The Going Public Decision, Initial Public Offerings, and Product Market Dynamics: Evidence from Nielsen Retail Scanner Data

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Abstract

Going public is one of the most important events in the life of private firms, especially due to the large infusion of cash on favorable terms associated with their Initial Public Offerings (IPOs) and the ability to raise further financing through subsequent sales of equity and publicly traded debt. In this paper, we use the Nielsen Retail Scanner database in conjunction with several other databases to analyze how going public affects the product market behavior of newly public firms (in terms of their product pricing, competitive strategy, advertising, and human capital accumulation), and develop implications for the accounting underperformance of these firms following their IPOs. First, we analyze how going public affects firms' product portfolios and pricing: we find that, after going public, these firms raise product prices on average, and are able to increase their overall sales and expand the geographic availability of their products, while keeping the size of their overall product portfolios roughly unchanged. Second, we analyze how firms' competitive behaviors with respect to other firms in their industry change upon going public, and study whether, after going public, firms are able to grab market share from other firms in their industry that remain private. Third, we analyze how going public affects these firms' product market advertising strategy. Fourth, we analyze whether firms are able to hire more and higher-quality employees, thus upgrading their firms' human capital after going public. Finally, we analyze whether product market performance changes after going public are an important factor driving the well-documented accounting (operating) underperformance of firms following their IPOs. We establish causality through a difference-in-differences analysis around firms' IPOs (using firms remaining private as the control group).

Keywords: Going Public; IPOs; Product Market Competition; Advertising; Human Capital

JEL classification: G32, L11, P42

1 Introduction

Going public is a big financial milestone for all firms, especially for their initial investors, employees, and executives. In particular, an IPO involves the biggest infusion of cash into the firm, usually on much favorable terms and in a much larger quantity, compared to prior infusions of cash from venture capitalists, angels, or other private equity investors while the firm remains private. Unfortunately, with some notable exceptions that we will discuss later, little is known about how the large infusion of cash that usually characterizes a firm's IPO affects its product market behavior relative to the situation where the firm remains private. The objective of this paper is to remedy this gap into the literature.

To identify and characterize firms product market decisions, we construct a novel dataset based on the Nielsen Retail Scanner Database from Kilts Center for Marketing of Chicago Booth. The Nielsen Retail Scanner Database contains a variety of information about a firm's product market, including product prices, sales, geographic availability, product advertising expenditures, etc. While the existing IPO literature mostly focuses on financial and accounting metrics and stock returns to measure a firm's post-IPO performance, we are able to look at the firm's product market decisions and performance using our novel dataset. This dataset runs between 2006 and 2019 and covers product market data for 98 firms filing for IPOs during this time frame. We complement the above database by matching with a number of other important databases. The first is the trademark database of USPTO (United States Patent and Trademark Office). The second is the NETS database, which allows us access to the employment data of private and public firms not available in our Nielsen Database. The third is the Revelio Labs database, which allows us to study the employment profile of a firm's employees before and after it goes public, thus allowing us to assess changes in the human capital of a firm from before to after it goes public. Finally, we match our data to Compustat, which allows us to analyze the profitability and other variables of firms subsequent to their IPO.

We test a number of novel hypotheses using the above dataset. Our first set of hypotheses

deals with firm's product market and pricing strategy after a firm goes public. Does the firm try to increase sales by cutting down or expanding its existing product line? Does it increase product prices (assuming it has the pricing power to do so) or decrease product prices? Our second set of hypotheses deals with how a firm deals with product market competition differently after it goes public. Is the firm able to grab market share from its competitors subsequent to going public (especially from firms remaining private) making use of the large infusion of money associated with an IPO? Further, what is the mechanism through which the firm attempts to grab market share after going public: does it increase its product market advertising after IPO relative to the extent of its advertising while the firm remained private? Our third set of hypotheses deals with how going public affects the firm's employee pool. Does the firm's employment increase substantially in the years immediately after it goes public relative to the situation where it remained private? Further, does the quality of its pool of employees (human capital) increase after its IPO, measured in terms of their education and experience? Our final set of hypotheses deals with the post-IPO operating underperformance of firms going public, and which has often been attributed to "creative accounting" by these firms prior to their IPO: see, e.g., Teoh et al. (1998). We test whether such operating (accounting) underperformance of firms going public is related to their post-IPO product market performance: is operating underperformance driven at least partially by poor product market performance by a subset of firms going public?

First, we compare firm's product market decisions two years before and five years after their IPOs at the firm level. Overall, we find that firms keep their product offerings mostly the same, but increase prices and their geographic footprints. This increase in prices, combined with firms selling more of their products, leads to dramatically higher sales of firms on average after their IPOs. However, this increase in prices and geographic footprints (and hence higher sales) could be due to firms changing their existing product lines or introducing new product lines.

Therefore, we redo the analysis within product modules that were around prior to the

IPOs, since firm-module level analysis provides us insight into what happened within those existing product lines.[1] Surprisingly, we find that, after going public, firms decrease their number of products and their geographical footprints. In addition, even though the average prices of products within firms' existing modules do not change after IPO compared to before, we document a significant drop in the sales in firms' existing modules post IPO, which is mainly driven by the decrease in the number of products sold. Together with the earlier evidence, this suggests that firms' existing product lines perform poorly in the product market after IPO and the overall post-IPO increase in sales is driven by the performance of new product offerings.

After developing these baseline results, we explore the heterogeneous effect of firms' going public decisions in our cross-sectional analysis. In particular, we study several mechanisms through which the firms' going public decision may affect their product market dynamics. First, because a significant part of the company is sold, the incentives of the existing CEO may not be entirely aligned with their investors. Thus, we may expect different product market strategies of firms that retained more equity post-IPO from those that retained less equity. By splitting our sample into two groups based on the fraction of shares retained by pre-IPO shareholders, we find the aforementioned patterns for the high-ownership group but not for the low-ownership group. Second, the level of competitiveness within a product module may impact a firm's product market strategies before and after its IPO. Firms in more competitive markets may need to more constantly innovate and adapt. We find that, within each product line, firms with a larger market share are more likely to engage in "exploratory" product market strategy (i.e., introducing new products and expanding to different locations) and shift their product portfolio mix to novel product lines. We find similar results for firms in product lines with lower market concentration (as measured by the low Herfindahl-Hirschman Index, or HHI).

Overall, in the five years after their IPOs, firms adopt an exploratory product market

[1] We follow the definition in the Nielsen Retail Scanner dataset. Each module represents a specific product line. We use the word "product module" and "product line" interchangeably throughout this paper.

strategy by shifting their existing modules to more novel and profitable product lines, and by expanding their product offerings to more geographical locations. This shift is associated with firms replacing the existing products in their product portfolio mix with new ones at least to some extent. Thus, our results support the relaxation of financial constraints hypothesis, which predicts that firms are likely to adopt a more exploratory product market strategy post IPOs than before. Through the IPOs, firms can access the public equity market and obtain external financing at a lower cost compared to when they are staying private. More importantly, IPOs clear the way for firms' subsequent equity offerings. Therefore, this hypothesis suggests that IPOs ease the firms' financial constraints and allow them to introduce new products and expand to new geographical locations.

While we have completed our empirical analysis of the product market and pricing strategy (Hypotheses 1), we are in the process of completing the rest of our empirical analysis. Thus, we are currently in the process of completing our analysis of Hypotheses 2 and 3 (on how a firm's interactions with competitors in the product market change after it goes public), of Hypothesis 4 (on how a firm's product market advertising changes from before to after going public), of Hypothesis 5 (on how a firm's human capital changes from before to after going public), and Hypothesis 6 (on how a firm's operating or accounting underperformance after IPO is related to its product market performance after IPO and changes in such performance from before to after IPO).

There may be several concerns related to our study. The first concern may be that our sample of firms with product market data is not representative of the overall mix of public firms, and thus one may worry about the external validity of these results. However, this may not a big concern since the IPO firms in our sample look identical to other public firms across most financial dimensions. The second possible concern is that there may exist some unobservable underlying forces rather than going public that drive our baseline results. If this were indeed the case, we would expect to find similar patterns if firms went public one or two years before they actually do. Therefore, to address this concern, we conduct

a falsification (placebo) test where we falsely assume a firm filed for IPO one or two years before the actual year of its going public. We find insignificant results in this placebo test for almost all product market dimensions, implying that our results are more likely to be driven by going public itself, as opposed to some unobservable forces.

The rest of this paper is organized as follows. Section 2 discusses how our paper is related to two existing literature and our contribution with respect to this literature. Section 3 discusses the underlying theory and develops testable hypotheses. Section 4 describes the datasets we use in this paper and our sample selection procedures. Section 5 presents our empirical tests and results. Section 6 examines the possible mechanisms driving our main empirical results. Section 7 presents a falsification (placebo) test of our empirical analyses to establish the robustness of our results. Section 8 discusses some further research to be undertaken and concludes.

2 Relation to the Existing Literature

Our paper contributes to several strands of literature. The first strand of literature to which our paper is related is on the relationship between IPOs and firm performance. A large extant literature focuses on the implications of IPOs for firms' post-IPO performance (Jain and Kini (1994), Pástor et al. (2009), Chemmanur et al. (2010), Aslan and Kumar (2011), Bernstein (2015), and Babina et al. (2020)). However, due to the availability of detailed data on firms' product market characteristics, the research on firms' product market dynamics around their IPO is scarce. There are two papers closely related to our study. The first paper is Chemmanur et al. (2010). They document that the dynamics of total factor productivity (TFP) and sales growth exhibit an inverted U-shaped pattern, which reach their peaks in the year of firms going public. They further show that firms' sales and capital expenditures increase consistently over the years before and after the IPOs. The second paper closely related to ours is Wies and Moorman (2015). They study the impact of stock market listing

on firm innovation behavior by employing a sample of consumer packaged goods firms. They find that IPOs affect both the level and riskiness of firms' innovation. They document that after going public, firms innovate at higher levels and introduce more variety, but the riskiness of firms' innovation decreases.

Our paper distinguishes itself from the above strand of literature in several important aspects. First, our paper utilizes a novel and comprehensive product market dataset. It includes the price of products, the quantity sold, different product lines, geographic footprints of firms selling their products, and product portfolio mix, among other variables. This granular dataset can provide more insights into different levels of firms' product market dynamics, while the existing studies focus on overall firm-level performance metrics. Second, we focus on the product market dynamics within IPO firms. A large body of this strand of literature compares firm-level outcomes between private and public firms (e.g., Chemmanur et al. (2010) and Gao et al. (2018)). By focusing exclusively on the sample of IPO firms, we eliminate unobservables affecting firms' product market performance that at the same time drive their going-public decision.

Second, this paper contributes to a growing body of literature on the broader product market. Levitt et al. (1965) and Argente et al. (2019) document that firms' revenue growth crucially depends on either developing current product lines or introducing novel products. Product creation and destruction also plays an important part in explaining firms' business cycle fluctuations and long-run growth (e.g., Shleifer (1986), Caballero and Hammour (1996), Broda and Weinstein (2010), and Argente et al. (2019)). At the firm level, capital investment and product introductions act as complements, and product dynamics induce stronger precautionary savings motives (Hajda and Nikolov (2020)). While we also contribute to this broader product market literature, our paper is different from these papers in that we look at within-firm evidence and see how IPO, an important milestone in a firm's life cycle, affects the firm's product market performance.

Third, our paper also contributes to the agency literature that studies the impact of

manager and shareholder conflicts on firms' performance and the literature on corporate myopia. Myopic behavior is defined as sacrificing long-term growth for the purpose of meeting short-term goals (Porter (1992)). Takeover pressure can be damaging because it leads managers to sacrifice long-term interests in order to boost current profits (Stein (1988)). Firms can be under the pressure of transient investors and need to meet short-term goals at the expense of long-term investments (e.g., Bushee (1998)). Also, since managers' incentives may not be completely in line with shareholders', managers are more likely to engage in conservative strategies to safeguard their careers: see, e.g., Holmstrom (1982), Aghion et al. (2013), Bernstein (2015), and Bertrand and Mullainathan (2003). We develop one of our testable hypotheses relying on the theoretical agency and corporate myopia literature.

Finally, our paper is related to the large theoretical and empirical literature on the going public decision. Chemmanur and Fulghieri (1999) develop a theoretical model of a firm's going public decision in an environment of asymmetric information. Clementi (2002) develops a theory of firms' going public decision based on product market considerations, and how going public affects firms' subsequent product market performance. Chemmanur and Yan (2009) analyze, theoretically and empirically, how the product market advertising by firms around their IPOs affects the extent of their IPO underpricing. Finally, Chemmanur and He (2011) study, theoretically and empirically, how going public affects a firm's competitive behavior in the product market, and how this can lead to the formation of IPO waves. Some of our testable hypotheses are related to the above theoretical literature on the going public decision.[2]

[2]The large theoretical and empirical literature on IPO underpricing (and IPOs in general) is also related to our paper: see Allen and Faulhaber (1989) and Chemmanur (1993) for examples of the theoretical literature, and Ritter and Welch (2002) for an excellent review of the empirical literature.

3 Theory and Hypotheses

3.1 The Agency and Corporate Myopia Hypothesis

Agency problems are long existing in public firms due to the separation of the ownership and control. So, manager's incentives may not be in line with shareholder's benefits. Thus, the agency conflicts between the owner-manager and outside shareholders as deriving from the manager's tendency to appropriate perquisites out of the firm's resources for his own consumption ("perk" consumption), see, e.g., Jensen and Meckling (1976). As a result, managers are less likely to pursue high-risk product market strategies. This implies that managers will adopt exploitative innovation, which is built on the existing knowledge, and its payoffs are realized faster with less uncertainty (Gao et al. (2018)). This section discusses two hypotheses based on the agency problems and corporate myopia that drive the managers to adopt exploitative innovation. One is the career concern hypothesis; another is the managerial myopia hypothesis.

First, we discuss the career concern hypothesis (Holmstrom (1982), Aghion et al. (2013), Bernstein (2015)). Employing exploratory product market strategies is a risker strategy since it requires new resources and large R&D expenditure. If the new product fails, shareholders may blame managers, which may cause them to be fired. Therefore, managers have incentives to pursue more conservative product strategies. This is also consistent with the quiet life hypothesis (Bertrand and Mullainathan (2003), Bernstein (2015)), which suggests that instead of empire building managers may prefer to enjoy the quiet life.

A related hypothesis is the managerial myopia hypothesis. Managers have incentives to take on short-term projects to boost current earnings at the expense of forgoing long-run investments (e.g., Stein (1989), (Porter (1992))). They also face pressure from investors to meet short-term goals (Bushee (1998))). As discussed before, exploitative product strategies focus on the firm's existing resources and products.

Overall, agency theory in our going public setting predicts that firms are more likely to

adopt an exploitative (more conservative) product market strategy after their IPOs. Specifically, firms are more likely to develop their existing product lines post IPOs. This can take the form of enlarging their current product portfolios in the product lines that exist prior to their IPOs, without developing new products. Further, firms are less likely to expand their existing products to more geographical locations. This leads to the following testable hypothesis:

Hypothesis 1a: Firms are more likely to adopt an exploitative (i.e. more conservative) product market strategy after their IPOs than when they were private firms.

3.2 The Relaxation of Financial Constraints Hypothesis

Compared to public firms, private firms are more likely to face certain financial constraints. (Kerr and Nanda (2009)). Having limited access to credit is likely to discourage private firms' risk-taking corporate strategy, which could be detrimental to firms' long-term growth (Beck et al. (2005)). Brav (2009) documents that private firms in UK rely heavily on debt financing and take on higher leverage than their public counterparts. The nature of debt financing oftentimes does not leave enough room for firms' product experimentation. On the other hand, the private equity financing commonly seen in spurring entrepreneurship (e.g., angel financing or venture capital financing) usually comes with terms unfavorable to entrepreneurs (Chemmanur and Fulghieri (1999) and Ewens et al. (2021)). This is mostly due to the information asymmetry that exists between the private firm insiders and the outside investors, which makes external financing relatively expensive.

Under the relaxation of financial constraints hypothesis, after going public, firms immediately receive the IPO proceeds and have access to the public capital market, which builds up a cash cushion for their future investments and exploratory (more aggressive) product market strategy. More importantly, IPOs pave the way for firms' subsequent seasoned offerings, making it easier for firms to obtain external financing. Therefore, this hypothesis predicts that firms are more likely to develop novel product lines and introduce new prod-

ucts in these categories post IPOs. Further, to develop their new product lines, firms are more likely to expand their new products to more geographical locations. This leads to the following testable hypothesis:

Hypothesis 1b: Firms are more likely to adopt an exploratory product market strategy (i.e., involving the development of new products) after their IPOs than when they were pricate firms.

Examining which theory is more prevalent in driving firms' product market dynamics around their IPOs is thus an empirical question. Accordingly, our first set of empirical tests focus on the aforementioned two alternative hypotheses. In addition, we conduct cross-sectional tests to analyze the mechanisms driving the product market strategy of these IPO firms. In particular, we examine differences in the portion of shares retained by pre-IPO shareholders (Jain and Kini (1994)), market share in a certain industry (Chemmanur et al. (2010), Spiegel and Tookes (2008)), and market concentration in a particular industry and study how they drive firms' product market dynamics around IPOs.

3.3 The Product Market Competition and Advertising Hypothesis

Chemmanur and He (2011) argue that firms may use the money they generate from their IPOs to compete better in the product market and grab market share from competitors, especially from those firms in their industry that remain private. This brings us to our next two testable hypotheses:

Hypothesis 2: Firms that go public will be able to increase their market share relative to the situation when they were operating as private firms.

Hypothesis 3: Firms remaining private while their competitors in the same industry go public will be associated with a significant reduction in their market share.

One interesting question associated with product market competition between new public

firms and those firms remaining private in the same industry is the following: If firms going public indeed are able to grab market share from competitors, what is the mechanism through which newly public firms are able to accomplish this? One mechanism through which they may be able to accomplish this is through increased product market advertising. This brings us to our next testable hypothesis:

Hypothesis 4: Firms going public will significantly increase firms' product market advertising in the years immediately after IPO compared to the years immediately before their IPOs when they were operating as private firms.

3.4 The Human Capital Hypothesis

As discussed earlier, one implication of a firm going public (having an IPO) is the availability of plentiful new capital on cheaper terms than when the firm was private. This means that the firm can hire a large number and more high quality employees immediately post-IPO compared to the situation when it was a private firm. Such employees can, in turn, help the firm develop new products and thereby increase its overall sales post-IPO. This leads us to our next testable hypothesis:

Hypothesis 5: Firms are likely to hire a large number of employees and also higher quality employees immediately after their IPOs compared to their workforce when they were operating as private firms.

3.5 The Post-IPO Operating Underperformance Hypothesis

A large literature has examined the operating (i.e., accounting) underperformance of firms starting immediately after they go public, see, e.g., Jain and Kini (1994) and Mikkelson et al. (1997). Much of this literature has attributed this underperformance to creative accounting or earnings management by firms prior to going public by advancing the recognition of revenues or by delaying the recognition of expenses, thereby showing superior earnings immediately prior to their IPOs: see, e.g., Teoh et al. (1998).

Our product market data allows us to explore whether or not such operating underperformance is related to product market underperformance. This leads us to our next testable hypothesis:

Hypothesis 6: The operating underperformance of firms going public after going public will be negatively related to their product market performance post-IPO (as measured by sales, product unit volume, etc.).

4 Data and Sample Selection

4.1 Product Market Data

We use the Nielsen Retail Scanner Dataset to capture firms' product market activities.[3] This dataset contains all purchases made at participating grocery, drug, mass merchandiser, and other stores in the U.S. from January 2006 to December 2019. This dataset has a broad coverage. Specifically, it includes information on sales at 60,600 stores from 139 retail chains among 883 three-digit ZIP code areas and 49 U.S. states. Nielsen Retail Scanner Dataset traces weekly average prices and quantities sold of each product at each participating store for more than 2 million unique consumer goods. Table 1 presents summary statistics for the Nielsen Retail Scanner data used in our study.

[Insert Table 1 here.]

The unit of observation in the Nielsen Retail Scanner dataset is an individual product. In this dataset, each product is uniquely identified by a Universal Product Code (UPC). The UPC is a 12-digit number usually seen underneath a barcode on a product.[4] Firms apply for

[3]This dataset is provided by the Kilts Center for Marketing at the University of Chicago Booth School of Business. The detailed introduction to this dataset is available at https://www.chicagobooth.edu/research/kilts/datasets/nielsenIQ-nielsen.

[4]When a good produced by a certain firm is sold in a participating store, the barcode is scanned, and the related UPC is reported back to Nielsen, which can then uniquely track the quantity and price of the good sold.

different UPCs to be used on their products in the first place. The applications for UPCs are then processed, approved, and managed by GS1, a non-profit organization that develops and maintains global standards for business communication. We exclude UPCs marked as "Private Label" goods, since the information about the firms to which these products belong is hid by Nielsen to protect the identity of these firms and thus cannot be traced.

After we obtain a list of all the UPCs present in the Nielsen Retail Scanner dataset, we match these UPCs to the parent firms which manufacture and sell them. The linking key we are using is the first 5 to 11 digits of the UPCs, also known as the company prefix (GCP code). We obtain all the GCP codes from the GS1 Company Database (GEPIR) provided by the Product Open Data (POD) and merge them with the original UPCs. The POD also provides us with the name and address associated with each GCP code. Later we use this information to merge with the IPO dataset. Overall, we successfully identify 3,768,901 unique UPCs in the Nielsen Retail Scanner Dataset with 62,387 parent firms.[5] For each UPC, Nielsen provides the data on its average pricing and quantity sold in a particular store in a given week. We aggregate these numbers to monthly level for our main analysis, since this allows us to better handle the data and smooth out any consumption pattern.[6] For quantity of a UPC sold in a given month, we add up the quantity of that UPC sold in all stores in that month. For average pricing, we employ two approaches for aggregation. The first approach is to calculate the total sale of this UPC in all stores in a given month, and then divide it by the total quantity sold to obtain the average price. The second approach is to use sale-weighted average price, where the weights are calculated as the sale of this UPC in a particular store divided by the total sale of this UPC in a given month.[7]

Table 2 provides an example of the hierarchy of the Nielsen Retail Scanner Dataset. Each

[5]Overall, there are 4,547,517 unique UPCs in the Nielsen Retail Scanner Dataset as of December 2019. So the match rate of our study is approximately 83% (i.e., 3,768,901/4,547,517). This is comparable to other studies using this dataset (e.g., Hajda and Nikolov (2020) and Fracassi et al. (2020)).

[6]For example, the quantity sold and thus the total sale are usually higher in the week of the Christmas than other contiguous weeks.

[7]We utilize the first approach to calculate the average price used in our empirical analysis. But the results are quantitatively similar if we use the other measure.

UPC is classified into one of the 1,311 product modules, which is nested under one of the 117 product groups. Each product group is then categorized into one of the 10 departments. For example, a product with UPC number 067497154005 is first classified as fresh-baked cakes (product module), which belongs to the "Bread and Baked Goods" product group. This product group is further nested under the "Dry Grocery" department. Note that this product is different from the product with UPC 007016397592 in that these two products are classified into different modules, even though both modules belong to the same product group and department. In this paper, we use the term "product module" and "product line" interchangeably. Given the granularity of data provided by Nielsen, we can examine firms' product market decisions on different levels. In addition, Nielsen provides us with the information about the geographical locations of different stores. We collect data on the 3-digit ZIP codes, counties, Designated Market Areas (DMAs), and states of various stores where products are sold.[8]

[Insert Table 2 here.]

4.2 IPO Data

The data on firms filing for IPOs comes from two sources: Form S-1 and firms' prospectuses. Before conducting an IPO, a company need to file a registration statement with the SEC (usually the Form S-1), as required by the Securities Act. We obtain the filing date of Form S-1 of firms. Subsequently, at the time of going public, firms file an additional form (usually the form 424B2), usually known as the prospectus. These forms are accessible from the SEC EDGAR Database. In the prospectus, a firm will provide information on, including but not limited to, the initial offer price of its stock, number of shares it offers to the outside investors (including the over-allotment option), the IPO deal size, and firms' fundamentals

[8] According to Nielsen, a DMA region is a group of counties and zip codes that form an exclusive geographic area in which the home market television stations hold a dominance of total hours viewed. For more information, see https://www.nielsen.com/us/en/contact-us/intl-campaigns/dma-maps/

prior to IPO. Some firms in our sample did not file the prospectus. Instead, they provide such information in their S-1 forms. Therefore, we collect the aforementioned data mainly from firms' prospectuses supplemented with data from S-1 forms. Further, since the Nielsen Retail Scanner Dataset contains retail data spanning from 2006 to 2019, we retrieve data on firms filing for IPOs during the same period from the SEC EDGAR. Following the existing literature, we exclude the IPO filings of closed-end mutual funds, unit issues, American Depositary Receipt (ADRs), corporate spin-offs, and financial firms. After we obtain the sample of firms conducting IPOs, we merge this sample with the Nielsen Retail Scanner to determine which firms in Nielsen dataset went public between 2006 and 2019. We discuss the matching procedure in the next sub-section.

To better understand the mechanisms through which IPO affects product market dynamics, in the cross-sectional tests in section 5.1, we separate the firms into two groups based on the equity ownership retained by the firm insiders (as well as some other variables). Here we discuss how we measure the equity ownership based on the data we collect from the SEC EDGAR. Following the definition of SDC Platinum Database, we calculate the variable *DEAL_PCT_MKT* as the IPO deal size divided by the market value of a company's total outstanding shares. The equity ownership retained by the pre-IPO shareholders is hence defined as one minus *DEAL_PCT_MKT*. Therefore, the lower percentage of shares firms float when they file for IPOs, the higher equity ownership they retain for pre-IPO shareholders. Specifically, we calculate the variable *DEAL_PCT_MKT* and the equity ownership as follows:

$$\text{DEAL_PCT_MKT}_i = \frac{\text{Principal Amount include Overallotment Sold}_i}{\text{Market Value after Offer from Prospectus}_i} \tag{1}$$

$$\text{EQ_OWNERSHIP}_i = 1 - \text{DEAL_PCT_MKT}_i \tag{2}$$

where the Market Value after Offer from Prospectus (i.e., the denominator in equation (1)) is equal to the product of offer price of firm i's stock and firm i's number of shares outstanding

after its IPO.

4.3 Matching Procedure and Overall Sample

After obtaining the sample of IPO firms spanning from 2006 to 2019, we merge this sample with the sample of firms in the Nielsen Retail Scanner Dataset to determine which firm in the Nielsen Dataset went public during this period. However, since firms' names could appear differently in two datasets (for example, a firm could have the suffix "Corporation" in the IPO sample but at the same time have the suffix "Corp" in Nielsen Dataset), we use the following algorithms to facilitate the matching procedure.

We use the name-standardization algorithm provided by the NBER Patent Data Project and the Python package "fuzzymatcher" to perform the matching.[9] To begin with, we merge two sample of firms based on their original names. Second, for those unmatched firms, we use the NBER name-standardization algorithm to remove the punctuation, standardize the suffix (e.g., changing both "Corporation" and "Corp" into "CORP"), and capitalize the names. We then conduct another round of matching based on these standardized firm names. Third, for those firms remaining unmatched, we again use the name-standardization algorithm to create stemmed names (e.g., keeping the main body of a name and removing its suffix) and merge two samples based on the stemmed names. Lastly, we use the Python package "fuzzymatcher" to conduct the last-round matching. This algorithm forms all pairwise combinations of every firm between two samples and then selects the firm pair with the highest fuzzy-name-matching score as a potential match. We manually check the matched sample provided by this algorithm based on information from Google, Capital IQ and Nexis Uni. As a result, we identify 98 IPO firms that appear in the Nielsen Retail Scanner Dataset during 2006 and 2019. This leads to 67,660 firm-product-year observations in our final sample.

To examine if our sample is representative, we compare some fundamentals of firms in our

[9]For detailed descriptions of the NBER name-standardization algorithm, please see the name standardization routines (https://sites.google.com/site/patentdataproject/Home/posts/namestandardizationroutinesuploaded) provided by Jim Bessen.

sample with that of Compustat firms going public during the same period (i.e., from 2006 to 2019). We collect data on firms' fundamentals and construct several firm-level variables in the year of firms going public.

[Insert Table 3 here.]

Table 3 shows the univariate comparison of these variables between firms in our sample and other Compustat firms. In terms of leverage, as captured by two variables total debt/market value of assets and total debt/assets, there is no significant difference between two groups of firms at 10% level, indicating two groups of firms have similar capital structure. Next, we examine the difference in profitability between two groups of firms as measured by the operating income before depreciation (OIBDP)/assets. Firms in our IPO sample have a higher profitability than other Compustat firms, even though they both incur some losses in the year of going public on average (as illustrated by the negative figures). The difference in profitability between two groups is significant at 5% level. In addition, firms in our IPO sample tend to be larger in size (as measured by higher log assets) and invest less in capital expenditure (as measured by lower capital expenditure/assets) than counterpart firms on average. However, in terms of the asset tangibility, R&D expenditure, and market-to-book ratio, two samples of firms are similar. The differences between these variables for two groups of firms are all insignificant from zero.

To sum up, since the firms in our sample are mainly in the consumer staples and retail sectors, it is reasonable that our sample firms have higher profitability, are larger in size, and invest less in capital expenditure than counterpart public firms at the time of going public. But these two groups of firms are similar in other dimensions. Therefore, our empirical results can have certain implications for other public firms.

5 Empirical Evidence

5.1 Baseline Specification

To examine the firms' product market dynamics around IPOs, we focus on firms that file for going public during the sample period and compare their product market strategies following the transition from private to public. The baseline specification is:

$$Y_{i,t} = \alpha + \beta IPO_{i,t} + \delta' X_{i,t} + \eta_i + \eta_t + \epsilon_{i,t} \tag{3}$$

where $Y_{i,t}$ represents several dimensions of product market dynamics (i.e., product release, pricing strategy, and geographic footprint) of the firm(or firm-module) i at month t. $IPO_{i,t}$ is an indicator equals to 1 if the time is 60 months after firm i's IPO; 0 if it's 24 months before firm i's IPO. This model includes firm (or firm-module) (η_i) and month (η_t) fixed effects.

We will examine the impact of IPOs on these three different dimensions of product market dynamics in the following subsections.

5.2 Summary Statistics

Before we investigate the impact of IPOs on product market dynamics, we briefly look at the summary statistics of all the dependent variables we will test in our empirical analysis.

Table 4 shows the mean, median, standard deviation, 25th percentile, and 75th percentile for each dependent variable in each firm-month or firm-module-month level. Instead of just examining the firm-level effects, we look underneath the surface and estimate the impact on each firm-module level. Therefore, Panel A in Table 4 reports the firm-level analysis; Panel B is for the firm-module level.

[Insert Table 4 here.]

Variables *No. Products*, *No. New Products*, *No.Exist Products*, and *age* captures the information of product release dimension. Variables *Average Prices*, *Quantity Sold*, and *Sales* represents the pricing strategy dimension. *No. Stores*, *No. Chains*, and *No. Counties* are variables for geographic footprint section.

5.3 Product Release

In this section, we study what kinds of product release strategies firms are more likely to adopt before and after going public. We estimate the regression model of equation 3, where the dependent variables are number of products, number of new products, and number of existing products. *Number of Products* is the natural logarithm of the number of unique UPCs a firm or firm-module sells nationwide in month t. *Number of New Products* is the natural logarithm of 1 plus the number of new UPCs introduced by a firm or firm-module in month t. *Number of Existing Products* is the natural logarithm of 1 plus the difference between number of products and number of new products in month t. To better understand the change of product portfolio mix post-IPOs, we employ a variable product portfolio age, a vital variable used in many works of literature. In particular, Hajda and Nikolov (2020) conclude that product portfolio age is negatively related to a firm's profitability, market-to-book ratio, net leverage, and capital investment. We follow Melser and Syed (2016), Argente et al. (2018), and Hajda and Nikolov (2020) to measure product portfolio age, the weighted share of old products in the firm's product portfolio, where the weights correspond to product-specific revenue. Specifically, the old products are those whose age exceeds half of their lifespan:

$$\text{age}_{it} = \frac{\text{weighted \# of products with age exceeding 50\% of lifespan}_{it}}{\text{total \# of products}_{it}} \tag{4}$$

First, we analyze these dependent variables at the firm level at Panel A of Table 5. In Columns (1), (2), (3), and (4), we find no significant changes in their product release

dimension within those firms before and after they file for IPOs.

To better understand the product release dynamics, we look beneath the surface and explore the impact within the firm-module level. In Table 5 Panel B Column (1), the coefficient estimate suggests that firms on average decrease their unique products by 12% [10] five years after going public for existing product lines. To better examine the causes of this decline, we decompose the products in a specific module into new and existing products. Columns (2) and (3) show that this total decline is caused by a 5% decrease of new products introduction and a 8% cutoff of those existing products within the existing modules. Column (4) suggests that firms have an older portfolio age inside the existing product modules after public.

[Insert Table 5 here.]

Evidence from Table 5 Panel B suggests that compared to their private stage, firms introduce fewer novel products within existing modules after becoming public. Combining with Panel A, the results imply that firms must expand their product lines and create new products in new modules after IPOs. Thus, overall, there is no significant change of product releases within firms before and after going public. We can further strengthen our conclusion from the estimated coefficients of column (4). Since firms decline their new product introduction for existing modules, thus the product portfolio age gets older. However, panel A suggests no significant change in the age, which implies that firms must replace their old products with new products in new modules. This results in a younger portfolio age for new modules. Thus, the younger age of new modules offsets the older age of existing modules. As a result, there is no significant change in product portfolio age for entire firms.

We can facilitate this explanation by using a simple example. Assume Firm X has three modules, A, B, and C; it has 100 products before it goes public. Panel A shows no significant changes in the product release variables within firms, and Panel B shows that firms decline

[10] Throughout this paper, we report the magnitudes after exponentiating the estimated coefficients with logged dependent variables.

the number of products and the number of new products within existing modules. Thus, after firm X successfully goes public, it declines the number of products in the current product lines to 50. To maintain the 100 products, firm X must introduce a novel product line D and novel products in this new module. Hence, these results show that firms generally explore exploratory (i.e., introducing new product lines) product market strategies after going public and replace the old products in the portfolio mix with new ones from novel product lines.

5.4 Pricing Strategy

In this section, we study the impact of IPOs on firms' pricing strategies. The dependent variables of regression equation 3 here are the sales-weighted average log prices, the natural logarithm of the number of quantities sold, and the natural logarithm of sales of firm i in month t. Table 6 shows estimated coefficients of regressions of these three variables on IPO, a dummy indicator that equals to one 60 months after firms (or firm-modules) go public, equals to zero 24 months before.

We start analyzing the pricing strategies at the firm level around IPOs. In Table 6 Panel A Column (1), the estimated coefficient on *IPO* is 0.357, which implies that after firms go public, they increase the average prices of products by 43%. What happened to the number of quantities sold after firms go public? Column (2) shows that the number of quantities sold per firm increase by 109%. The rise in prices and quantities sold drives the average monthly sales per firm to increase dramatically, almost twice as much as before they go public (Column (3)).

In Panel B of Table 6, we break down the firm level analysis to firm-module level analysis. We treat each product line in a firm as a single group instead of all the modules as a whole group. In this way, we can better understand how firms change their pricing strategies within existing product lines and the corresponding changes of quantities sold and sales after IPOs. In Column (1), we find that firms do not change the prices of products within the existing product lines after going public. These product lines also experience a 45% decrease in the

products sold. The decreased quantities sold and the unchanged prices cause a 46% decrease in sales within existing product lines after firms go public.

[Insert Table 6 here.]

Table 6 Panel A shows different results from firms level and firm-modules level, with opposite signs of estimated coefficients. This means that firms have fewer units sold for existing modules after going public, which is the main reason for the decreased sales. In fact, the overall increase in the average prices in firms is caused by the novel introduced modules after firms go public. This is because the new modules have higher average prices than the existing modules. Additionally, consumers are more interested in firms' novel products and tend to purchase more innovative products. These results are in line with what we find in section 4.3. Overall, firms appear to engage in exploratory product market strategies, with the introduction of new and luxury product lines, resulting in higher sales after they successfully go public. To examine what drives the change in the number of quantities sold within firms and firm-modules, we explore the geographic availability of products after firms go public in the next section.

5.5 Geographic Footprint

In the previous section 4.3, we find that after public, the number of quantities sold for existing product lines decreases, and the overall number increases within firms. In this section, we examine how firms expand their products' geographic footprints and facilitate the quantities sold after they go public. We estimate the regression equation 3. Here, the dependent variables are the natural logarithm of the number of stores where firms (firm-modules) have products sold in month t, the natural logarithm of the number of retail chains in which firms (firm-modules) sell their products in month t, and the natural logarithm of the number of counties firms (firm-modules) have their products sold in month t. Table 7 reports the estimated coefficients of the impact of IPOs on these geographic expansion variables.

Panel A shows the firm level analysis. In Column (1), we document an 82% increase in the number of stores firms sell their products after IPOs. To better understand how firms achieve this increase in the number of stores, Columns (2) and (3) show that firms expand their products to 25% more retail chains and 41% more counties after going public. Thus, the expansion of geographic footprints is associated with the increase in the number of stores firms sell their products. This result is consistent with what we find in the previous section, where we document that firms dramatically increase the number of quantities sold after going public. Thus, Table 7 illustrate that the rise in the number of quantities sold is mainly driven by firms adopt a geographic expansion strategy on their products.

To examine the effects on firms' geographic expansion more precisely, we break down the entire firms into each product line and analyze the firm-module level effects. Panel B represents the changes in the existing product lines. Column (1) shows a 39% decrease in the number of stores firms sell their existing modules' products. This decrease is caused by firms cutting down 13% of the retail chains and 28% of the counties where they sell their products before going public (Columns (2) and (3)).

[Insert Table 7 here.]

The overall expansion of the geographic footprints (Panel A) and the cutting down of the existing products' geographic availability (Panel B) imply that firms introduce new product lines and expand these novel products to new geographic locations. Therefore, combing with the shrinkage of existing product lines, overall, firms' products gain more attention after going public. This finding is consistent with what we find in the section 4.3 and section 4.4, where we conclude that firms have more new products and more quantities sold after IPOs. Hence, after getting the access to the public equity market, firms adopt more exploratory product market strategies.

6 Mechanisms

In the previous section, we show that, in general, firms change their product market strategies by shifting their product lines to more profitable modules after firms go public. In particular, firms introduce more novel and expensive products, expand those new products to more geographic locations after IPOs. In this section, we investigate several channels through which firms achieve the product market strategies.

6.1 Ownership

Jain and Kini (1994) document that under the agency theory hypothesis (Jensen and Meckling (1976)) and the signaling hypothesis (Leland and Pyle (1977)), firms with a higher fraction of shares retained by the pre-issue shareholders have higher post-IPO operating performance. Zingales (1995) provides a framework for balancing the decision of IPOs and the fraction of ownership to retain. Therefore, this implies that firms with different fractions of management ownership could have different incentives on the product market strategies. This leads us to expect that the larger fraction of shares retained, the more innovative strategies firms could pursue. To test our hypothesis, we examine cross-sectional variation in IPO effects by splitting the whole sample into two groups based on the fraction of shares retained.

Equation 2 shows the calculation process of the deal size as a percent of the total dollar market value of all of a firm's outstanding shares. We use one minus the variable *DEAL_PCT_MKT* to measure the fraction of shares retained by pre-issue shareholders. Variable *DEAL_PCT_MKT* represents the portion of the shares firm first time float to the public; thus, the rest of the portion stands for the management ownership. We split the sample based on the median value of the management ownership. So the above median subsample is identified as the high-ownership group and the below median subsample as the low-ownership group.

In Table 8, we regress the pricing strategy, product release, and geographic footprint

variables on the IPO dummy separately by high-ownership and low-ownership groups. For each panel, we run the regression based on firm (firm-module) levels and control for the firm (firm-module) and time fixed effects.

[Insert Table 8 here.]

Panel A reports that within firms, both high-ownership and low-ownership firms do not change their number of products, the number of new products, and the number of existing products after going public. However, when we look underneath and focus on the existing product lines, high-ownership firms decrease 15% of their number of products, 7% of the introduction of the new products, and 11% of the existing products after they go public; no significant changes within low-ownership firms. Therefore, combining the results of the entire firm, we conclude that firms with a higher portion of shares retained by the pre-IPO shareholders shift their product portfolio to novel product lines after public.

Panel B examines the pricing strategies in different groups after IPOs. High-ownership firms dramatically increase their sales, caused by the massive number of quantities sold after going public. The Low-ownership group also increases the sales, but the increase is driven by the 53% rise in the average product prices. To better figure out what happened inside these two groups, we also examine the change of existing modules. Comparing with the no significant change of the pricing and quantity sold for existing modules in the low-ownership firms, the high-ownership firms show a 54% decrease in the quantity sold. As a result, the high-ownership group decreases 51% of the sales for the existing product lines. Thus, Panel B shows that firms with a large portion of shares retained by the entrepreneurs decrease the number of quantities sold for the old product lines. Alternatively, they shift to new and profitable product lines after going public. Overall, this result is consistent with what we find in Panel A. Low-ownership firms show no change in their portfolio mix and focus on short-term increasing of their sales by raising the prices of products after IPOs.

In Panel C, we regress the change of geographic expansion on the IPO indicator for these

two groups. For high-ownership firms, they decrease 49% of the number of stores in which they sell their products in existing product lines. This result can be driven by selling to fewer stores within the same retail chain or declining the number of retail chains. We show that the decrease in the number of physical stores is caused by reducing 21% of the retail chains and 30% of the counties they sell their products after going public. However, if we treat the entire firm as an entity after firms go public, they expand their products to 1.7 times more geographic locations and 42% more retail chains, which correspond to above three times more stores than when they are private. There is no significant change in geographic footprint for low-ownership firms. The results in Panel C are in line with the findings in Panel A and B.

Thus, Table 8 suggests a positive relationship between managerial ownership and post-IPO product market performance, as a result of adopting exploratory product strategy, replacing their previous product lines with more profitable ones and expanding them to more geographic locations. This result is consistent with the implication of agency and signaling models, which predict that there will be a monotonic relationship between insider holdings and firm value.

6.2 Market Share

Chemmanur et al. (2010) study that firms with a greater market share in their product market are more likely to go public. So what happened to firms' product market dynamics if they have a higher market share in their product lines after going public? Spiegel and Tookes (2008) document that firms with small rivals have the greatest incentives to innovate. In this section, we examine the product market dynamics after firms go public for two groups, one with a higher market share and another one with relatively lower. We calculate firms' market shares based on their monthly sales in that product module. [11] A firm has a high

[11] Our sample has 62,387 firms in total. We first calculate each firm's monthly sales in a particular product module and calculate the total monthly sales in that module. Market share in a specific module for each firm is its monthly sales divided by total monthly sales. We then extract our sample firms' market share information.

market share in one product module if it has above median market share in that module and low otherwise. Thus, in this section, we can only focus on the firm-module analysis and what happened inside existing product lines after public.

Table 9 shows that low market share firms have no significant change in their product market dynamics for existing product lines around IPOs. However, firms with higher market shares decrease 13% of their number of products by 8% decline of the new products introduction and 10% shrinkage of existing products. This result is associated with decreases in the number of physical stores and counties in which firms sell their products. As a result, those declines cause a dramatic decrease in sales for existing product modules after public.

[Insert Table 9 here.]

No direct evidence in Table 9 shows that firms with high market shares will employ more innovative product market strategies after public. However, our results suggest that firms that have high market powers will engage in less exploitative product market strategies, less developing the existing products in their portfolio mix post-IPOs.

6.3 Industry Concentration

In this section, we analyze the product market dynamics around IPOs for firms in different industry concentrations. Low concentration industries, with many firms operate in these industries, are relatively more competitive and have lower barriers to entry. Thus, firms in low concentration industries are comparatively easier to change their product portfolio mix and adopt different product market strategies after public. To test our conjecture, we split our sample based on their Herfindahl-Hirschman Index value (HHI). In section 5.2, we calculate the market share of each firm in each of the 1,311 product modules. HHI is calculated by squaring the marker shares and summing them up. Firms with HHI value below the median are referred to as the low HHI group and as high HHI group otherwise.

Low HHI group represents the product modules with a large number of firms in them and lower "industry" concentration.

Table 10 shows that for firms in low concentration product modules, they decline 7% the introduction of new products and cut down 10% of their existing products, which cause an overall 15% decrease in the number of unique products after public. The decline of products is accompanied by the decrease in quantity sold and sales and is associated with discontinuing their products in 34% number of physical stores and 24% of counties. Higher HHI firms trim their product sales by stopping selling their products in 36% of the stores, 14% of the retail chains, and 25% of geographic locations post-IPOs. No significant change in their product release dimension after public.

[Insert Table 10 here.]

Overall, firms in low concentration "industries" show a change in their portfolio mix by trimming their products in existing modules. Although the results provide no evidence of whether firms replace their portfolio mix with new and profitable product lines, we still can conclude that firms in industries with lower barriers to entry show a significant change in their portfolio mix after public.

7 Falsification Test

One may argue that our results are a short-term effect driven by pre-IPO window dressing and not a persistent transformation in firm strategy (Wies and Moorman (2015)). However, in our empirical setting, we choose a seven-year window with two years before going public and five years after, which can partially eliminate the concern.

Additionally, one may concern that some unobservable underlying forces rather than IPOs can drive our baseline results. If this were indeed the case, we would expect to find similar patterns if firms went public one or two years before they actually do. Therefore,

we conduct a falsification test where we falsely assume a firm filed for IPO one or two years before the actual year of it going public.

Table 11 shows the regression results of the falsification test. First, we falsely assume that firms filed for IPOs one year before they actually do. Panel A suggests that if firms go public one year before, there is no significant change of their product release strategy within the firm and firm-module level among the seven-year window. Panel B shows that after "going public", overall firms increase the number of quantities sold and result in an increase in sales; both are significant at a 10% significant level. Since the results are not highly substantial, we can still argue that no significant change in terms of pricing strategy before and after "IPOs". In Panel C, we find that firms keep their geographic footprint the same around their "IPOs".

To make our results more convincing, we also run the regression that falsely assumes that firms went public two years before they really do. Panel A shows that firms do not change their product release strategy after "public" at the firm level. However, when we focus on the existing module, firms increase the number of existing products, which results in an increase in the number of unique products after "IPOs". One interpretation is that since now the firms in our sample are slightly younger than the actual sample, comparing to two years before "going public", firms may develop the existing product lines at this stage. Therefore, this can drive a significant change in the existing product lines. In Panel B, we conclude that firms do not change their pricing strategy after "public". We find the same results of firms' geographic footprint in Panel C. Although there is a slightly significant change in the number of retail chains firms selling their existing products, we can still argue that the magnitude is not substantial.

[Insert Table 11 here.]

Thus, Table 11 shows that there is no significant change in almost all product market dimensions if the going public decision occurs one or two years before it actually happened.

Therefore, the falsification test eliminates our concern and implies that the impact of going public mainly drives our results.

8 Future Research and Conclusion

Going public is a big financial milestone for all firms, especially for their initial investors, employees, and executives. In particular, an IPO involves the biggest infusion of cash into the firm, usually on much favorable terms and in a much larger quantity, compared to prior infusions of cash from venture capitalists, angels, or other private equity investors while the firm remains private. Unfortunately, with some notable exceptions, little is known about how the large infusion of cash that usually characterizes a firm's IPO affects its product market behavior relative to the situation where the firm remains private. On this paper, we attempted to remedy this gap into the literature.

We use the Nielsen Retail Scanner database, which tracks weekly average prices and quantities sold of each product at each participating store for more than 2 million unique consumer goods. Given the granularity of this data, we were able to analyze the impact of IPOs on many dimensions of a firm's product market strategies. Our empirical analysis estimates a baseline regression that focuses on the product market dynamics 24 months before and 60 months after firms file for IPOs.

Overall, we find that firms keep their product offerings mostly the same, but increase prices and their geographic footprints. This increase in prices, combined with firms selling more of their products, leads to dramatically higher sales of firms on average after their IPOs. Further, firms adopt exploratory product market strategy by shifting their existing modules to more novel and profitable modules and expanding them to more geographical locations. This shift is associated with replacing their existing modules in the product portfolio mix with new ones. Our finding supports the relaxation of financial constraints hypothesis, which predicts that firms are more likely to adopt an exploratory (more aggressive) product

market strategy after their IPOs after getting access to the public equity market. We further investigate and find that firms with high management ownership (i.e., with a large portion of shares retained), high market share in a product module, and a low HHI are more likely to engage in more aggressive product market strategy and shift their portfolio mix to novel categories than their opposite groups.

While we have completed our empirical analysis of the product market and pricing strategy (Hypotheses 1), we are in the process of completing the rest of our empirical analysis. Thus, we are currently in the process of completing our analysis of Hypotheses 2 and 3 (on how a firm's interactions with competitors in the product market change after it goes public), of Hypothesis 4 (on how a firm's product market advertising changes from before to after going public), of Hypothesis 5 (on how a firm's human capital changes from before to after going public), and Hypothesis 6 (on how a firm's operating or accounting underperformance after IPO is related to its product market performance after IPO and changes in such performance from before to after IPO).

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Table 1: Overall Nielsen Data

This table shows an overall summary statistic of the Nielsen Retail Scanner data. In this dataset, *Products* is uniquely identified by each Universal Product Code (UPC). Variable *Stores* is represented by each specific store code. The number of *Firms* is the result of matching the Nielsen dataset and the GS1 database. Variable *Chains* represents the retail chain. *3-Digit ZIP* is simply the first three numbers in a zip code. *Counties* is identified by each county code in the Nielsen data. *Designated Market Areas* regions are the geographic areas in the U.S. in which Nielsen measures television viewing. *States* does not include the District of Columbia.

	Num. of Obs.
Products	2,463,853
Stores	60,600
Firms	62,387
Chains	139
3-Digit ZIP	883
Counties	279
Designated Market Areas	209
States	49

Table 2: An Example of the Hierarchy of the Retail Scanner Dataset

This table shows an example of the hierarchy of the Nielsen Retail Scanner Dataset. Each UPC is classified into one of the 1,311 product modules, which is nested under one of the 117 product groups. Each product group is then categorized into one of the 10 departments.

UPC	Product Module	Product Group	Department
067497154005	Bakery-Cakes-Fresh	Bread and Baked Goods	Dry Grocery
007016397592	Bakery-Bread-Fresh	Bread and Baked Goods	Dry Grocery
500015939700	Candy-Chocolate	Candy	Dry Grocery
007723402619	Pet Accessory	Pet Care	Non-Food Grocery
007230202031	Cat & Dog Litter	Pet Care	Non-Food Grocery
073785778648	Cloth-Polishing/Cleaning	Household Supplies	Non-Food Grocery

Table 3: Sample Representation

This table shows the univariate comparison of firm-level fundamentals between two groups of firms. *Sample Firms* is the firms in our sample. *Other Public Firms* represent all Compustat firms going public during the same period as our sample firms (i.e., from 2006 to 2019). *Total debt/market value of assets* is the sum of a firm's debt in current liabilities (Compustat item *dlc*) and the firm's long-term debt (Compustat item *dltt*) divided by the firm's market value of assets. A firm's market value of assets is calculated as the sum of market value of equity (Compustat item *prcc_c* times *csho*), the firm's debt in current liability, the firm's long-term debt, and the firm's preferred-liquidation value (Compustat item *pstkl*) minus the firm's deferred taxes and investment tax credit (Compustat item *txditc*). *Total debt/assets* is the sum of a firm's debt in current liabilities and the firm's long-term debt, divided by the firm's book assets (Compustat item *at*). *OIBDP/assets* is a firm's operating income before depreciation (Compustat item *oibdp*) divided by its book assets. *Log assets* is the natural logarithm of a firm's book assets. *Asset Tangibility* is the ratio of a firm's net property, plant, and equipment (Compustat item *ppent*) to its book assets. *R&D expense/sales* is the ratio of a firm's R&D expense (Compustat item *xrd*) to its sales (Compustat item *sale*). *Market-to-book ratio* is the ratio of a firm's market value of assets to its assets. *Capital expenditure/assets* is calculated by a firm's capital expenditure (Compustat item *capx*) divided by its assets. All the variables are calculated in the year of a firm going public. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively.

	Mean		Difference
	Sample Firms	Other Public Firms	
	(1)	(2)	(3)
Total debt/market value of assets	0.2552	0.198	0.0572
Total debt/assets	0.3397	0.3389	0.0007
OIBDP/assets	-0.0632	-0.3428	0.2796**
Log assets	6.7234	5.6914	1.032***
Asset Tangibility	0.1811	0.1612	0.0199
R&D expense/sales	10.5766	7.1323	3.4442
Market-to-book ratio	2.8644	4.3314	-1.467
Capital expenditure/assets	0.0358	0.0458	-0.01**

Table 4: Summary Statistics

This table reports the summary statistics of all dependent variables we employ in this paper. Except for the variable *Number of Obs.*, other measurements are calculated based on monthly level data. *No. Products* is the log of the number of unique UPCs a firm or firm-module sells nationwide, *No. New Products* is the log of 1 plus the number of new UPCs introduced by a firm or firm-module, *No. Exist Products* is the log of 1 plus the difference between the number of products and the number of new products, *age* represents the product portfolio age, which is the weighted share of old products in the firm's product portfolio, where the weights correspond to product-specific revenue. *Average Prices* is the ales-weighted average log prices of a firm or firm-module, *Quantity Sold* is the log of units sold by a firm or firm-module, *Sales* is the log of the sales of a firm or firm-module, *No. Stores* is the log of the number of stores a firm or firm-module has its products sold, *No. Chains* is the log of the number of retail chains a firm or firm-module sells its products, and *No. Counties* is the log of the number of counties that sell its products.

Panel A: Within Firm

	Mean	Median	S.D.	25th percentile	75th percentile	Number of Obs.
No. Products	2.179	1.792	1.947	0.693	4.007	2,053
No. New Products	0.372	0.000	0.829	0.000	0.000	2,053
No. Exist Products	2.409	1.946	1.726	0.693	3.932	2,053
Age	0.427	0.185	0.439	0.000	0.972	2,053
Average Prices	2.546	2.642	0.947	2.086	3.267	2,053
Quantity Sold	6.872	6.973	3.774	3.664	9.806	2,053
Sales	9.418	9.63	4.001	6.455	12.579	2,053
No. Stores	5.325	5.811	2.969	2.639	7.541	2,053
No. Chains	1.836	1.386	1.572	0.000	3.555	2,053
No. Counties	3.513	4.357	1.684	2.303	4.852	2,053

Panel B: Within Firm-Module

	Mean	Median	S.D.	25th percentile	75th percentile	Number of Obs.
No. Products	0.955	0.693	1.213	0.000	1.386	10,424
No. New Products	0.100	0.000	0.403	0.000	0.000	10,424
No. Exist Products	1.351	1.099	1.003	0.693	1.609	10,424
Age	0.543	0.810	0.472	0.000	1.000	10,424
Average Prices	2.074	2.232	1.181	1.281	2.985	10,424
Quantity Sold	4.786	4.357	3.312	2.079	7.145	10,424
Sales	6.859	6.705	3.706	4.088	9.580	10,424
No. Stores	3.813	3.526	2.739	1.386	6.075	10,424
No. Chains	1.069	0.693	1.256	0.000	1.792	10,424
No. Counties	2.700	2.708	1.727	1.099	4.454	10,424

Table 5: Product Release and Portfolio Composition

This table reports the OLS coefficient estimates from regressing product release variables on IPO, a dummy variable equal to one for 60 months after firms (Panel A) or firm-modules (Panel B) file for going public, zero for 24 months before they file for going public. *Number of Products* is the natural logarithm of the number of unique UPCs a firm or firm-module sells nationwide in month t. *Number of New Products*is the natural logarithm of 1 plus the number of new UPCs introduced by a firm or firm-module in month t. *Number of Existing Products* is the natural logarithm of 1 plus the difference between the number of products and the number of new products in month t. *Age* represents the product portfolio age, which is the weighted share of old products in the firm's product portfolio, where the weights correspond to product-specific revenue. Specifically, the old products are those whose age exceeds half of their lifespan. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively. Standard errors are in parentheses and clustered by firm.

Panel A: Within Firm

	Number of Products	Number of New Products	Number of Existing Products	Age
	(1)	(2)	(3)	(4)
IPO	-0.009	-0.071	0.035	-0.054
	(0.211)	(0.068)	(0.172)	(0.080)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Number of Obs.	2,052	2,052	2,052	2,052
Adjusted R^2	0.937	0.655	0.842	0.523

Panel B: Within Firm-Module

	Number of Products	Number of New Products	Numbere of Existing Products	Age
	(1)	(2)	(3)	(4)
IPO	-0.124**	-0.055***	-0.081*	0.119***
	(0.058)	(0.021)	(0.046)	(0.045)
Firm-Module FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Number of Obs.	10,409	10,409	10,409	10,409
Adjusted R^2	0.873	0.491	0.871	0.447

Table 6: Pricing Strategy

This table reports the OLS coefficient estimates from regressing the sales-weighted average log prices, the natural logarithm of the number of quantities sold, and the natural logarithm of sales on IPO, a dummy variable equal to one for 60 months after firms (Panel A) or firm-modules (Panel B) file for going public, zero for 24 months before they file for going public. *Average Prices* is the ales-weighted average log prices of a firm or firm-module in month t. *Quantities Sold*is the natural logarithm of units sold by a firm or firm-module in month t. *Sales* is the natural logarithm of the sales of a firm or firm-module in month t. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively. Standard errors are in parentheses and clustered by firm.

Panel A: Within Firm

	Average Prices	Quantity Sold	Sales
	(1)	(2)	(3)
IPO	0.357**	0.736**	1.092**
	(0.171)	(0.353)	(0.413)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Number of Obs.	2,052	2,052	2,052
Adjusted R^2	0.714	0.883	0.867

Panel B: Within Firm-Module

	Average Prices	Quantity Sold	Sales
	(1)	(2)	(3)
IPO	-0.016	-0.606***	-0.622***
	(0.045)	(0.212)	(0.219)
Firm-Module FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Number of Obs.	10,409	10,409	10,409
Adjusted R^2	0.818	0.722	0.718

Table 7: Geographic Footprint

This table reports the OLS coefficient estimates from regressing geographic footprint variables on IPO, a dummy variable equal to one for 60 months after firms (Panel A) or firm-modules (Panel B) file for going public, zero for 24 months before they file for going public. *Number of Stores* is the natural logarithm of the number of stores a firm or firm-module has its products sold in month t. *Number of Chains* is the natural logarithm of the number of retail chains a firm or firm-module sells its products in month t. *Number of Counties* is the natural logarithm of the number of counties that sell its products in month t. Columns (2), (4), and (6) control for product portfolio age. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively. Standard errors are in parentheses and clustered by firm.

Panel A: Within Firm			
	Number of Stores	Number of Chains	Number of Counties
	(1)	(2)	(3)
IPO	0.598**	0.220*	0.343*
	(0.278)	(0.131)	(0.189)
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Number of Obs.	2,052	2,052	2,052
Adjusted R^2	0.867	0.943	0.811

Panel B: Within Firm-Module			
	Number of Stores	Number of Chains	Number of Counties
	(1)	(2)	(3)
IPO	-0.497***	-0.143**	-0.327***
	(0.183)	(0.065)	(0.117)
Firm-Module FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Number of Obs.	10,409	10,409	10,409
Adjusted R^2	0.740	0.882	0.700

Table 8: Ownership

This table represents the estimated coefficients from regressing all outcome variables on IPO, a dummy variable equal to one for 60 months after firms or firm-modules file for going public, zero for 24 months before they go public. We separate the sample based on the variable *EQ_OWNERSHIP*, which represents the portion of shares retained by pre-IPO shareholders. Equation 1 and 2 show the calculation procedure of the *EQ_OWNERSHIP*. High ownership is the group with *EQ_OWNERSHIP* values above median. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively. All regressions control for firm (firm-module) and time fixed effects. Standard errors are clustered by firm.

Panel A: Product Release

		High Ownership			Low Ownership		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
Within Firm	No. Products	0.041	0.207	1,016	0.036	0.324	1,036
	No. New Products	-0.183	0.158	1,016	0.022	0.051	1,036
	No. Exist Products	0.040	0.181	1,016	0.092	0.259	1,036
Within Firm-Module	No. Products	-0.160**	0.080	7,595	0.046	0.094	2,814
	No. New Products	-0.073**	0.032	7,595	0.000	0.025	2,814
	No. Exist Products	-0.113*	0.063	7,595	0.051	0.077	2,814

Panel B: Pricing Strategy

		High Ownership			Low Ownership		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
Within Firm	Average Prices	0.433	0.33	1,016	0.422**	0.172	1,036
	Quantity Sold	1.355**	0.529	1,016	0.566	0.471	1,036
	Sales	1.787**	0.681	1,016	0.988*	0.496	1,036
Within Firm-Module	Average Prices	0.068	0.065	7,595	0.039	0.069	2,814
	Quantity Sold	-0.784***	0.298	7,595	-0.0172	0.280	2,814
	Sales	-0.716**	0.304	7,595	0.022	0.308	2,814

Panel C: Geographic Expansion

		High Ownership			Low Ownership		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
Within Firm	No. Stores	1.453***	0.37	1,016	0.255	0.354	1,036
	No. Chains	0.351**	0.135	1,016	0.220	0.191	1,036
	No. Counties	0.985***	0.275	1,016	0.025	0.226	1,036
Within Firm-Module	No. Stores	-0.665***	0.255	7,595	0.112	0.2213	2,814
	No. Chains	-0.230***	0.083	7,595	0.088	0.099	2,814
	No. Counties	-0.358**	0.173	7,595	-0.059	0.131	2,814

Table 9: Market Share in the Product Module

This table represents the estimated coefficients from regressing all outcome variables on IPO, a dummy variable equal to one for 60 months after firm-modules file for going public, zero for 24 months before they go public. Market share for each firm is its sales divided by total sales in each month, in a particular product module. A firm has a high market share in one product module if it has above median market share in that module and low otherwise. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively. All regressions control for firm-module and time fixed effects. Standard errors are clustered by firm.

		High Marekt Share			Low Market Share		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
	No. Products	-0.144**	0.072	6,200	-0.042	0.062	4,188
	No. New Products	-0.080**	0.033	6,200	-0.007	0.014	4,188
	No. Exist Products	-0.100*	0.059	6,200	-0.027	0.043	4,188
Within	Average Prices	-0.057	0.037	6,200	0.069	0.082	4,188
Firm-Module	Quantity Sold	-0.524**	0.231	6,200	-0.042	0.196	4,188
	Sales	-0.579***	0.233	6,200	0.027	0.228	4,188
	No. Stores	-0.405**	0.201	6,200	-0.040	0.180	4,188
	No. Chains	-0.096	0.082	6,200	-0.084	0.077	4,188
	No. Counties	-0.222**	0.105	6,200	-0.043	0.158	4,188

Table 10: HHI in the Product Module

This table represents the estimated coefficients from regressing all outcome variables on IPO, a dummy variable equal to one for 60 months after firm-modules file for going public, zero for 24 months before they go public. Herfindahl-Hirschman Index value (HHI) is calculated by squaring each firm's market share and summing them up in a particular product module each month. A firm is in a high HHI group with above median HHI value in that module and low otherwise. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively. All regressions control for firm-module and time fixed effects. Standard errors are clustered by firm.

		High HHI			Low HHI		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
	No. Products	-0.071	0.078	4,860	-0.157**	0.065	5,530
	No. New Products	-0.009	0.020	4,860	-0.074**	0.032	5,530
	No. Exist Products	-0.047	0.061	4,860	-0.103**	0.051	5,530
Within	Average Prices	-0.062	0.058	4,860	0.015	0.060	5,530
Firm-Module	Quantity Sold	-0.493*	0.276	4,860	-0.588**	0.273	5,530
	Sales	-0.555*	0.301	4,860	-0.573**	0.275	5,530
	No. Stores	-0.443*	0.232	4,860	-0.412*	0.240	5,530
	No. Chains	-0.148**	0.073	4,860	-0.122	0.081	5,530
	No. Counties	-0.293*	0.158	4,860	-0.279*	0.157	5,530

Table 11: Falsification Test

This table represents the OLS estimated coefficients for "IPO", a dummy variable equal to one for 60 months after firms or firm-modules file for "going public", zero for 24 months before. We run two regressions. First, we falsely assume that firms file for the public one year before they really do; second, we falsely assume that firms file for IPOs two years before they actually do. All regressions control for firm (firm-module) and time fixed effects. ***, **, and * represent statistical significance at 1%, 5%, and 10% levels, respectively. Standard errors are clustered by firm.

Panel A: Product Release

		One Year Before			Two Years Before		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
Within Firm	No. Products	0.002	0.183	1,987	0.060	0.206	1,868
	No. New Products	0.014	0.095	1,987	-0.082	0.058	1,868
	No. Exist Products	-0.000	0.142	1,987	0.103	0.175	1,868
Within Firm-Module	No. Products	0.072	0.056	10,405	0.137**	0.062	10,149
	No. New Products	0.007	0.023	10,405	-0.011	0.018	10,149
	No. Exist Products	0.035	0.043	10,405	0.111**	0.048	10,149

Panel B: Pricing Strategy

		One Year Before			Two Years Before		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
Within Firm	Average Prices	0.158	0.170	1,987	-0.126	0.246	1,868
	Quantity Sold	0.714*	0.382	1,987	0.026	0.386	1,868
	Sales	0.872*	0.481	1,987	-0.100	0.541	1,868
Within Firm-Module	Average Prices	0.015	0.045	10,405	0.028	0.053	10,149
	Quantity Sold	0.004	0.186	10,405	0.259	0.209	10,149
	Sales	0.019	0.210	10,405	0.287	0.226	10,149

Panel C: Geographic Expansion

		One Year Before			Two Years Before		
		IPO	S.E.	N. Obs	IPO	S.E.	N. Obs
Within Firm	No. Stores	0.461	0.314	1,987	-0.063	0.338	1,868
	No. Chains	0.106	0.128	1,987	-0.025	0.106	1,868
	No. Counties	0.222	0.205	1,987	-0.018	0.235	1,868
Within Firm-Module	No. Stores	0.006	0.163	10,405	0.261	0.191	10,149
	No. Chains	-0.042	0.062	10,405	0.107*	0.064	10,149
	No. Counties	0.002	0.116	10,405	0.156	0.125	10,149