The Customer is Always Right: Client-Driven Product Introduction and Firm Growth*

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Abstract

We study how existing client relationships drive product portfolio expansion using transaction-level data from India. Firms rely heavily on existing clients when expanding their product portfolios: existing clients account for 60-70% of sales of new products, and firms predominantly introduce products that their clients were already buying. These product introductions create mutual benefits, increasing firm sales by 70% and client sales by 5%. A substantial portion of the firm sales increase stems from complementary products purchased alongside the new product, suggesting that demand-side complementarities drive portfolio expansion. However, this dependence on existing networks may constrain product introductions, particularly for smaller firms. We find that firms depend more on existing clients when introducing products with higher transaction costs and when they face higher costs of acquiring new clients.

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1 Introduction

Expanding product portfolios is a key driver of firm growth. Multi-product firms are larger and more productive than single-product firms, and contribute the dominant share to aggregate output (Boehm, Dhingra, & Morrow, 2022). *What determines the scope of product portfolios in firms?* In this paper, we document the role that demand from existing clients plays in driving portfolio expansion decisions.

Our analysis draws on an administrative dataset from a large Indian state. The dataset provides us with a comprehensive view of all business-to-business transactions in the state. Firms in India are required to generate an electronic document, known as the e-way bill, for all movement of goods valued above a threshold. The document details the identity of the buyer and seller, and the value of the goods being shipped broken down by product code. This gives us information on all transactions between buyers and sellers, and allows us to study the role that clients play in driving portfolio expansion decisions.

We identify 2,400 product introductions in our sample, where products are defined at the four-digit HSN code level. In 90% of cases, at least one existing client of the firm had previously purchased the product before the firm began offering it. *Ex-post*, existing clients account for 60 - 70% of sales of the new product. Both of these facts suggest that existing clients play an important role when firms expand their product portfolio.

New products positively impact both firm sales and their clients. The average new product introduction leads to a 70% increase in firm sales and a 5% increase in client sales. Interestingly, a significant portion of the increase in firm sales is driven by sales of products other than the newly introduced product. We break down these other products into two categories: products that are typically purchased together with the newly introduced products, and the rest. The increase in sales of other products is largely driven by complementary products that are purchased together with the newly introduced product. This again suggests that demand-side considerations are important when firms

expand their product portfolio.

However, relying on existing clients might have potential costs for product introductions. Small and new firms without extensive client networks might find it more costly to introduce products. In the final part of the paper, we provide two potential explanations for why firms rely on existing clients.

The first explanation centers on transaction costs. If a transaction generates ex-post rents, parties may engage in inefficient behavior to appropriate a larger share of the rents (Klein, Crawford, & Alchian, 1978; Williamson, 1971, 1989). Relying on existing clients, with whom sellers have long-term relationships, may reduce the cost of transactions. Transaction costs are likely higher when products are more specific to the production process and have fewer alternative uses. Firms may rely more on existing clients when introducing products with higher specificity. Using Rauch (1999)'s classification, we confirm that firms rely more on existing clients when introducing products with higher specificity.

The second explanation centers on search costs. Some firms may have higher costs of finding new clients and may therefore rely more on existing clients. We proxy for search costs by measuring client base churn prior to new product introduction. Specifically, we calculate the monthly share of sales going to new clients in the months prior to the product introduction. We find that firms with higher client base churn are less dependent on existing clients when introducing new products.

Our results point to two mechanisms that may inhibit product introduction and innovation in developing countries. First, the reliance on existing client relationships may create barriers for less-connected firms. Second, the downstream benefits of product introduction may not be fully internalized by firms, leading to underinvestment in product introduction. Addressing these challenges may help foster firm growth in developing countries.

Our work contributes to the literature studying the determinants of product diversifi-

cation and new product introduction. The literature has identified several determinants of which products to introduce.

The first set of papers focuses on input linkages in driving product choices. Goldberg et al. (2010) shows that firms in India increased the scope of product offerings following India's trade liberalization in 1991. Boehm, Dhingra, and Morrow (2022) also studies the effect of input linkages, focusing on *which* products firms choose to introduce. They argue that firms are more likely to introduce products that share inputs with their existing product portfolio. Flagge and Chaurey (2014) develop a method to estimate how the cost of introducing new products is influenced by overlapping inputs, plant location, and vertical linkages. The second set of papers focuses on demand-side factors in driving product choices. Bernard et al. (2019) study *carry-along trade* among exporters and argue that firms export products that share demand complementarities with their other products, even when they do not produce these products themselves. We contribute to this literature by focusing on the role of existing client relationships in product introduction decisions.

2 Data

Firms in India must submit an electronic document (known as the e-way bill) prior to any movement of goods valued above Rs. 50,000. Registered firms are responsible for generating the e-way bill; if the consignor is not registered, responsibility falls on the consignee or the transporter. Government officials have the authority to intercept any conveyance to verify the e-way bill, and non-compliance attracts a penalty of Rs 10,000 or the value of tax evaded, whichever is higher.

Our primary dataset consists of all the e-way bills generated in a large Indian state from April 2018 to April 2021. [1] An e-way bill is generated whenever either the buyer

[1] We limit our main analysis to the two-year period from April 2018 to March 2020 to avoid confounding effects of the COVID-19 pandemic.

or seller is located in the state. Each e-way bill contains unique tax identifiers for both buying and selling firms, the transaction value, the value of items within the shipment by HSN code, quantity, and unit.

Firms report product codes using the HSN code system, with the level of detail varying by firm size. We exclude observations with 2-digit HSN codes and aggregate the remaining observations to the 4-digit HSN level.[2]

While the data is at the transaction level, we aggregate it to the buyer-seller-product-month level for most of our analysis by summing over all e-way bills for a given buyer-seller pair, product, and month. Firms must generate e-way bills for all shipments, including shipments to other establishments within the same firm. We focus on shipments between different firms and drop all observations where the buyer and seller are the same firm. Finally, we winsorize the transaction value variable at the 99.999^{th} percentile. After aggregation, we have approximately 53 million observations, with approximately 166,000 unique sellers and approximately 322,000 unique buyers. The average shipment value is $876. Table 1 presents descriptive statistics.

For the baseline analysis, we impose two additional restrictions. First, we retain only firms that appear in our data for at least 12 months, either as buyers or sellers. Second, we restrict our sample to seller-product pairs that record at least 50 transactions over the entire sample period to exclude one-off shipments.

2.1 Product Introduction

We define product introduction at the seller-product-time level as instances where a firm begins shipping an HSN4 product code that it had not previously sold. We require that product introductions occur at least 6 months after the firm's first appearance in the dataset. This helps us distinguish between product introduction effects from firm entry effects. Additionally, we restrict our analysis to products that are shipped consistently

[2] 2-digit HSN codes represent 5.4% of observations and 0.4% of total transaction value.

Table 1: *Descriptive Statistics*

Variable	Value
Total Observations	53,775,582
Unique Seller Firms	166,379
Unique Buyer Firms	322,234
Unique Products (HSN4)	1,476
Unique E-way Bills	31,319,327
Total Transaction Value (Billion USD)	128.140
Median Transaction Value (Hundred USD)	8.760
Median Transactions per Seller	15
Median Products per Seller	2

Notes. This table presents descriptive statistics for the e-way bill dataset covering the period from April 2018 to March 2020. The sample includes only firms that were active in 2018 and excludes within-firm shipments. Transaction values are converted to USD using an exchange rate of 85 INR per USD.

by requiring firms to ship the new product in at least 50% of the months following introduction. Our analysis focuses on product introductions that occur with at least 6 months remaining in our sample period, yielding approximately 2,400 product introductions.

3 Results

We provide three sets of results. First, we show that firms depend on existing clients to purchase new products. Second, we show that product introductions benefit both firms

and their existing clients. Third, we explore the conditions under which firms rely more heavily on existing clients.

In our notation, firms are denoted by i, products by p, and time by t. The month of a product introduction is normalized to $t = 0$.

3.1 Product Introduction and Client Composition

We begin by demonstrating that firms rely heavily on their existing clients for selling new products. We define existing clients as buyers that purchased from the firm in any month prior to the product introduction. To quantify this reliance, we define the share of sales to existing clients, for product p by firm i in month t, as follows:

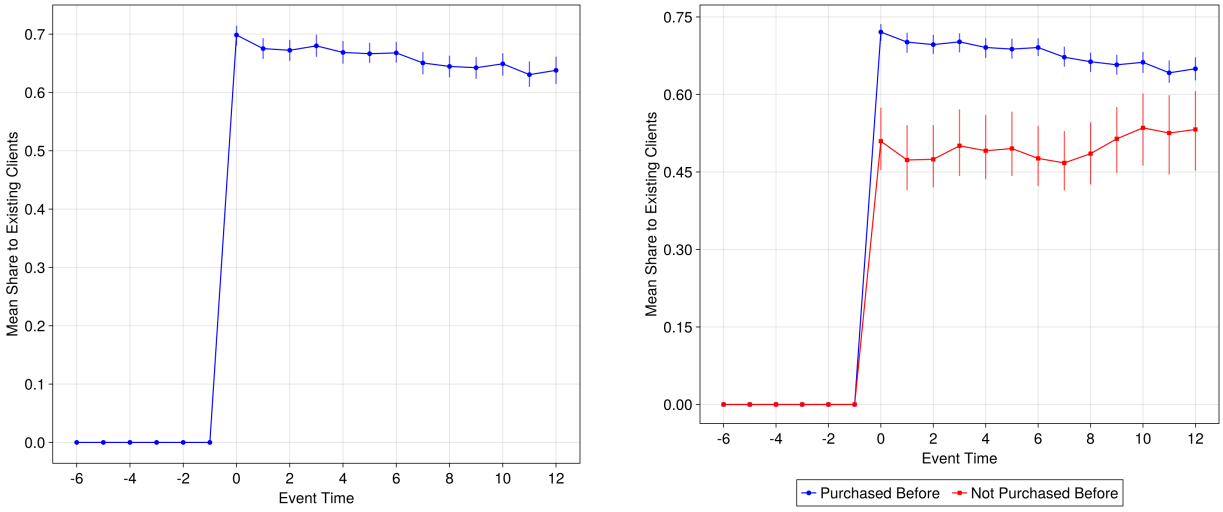
$$\text{Share to Existing}_{i,p,t} = \frac{\text{Sales to Existing Clients}_{i,p,t}}{\text{Sales to Existing Clients}_{i,p,t} + \text{Sales to New Clients}_{i,p,t}}$$

We set this share to zero for pre-event periods ($t < 0$). Figure 1a plots the average of this share across all product introductions. In the first month, 70% of sales go to existing clients. This share declines modestly over time, to roughly 65% over the next 12 months.

This reliance on existing clients may influence firms' decisions about which products to introduce. Firms may be incentivized to introduce products for which there is existing client demand. We find that in approximately 90% of cases, at least one existing client had prior purchase history of the product.

In Figure 1b, we examine the share of sales to existing clients broken down by whether at least one existing client had prior purchase history of the product. Only 10% of new product introductions occur when no existing clients have prior purchase history of the product. In these cases, firms rely more on new clients, with roughly 50% of the sales going to new clients compared to the 60-70% baseline.

Figure 1: *Share of Sales to Existing Clients*



(a) *Share to Existing Clients* **(b)** *By Prior Purchase History*

Notes. Share of sales to existing clients over event time. Left panel shows overall patterns, right panel shows patterns grouped by whether existing clients had prior purchase history with the product. Event time 0 represents new product introduction. 95% bootstrap confidence intervals are shown.

3.2 Impact of Product Introduction

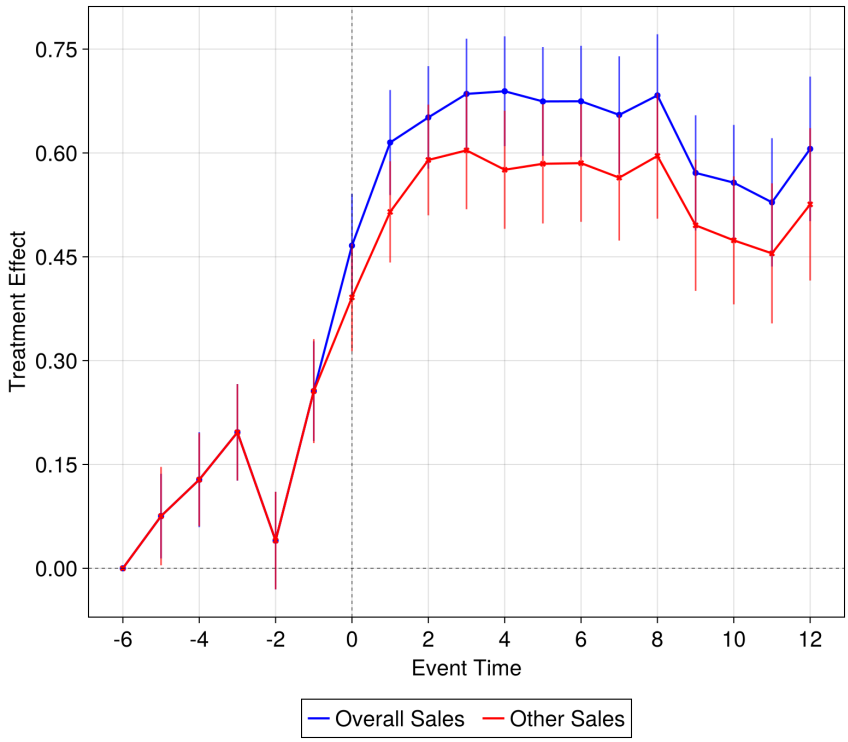
Having established firms' reliance on existing clients, we now examine the impact of new product introductions on both the introducing firm and its existing clients.

3.2.1 Impact on Introducing Firm

We first examine how product introduction affects the sales of the introducing firm. We examine two outcome measures: *overall sales* and *other sales*. Overall sales represents the sum of sales across all products in a given firm-month, while other sales excludes the newly introduced product to isolate spillovers on the rest of the portfolio.

To measure the impact, we employ an event study design, using the Callaway and

Figure 2: *Treatment Effects on Sales Around New Product Introduction*



Notes. Event study results showing treatment effects on overall sales and other sales around product introduction. Event time 0 represents product introduction. Estimates use Callaway and Sant'Anna (2021) difference-in-differences. Outcome variables transformed using inverse hyperbolic sine.

Sant'Anna (2021) estimator. We assign treatment timing based on the month of the product introduction ($t = 0$) and compare treated firms to control firms that never introduce new products during our sample period. Both variables are transformed using inverse hyperbolic sine.

Figure 2 presents event study results for both outcome measures. Product introduction leads to an increase in overall sales by 70% on average, while sales of other products increase by 60%. Thus, a significant portion of the increase in firm sales is driven by sales of products other than the newly introduced product.

To understand what drives this increase in other sales, we examine whether the effects vary by product complementarity. For example, if two products are typically pur-

chased together, an increase in sales of one product might drive up sales of the other. We capture this relationship using lift scores as a measure of product complementarity.

Lift scores measure how much more likely two products are to be purchased together in the same transaction, relative to their independent purchase probabilities. The lift score between two products p and p' is defined as:

$$\text{lift}(p, p') = \frac{P(p \cap p')}{P(p) \times P(p')},$$

where $P(p \cap p')$ is the probability that products p and p' are purchased together in the same transaction, $P(p)$ is the probability that product p is purchased, and $P(p')$ is the probability that product p' is purchased. A lift score greater than 1 indicates that products are more likely to be purchased together than expected by chance. To avoid mechanical relationship in our results, we exclude all shipments from all the firms that introduce products during our sample period.

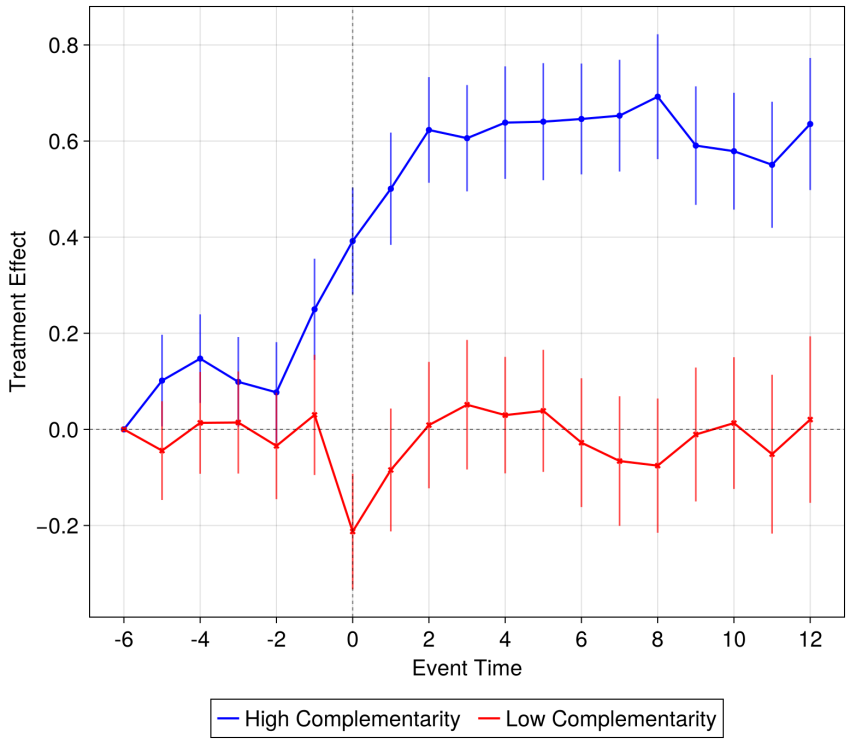
We classify products as having high or low complementarity with the new product based on these market basket lift scores. For each new product, we use the 90th percentile of its lift distribution as the threshold to classify other products as having high complementarity (above threshold) or low complementarity (below threshold) to it.[3]

We run separate event studies for high and low complementarity product sales. Treatment timing is assigned based on the new product introduction ($t = 0$), and we compare treated firms to control firms that never introduce new products during our sample period. We restrict this analysis to treated firms selling both high and low complementarity products.

Figure 3 reveals a divergence between high and low complementarity products. High complementarity products experience a 60% increase in sales after introduction of the

[3] A significant proportion of lift scores are zero because many product pairs are never purchased together. In cases where the 90th percentile of lift scores for product p is zero, we classify all products with positive lift scores as having high complementarity with p.

Figure 3: *Treatment Effects on Complementarity Sales Around New Product Introduction*



Notes. Event study results showing differential treatment effects on high and low complementarity product sales around product introduction. Products classified by market basket lift scores with 90th percentile threshold. Event time 0 represents product introduction. Estimates use Callaway and Sant'Anna (2021) difference-in-differences. Outcome variables transformed using inverse hyperbolic sine.

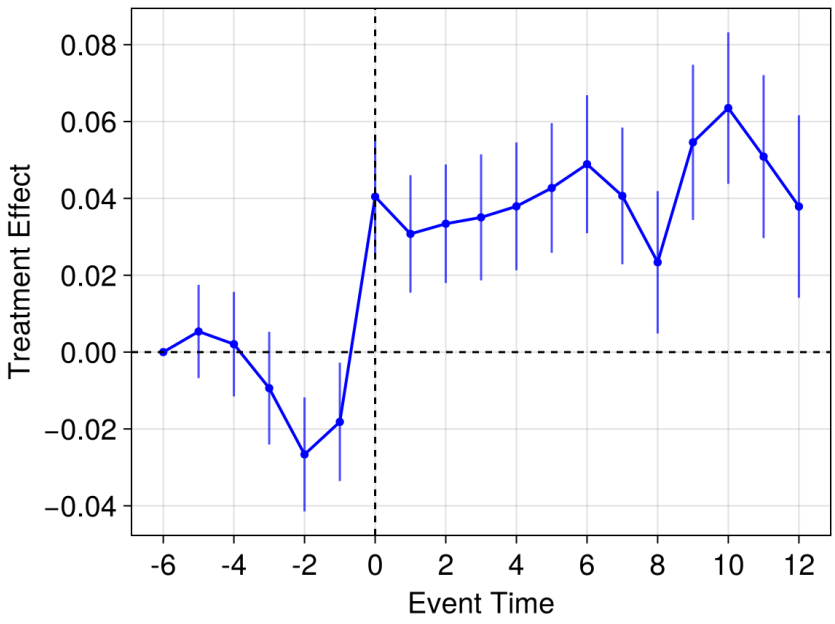
new product. In contrast, low complementarity products show minimal effects.

3.2.2 Impact on Clients

Turning to the demand side, existing clients also experience increased sales following product introduction by their suppliers. To measure these effects, we construct an event study where treatment timing is assigned based on the supplier's product introduction ($t = 0$). We compare treated clients to a control group of firms that do not experience supplier product introduction during our sample period.

We examine *total downstream sales*—the sum of all sales across all products that each

Figure 4: *Treatment Effects on Client Sales Following Supplier New Product Introduction*



Notes. Event study results showing treatment effects on existing clients' total downstream sales following their suppliers' product introductions. Event time 0 represents the supplier's product introduction. Estimates use Callaway and Sant'Anna (2021) difference-in-differences. Outcome variable (client total sales) transformed using inverse hyperbolic sine.

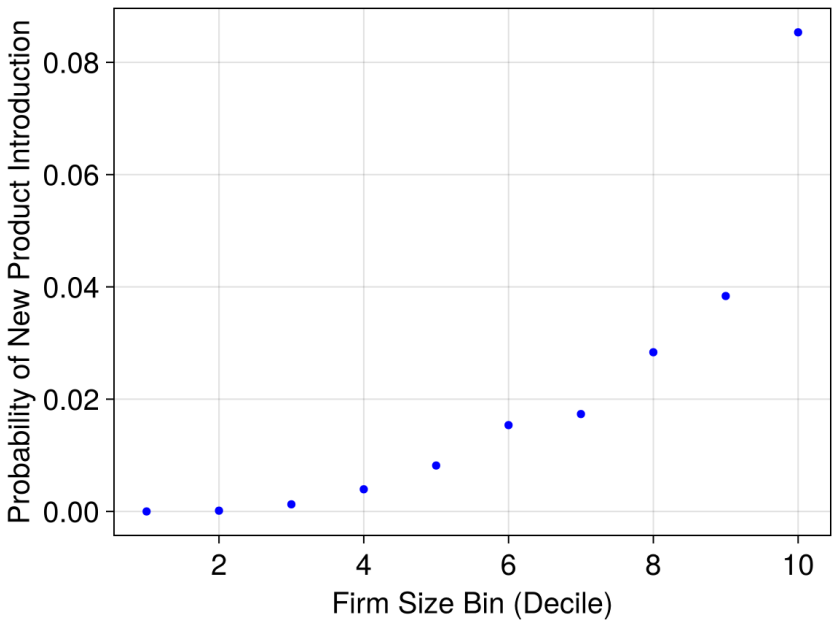
client sells to their own customers. Figure 4 presents event study results for client sales. New product introductions by suppliers lead to a 5% increase in client sales on average.

3.3 Rationale for Client Dependence

So far, we have shown that product introductions benefit both introducing firms and their existing clients. However, firms rely heavily on their existing client base for purchasing these products. Such dependence on existing relationships may constrain product introductions, particularly for firms with smaller client networks. As Figure 5 illustrates, larger firms are substantially more likely to introduce products.

This raises the question: what drives this dependence on existing clients? We propose two potential explanations, transaction costs and search costs.

Figure 5: *Product Introduction Probability by Firm Size*

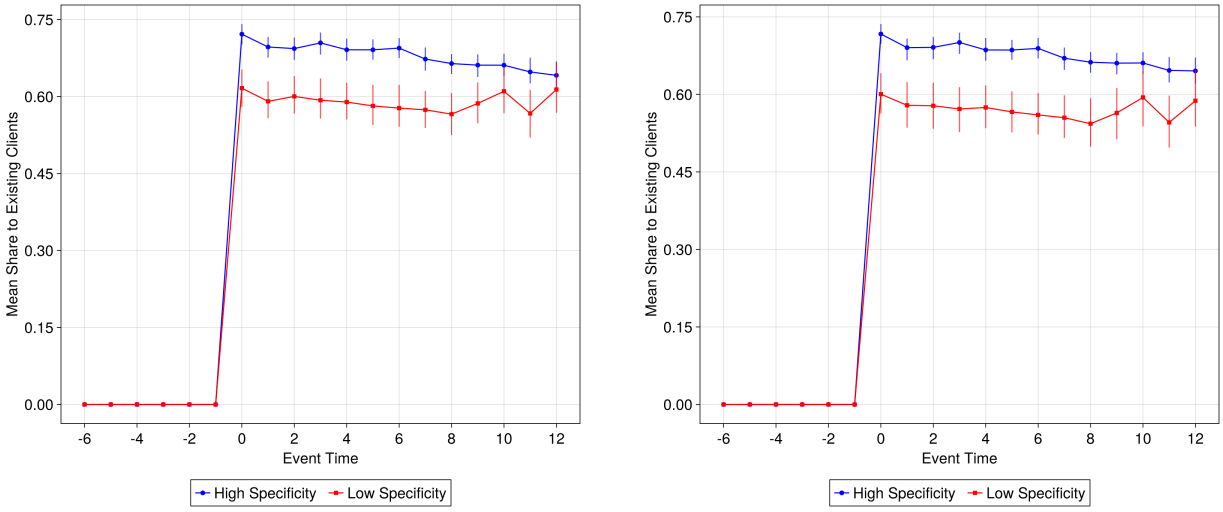


Notes. Binscatter plot showing the relationship between firm size and probability of product introduction. Firms are grouped into deciles based on total assessed transaction value. Each point represents the average probability of introducing a product for firms in that size decile.

3.3.1 Transaction Costs

Our first explanation centers on transaction costs. When transactions generate ex-post rents, parties may hold up transactions to appropriate a larger share of the rents (Klein, Crawford, & Alchian, 1978; Williamson, 1971, 1989). These transaction costs are likely higher when products are more specific to the production process and have fewer alternative uses. Firms may rely more on existing clients when introducing products with higher specificity. To measure, we employ the classification system developed by Rauch (1999), which categorizes goods into three types: reference-priced in trade publications (r), traded on organized exchanges (w), and neither (n). Products traded on organized exchanges or reference-priced in publications operate in market conditions with numerous buyers and sellers, reducing hold up potential. We construct two specificity measures: first, a measure combining reference-priced and exchange-traded goods; second,

Figure 6: *Product Homogeneity Analysis for Frequent Firms*



(a) *R&W* **(b)** *R*

Notes. Share of new product sales to existing clients by product homogeneity measure using Rauch classification. Blue lines represent high specificity products, red lines represent low specificity products. R&W combines reference-priced and exchange-traded goods; R uses only reference-priced goods. Event time 0 represents product introduction. 95% bootstrap confidence intervals shown.

a measure using only reference-priced goods.[4] Both measures are split at their median values, with higher values indicating more homogeneous products.

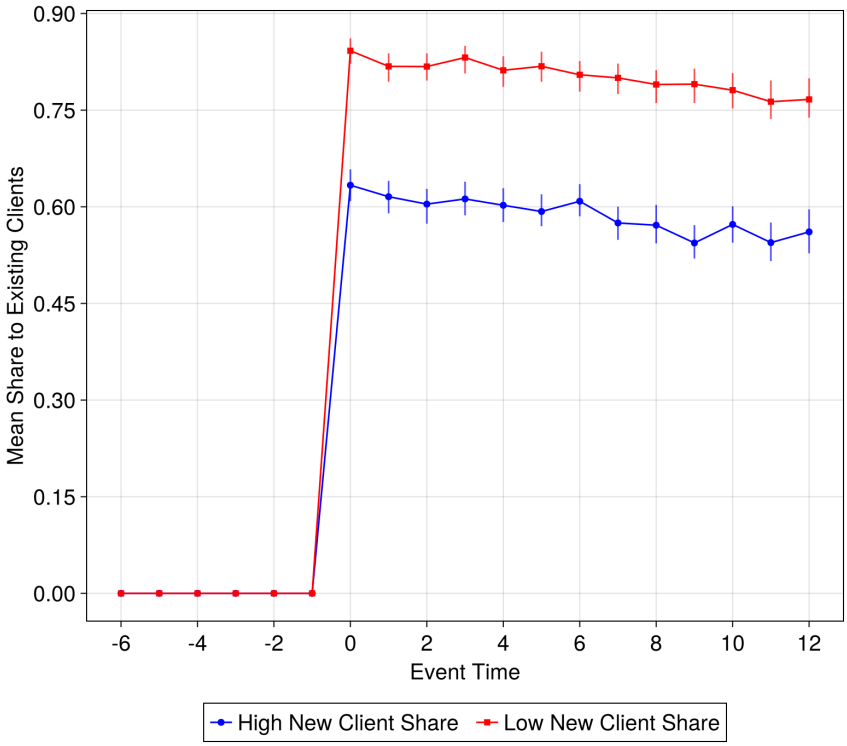
Figure 6 presents the results. We find that firms rely more on existing clients for products that are less homogeneous.

3.3.2 Search Costs

Our second explanation focuses on search costs. Firms with higher costs of finding new clients may rely more on existing clients when introducing products. We proxy for search costs by measuring client-base churn prior to product introduction. Specifically, we calculate the monthly share of sales going to new clients, defined as clients who did

[4]We use the conservative classification.

Figure 7: *Share of Sales to Existing Clients by Search Costs*



Notes. Share of new product sales to existing clients by search costs. Event time 0 represents product introduction. 95% bootstrap confidence intervals shown.

not transact with the firm in the previous two months, and average these monthly shares across all pre-introduction months.

We classify firms into high and low search cost groups based on the median value of this measure. Figure 7 shows that firms with lower search costs depend less on existing clients when introducing products.

4 Conclusion

We study the scope of product portfolios in firms and show that existing client relationships play an important role in portfolio expansion. Using administrative data on

firm-to-firm transactions, we document that firms rely heavily on existing clients to purchase their new products. We find that product introductions increase sales for both firms and their clients, with a significant portion of the increase driven by sales of products that are complementary to the newly introduced product. This reliance on existing clients can be explained by transaction costs and search costs, which create barriers to finding and working with new clients.

Our results suggest two mechanisms that may inhibit product innovation in developing countries: reliance on existing client relationships creates barriers for less-connected firms, and firms may underinvest in product introduction due to incomplete internalization of downstream benefits. Addressing these challenges could foster firm growth in developing countries.

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Appendix