE firm has expertise in growth deals. Using this definition, we classify 146 deals (or 64% of our sample) as growth deals. Our results are robust to different specifications, such as requiring that the majority or all PE firms have expertise with growth capital deals.

[16] We can identify information on PE firms in Capital IQ for 227 out of our 236 deals; 228 PE firms are involved in these 227 deals.

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Table X

Mechanisms: Private Equity Firm Type

This table presents OLS coefficient estimates from regressions of, in Panel A, log sales, average monthly log prices, and log units sold on *After*, a dummy equal to 1 for the post-PE deal months in which the target firm, firm-category, or product-store underwent a PE deal during our sample period. In Panel B, we focus on product innovation and in Panel C, we study geographic availability. The columns "Growth PE" include results from PE deals in which at least one of the PE firms is classified as having expertise in Growth Capital deals by Capital IQ. The columns "Nongrowth PE" include results from PE deals in which none of the PE firms is classified as having expertise in Growth Capital deals by Capital IQ. Each cohort is a pair of treated-untreated firms, firm-categories, or product-stores in which the treated unit is matched to an untreated unit using the same methodologies followed in the previous tables. The unit of analysis is unique at the firm-month-cohort, firm-category-month-cohort, or product-store-month-cohort level. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Sales, Pricing, and Units

		Growth PE Firms			Nongrowth PE Firms		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within	Sales	0.549***	(4.36)	19,878	0.170	(0.75)	10,566
Firm	Average Prices	0.079***	(3.36)	19,878	0.043	(1.43)	10,566
	Units Sold	0.470***	(4.10)	19,878	0.138	(0.65)	10,566
Within	Sales	0.363***	(5.62)	139,764	−0.124	(−0.94)	72,942
Firm-Category	Average Prices	0.038***	(3.91)	139,764	0.020	(1.07)	72,942
	Units Sold	0.307***	(5.26)	139,764	−0.142	(−1.18)	72,942
Within	Sales	0.001	(0.02)	425,662,486	0.027	(1.57)	411,874,912
Product-Store	Prices	0.004	(0.79)	425,662,486	0.021***	(3.11)	411,874,912
	Units Sold	−0.015	(-0.60)	425,662,486	0.019*	(1.70)	411,874,912

(*Continued*)

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Table X—*Continued*

Panel B. Product Innovation

		Growth PE Firms			Nongrowth PE Firms		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm	Number of Products	0.165***	(4.13)	19,878	−0.006	(−0.10)	10,566
	New Products	0.550**	(2.11)	19,878	0.106	(0.42)	10,566
	Discontinued Products	0.139	(0.95)	19,878	0.307	(0.97)	10,566
	Number of Categories	0.084***	(2.73)	19,878	−0.010	(−0.29)	10,566
Within Firm-Category	Number of Products	0.054***	(4.14)	139,764	−0.039	(−1.47)	72,942
	New Products	0.048*	(1.85)	139,764	0.056*	(1.78)	72,942
	Discontinued Products	0.024*	(1.75)	139,764	0.072	(1.42)	72,942

Panel C. Geographic Availability

		Growth PE Firms			Nongrowth PE Firms		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm	Number of Stores	0.238***	(2.88)	19,878	0.207	(1.46)	10,566
	Number of Chains	0.139***	(3.70)	19,878	0.019	(0.38)	10,566
	Number of ZIP Codes	0.079	(1.40)	19,878	0.230**	(2.17)	10,566
Within Firm-Category	Number of Stores	0.262***	(5.14)	139,764	−0.159*	(−1.82)	72,942
	Number of Chains	0.082***	(3.62)	139,764	−0.035	(−1.19)	72,942
	Number of ZIP Codes	0.179***	(4.52)	139,764	−0.092	(−1.53)	72,942

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In Panel A of Table X, we rerun our main analyses after splitting the sample between deals by growth and nongrowth PE firms. Both at the firm and firm-category levels, target firms substantially increase sales, average prices, and units when PE firms with growth expertise are involved in the deal. For deals by PE firms without growth expertise, the results are not statistically significant at the firm and firm-category levels. At the product-store level, however, we find opposite results: prices and units grow only for deals by nongrowth PE firms. While growth-oriented PE firms spur growth in new product categories with higher prices, nongrowth-oriented PE firms tend to increase prices on existing products. This evidence mirrors the analyses on private firms in Table VIII. In Panels B and C, we investigate product innovation and geographic availability. We find similar results: product innovation and geographic expansion arise predominantly in deals in which PE firms with growth expertise are involved.

These results suggest that PE firms with expertise in growth capital deals drive our results. This evidence is consistent with the growth motivation prevalent in deals' press releases (see Table VII). Our overall results of higher growth postdeal are at odds with the "cut to the bones," negative view of PE firms in the media. In the 2000s and 2010s, PE firms as a growth engine, particularly for smaller and private firms, seems a more appropriate narrative.

E. Financial Crisis

The financial crisis of the late 2000s provides a setting to investigate how PE targets operate when financial resources and managerial expertise likely become more important. In Table XI, we split the PE deals into those that close between 2007 and 2010 (during the crisis) and those that close between 2011 and 2015 (after the crisis). Consistent with the full-sample results, we find in Panel A that prices, units, and sales increase for PE firm targets in the two time periods, at both the firm and the firm-category levels. Results at the store level diverge. During the crisis, existing PE products gain share in a given store, even as relative prices increase by 3%, while postcrisis existing PE products do not gain or even lose share relative to likely shelf neighbors as their prices fall by 1%. This evidence suggests that for existing products, PE targets are able to gain market share and sustain (relatively) higher prices in poorer economic conditions.

For product innovation (Panel B), we find that there is more product turnover for PE targets during the crisis. The geographic availability results in Panel C show that expansion to new locations is generally similar during the two periods.

There are two main takeaways from these results. First, PE-driven growth occurs under all economic conditions, including during the financial crisis when capital was scarce. This evidence is consistent with Bernstein, Lerner, and Mezzanotti (2019), who find that during the financial crisis U.K. PE-backed companies decreased investment less and increased market share more compared to control firms. The authors attribute this evidence to the ability of

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Table XI

Mechanisms: During versus After the Financial Crisis

This table presents OLS coefficient estimates from regressions of, in Panel A, log sales, average monthly log prices, and log units sold on *After*, a dummy equal to 1 for the post-PE deal months in which the firm, firm-category, or product-store underwent a PE deal during our sample period. In Panel B, we focus on product innovation and in Panel C, we study geographic availability. The columns "2007-2010" and "2011-2015" include results from PE deals that closed in the respective years. Each cohort is a pair of treated-untreated firms, firm-categories, or product-stores in which the treated unit is matched to an untreated unit using the same methodologies followed in the previous tables. The unit of analysis is unique at the firm-month-cohort, firm-category-month-cohort, or product-store-month-cohort level. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Sales, Pricing, and Units

		2007-2010			2011-2015		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within	Sales	0.589***	(2.98)	15,390	0.255**	(2.01)	16,206
Firm	Average Prices	0.057*	(1.84)	15,390	0.049**	(2.23)	16,206
	Units Sold	0.514***	(2.88)	15,390	0.223*	(1.89)	16,206
Within	Sales	0.206*	(1.98)	99,864	0.215***	(3.20)	124,590
Firm-Category	Average Prices	0.035**	(2.25)	99,864	0.030***	(3.11)	124,590
	Units Sold	0.177*	(1.95)	99,864	0.163**	(2.54)	124,590
Within	Sales	0.045***	(2.68)	465,149,446	−0.021	(−0.73)	415,182,486
Product-Store	Prices	0.031***	(6.04)	465,149,446	−0.011**	(−2.59)	415,182,486
	Units Sold	0.024**	(2.22)	465,149,446	−0.021	(−0.87)	415,182,486

(*Continued*)

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Table XI—*Continued*

		Panel B: Product Innovation					
		2007-2010			2011-2015		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm	Number of Products	0.106*	(1.90)	15,390	0.102**	(2.57)	16,206
	New Products	0.603	(1.59)	15,390	0.220	(1.40)	16,206
	Discontinued Products	0.347	(1.43)	15,390	0.004	(0.02)	16,206
	Number of Categories	0.048	(1.25)	15,390	0.054*	(1.94)	16,206
Within Firm-Category	Number of Products	0.026	(1.35)	99,864	0.024	(1.66)	124,590
	New Products	0.082**	(1.99)	99,864	0.024	(1.34)	124,590
	Discontinued Products	0.087**	(2.14)	99,864	−0.004	(−0.31)	124,590
		Panel C. Geographic Availability					
		2007-2010			2011-2015		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm	Number of Stores	0.308**	(2.50)	15,390	0.153*	(1.82)	16,206
	Number of Chains	0.125**	(2.44)	15,390	0.075**	(2.17)	16,206
	Number of ZIP Codes	0.206**	(2.24)	15,390	0.064	(1.15)	16,206
Within Firm-Category	Number of Stores	0.102	(1.43)	99,864	0.150***	(2.73)	124,590
	Number of Chains	0.050**	(2.20)	99,864	0.053**	(2.11)	124,590
	Number of ZIP Codes	0.079	(1.64)	99,864	0.107**	(2.45)	124,590

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PE firms to raise capital, to assist with operating problems, and to provide strategic guidance. Second, we find that PE strategies change based on general economic conditions. During the crisis, greater innovation and product turnover drive sales, while after the crisis—in better economic times—PE targets are also able to reduce prices on their existing products.

F. Industry Structure

In which industries/product categories are PE firms more successful? We examine (i) a PE target's market power within an industry, (ii) the industry's overall competitiveness and concentration, and (iii) the popularity of an industry among high-income consumers.

Lerner, Sorensen, and Stromberg (2011) document that, following a PE deal, new patent activity becomes more concentrated in "core innovation" areas, that is those with more patenting prior to the PE deal. We similarly examine whether PE targets focus their efforts in product categories in which they are well established or direct attention to categories in which they have smaller presence and more room to grow. In Table XII, Panel A, we repeat our main product-category analyses but split the sample by PE target market share. For each firm-month, we calculate its market share in each product category.[17] A firm's product category is classified as having "high market share" if it is above the median firm market share in that category and as having "low market share" otherwise. Growth in sales and units sold and higher average prices all arise in the product categories in which target firms have higher market share. We also find more product churn—introductions and discontinuations—and higher geographic expansion in these higher-share categories.

We next analyze whether PE strategies vary based on industry concentration. Low-concentration industries are traditionally considered more competitive, but they are also less likely to be dominated by a small number of firms. Do PE-treated firms expand where there are many small sellers and possibly lower barriers to entry? Or do they pursue growth in categories where a few dominant players (e.g., Coke and Pepsi) have the lion's share of the market? For each of the 1,127 product categories each month, we calculate the nationwide Hirfindahl-Hirschman index (HHI) value. Specifically, we compute the revenue market share by firm and then square and sum these squared shares, which results in a value between 0 and 1. Lower HHI values correspond to lower industry concentration. We split categories into those above and below the median HHI each month, which we label "high HHI" and "low HHI", respectively. In Panel B of Table XII, we run our main specifications separately for these two groups. Many of the results are similar across the high versus low HHI categories. A notable difference is that innovation seems to be concentrated in

[17] For example, if in a month, 30 firms nationwide sell green beans, we divide each firm's green bean sales by total green bean sales that month. We then categorize these 30 firms into those that are above or below the median green bean market share.

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Table XII

Mechanism: Industry Structure

This table presents OLS coefficient estimates from regressions of the outcome variables of interest on *After*, a dummy equal to 1 for the post-deal months in which the firm-category underwent a PE deal during our sample period. In Panel A, we split results based on the target firm's market share in the product categories. In Panel B, we separately report results based on the degree of concentration (HHI index) in the product categories. In Panel C, we split the evidence based on the popularity of the product categories among high-end consumers. *Market Share* for each firm is its sales divided by total sales, each month, in a particular category. *High* values of *Market Share* are firms above the median in a category-month. *HHI* is the Herfindahl-Hirschman index of each product category, each month, calculated by squaring and summing the national market shares of each firm in a given category. *High* values of *HHI* are those categories whose *HHI* is above the median that month. Using Nielsen Consumer Panel, for each product category, we compute the average income of the consumers who buy products in the category. *High-Income Consumers* categories are those categories with weighted-average purchaser income above the median income among all categories. Each cohort is a pair of treated-untreated firm-categories in which the treated unit is matched to an untreated unit using the closest distance at the time of the PE deal as described in Table III. The unit of analysis is unique at the firm-category-month-cohort level. The estimation period runs from −24 to +60 months around the PE deal closing date. The regressions are estimated using the fixed-point iteration procedure implemented by Correia (2014). *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Market Share in the Product Category

		High Market Share			Low Market Share		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm-Category	Sales	0.265***	(3.13)	92,712	0.109	(1.39)	98,920
	Average Prices	0.055***	(5.07)	92,712	0.013	(0.97)	98,920
	Units Sold	0.208***	(2.73)	92,712	0.089	(1.23)	98,920
	Number of Products	0.014	(0.80)	92,712	0.043**	(2.57)	98,920
	New Products	0.107**	(2.53)	92,712	0.005	(0.43)	98,920
	Discontinued Products	0.076*	(1.80)	92,712	0.002	(0.26)	98,920
	Number of Stores	0.168***	(3.00)	92,712	0.079	(1.27)	98,920
	Number of Chains	0.087***	(4.29)	92,712	−0.007	(−0.26)	98,920
	Number of ZIP Codes	0.128***	(3.53)	92,712	0.058	(1.21	98,920

(*Continued*)

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Table XII—*Continued*

Panel B. Product Category Concentration

		High HHI			Low HHI		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm-Category	Sales	0.186***	(2.72)	109,800	0.243***	(3.60)	114,490
	Average Prices	0.037***	(3.23)	109,800	0.031***	(3.25)	114,490
	Units Sold	0.152**	(2.41)	109,800	0.193***	(3.14)	114,490
	Number of Products	0.010	(0.71)	109,800	0.037**	(2.47)	114,490
	New Products	0.013	(0.69)	109,800	0.075**	(2.52)	114,490
	Discontinued Products	0.041	(1.42)	109,800	0.020	(1.11)	114,490
	Number of Stores	0.133**	(2.58)	109,800	0.128**	(2.55)	114,490
	Number of Chains	0.041*	(1.89)	109,800	0.066***	(3.10)	114,490
	Number of ZIP Codes	0.106***	(2.73)	109,800	0.087**	(2.36)	114,490

Panel C. Category Popularity Among High-Income Consumers

		High-Income Consumers			Low-Income Consumers		
		After	*t*-Stat	Observations	After	*t*-Stat	Observations
Within Firm-Category	Sales	0.274***	(3.72)	147,044	0.093	(1.28)	77,410
	Average Prices	0.034***	(3.10)	147,044	0.030***	(2.67)	77,410
	Units Sold	0.231***	(3.51)	147,044	0.051	(0.74)	77,410
	Number of Products	0.026*	(1.86)	147,044	0.023	(1.38)	77,410
	New Products	0.063***	(2.84)	147,044	0.020	(0.65)	77,410
	Discontinued Products	0.055**	(2.17)	147,044	−0.008	(−0.39)	77,410
	Number of Stores	0.168***	(3.19)	147,044	0.057	(0.99)	77,410
	Number of Chains	0.070***	(3.63)	147,044	0.017	(0.61)	77,410
	Number of ZIP Codes	0.123***	(3.21)	147,044	0.043	(0.99)	77,410

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low-HHI categories. Here, target firms introduce more new products and have greater variety.

There is growing evidence that over the past decade product introductions have favored high-income consumers (e.g., Argente and Lee (2020) and Jaravel (2018)). Do PE-treated firms concentrate their growth efforts in product categories popular among consumers with higher income? We integrate our retail-scanner data set with the Nielsen Consumer Panel data to address this question. The Consumer Panel Data include a representative panel of households that provide information about their purchases and, critically, demographic information, including their income. We compute the average income of the consumers who buy products in each category. We define a category as "high income" if the average income in the category is above the median income across all categories. In Panel C of Table XII, we separately run our main specifications for high- versus low-income categories. All of our results are stronger, and statistically significant, for the high-income categories.

Overall, the evidence in this section provides insights into where PE finds positive NPV projects. PE firms are more successful when target firms have higher market power and more popularity among high-income consumers. Innovation efforts also appear to be more pronounced in categories with lower concentration and potentially lower barriers to entry. These results complement our previous evidence on PE deal selection (Table IA.V). PE selects categories that are less concentrated and more popular among high-income consumers. In these same categories—as shown in Table XII—PE is able to achieve more innovation and higher growth.

Subsections VI.B to VI.F provide evidence on heterogeneous effects of PE treatment. In Table IA.XIV, we employ multivariate specifications in which we jointly test for the relative importance of all the factors previously analyzed (e.g., private versus public status). In Panel A, we report correlation coefficients between these factors. We find low correlations among all the variables. For example, the correlation between product categories from public firms and from low-SA index (or most financially constrained) firms is −6.9%. All the other correlations range from −20.1% to 7.2%. Consistent with these low correlations, we find that our major findings also hold in these multivariate settings. For example, in Panel B, we document that growth in sales, prices, and units sold are higher for private firms, more financially constrained firms, firms with high market shares, and for targets of growth PE firms. In Panels C and D, we present similar results for product innovation and geographic availability. Taken together, this evidence suggests that the channels previously documented are independently relevant.

G. Company Strategy and Investments

What specific levers do PE firms pull to spur growth? We examine three specific actions: corporate acquisitions, product advertising, and price change frequency. In Table XIII, Panel A, we investigate PE target acquisitiveness postdeal. We collect from Capital IQ all M&A transactions where the buyer is one of the 236 firms in our sample or a matched control firm. We find 651 such

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Table XIII

Mechanism: Company Strategy and Investments

This table presents OLS coefficient estimates from regressions of the outcome variables of interest on *After*, a dummy equal to 1 for the postdeal months in which the firm underwent a PE deal during our sample period. In Panel A, the unit of analysis is unique at the firm-month level. We restrict the sample to firms for which we observe at least one acquisition in Capital IQ. The outcome variable *Acquisitiveness* counts the number of acquisitions closed in a month. In Panel B, the unit of analysis is a firm-year. We restrict the sample to firm-years in which we see at least one month of positive advertising expenditure. The outcome variable is *Advertising Expenditures*, the log of one plus the annualized average monthly advertising expenses for all the brands related to the firm as reported in Ad$pender by Kantar Media. Each cohort is a pair of treated-untreated firms in which the treated unit is matched to an untreated unit using the closest distance at the time of the PE deal as described in Table III. The estimation period runs from −24 to +60 months around the PE deal closing date. In Panel C, the unit of analysis is a product-store-period. A period is either before or after the PE event. The outcome variable is the standard deviation of the price for a product in a specific store during the period. *t*-Statistics are in parentheses and standard errors are double-clustered by firm and month in Panel A and B and clustered by firm in Panel C. The regressions are estimated using the fixed point iteration procedure implemented by Correia (2014). $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Panel A. Acquisitiveness—within Firm

	Full	Target		Time Period	
	Sample	Public	Private	2006-2010	2011-2015
After	0.016***	0.017	0.016***	0.014***	0.018***
	(4.71)	(1.21)	(4.47)	(3.25)	(3.48)
Adjusted R^2	0.107	−0.016	0.112	0.081	0.120
Number of Observations	26,334	1,770	24,564	12,662	13,672
Firm-Cohort FE	Yes	Yes	Yes	Yes	Yes
Date-Cohort FE	Yes	Yes	Yes	Yes	Yes

Panel B: Advertising Expenditures—within Firm

	Full	Target		Time Period	
	Sample	Public	Private	2006-2010	2011-2015
After	0.396**	0.499	0.376*	0.056	0.330
	(2.26)	(1.46)	(1.84)	(0.14)	(1.65)
Adjusted R^2	0.746	0.880	0.721	0.682	0.787
Number of Observations	708	87	621	331	377
Firm-Cohort FE	Yes	Yes	Yes	Yes	Yes
Year-Cohort FE	Yes	Yes	Yes	Yes	Yes

Panel C. Price Adjustments—within Product-Store

After	0.094***	0.039*	0.124***	0.077***
	(3.73)	(1.67)	(3.89)	(3.67)
After × Financial Crisis		0.100**		
		(2.56)		
After × High HHI			−0.062*	
			(−1.74)	
After × High Market Share				0.036
				(0.79)
Adjusted R^2	0.648	0.648	0.648	0.648
Number of Observations	31,427,836	31,427,836	31,427,836	31,427,836
Product-Store-Cohort FE	Yes	Yes	Yes	Yes

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deals that close between two years before to five years after the PE deal, 361 by target firms and 290 by control firms. Our outcome variable is the number of monthly acquisitions closed by the firm. We keep in the sample only those firms that made at least one acquisition in Capital IQ. The regression follows equation (1). We find that target firms do indeed become more active buyers postdeal, increasing the number of acquisitions per month by 0.016, which translates into roughly one additional deal over the next five years. This result holds whether targets are public or private and during or after the financial crisis.

This evidence is consistent with the finding in Davis et al. (2014) that acquisitions are a driver of growth in PE deals. We thus further study the extent to which external growth drives our results. This is an important test, because we can investigate if PE firms simply redraw target firm boundaries or if they generate new products and markets. Creation is arguably better for society than reshuffling product property rights. We describe this analysis in detail in Internet Appendix Section III and present the results in Tables IA.IX and IA.X. Although acquisitions clearly drive some growth, we still find economically and statistically significant growth for nonacquisitive firms. That said, external acquisitions do play an important role in our results and thus temper the potential positive social welfare interpretation of the growth originating from PE deals.

Another channel through which firms can achieve sales growth is investing in advertising. We compile data from Ad$pender by Kantar Media, which records the dollar value of monthly advertising expenses for over three million brands across 18 major communication media (e.g., television, magazines, radio, newspapers). Ad$pender aggregates these brands to the firm level. The data reported by Kantar Media are sparse with many missing observations. To smooth the data, we take the average monthly advertising expenditure when reported and annualize it. We keep only firm-year data for which advertising expenditure is reported for at least one month of the year. We are able to identify monthly spending for 203 out of our 236 treated firms. We then run a generalized diff-in-diff regression between the treated firms and the matched control firms, where the dependent variable is the log of one plus the annualized monthly advertising expenditure. We report these results in Panel B of Table XIII. After the deals, treated firms increase advertising expenses by roughly 49% compared to their matched control firms. This result is similar across public and private firms, and it is stronger in the years following the financial crisis (2011 to 2015).

Finally, we examine whether PE targets more actively manage prices and hence increase the price volatility of their products postdeals. Price dispersion could increase because of changes in pricing strategies of existing products or because of changes to the product mix or geographic availability. To isolate the effects on individual UPCs, we conduct our analysis at the product-store level. For each product in each store, we compute the standard deviation of prices during the two years before the PE deal, and we compare it to the standard deviation of prices during the five years after the deal. We present these results

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in Panel C of Table XIII. Compared to matched products sold in the same store-category, prices of target firms' products display a higher standard deviation postdeal. Specifically, postdeal price dispersion increases by 9.4 cents or 13% of the unconditional standard deviation of prices before the deal.

We next study if this price dispersion varies based on economic conditions or product-category characteristics. First, the standard deviation of prices is higher for products in deals completed during the Great Recession versus deals completed afterwards. The interaction term between our diff-in-diff coefficient and an indicator variable equal to 1 for deals completed in the 2007 to 2010 period is positive and highly statistically significant. This evidence suggests that PE firms try to more actively adjust prices under bad economic conditions. Second, price dispersion is higher for products in low-HHI industries. This result is consistent with our previous evidence in Table XII that target firms grow faster in low-HHI product categories with lower barriers to entry. Finally, price dispersion is not different—at conventional statistical significance levels—in high- versus low-market share product categories. With the caveat that we do not observe how prices are negotiated between retailers and producers (the target firms in our study), our evidence seems to suggest that postdeal target firms are more active in setting prices.

To summarize, PE target firms are more likely to acquire other firms, ramp up advertising, and more frequently adjust prices following deals. Consistent with our previous evidence, these results suggest that PE firms provide both managerial expertise and financial resources to spur target firm growth. While we cannot comment on their cost-benefit trade-offs, these activities are concrete examples of changes to target firm strategy implemented after the deal.

H. Nonprivate Equity Ownership Changes

Are the changes that follow PE deals unique to PE buyers, or do acquisitions by operating firms have the same effect? To test whether non-PE acquisitions also lead to growth, we repeat our main analyses on sales and prices, product innovation, and geographic availability, replacing PE firms' targets with merger targets.

We collect from Capital IQ all of the target firms of M&A deals during our sample period. Repeating our process for PE targets, we match these firms first with the GS1 database and then with the Nielsen data. Our final sample of M&A targets consists of 126 firms. For each M&A target firm, we find the closest match using the process described in Section III.B.

Table IA.VIII mimics Tables III, IV, and V, examining what happens to targets following an acquisition by an operating firm. The results in this setting are quite different compared to PE deals. Most coefficients on the *After* variable are not significantly different from zero.

In stark contrast to PE deals, operational M&As do not seem to lead to growth in our sample. Some M&A deals could reduce competition. For example, Cunningham, Ederer, and Ma (2021) find that pharmaceutical firms discontinue acquired drugs that directly compete with their existing products. One caveat in interpreting these results is that some of the growth prospects

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that the target would have pursued as a stand-alone firm could instead be implemented under the acquiring firm brand names. Nevertheless, these results suggest that it is PE firms specifically—not any change in ownership—that spurs growth.

VII. Conclusion

PE deals often elicit strong negative reactions. A common view is that PE firms try to increase corporate profitability by laying off workers and increasing prices, hurting stakeholders such as workers and consumers. PE is undoubtedly exercising a growing influence on consumer products and the purchases of millions of people. Using price and sales data for nearly two million unique UPCs sold in over 41,000 stores, we formally investigate the effects of PE firms on consumer products.

Retail scanner data have several nice features. First, we are able to study the evolution of pricing strategies, product innovation, and geographic availability following a deal. Second, we can more precisely identify treated units and their counterfactuals in our empirical analyses. In our diff-in-diff estimations, we analyze firms but also decompose them into product categories and products sold within a particular store. This granularity helps curtail—although it does not fully eliminate—the concern that PE firms might simply select units that are poised to grow faster. Ultimately, the better our conterfactuals, the more credibly we can interpret our results as due to PE firm treatment rather than selection. Finally, thanks to the geographic richness of the data, we can investigate how competitors react by comparing price changes in locations with and without a brand acquired by PE firms.

Contrary to critics' view, we find that target firms raise prices only marginally. Compared to similar products sold in the same store, target firms raise prices by about 1.0% in the five years following the deal. Competitors respond by also marginally raising prices, by roughly 0.4%, but only in those stores where they face direct PE competition. Despite the marginal increase in the price of existing products, target firms experience a significant increase in sales of about 50% in the years postdeal. Compared to matched firms, target firms launch more products, expand more geographically, and enter more retail chains.

To identify how PE firms might spur this growth, we explore heterogeneity in target firms, PE firms, economic environments, and product categories. Growth is stronger for private, small, and young targets, firms that likely demand more access to capital and management expertise. PE firms' product strategies vary with the economic environment; there is more product turnover during the financial crisis, while normal times see lower prices on existing products. PE firms are particularly successful in product categories in which they hold a strong position in a fragmented market and in categories popular among high-income consumers. Target firms become more acquisitive following PE deals, but organic growth is also meaningful. Last, target firms more aggressively advertise and adjust prices. Collectively, these results suggest that PE firms

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spur growth by both alleviating financial constraints and providing managerial expertise.

Overall, our evidence in consumer product markets does not support the traditional view of PE firms relying largely on "cut to the bone" strategies. Rather, we document a large increase in product offerings and geographic availability. While other studies document that consumers value increased product variety and availability (Lancaster (1990), Kahn and Lehmann (1991), Petrin (2002), Brynjolfsson, Hu, and Smith (2003), Broda and Weinstein (2006)), investigating whether PE firms increase consumer welfare is beyond the scope of this paper.

Our findings are limited to one "industry" and may not necessarily generalize outside the consumer product space. Nonetheless, this industry is highly visible in the day-to-day lives of consumers and plays an important role in popular and media perceptions of PE firms.

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