

Strategic Adaptations to Competition: Supplier Investment Shifts Following Import Tariff Cuts*

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This paper examines the effects of increased foreign competition on suppliers' choice of relationship-specific investments (RSI). Using import tariff reductions as an exogenous shock, we find that in response to heightened competition, suppliers reallocate their investments from long-term R&D expenses to short-term trade credit, suggesting that they balance the need to retain key customers while mitigating increased holdup risks. Cross-sectional analyses show that the trade-off between R&D and trade credit is most pronounced in firms highly vulnerable to holdup risks, whereas firms more dependent on their supply chain tend to use these complementarily. While suppliers may take other actions such as cost-cutting, increase capex etc., RSI adjustment are more effective in maintaining competitiveness and managing risks in the face of shifting market dynamics. We confirm the robustness of our results through placebo tests, propensity score matching, entropy balancing, stacked regressions, and alternative tariff cut scenarios.

Keywords: Foreign Competition, Trade Credit, R&D, Supply chain, Relationship-specific investment

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1. Introduction

The relationship between suppliers and customers serves as the cornerstone of a thriving economy. This dynamic interplay is not just a transactional exchange; it's a strategic alliance based on mutual gains and trust. A collaborative supply chain is essential for firms to gain competitive advantages, adapt to changing market conditions, achieve operational excellence, mitigate risks, and create value for all stakeholders involved (Cowley, 1988; Hoegl and Wagener, 2005; Terpend, Tyler, Krause, and Handfield, 2008).

Import tariff cuts pose a critical challenge to existing supply chain relationships as customers have access to cheaper alternatives. This threat to the supply chain relationship has acute ramifications for firms given suppliers facing higher risk of losing customers bear higher cost of equity (Dhaliwal et al, 2016), face higher credit spread (Hertzel and Officer, 2012), and have lower profit margins and higher SG&A (Kolay et al., 2016). Therefore, firms have strong incentives to take steps that mitigate the threat of losing key customers on account of tariff cuts. Prior literature has shown that investing in relationship-specific assets as a potent tool to strengthen supply chain relationships. RSIs are costly investments that signal to the customer that the firm is specifically committed to this relationship and helps enhance the durability of the relationship (Kang et. al. 2024).

Suppliers frequently make relationship-specific investments (RSI), such as extending trade credit and investing in R&D, to foster long-term ties with key customers. In this paper, we investigate whether suppliers strategically respond to increased foreign competition through their choice of RSI, such as R&D and trade credit. While both trade credit and R&D are significant investments made by firms to strengthen supply chain relationships, a key distinction between these forms of RSI is that trade credit is a short-term contract, whereas R&D is a longer-term commitment that is costly to reverse. Further, while firms can use trade credit to respond more quickly to increased competition, R&D investments have a longer gestation period. In addition, investing in R&D exposes suppliers to holdup risks arising from incomplete contracts since such relationship-specific assets have limited value outside of the relationship, especially when the supplier has weaker bargaining power (Dass, Kale, and Nanda, 2015).

The disparity between suppliers' choice of RSI is further amplified in a competitive environment. While competition increases suppliers' need to retain their key customers, it also

reduces customers' cost of switching to another supplier, potentially altering suppliers' incentives to invest as they face higher holdup risk. Therefore, firms facing increased competition can strategically reallocate resources across different forms of RSI to remain competitive. Further, while firms might take several actions such as cost-cutting, expanding customer base, or acquisitions to respond to competition, RSI are customer-centric and hence stronger signals to customers, whereas other responses to increased competition are more generalized in nature. Thus, examining trade credit and R&D together allows us to better explain firms' efforts to balance retaining key customers and mitigating supply chain risks.

We start our analyses by examining the impact of tariff cuts on supplier firms' operations. Tariff cuts act as quasi-random shocks that increase competition within supplier industries, leading to substantial impacts on suppliers' profitability and supply chain efficacy. Unlike tariff increases, which can be lobbied for by incumbent firms, suppliers are less likely to lobby for tariff cuts in their own industries. Hence, tariff cuts allow for a setting where the shock to industry competition is exogenous to suppliers' choice of RSI, providing an appropriate empirical design for our study. We show that tariff cuts of 10% or more are associated with decreased profit margins and lower average sales per key customer, i.e., the tariff cuts materially affect supplier performance.

Our main findings show that following tariff cuts, suppliers increase trade credit by 1.2%, a 6.7% increase compared to the average supplier in our sample. In contrast, suppliers reduce their long-term RSI in the form of R&D investments by 0.53%, which is 7% lower than the average supplier. Importantly, we find that the reduction in R&D in response to tariff cuts is concentrated among suppliers who also increase trade credit. Additionally, we find no change to total RSI (sum of trade credit and R&D expense) in response to increased foreign competition. Overall, our results suggest that firms strategically substitute higher-risk, longer-term RSI like R&D with relatively lower-risk, shorter-term RSI like trade credit in response to import tariff cuts.

Suppliers who respond to increased foreign competition by extending more trade credit are also able to maintain their profit margins and average sales per customer, compared to those that don't increase trade credit when their industries face tariff cuts. Since price reduction and reduced profit margins have been shown to be a first-order effects of increased competition (Katic and Petersen, 1994), these findings also point to suppliers extending more trade credit as an alternative to reducing prices to respond to increased competition. Notably, suppliers that increase trade credit

in response to tariff cuts also increase their number of customers, further supporting our hypothesis that the need to retain key customers is an important consideration when competition increases. However, reducing R&D in response to increased competition comes at a cost. Suppliers that cut R&D expenditures experience nearly a 15% decline in profit margins. Thus, while shifting from long-term to short-term RSI offers some benefits, it also comes with significant trade-offs.

Firms can take several alternative actions, such as price reduction, acquisitions, product market innovation, or expanding customer base. We next examine the interplay between these alternative firm actions and firms' choice of RSI. We find that in response to import tariff cuts, supplier firms that increase trade credit also undertake other measures that are faster to implement i.e., cost-cutting and making equity investments in trade partners, further suggesting a shift to shorter-term investments to counter increased foreign competition. However, we find that these alternate measures are not able to mitigate adverse impact of competition on profit margins, highlighting the importance of RSI as a first-order response by suppliers to increased foreign competition when they need to retain their key customers and mitigate holdup risk in a competitive environment.

We next examine the cross-sectional variations in supplier RSI to better understand the interplay between R&D and trade credit. We analyze supply chain dynamics where suppliers would strategically use these two forms of RSI as complements or substitutes as a best response to heightened competition. Suppliers operating within industries with already low market power and weak bargaining leverage are more susceptible to increased holdup risks due to increased competition. Similarly, suppliers exposed to higher ex-ante holdup risks are more vulnerable to exploitation when competition intensifies. Despite these challenges, these suppliers must sustain their trade relationships with key customers to counteract the impact of increased competition. Consistent with this argument, we find that firms with lower market power and those exposed to higher holdup risks to substitute R&D with trade credit as an optimal response to increase in competition.

Suppliers' dependence on their trade partners is another factor that affects their choice of RSI. Suppliers that depend more on their supply chain relationships risk significant losses from losing key customers, and might be limited in their ability to reduce long-term RSI in response to tariff cuts. Consistent with these arguments, we find that suppliers whose customers account for

above-median fraction of sales, who report a unique customer, and suppliers that are smaller in size extend greater amounts of trade credit while also maintaining their investment in R&D in response to tariff cuts. These results indicate that suppliers with greater reliance on their supply chain relationships may use trade credit and R&D as complementary RSI mechanisms when responding to increased foreign competition.

While reducing long-term RSI can help suppliers mitigate holdup risk due to customers' reduced switching costs, shifting from R&D to trade credit could expose suppliers to higher customer default risk. Further, while retaining key customers is critical for all suppliers in a competitive environment, only those with sufficient financial flexibility can respond to increased competition by extending more trade credit. We find that suppliers' higher trade credit extended in response to tariff cuts is concentrated among customers with higher z-scores and suppliers with greater financial strength. These results support our hypothesis that suppliers use trade credit as a means of retaining key customers, but only when suppliers have the financial wherewithal to do so, and only to customers with lower default risk. We also find that suppliers that increase trade credit in response to increased foreign competition reduce their payouts, indicating that suppliers use alternative sources of funds to extend trade credit to retain key customers.

We next investigate alternative channels through which import competition can induce suppliers to reallocate their RSI. Increased foreign competition can lower future profitability (Xu, 2012) and motivate suppliers to manage earnings (Raman and Shahrur, 2008). Consequently, higher trade credit and lower R&D investment in response to increased foreign competition can potentially be attributed to earnings management rather than an optimal risk management strategy. If earnings management were driving our results, we would expect firms with poor earnings quality to reduce R&D and increase accounts receivable more to boost short-term earnings. Contrary to this argument, we find no evidence of earnings management driving the association between suppliers' RSI choices and increased foreign competition. Additionally, we show that suppliers that make RSI adjustments in response to tariff cuts also increase their total number of customers and increase their equity investments in customer firms, a response consistent with managing supply chain risk, rather than earnings management. Overall, these results mitigate the concerns that alternate explanations such as earnings management may be driving our results.

Finally, we conduct several tests to examine the robustness of our findings. First, we use timing tests to show that the positive (negative) association between supplier trade credit (R&D intensity) and tariff cuts does not exist in the years before the tariff cuts. The statistically significant associations appear in the year of tariff cuts and persist for up to two years after the tariff cuts, supporting the causal nature of our findings. Our results are also robust to alternative estimation using stacked regression that mitigates biases from a staggered shock (DiD) setting. To further rule out spurious correlation between tariff cuts and RSI, we conduct placebo tests by assigning tariff cuts to random firm-years and find no evidence that our results may be driven by random chance. Moreover, to ensure that the fundamental differences between treatment and control groups are not driving our results, we confirm our findings on a propensity score matched sample and an entropy-balanced sample. Overall, these results show that our findings are causal in nature and are robust to alternative specifications.

Our paper makes several contributions. First, we extend the findings of prior studies like Fresard and Valta (2016) that examine the relation between corporate investments and industry competition. By focusing on suppliers engaged in strong, established supply chain relationships, where the loss of major customers is particularly costly, we are able to directly study not only changes in levels of investment, but also the nuances of shifts across long-term and short-term investments.

Second, we introduce a previously unexplored mechanism through which suppliers adjust across different forms of RSI in response to heightened foreign competition. Whereas prior studies typically examine the effects of industry competition on trade credit and R&D separately, to our knowledge, we are the first to show that suppliers strategically reallocate resources, i.e., shift investment from long-term R&D toward trade credit, when faced with increased foreign competition. We also identify firms' motivation behind these actions by showing that firms are willing to accept potential long-term value decreative actions such as lower R&D (which comes at the cost of lower profit margin) to facilitate optimal response to increased competition. Moreover, we document that firms complement these RSI adjustments with additional short-term-oriented strategies such as cost-cutting, expanding customer base, and equity investments in customer firms to mitigate the adverse effects of rising foreign competition. Taken together, our findings offer a more comprehensive view of firms' strategic responses to increased foreign competition, revealing

how they employ a portfolio of actions rather than isolated adjustments when competitive pressures intensify.

Third, our paper documents substantial heterogeneity in firms' responses to rising foreign competition. We show that firms facing high ex-ante holdup and financial risks, and those with weaker bargaining power, exhibit a stronger propensity to substitute high-risk, long-term R&D with shorter-term, lower-risk RSI, such as trade credit. In contrast, firms more dependent on their supply chain relationships, where losing customers is more costly, treat R&D and trade credit as complementary forms of RSI – these firms extend more trade credit without reducing their R&D investment. Together, these findings help improve our understanding of how firms adjust the composition of their RSI when foreign competition intensifies.

Finally, we attempt to address the mixed findings in the literature on trade credit and competition. While Fisman and Raturi (2004) find that supplier monopolies offer less trade credit, others (Chod et al., 2019; Petersen and Rajan, 1997) argue that trade credit declines with increased industry competition. These studies, however, rely on potentially endogenous measures of competition. By examining trade credit and R&D together, and by using tariff cuts as an exogenous shock to supplier industry competition, we can reconcile these seemingly contrasting findings. We show that firms facing heightened foreign competition extend more trade credit to preserve supply chain relationships, while simultaneously reducing the use of risky and longer-term R&D investment as a commitment mechanism. We contribute to the literature that examines the interplay between industry competition and corporate policies by showing that firms' extent of investments in their customer-supplier relationships is a nontrivial channel through which they respond to industry shocks, and our results identify profitability and sales efficiency as key channels through which increased foreign competition affects suppliers' relationship-specific investments.

The rest of the paper is organized as follows. Section 2 provides an overview of relevant existing literature and develops our main hypotheses. Section 3 discusses our data and research design, while Section 4 details our empirical results. Section 5 concludes.

2. Literature Review and Hypothesis Development

2.1 *Relationship-specific investments and corporate policies*

Firms along the supply chain invest in relationship-specific assets to signal their commitment to their trade partners. However, these investments have little value outside of the relationship and expose firms to holdup risks. Empirical evidence suggests that suppliers as well as customers demonstrate their commitment to their trade partners through RSI. For example, firms maintain lower debt, keep more cash, and have lower CEO incentive-based pay to signal lower cash flow risk and to induce their supply chain partners to make greater relationship-specific investments (Kale and Shahrur, 2007; Kale et al., 2016) and to reduce the risk of losing relationship-specific investments (Banerjee et al., 2008). Firms also take other confidence-building measures, such as having overlapping ownership (Freeman, 2023), buying minority stakes (Nain and Wang, 2018), and sharing board seats (Minnick and Raman, 2017) to improve trust in each other. Harford et al. (2019) find that firms with significant trade relationships are less likely to participate in mergers and acquisitions, whereas Chen et al. (2023) show that suppliers facing increased competition relocate closer to their customers.

For suppliers specifically, losing key customers is costly. Suppliers experience lower margins following bankruptcy of their customers as well as higher SG&A costs due to replacing such bankrupt customers (Kolay et al., 2016). The risk of losing a major customer is also associated with higher cost of equity (Dhaliwal et al., 2016) and wider credit spreads (Jorion and Zhang, 2009) for suppliers. Indeed, the risk of losing key customers, especially when revenue is concentrated among a few customers, is material enough that CEOs of suppliers with such concentrated customer base are offered higher incentive-based compensation.

Increased competition further amplifies the risk of losing key customers, since these customers can now easily switch to other suppliers. Thus, suppliers invest in costly RSI to maintain their supply chain relationships. Two important channels through which suppliers make relationship-specific investments (RSI) are extending trade credit and making R&D investments. A large body of research examines the importance of trade credit in firms' strategic goals. For example, firms use trade credit as an alternative form of external finance since suppliers may be better at assessing customers' credit risk and customer product quality compared to banks (Petersen and Rajan, 1997; Biais and Gollier, 1997; Ng et al., 1999; Cunat, 2007). Suppliers also use trade

credit as a commitment device when they trade non-standard goods (Gianetti et al., 2011), when customers have high bargaining power (Dass et al., 2015), and to dampen the price response to increased competition. The literature also finds that firms leverage relationship-specific R&D investments to maintain their relationships with strategic trade partners (Allen and Phillips, 2000; Kale and Shahrur, 2007; Fee et al., 2006; Raman and Shahrur, 2008). Further, this literature suggests that firms that invest in R&D are likely to have a stronger and stable supply chain relationships (Perry, 1989; Kang et al., 2024).

While firms take several other actions to strengthen their supply chain relationships, such as equity investments in partner firms, sharing board members, and forming joint ventures (Minnick and Raman, 2017; Harrigan, 1988; Houston and Johnson, 2000; Fee, Hadlock and Thomas, 2006; Freeman 2023), we focus on trade credit and R&D for several reasons. First, both R&D and trade credit are significant investments by firms in their supply chain relationships¹. In our sample, firms that are suppliers in significant supply chain relationships spend, on average, \$200 million on R&D and \$290 million on trade credit – almost 10% and 20% of total assets – respectively. However, a key difference between trade credit and R&D investments as tools of RSI commitments is that trade credit is a shorter-term investment, while R&D investments is a longer-term commitment. In response to new information or a changing competitive landscape, firms should be able to adjust the terms and extent of trade credit relatively faster. On the other hand, R&D investments may be costly to reverse once a supplier or customer has committed to the RSI (Dasgupta and Tao, 2000; Fee, Hadlock, and Thomas, 2006; Raman and Shahrur, 2008). Further, while R&D has a longer gestation period, firms can extend trade credit faster. As a result, suppliers can use trade credit to react more swiftly to increased competition.

The inherent differences between trade credit and R&D investment allow us to examine whether firms strategically choose between these commitment mechanisms to balance relationship strength and supply chain risks in response to increased foreign competition. By examining both

¹ Since firms are not required to report trade credit extended and R&D expenses by each trade partner, we only observe these RSI at the supplier level rather than at the supplier-customer level. Nonetheless, since both these investments help firms strengthen their trade relationships and communicate their commitment, we use trade credit and R&D as aggregate measures of RSI. Thus, consistent with prior literature, all our analyses in the paper are at the supplier-year level.

short- and long-term aspects of RSI, we provide a novel perspective on supplier-customer relationships in the presence of increased competition.

2.2 *Product market competition and corporate policies*

Extant literature has examined the effect of industry competition on corporate policies. This literature documents that product market competition significantly impacts firms' capital structure decisions (MacKay and Phillips, 2005), payout policies (Grullon and Michaely, 2007; Hoberg et al., 2013), and the cost of debt (Valta, 2012). A significant body of research within this literature exploits tariff cuts as an exogenous shock to industry competition and examines firms' response to increased foreign competition. For example, Fresard (2010) shows that firms with large cash reserves are able to respond to increased foreign competition by gaining market share, whereas Fresard and Valta (2016) find that firms counter increased import competition by reducing capital investments. Using USITC data, Srinivasan (2020) finds that domestic firms react to increased foreign competition by making more acquisitions, whereas Bai (2021) uses plant-level data and finds that following tariff cuts, conglomerates are more likely to restructure to focus on their core competencies and improve productivity. Bakke et al. (2022) find that tariff cuts impact managers' risk-taking incentives, reducing CEOs' compensation vegas. Thus, it is well established that import tariff cuts lead to significant increases in product market competition that have broad ramifications.

In the context of industry competition, the evidence so far on whether firms extend more or less trade credit is mixed. For example, Chod et al. (2019) argue that since cash constrained customers can utilize trade credit from one supplier and increase cash purchases from another supplier, suppliers with a smaller share of their customers' sales will extend less trade credit. Their findings suggest that competition for a customer's share of purchases is associated with lower trade credit. On the other hand, Fisman and Raturi (2004) argue that customers with monopolistic suppliers are unwilling to invest upfront and establish creditworthiness before receiving trade credit, since such suppliers can holdup their customers and extract all surplus ex post. Therefore, customers with monopolistic suppliers do not avail much trade credit. As a result, lower competition in supplier industry is associated with lower use of trade credit.

2.3 Hypothesis development

2.3.1 Strengthening supply chain relationships vs. mitigating holdup risk

We extend prior literature by examining changes in suppliers' RSI choices in response to tariff cuts in supplier industries, as well as the interplay between trade credit and R&D as forms of RSI. Increased competition in the supplier industry increases customers' opportunity set, and consequently, reduces customers' switching costs. Since it is costly to lose key customers, we posit that suppliers respond by making strategic changes to RSI to retain key customers. This leads to the prediction that suppliers should increase RSI in response to import tariff cuts (Relationship Strengthening Hypothesis). However, such a strategy is not without risks. Increased competition erodes suppliers' bargaining power and exposes them to higher holdup risks. This risk is further enhanced for firms that make longer-term RSI. This argument leads to the prediction that suppliers would respond to increased foreign competition by reducing investment in long-term RSI to mitigate holdup risk (Risk Mitigating Hypothesis).

Ultimately, suppliers must balance the two opposing effects of increased foreign competition due to tariff cuts. We argue that suppliers respond to increased foreign competition through a combination of R&D and trade credit investments to balance the need to mitigate holdup risk with the importance of retaining key customers. While R&D has a longer gestation period, extending more trade credit is a relatively quicker adjustment. As a result, suppliers can use trade credit to react more swiftly to increased competition. In addition, trade credit poses lower holdup risks compared to R&D investment due to its shorter duration. Therefore, we conjecture that firms use short-term investments such as trade credit to strengthen supply chain relationships while simultaneously reducing riskier investments such as R&D when faced with increased competition. Thus, our hypotheses stated in alternative forms are:

H1a: Relationship Strengthening Hypothesis: Suppliers increase trade credit in response to increased foreign competition to retain key customers.

H1b: Risk Mitigating Hypothesis: Suppliers reallocate their RSI investment from R&D expenses to trade credit in response to increased foreign competition.

2.3.2 *Substitution vs. complementary use of R&D and trade credit*

While, on average, we expect firms to increase short-term RSI (trade credit) and reduce long-term RSI (R&D) in response to tariff cuts, suppliers' reactions to heightened foreign competition are unlikely to be uniform. A firm's choice of RSI depends critically on the relative cost of losing customers versus the holdup risk associated with relational investments. Accordingly, in the subsequent sections, we examine how suppliers' RSI decisions vary with customer ex-ante holdup risk, the strength of supply chain relationships, suppliers' product-market positions, and their financial health. Specifically, we investigate supply chain conditions under which firms substitute between trade credit and R&D, as well as conditions under which these two forms of RSI operate as complements.

We expect firms that face high ex-ante holdup risk and weaker bargaining power to be particularly cautious about undertaking additional long-term, non-contractible investments when competition intensifies. Yet, because losing key customers is costly, these firms still need to preserve supply chain relationships. Consequently, we predict that such firms will exhibit a greater tendency to substitute long-term RSI, such as R&D, with shorter-term, lower-risk RSI, such as trade credit.

In contrast, suppliers embedded in their supply chain relationships, where dependence on customer is high and maintaining the relationship is critical for the suppliers, cannot easily scale back their long-term R&D even if holdup risk increases. For these firms, we expect an increase in trade credit without reducing R&D, treating the two forms of RSI as complementary.

H2a: Substitution effect: Suppliers facing high ex-ante holdup risk and weaker bargaining power respond to increased foreign competition by substituting long-term RSI (R&D) with short-term RSI (trade credit); i.e., they increase trade credit while reducing R&D investment.

H2b: Complementary effect: Suppliers highly dependent on their supply chain relationships treat R&D and trade credit as complementary forms of RSI; i.e., they increase trade credit in response to foreign competition without reducing R&D investment.

2.3.3 *Trade credit, supplier financial strength, and customer default risk*

While substituting R&D with trade credit helps suppliers mitigate holdup risk while maintaining supply chain relationships, it exposes them to customer default risk. Prior literature

finds that suppliers support their key customers by extending greater trade credit when they face financial constraints or when alternate credit supply is not available (Petersen and Rajan, 1994;1997). However, increasing trade credit to customers in such a scenario would exacerbate overall risk that suppliers face when foreign competition increases. We expect that suppliers would extend greater trade credit to only those customers that are financially stronger.

Further, suppliers should have financial slack to be able to extend greater trade credit. We propose that trade credit increases will be concentrated in suppliers that are financially able to respond in such a way to increased foreign competition.

H3a: Suppliers extended greater trade credit following import tariff cuts when their customers are financially stronger i.e., have high Z-scores.

H3b: Financially strong extend more trade credit to their key customers in response to import tariff cuts.

3. Data and Research Design

3.1 Sample

Our sample consists of all firms covered by the Compustat customer segment database between 1999 and 2022.² SFAS 131 requires firms to report sales to all customers that account for more than 10% of total sales. Some firms voluntarily report customers who are important but account for less than 10% of total sales. To avoid potential biases due to firms' voluntary reporting, we follow prior literature and include only the trade relationships with customers that account for at least 10% of the total supplier sales (Cohen and Frazzini, 2008; Cen et al., 2017; Minnick and Raman, 2017; Kang, Nemani, and Raman, 2024). We aggregate our sample at the supplier-year level and exclude observations with missing controls from Compustat and CRSP databases. We then merge our sample with the import tariff data from the U.S. International Trade Commission's (USITC) website. Our final sample consists of 16,391 supplier-year observations.

² The customer segment database links customer identifiers from historical CRSP and Compustat using fuzzy name-matching algorithm along with manual verification. The records are further calibrated and complemented by publicly available data and data contributed by researchers (Cen et al., 2017; Cohen and Frazzini, 2008).

3.2 Key variables

3.2.1 Import tariff cuts

To measure increases in competition, we follow recent literature that uses tariff cuts as an exogenous shock to industry competition (Fresard, 2010; Xu, 2012; Fresard and Valta, 2016; Srinivasan, 2020; Bakke et al., 2022, to name a few). Although import tariff cuts are not entirely unpredictable, they are largely independent of firms' corporate decisions, allowing a quasi-natural experiment setting to study the causal association between competition faced by suppliers and changes in their choice of RSI. Moreover, firms' lobbying efforts tend to be focused on tariff increases in their industries rather than tariff cuts. Hence, tariff cuts provide a quasi-random shock to the supplier industry that are largely exogenous to suppliers' responses through RSI changes.

We calculate tariff rate as the ad-valorem duty scaled by the dutiable import value for all MFN countries for each industry-year. We download data on ad-valorem duties collected and the dutiable value of imports from Most Favored Nations (MFN) from the U.S. International Trade Commission's (USITC) website. Since our analyses use tariff cuts as an industry-level shock, we aggregate the tariffs across all products within each 6-digit NAICS for each year. Further, all WTO members accord each other the status of Most Favored Nations (MFN), and countries enjoying the MFN status are charged the same tariff rates³. This allows us to aggregate import tariffs across MFN countries to create our tariff cut variables at the industry-year level. Finally, since the USITC database switches from SIC- to NAICS-based industry classification in 1997, we start our import tariff sample in 1998 to ensure a consistent industry classification throughout our sample.

For each industry, we define tariff cuts as the percentage change in the tariff rate for that industry from year $t-1$ to year t . Our independent variable of interest (*Decdummy*) is a binary variable that takes a value of one if the percentage change in tariff rate is -10% or less (this roughly coincides with the 10th percentile value of percentage change in tariff rates), zero otherwise. As a robustness check, we also use alternate thresholds to define the tariff cut dummy variables to take

³ The WTO agreements impose binding tariffs equally on all trading partners by providing member nations with Most Favored Nations (MFN) status. Further, the WTO is also responsible for taking disciplinary actions against countries that export at unfairly low prices (Anti-Dumping Agreement) as well as against countries that provide subsidies to domestic firms to counteract the effect of the tariff cuts. Thus, using import tariff rates faced by MFN countries implies that all exporters to the U.S. face a uniform tariff rate, making it feasible to aggregate tariff data across countries. See https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm8_e.htm.

a value of one if the percentage change in tariff rate is -2% or less (*Decdummyalt1*), -15% or less (*Decdummyalt2*), and -20% or less (*Decdummyalt3*), respectively. To ensure that our results are not influenced by transitory cuts in import tariffs, we replace the tariff cut dummy variables with zero for years where a tariff cut is followed by an increase in tariff rates by an equivalent value or more within two years of the tariff cut.

Since most U.S. tariff cuts have historically been bilateral or multilateral and stem from WTO agreements, one concern could be that suppliers in our sample that face tariff cuts in their industries may also face lower export costs, enabling them to compete abroad better. This could allow them to offset the loss of key domestic customers by acquiring new ones overseas. However, building supply chain relationships takes time, and acquiring new customers in foreign markets immediately following lower tariffs is not a trivial undertaking (Eaton, et al., 2021). On the other hand, retaining existing key customers where the supplier has already invested significant time and effort is a more immediate need when faced with the threat of new entrants⁴. Thus, it is not clear why a supplier facing increased competition in the domestic market would choose to acquire new customers overseas rather than focus on retaining key customers. Moreover, if suppliers' improved competitiveness abroad fully offsets the increased domestic competition, we would expect no significant relationship between tariff cuts and changes in RSI.

Another concern could be that since tariff cuts are often instituted as part of larger bilateral or multilateral agreements, multiple industries could be facing tariff cuts at the same time, including suppliers' input industries. Therefore, suppliers facing tariff cuts in their output industries could also simultaneously benefit from lower input costs due to competitive input prices as well as reduced costs of switching from one supplier to another. Such suppliers experiencing tariff cuts in their input industries could at least partially be offsetting the increased competition they face in the output industries. However, tracking tariff changes to a supplier's input industries can be challenging. A supplier might source inputs from multiple industries, and not all of them might experience tariff cuts. Indeed, it is possible that tariff cuts in one input industry offset tariff cuts in another input industry. To the extent that increased foreign competition in the suppliers'

⁴ A related question is whether tariff increases are associated with reduced trade credit and increased R&D expenses. While this is an interesting conjecture, suppliers can lobby for tariff increases within their industries and, therefore, are not necessarily exogenous to suppliers' RSI choices. While we do find a positive correlation between R&D investment and import tariff increases, the coefficient is not statistically significant.

output industry if accompanied by tariff cuts in the input industries as well, this should bias us against finding significant changes in supplier RSI in response to increased foreign competition.

Finally, we look for major tariff policy changes affecting U.S. import tariff structures during our sample period. While the multilateral negotiations under the Doha Development Agenda (DDA) initiated by the WTO in 2001 eventually stalled, the U.S. entered into several bilateral trade agreements with Singapore, Chile, and Australia during the early part of our sample between 2004 and 2005. These also mark a general shift in the U.S. tariff regime toward bilateral free trade agreements rather than multilateral agreements over our sample period. Another notable change to the U.S. tariff structures during our sample period is the renegotiation of NAFTA to be replaced by the US-Mexico-Canada Agreement (USMCA) in July 2020⁵. Overall, we find little cause for concern that our use of tariff cuts to measure increased foreign competition in the supplier industries could be confounded by alternative mechanisms where multilateral agreements could be affecting supplier's ability to compete in foreign markets or by suppliers facing lower input costs upstream.

Table 1 presents tariff cuts by 3-digit NAICS industries. *Duty (Mean)* presents the average tariff for each industry, whereas *%Change (Mean)* and *%Change (Median)* present the average and median percentage changes in tariffs from the prior year, respectively. Oil and Gas, Forestry, and Minerals and Ores have some of the lowest tariff rates, whereas industries like primary metal manufacturing, computers and electronic products, and several others have tariff rates above 5%. Our sample has an average duty cut of 12.7% (of the existing tariffs), and a range between 0.7% and 73.5%.

3.2.2 *Relationship-specific investments (RSI)*

Our measures of short-term and long-term RSIs are trade credit and R&D intensity, respectively. We define trade credit as total account receivables scaled by sales, and we define R&D intensity as the R&D expenses scaled by total assets. Extensive literature has shown that firms use trade credit and R&D investments to strengthen supply chain relationships. Firms make R&D investments to produce specialized products for their key customers. These assets often have

⁵ The recent tariff increases under the current administration are outside of our sample period, which ends in 2022. A detailed timeline of trade agreements that overlap with our sample period can be found at https://www.usitc.gov/publications/332/us_trade_policy_since1934_ir6_pub4094.pdf.

little value outside of the relationship and are intended for specific customers (Aghion and Tirole, 1994; Kale and Shahrur, 2007; Banerjee, Dasgupta, and Kim, 2008; Raman and Shahrur, 2008; Minnick and Raman, 2017). Similarly, trade credit has been shown to be used by firms to support supply chain partners and to strengthen customer-supplier relationships (Fabbri and Klapper, 2016; Burkart and Ellingsen, 2004; Dass, Kale, and Nanda, 2015).

3.2.3 Summary statistics

Table 2 Panel A provides summary statistics for our key variables. We use control variables standard to this literature in our regressions, including firm size, firm age, cash holdings, market-to-book value of assets, as well as RSI-specific controls like relationship sales and number of customers. Table A1 in the Appendix defines all control variables used in our analyses. The average (median) firm in our sample extends 17.63% (14.64%) of its sales as trade receivables (*Trade Credit*) and spends 7.6% of its assets in R&D (*R&DIntensity*). On average suppliers report 2.4 number of key customers per year. Further, about 4.1% of firm-years in our sample face a tariff cut of 10% or more (*Decdummy*).

Our treatment sample consists of supplier firms that face a tariff cut of 10% or more from the previous year, whereas our control sample consists of all other supplier firms. Panel B of Table 2 presents firm-specific variables for the treatment and control samples. Univariate tests indicate that on average, suppliers that face tariff cuts tend to offer significantly higher trade credit as a percentage of their total sales and have lower R&D expenses than supplier firms that do not face increased foreign competition. Comparisons of other variables in Table 2 also suggest that industries that face tariff cuts tend to have smaller and younger firms with greater sales growth and lower dividends and repurchases compared to suppliers in industries that do not face tariff cuts.

3.3 Empirical design

We use a difference-in-difference model to test our main hypotheses that suppliers respond to increased foreign competition by increasing trade credit in the short-term and reducing R&D expenses. We test our main hypotheses using the following regression equations:

$$Y_{i,t} = X'_{i,t-1} * \beta_i + \gamma_i * Decdummy_{j,t-1} + Firm\ FE + Industry - Year\ FE + \epsilon_{i,t} \quad (1)$$

$$Z_{i,t} = X'_{i,t-1} * \beta_i + \gamma_i * Decdummy_{j,t-1} + Firm\ FE + Industry - Year\ FE + \epsilon_{i,t} - (2)$$

Where $Y_{i,t}$ and $Z_{i,t}$ are firm i 's receivables scaled by sales and R&D expenses scaled by total assets, respectively, in year t . Our main measure of increase in foreign competition is defined as a binary variable that takes a value of one if a firm's industry faces a percentage decrease in tariff rates by 10% or more compared to the previous year, zero otherwise (*Decdummy*). We measure all right-hand side variables in year $t-1$ to mitigate potential concerns of reverse causality. To control for unobserved time invariant firm-specific characteristics as well as for variations across industries and years, we use firm and industry-year fixed effects in our analyses, and we correct for heteroskedasticity by clustering our standard errors at the firm-level.

4. Results

4.1 Import Competition and Suppliers' Operations

We start our analyses by examining the impact of foreign competition on supplier profitability and supply chain performance. Industrial trade literature has documented ample evidence of foreign competition reducing price-cost margins and constraining market power (Pugel, 1980; DeRosa and Goldstein, 1981; Katics and Petersen, 1994). Using supplier profitability and sales from key customers, we examine whether increased foreign competition has a material impact on suppliers. Table 3 presents these results. In Column (1), we find that a reduction in import tariffs by 10% or more is associated with a reduction in suppliers' net profit margins by 2.3% versus average net margin of -3.2%. Column (2) shows that for suppliers in industries facing tariff cuts, the average sales per customer declines by almost \$22.5 million, which translates to nearly 10% decrease compared to mean sales per customer. Thus, these results indicate that increased foreign competition has a significant impact on suppliers' profitability as well as sales efficiency.

4.2 Main Results

We present the results from tests of our main hypotheses in Table 4. Column (1) shows that for the average supplier firm, a percentage decrease of 10% or more in the ad-valorem tariff rate (*Decdummy*) is associated with a 1.37% increase in trade credit offered to customers, whereas (2) reports that *Decdummy* is associated with an almost 0.53% reduction in R&D intensity. In terms

of economic significance, these results imply that suppliers in industries that face a tariff cut of 10% or more increase trade credit by 7.75% (1.37/17.63) and decrease R&D by 6.9% (0.526/7.586) compared to the average firm in the sample. In Column (3), we find no significant change in suppliers' total RSI (calculated as the sum of trade credit and R&D expenses scaled by total assets) in response to increased foreign competition, suggesting that suppliers substitute short-term RSI for long-term RSI to balance the need to retain key customers and the need to mitigate increased holdup risk from customers.

To further support our substitution argument, we use subsample analysis to directly examine whether R&D decreases and trade credit changes are correlated. In Columns (4) and (5), we find that in response to material tariff cuts, decrease in R&D intensity is concentrated in suppliers that increase trade credit, indicating that suppliers trade off short-term and long-term RSI to mitigate the adverse effects of increased competition.

If tariff cuts as part of larger multilateral agreements affect suppliers' input as well as output industries simultaneously, such suppliers could benefit from reduced input costs while also facing increased competition in their output industries. We repeat our main tests in Columns (1) and (2) after controlling for supplier COGS to ensure that suppliers' shifts in RSI is a significant response to increased competition even after controlling for changes to their input costs. We also control for average customer leverage and average z-score of key customers in these tests and find that our results are robust to including these controls. We present these results in Table A2 in the Appendix. Overall, consistent with our hypotheses, we find that suppliers facing increased foreign competition tend to increase trade credit to strengthen their relationship with key customers, while reducing their R&D investments to mitigate the increased holdup risk from their key customers.

Recent studies (Cengiz et al. 2019, Baker et al. 2022) have highlighted that staggered DiD estimates are biased because of two reasons. First, standard DiD estimation uses previously (or later) treated firms as control group, which biases the coefficients. Second, the time-varying nature of the impact may bias the findings. Baker et al. (2022) suggest a staggered estimation approach to mitigate these biases. To implement this approach, we identify each treatment i.e., import tariff cut as a separate event and create a pool of control firms consisting of observations that never face a tariff cut through the sample period. We then create a new database by stacking treatment and control group observations for an event window of -3 to +3 years around the treatment period. Our

stacked sample consists of 28,907 firm-years. We estimate our results using firm fixed effects, industry fixed effects, and event-year fixed effects. Panel A of Table 5 reports the results. Our main finding that firms increase trade credit and reduce R&D in response to import tariff cuts remains robust to using this approach.

To alleviate concerns of reverse causality, we conduct timing and placebo tests as robustness checks. First, we regress our measures of relationship-specific investments on separate dummy variables that take a value of one for four years before through four years after an industry faces a tariff cut of 10% or more, respectively. If our results were driven by reverse causality, we should see significant changes to supplier RSI in the years prior to tariff cuts. Panel B of Table 5 presents the results from these timing tests. We find a significant positive (negative) association between supplier trade credit (R&D intensity) and tariff cuts for the years of and up to two years after the tariff cuts. However, we find no significant changes in supplier RSI for the years before the tariff cuts. These results support the causal nature of the association between increased foreign competition and changes to short-term and long-term RSI by supplier firms.

To ensure that fundamental differences between treatment and control groups are not driving our results, we repeat our main tests using a propensity score-matched sample and an entropy-balanced sample. For propensity score matching, we match treated and control firms on all firm-level variables in our main specification and confirm that the matching process results in reduced bias and greater similarity between the two groups. Panel A of Table 6 confirms that our results in Table 4 hold for the propensity matched sample. Panel B of Table 6 presents results of the entropy balanced sample. Following Hainmueller (2012), we use the reweighting scheme to adjust for inequalities in representation with respect to the higher moments of the covariate distributions. We confirm that following reweighting, the first and second moments of the sample are balanced and our findings persist in the entropy-balanced sample.

Next, we conduct a placebo test to rule out the concern that our results may be driven by some unobserved biases in our sample or test design. We replace our key independent variable *Decdummy* with a variable that assigns tariff cuts to random firm-years. If the significant association between increased foreign competition and supplier RSI is indeed causal, we should find no significant association between increased (decreased) trade credit (R&D investments) and randomly assigned tariff cuts. In Panel C of Table 6, we find evidence consistent with this

argument. Overall, these findings indicate that our main results in Table 4 that tariff reductions in the suppliers' industry are associated with increased trade credit and reduced R&D intensity are unlikely to be the result of spurious correlation or driven by reverse causality.

Finally, Panel D of Table 6 shows that our results are robust to using alternate cutoffs for defining our tariff cut variables. We define the tariff cut dummy variables to take a value of one if the percentage change in tariff rate is -2% or less (*Decdummyalt1*), -15% or less (*Decdummyalt2*), and -20% or less (*Decdummyalt3*), respectively. Consistent with our hypotheses, we find that in all except one column, increased foreign competition is significantly associated with supplier firms increasing their short-term RSIs while reducing their long-term RSIs, suggesting that our results are unlikely to be an artifact of the way we measure increased foreign competition.

4.3 *Supplier response to import competition and supplier profitability and sales efficiency*

We next examine how firms' responses to tariff cuts impact their performance. We specifically examine how changes in trade credit and R&D affects firm's profitability and sales to key customers. Table 3 shows that when foreign competition increases, suppliers face decreases in profit margins and sales to key customers. To the extent that suppliers increase trade credit to retain key customers and mitigate the adverse effect of increased competition, we should observe the benefits of such responses in suppliers' profit margins, customer retention, and sales to key customers. Further, we also examine the impact of reduction in R&D on suppliers' profitability measures. Specifically, we ask whether decreasing investments in innovation affects suppliers' ability to compete.

In Panel A of Table 7, we show that suppliers who increase trade credit in response to increased competition experience no adverse effects on profitability or average sales per customer. Such suppliers also increase their number of key customers, suggesting that suppliers do indeed increase trade credit in response to increased competition to retain key customers. Conversely, suppliers that do not increase trade credit in response to tariff cuts face significant negative impacts: net margin drops by 14.9%, and sales to key customers decreases by \$46.5 million (~27% of average sale per customer of \$170 million). These results suggest that extending more trade credit helps suppliers mitigate the adverse impact of competition on profitability, ability to retain key customers, and maintain sales to key customers when faced with increased foreign competition.

The results regarding R&D intensity are also significant. Suppliers that reduce R&D investments in response to increased competition experience a decline in profitability, indicating that efforts to mitigate holdup risks by cutting long-term investments come at the cost of reduced margins. However, we do not find that R&D cuts significantly affect sales per key customer or suppliers' ability to retain key customers.

In Panel B, we examine that the efficacy of alternate measures like cost-cutting, acquisitions, and capital investments in mitigating the effect of tariff cuts on firm outcomes. We find that supplier' cost-cutting, acquisitions, or capex increases are not effective in maintaining suppliers' profit margins or retaining sales per key customer. Thus, we find that changes to RSI are a first-order response by suppliers, and that responding through RSI is more significant for their profit margins compared to measures like cost-cutting and capital investments.

Overall, these results indicate that these other measures may be anecdotally significant for most firms facing increased competition, strategically investing in RSI is a more effective response that allows suppliers to signal their commitment to their customers when competition reduces customers's cost of switching to other suppliers.

4.4 *Trade credit and R&D as substitutes: Cross-sectional analyses*

Our baseline results show that firms increase trade credit and reduce R&D expenses in response to increased foreign competition. This is consistent with our hypotheses that suppliers respond to competition through their choice of RSI to retain key customers as well as to mitigate increased holdup risk from customers with lower switching costs. However, they may not respond to increased competition uniformly as their response would vary depending on their relative holdup risk, bargaining power, and relationship importance. To further explore this heterogeneity in firm response, we examine how suppliers' choices of RSI change with cross-sectional variations in supply chain characteristics.

First, we study if supplier firms' market power prior to the tariff cuts moderates how suppliers respond to increased foreign competition. Dass et al. (2015) find that low-market-power firms use trade credit to strengthen supply chain relations. The effect of increased foreign competition is more severe on suppliers with weak market power, and hence, the *Relationship Strengthening Hypothesis* suggests that in response to tariff cuts, suppliers with weaker ex-ante

market power should increase RSI more than suppliers with greater market power. Simultaneously, the risk of holdup would be more pronounced for suppliers with lower market power as they have less bargaining power in the relationship. Hence, according to the *Risk Mitigating Hypothesis*, we should find that suppliers with lower ex-ante market power reduce their RSI more when faced with increased import competition compared to suppliers with higher market power. Overall, we posit that suppliers with lower market power should substitute high-risk R&D with relatively lower-risk trade credit in response to increased foreign competition to balance the need to retain key customers and manage enhanced holdup risk.

We draw on existing literature to identify suppliers with low market power – firms with below median HHI within their industries (Gaspar and Massa, 2006), firms with product fluidity higher than the industry median (Hoberg et al., 2014), and firms with above-median product similarities (Hoberg and Phillips, 2016). We present results from this analysis in Panel A of Table 8 and show that our main findings that supplier firms increase trade credit in response to increased foreign competition is further amplified for firms with lower ex-ante market power. Specifically, in Columns (1) through (3), we find that in response to increased foreign competition, suppliers with low ex-ante market power increase trade credit by 2.5% to 3.1%. In contrast, high-market-power suppliers do not increase trade credit in response to tariff cuts. In Columns (4) through (6) of Table 8, we find that in response to increased foreign competition, suppliers with lower ex-ante market power reduce R&D by 0.62% to 0.78%. These findings suggest that low-market-power suppliers substitute R&D investments with trade credit in response to tariff cuts to mitigate the adverse impact of increased foreign competition.

In Panel B of Table 8, we examine cross-sectional variation with holdup risks from customers. Suppliers making large relationship-specific investments face high holdup risk, since these investments have little value outside of the relationship (Kale and Shahrur, 2007; Kale et al., 2016). Increased competition amplifies suppliers' holdup risk, since customers now have lower costs of switching to alternate suppliers. Such suppliers would be expected to respond to increased competition by strategically choosing shorter-term, low-risk RSI (trade credit) to retain key customers. Thus, suppliers facing higher holdup risks from their customers should be more likely to substitute trade credit for longer-term R&D investments.

In the same vein as Titman and Wessels (1988) and Banerjee et al. (2008), we argue that customers with higher leverage pose a higher holdup risk to their suppliers. Suppliers also face greater holdup threat when their key customers are in concentrated industries as there are fewer alternative customers from the same industry. Additionally, we create an indicator variable to measure if there is a below-median overlap between block ownership of the supplier firm and its key customers. Prior studies show that common ownership can help align supply chain goals and alleviate holdup problems (Freeman, 2023), and as such we expect that suppliers that have below-median overlap of blockholders with their customers would be more prone to being held up by their customers. Finally, we create an indicator variable that takes a value of one for suppliers with below-median average duration of relationship with key customers. Longer trade relationships entrench customer firms in the trade relationships and increase switching costs for the customer (Krolikowski and Yuan, 2017). Thus, for suppliers with shorter relationship durations, the holdup cost should be higher compared to suppliers with longer trade relationships.

Columns (1) through (4) of Panel B of Table 8 show that suppliers with greater risk of being held up by customers increase trade credit by 0.88% to 2.7% when their industry faces a tariff cut of 10% or more. Simultaneously, Columns (5) through (8) indicate that suppliers with higher risk of being held up by customers also make significantly lower R&D investment (0.39% to 0.85%) when faced with increased foreign competition. On the other hand, suppliers facing lower ex-ante holdup risk do not substitute trade credit with R&D; they increase trade credit by 1.7% to 3.8% without significantly reducing R&D investments.

In summary, our findings in Table 8 suggest that when faced with tariff cuts, suppliers are more likely to shift from longer-term to shorter-term RSI when the effect of such increased competition is amplified due to lower market power and higher holdup risks from customers prior to the tariff cuts.

4.5 Trade credit and R&D as complements: cross-sectional analyses

Next, we examine whether changes to suppliers' choice of RSI in response to increased foreign competition varies with their dependence on the supply chain. Prior studies provide theoretical as well as empirical evidence that suppliers with lower bargaining power offer more trade credit to higher-bargaining-power customers (Giannetti et al., 2021; Dass et al., 2015). Consequently, suppliers for whom the supply chain relationships matter more should be more

likely to increase trade credit in response to increased foreign competition because retaining key customers is more important to them (*Relationship Strengthening Hypothesis*). Firms that are more reliant on their supply chain relationships would also be reluctant to cut R&D for two key reasons. First, suppliers with greater reliance on supply chain would have more to lose if customers switch due to availability of more alternatives. Second, such suppliers have lesser bargaining power to adjust their RSI (Kang et al., 2024) to respond to competitive pressures. Therefore, we expect suppliers with high dependence on supply chain to be limited in their ability to reduce R&D in response to increased foreign competition.

We present these results in Table 9. We use three alternative measures to define suppliers' relationship dependence. In Columns (1) and (4), we define a supplier as being more dependent on the supply chain if the supplier reports only one key customer (*UniqueCustomer*). In Columns (2) and (5), we define suppliers as having greater relationship dependence on their customers if they report above-median proportion of their total sales to their key customers (*HighRelationSales*). Our third measure of greater supply chain dependence is an indicator variable that takes a value of one for below-median supplier size (*SmallSupplier*), as smaller suppliers have lower bargaining power with their customers compared to larger suppliers.

We find that suppliers with greater dependence on the supply chain respond to increased foreign competition by increasing trade credit by 1.6% to 2.1% while also maintaining their R&D investments (no significant reduction in R&D). These findings highlight that suppliers with greater reliance on the supply chain use R&D and trade credit as complementary RSI devices to bolster their trade relationships when faced with increased foreign competition. In contrast, suppliers with lower reliance on the supply chain, i.e., greater bargaining power, respond to increased foreign competition by reducing R&D investments (-0.7% to -0.8%) since the need to mitigate holdup dominates the need to retain key customers. Thus, we find that suppliers' bargaining power moderates their choice of RSI when responding to increased foreign competition.

4.6 *Financing trade credit and customer default risk*

The results so far indicate that suppliers extend more trade credit in response to foreign competition to retain key customers, and reduce long-term R&D to mitigate the holdup risk due to the increased foreign competition. However, to the extent that suppliers also use trade credit to finance their credit constrained customers (Petersen and Rajan, 1994;1997), extending more trade

credit when supplier competition increases could expose suppliers to a higher risk of their customers defaulting. Thus, shifting from R&D to trade credit, while mitigating holdup risk, increases suppliers' exposure to customer default risk. We analyze these effects in Panel A of Table 10. In Column (1), we find that suppliers increase trade credit by 2% (versus mean trade credit of 16%) in response to tariff cuts when their customers' z-scores are above median, while they reduce trade credit (statistically insignificant) when customer z-scores are below-median, suggesting that suppliers facing intensified competition use higher trade credit only when ex-ante risk of customer default is low. We also rerun our tests in Table 4 after controlling for average customer z-score, and find that our main finding that suppliers shift from long-term to shorter-term RSI in response to increased foreign competition is significant even after accounting for customer default risk. We present these results in Table A2 in the Appendix.

Additionally, when faced with increased foreign competition, financially constrained suppliers cannot effectively respond to tariff cuts by offering more trade credit. Thus, the increase in RSI to retain key customers in response to increased foreign competition should be stronger for financially stronger firms. In Panel B of Table 10, we present results from interacting *Decdummy* with measures of greater financial slack in suppliers. Following prior literature, we measure greater supplier financial slack using below-median leverage, above-median Z-score, and above-median cash holdings in suppliers. We find that suppliers with greater financial slack increase trade credit by 1.9% to 2.4% more in response to tariff cuts.

While supplier financial slack is a significant moderator of the association between increased foreign competition and increased trade credit, we note here that financial slack does not fully explain suppliers' response through RSI to increased foreign competition. All our tests control for supplier leverage and cash holdings – which are common measures of financial slack, and our results show a significant association between changes in RSI and tariff cuts after controlling for these variables. Further, our cross-sectional analyses indicate that suppliers extend more trade credit in response to tariff cuts when retaining key customers is more important, i.e., when suppliers have lower market power, higher risk of being held up by customers, and when suppliers are more dependent on their trade partners. This implies that suppliers' RSI shifts in response to increased competition are significant responses to retain key customers and manage holdup risk even after controlling for availability of financial slack. Thus, while financial flexibility is

important for suppliers to extend more trade credit to respond to tariff cuts, it is not the primary channel through which suppliers trade-off their RSI choices when responding to increased foreign competition.

Finally, in Table 11, we examine various sources of funds that firms may use to finance increased trade credit. Fresard (2010) finds that large cash reserves allow firms to “use their war chest to finance competitive strategies”. Arguably, one way firms can use their cash reserves to respond to competition is by increasing trade credit to retain their most important customers. In Columns (1) and (2), we find no evidence that the suppliers in our sample that increase trade credit in response to tariff cuts reduce their cash holdings or increase their leverage. Interestingly, Column (3) shows that suppliers that increase trade credit following a material tariff cut reduce their payouts. Overall, these results suggest that suppliers reduce payouts to fund their increases in trade credit to respond to increased foreign competition rather than using existing cash or borrowing. This is also consistent with prior studies (Alimov, 2014; Xu, 2012) that show that firms hold more cash and reduce leverage to face potential threats from increased competition.

4.7 Alternative interpretations of results

The results so far show that suppliers respond to foreign competition by increasing short-term RSI to retain their key customers and reducing long-term RSI to mitigate holdup risk. Consistent with prior literature, we use trade credit to proxy for short-term RSI and R&D intensity as a measure of long-term RSI. However, these results can also be consistent with alternative explanations. Increased foreign competition could motivate suppliers to manage their earnings, either to increase the information content by removing transitory components, or to opportunistically inflate earnings, because retaining key customers becomes strategically more important (Raman and Shahrur, 2008). Thus, tariff cuts could be associated with higher trade credit and lower R&D investments through the earnings management channel rather than the customer retention or risk mitigation channels that we suggest.

In Table 12, we explore if earnings management could be driving our main results. We use two proxies to identify firms that are more susceptible to earnings management. First, firms with high accruals are more likely to manipulate earnings (Kothari et. al., 2005; Guay et. al., 1996). Second, firms that just miss or just meet earnings estimate are likely to engage in earnings management (Burgstahler and Dichev, 1997; Dhaliwal et al., 2004). If earnings management is

driving our results, then we should expect to find that the results are stronger for firms that are more likely to engage in earnings management. To test this hypothesis, we interact our tariff cut variable (*Decdummy*) with indicator variables *HighAccruals* (Columns 1 and 3), *JustMiss*, and *JustBeat* (Columns 2 and 4). *HighAccruals* takes a value of one for above-median discretionary accruals and zero otherwise. *JustMiss* and *JustBeat* take a value of one if the supplier misses or beats analyst estimate by 1% or less. In all except one column in Table 12, we find no significant evidence that poor earnings quality drives the association between tariff cuts and suppliers' choice of RSI. These results, along with those in Panel B of Table 8, suggest that the association between increased foreign competition and reduced long-term RSI and increased short-term RSI, respectively, is more likely to be driven by supplier market power, holdup risk from customers, and suppliers' bargaining power rather than by increased earnings management.

4.8 *Alternative actions by suppliers facing increased foreign competition*

Tariff cuts increase the threat of new entrants, thereby reducing customers' costs of switching to new suppliers. To address this, firms can take several actions other than investing in RSI such as trade credit and R&D. In this section, we investigate whether these actions are part of a broader strategy adopted by suppliers, or are independent actions undertaken to address increased competition.

We follow prior literature to identify different steps that companies may adopt to combat competition: cost cutting, expanding customer base, making equity investments in partner firms, making acquisitions, increasing capital expenditure, and engaging in product innovation (Ahmad, Bodt, and Harford, 2021; Frésard and Phillips, 2024; Jiang et. al., 2015; Becerra, Markarian, and Santalo, 2020). We then examine whether firms' RSI decisions are correlated with these alternate actions. We use year-on-year change in COGS scaled by sales to measure the extent of cost-cutting by supplier firms. We use changes in number of key customers as our measure of expansion of customer base by suppliers, and we use changes in total investment (IVAO) in key customer firms' equity as our measure of *Equity Investment*. To capture acquisition activity, we check if a supplier firm engaged in M&A during the year. We also examine year-on-year change in capital expenditure (CAPX) by suppliers, and measure product market innovation through decrease in product similarity variable as defined by Hoberg and Phillips (2016).

To test the correlation between suppliers' RSI decisions (i.e., trade credit increases and R&D investments) and these alternate firm actions in response to tariff cuts, we regress RSI measures on the interaction of the tariff cut indicator variable (*Decdummy*) and binary variables for above-median values for various alternate actions. Table 13 presents the results. We find that firms that increase trade credit in response to increased foreign competition also engage in cost-cutting (i.e., above-median reduction in COGS/Sales), expand their customer base (i.e., above-median increase in number of key customers), and make greater equity investment in customer firms (i.e., above-median IVAO/total assets). In contrast, increase in capital expenditure, acquisitions, and product innovation are not correlated with trade credit increases in response to higher foreign competition. In other words, actions that have longer gestation periods and pose greater risks are not correlated with trade credit increases.⁶ In almost all columns but one, we do not find any significant relation between alternate supplier responses to competition and R&D investment.

The results in Table 13 highlight that increased foreign competition as measured by tariff cuts are indeed a significant source of risk for supplier firms, and that in addition to reallocating RSI from R&D to trade credit, supplier firms also respond to increased foreign competition through other strategies that can be implemented relatively quickly in response to increased foreign competition. These results lend support to our earlier analyses and show that these actions are consistent with our hypothesis that suppliers' response to increased foreign competition is more likely to be motivated by their need to retain key customers while also reducing the potential losses due to customers switching to new suppliers, and less likely to be driven by alternate explanations such as earnings management.

5. Conclusion

We examine the suppliers' strategic use of RSI as a mechanism to retain key customers in response to increased foreign competition. Tariff cuts in the supplier industries provide an exogenous shock to the level of competition that suppliers face, consequently lowering the cost for customers to switch to another supplier. We conjecture that suppliers facing increased foreign

⁶ Table A2 in the Appendix shows that our main results are robust to controlling for supplier COGS/Sales. We interpret this to also imply that suppliers' shifts across different forms of RSI is an incrementally significant response to increased competition in addition to cost-cutting.

competition extend more trade credit to counter customers' lower switching costs and retain their key customers. We further propose that suppliers facing increased foreign competition balance the risk of customer holdup risk and the need to retain their key customers by strategically reallocating resources from long-term R&D investments to shorter-term RSI in the form of trade credit. Using a binary variable for tariff reductions by 10% or more from the previous year, we find that suppliers facing increased import competition increase trade credit but reduce their R&D investments, consistent with suppliers trading off their long-term RSI for short-term RSI when faced with increased foreign competition. Using a battery of robustness tests, we confirm that our results are unlikely to be driven by reverse causality or by random chance.

We find that suppliers that increase trade credit following material tariff cuts are able to maintain their profit margins and sales to key customers, underscoring the use of trade credit as a strategic device to retain key customers. However, we find no significant impact on profit margin when firms use other methods such as cost-cutting, acquisitions, or increased capex investments in response to tariff cuts, suggesting that for suppliers who risk losing key customers, RSI is a more effective response than other general methods like cost-cutting and acquisitions.

Lower market power as well as higher holdup risks increase suppliers' risk of losing their key customers to competitors when foreign competition increases. In cross-sectional analyses, we provide evidence that the substitution effect is more prominent when suppliers have lower ex-ante market power and higher holdup risks from their customers. On the other hand, suppliers that depend more on their supply chain relationships risk significant losses from losing key customers and therefore, their need to maintain trade relationships outweighs the need to mitigate holdup risk. We find that such suppliers extend more trade credit without cutting R&D to mitigate the impact of increased competition on trade relationships, suggesting complementarity between the two forms of RSI.

However, increasing trade credit exposes suppliers to their customers' default risk, and our results show that suppliers extend more trade credit as a response to increased foreign competition only to customers with above-median z-scores. We also find that the increase in trade credit following material tariff cuts is concentrated among suppliers with enough financial slack and among suppliers that reduce their payouts, suggesting that suppliers use other sources of funds to respond to increased competition through the trade credit channel.

We are cautious in interpreting these results and posit that while financial flexibility is an important consideration when firms make RSI adjustments to respond to foreign competition, it is unlikely to be the main channel that drives the association between tariff cuts and RSI shifts. We also rule out the alternative explanation that our findings may be driven by earnings management.

Further, we find that suppliers undertake several other short-term measures to respond to increased foreign competition in addition to increasing trade credit. Overall, our results point toward suppliers strategically shifting to shorter-term RSI to retain important customers in response to increased competition.

Our paper contributes to the literature on industry competition and customer-supplier relationships by introducing the idea that rather than responding to competition through either trade credit or R&D alone, suppliers use RSI as a device to counter two simultaneous effects of increased foreign competition. Suppliers strategically use long-term and short-term RSI to balance the need for retaining key customers and mitigating heightened risks on account of increased foreign competition.

6. References

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Table 1: Industry-wise import tariff cuts

This table presents details of industry wise import tariff cuts (cuts in Ad-valorem duty rates) in our sample. Column 3 presents mean duty prior to the tariff cuts. Columns 4 and 5 present mean and median percentage changes in the import tariffs compared to the prior year. Ad-valorem duty rates are defined at the industry-year level and are aggregated across all countries of import with Most Favored Nation (MFN) status. Data on import tariffs are from USITC's website.

NAICS	Description	Duty (Mean)	%Change (Mean)	%Change (Median)
111	Agricultural Products	2.05%	-3.2%	-1.6%
113	Forestry Products	0.34%	-5.9%	-5.9%
211	Oil & Gas	0.18%	-22.7%	-25.0%
212	Minerals & Ores	0.63%	-73.5%	-73.5%
311	Food & Kindred Products	8.14%	-4.3%	-1.4%
312	Beverage & Tobacco Products	0.41%	-11.2%	-7.5%
313	Textiles and Fabrics	11.22%	-2.1%	-2.1%
314	Textile Mill Products	4.28%	-1.1%	-1.1%
316	Leather and Allied Products	1.96%	-2.1%	-2.1%
321	Wood Products	6.50%	-0.9%	-1.1%
322	Paper	4.41%	-21.8%	-8.2%
323	Printed Material and Related Products	4.45%	-8.7%	-8.7%
324	Petroleum & Coal Products	3.57%	-17.2%	-13.8%
325	Chemicals	1.07%	-1.4%	-0.3%
326	Plastic and Rubber Products	3.62%	-0.7%	-0.4%
327	Nonmetallic Mineral Products	4.69%	-5.3%	-3.8%
331	Primary Metal Manufacturing	5.47%	-6.6%	-6.6%
332	Fabricated Metal Products	3.08%	-1.4%	-1.0%
333	Machinery Except Electrical	4.32%	-33.1%	-0.4%
334	Computer & Electronics Products	6.05%	-33.1%	-2.6%
335	Electrical Equipment, Appliances, & Components	3.45%	-7.0%	-0.6%
336	Transport Equipment	3.61%	-2.2%	-0.8%
337	Furniture & Fixtures	3.09%	-26.2%	-2.5%

Table 2: Summary statistics

This table presents the summary statistics of key variables used in our analyses. Our sample include all firms in Compustat customer-supplier database between 1999 and 2022. We exclude utilities and firm-years with missing data on control variables. The final sample consists of 16,391 firm-quarters. Ad-valorem duty rates are defined at the industry-year level and are aggregated across all countries of import with Most Favored Nation (MFN) status. Panel A reports statistics for the entire sample. Panel B presents comparison of treatment and control sample. Appendix A1 provides detailed definitions of the variables.

Panel A: Unconditional summary stats: all firm-years

	Obs.	Mean	Median	Std Dev	Min	Max
R&DIntensity	16,391	7.586	1.518	13.248	0.000	91.813
Trade Credit	16,391	17.630	14.638	16.770	0.000	154.630
#Customers	16,391	2.368	2.000	2.449	1.000	44.000
Investments	16,391	2.416	0.000	9.243	0.000	119.660
ProfitMargin	16,391	-0.032	0.026	1.559	-11.375	0.762
Relationsales/#customer	16,391	217.03	36.68	498.25	0.186	2,548.28
Decdummy	16,391	0.041	0.000	0.197	0.000	1.000
Decdummyalt1	16,391	0.080	0.000	0.272	0.000	1.000
Decdummyalt2	16,391	0.037	0.000	0.188	0.000	1.000
Decdummyalt3	16,391	0.032	0.000	0.175	0.000	1.000
Decdummyalt4	16,391	0.019	0.000	0.135	0.000	1.000
Placebo	16,391	0.037	0.000	0.188	0.000	1.000
RelationSale	16,391	0.253	0.187	0.230	0.000	0.940
Log(Age)	16,391	8.437	8.564	0.775	6.054	9.593
Log(Asset)	16,391	6.054	5.997	1.962	0.616	10.416
Cash	16,391	0.230	0.138	0.239	0.000	0.896
Dividends	16,391	0.102	0.000	0.026	0.000	0.167
Repurchases	16,391	0.017	0.000	0.040	0.000	0.212
FreeCashFlow	16,391	0.024	0.077	0.215	-1.037	0.357
Leverage	16,391	0.223	0.176	0.222	0.000	0.994
Market-to-book	16,391	1.887	1.306	1.781	0.345	11.063
OperatingIncome	16,391	0.051	0.099	0.206	-0.937	0.458
PriorRet	16,391	0.134	0.118	0.584	-1.348	2.021
SalesGrowth	16,391	0.200	0.075	0.631	-0.612	4.477
ROA	16,391	-0.044	0.026	0.236	-1.216	0.326
Intangibility	16,391	0.172	0.099	0.193	0.000	0.720
InstOwn	16,391	0.557	0.603	0.317	0.000	2.306

Panel B: control vs sample firms

	Control (Decdummy = 0)	Treated (Decdummy = 1)	Difference	P-value
R&DIntensity	7.641	6.294	-1.347	2.57
Trade Credit	17.993	21.483	3.490	0.00
Controls				
RelationSale	0.253	0.256	0.003	0.78
Log(Age)	8.443	8.279	-0.164	0.00
Log(Asset)	6.070	5.673	-0.397	0.00
Cash	0.231	0.191	-0.040	0.00
Dividends	0.010	0.007	-0.003	0.00
Repurchases	0.017	0.015	-0.002	0.07
FreeCashFlow	0.023	0.057	0.034	0.00
Leverage	0.223	0.233	0.010	0.25
Market-to-book	1.887	1.880	-0.007	0.92
OperatingIncome	0.050	0.077	0.027	0.00
PriorRet	0.129	0.268	0.139	0.00
SalesGrowth	0.196	0.307	0.111	0.00
ROA	-0.044	-0.027	0.017	0.06
Intangibility	0.173	0.142	-0.031	0.00
InstOwn	0.561	0.456	-0.105	0.00

Table 3: Tariff cuts and supplier performance

This table presents results from a difference-in-difference analysis of effect of supplier response to import tariff cuts on supplier outcomes. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. ProfitMargin is defined as net income divided by total sales, Relationsales/customer is defined as relationship sales divided by number of key customers reported, and #Customers is the number of key customers reported by suppliers in a given year. All models include firm, and industry-year fixed effects. Control variables are measured in year t-1. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. *t*-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	ProfitMargin	Relationsales/customer	#Customers
Decdummy	-0.023** (-2.10)	-22.438** (-2.14)	0.200** (2.60)
Observations	15,377	15,377	15,377
Firm Fixed Effect	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Adj. R-squared	0.662	0.855	0.637

Table 4: Import tariff cuts and RSI

This table presents results from a difference-in-difference analysis of changes in R&D investment and trade credit in response to import tariff cuts. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. (S) denotes that the variable measured is for supplier firms. TradeCredit is defined as trade credit divided by total sales, R&DIntensity is defined as R&D divided by total assets, and Total RSI is defined as sum of R&D and trade credit divided by total assets. Columns 1, 2 and 3 report result for full sample. Columns 4 and 5 report results of subsample analysis to examine the substitution between trade credit increased and R&D decreases. Column 3 consists of firm-years for which suppliers increase trade credit and Column 4 include subsample for which suppliers reduce trade credit. All models include firm, and industry-year fixed effects. Control variables are measured in year t-1. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. *t*-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(3)	(4)
	TradeCredit (S)	R&DIntensity (S)	Total RSI (S)	R&DIntensity (S)	R&DIntensity (S)
	Full sample	Full sample	Full sample	Trade credit ↑	Trade credit ↓
Decdummy	1.367** (2.53)	-0.526*** (-4.81)	0.608 (1.30)	-0.832*** (-6.86)	0.037 (0.21)
RelationshipSales	-2.302** (-2.53)	0.093 (0.32)	-1.691*** (-3.27)	-0.284 (-0.41)	0.248 (0.70)
Log(Age)	-1.642*** (-3.20)	0.992** (2.51)	-0.176 (-0.66)	0.916** (2.56)	1.149 (1.60)
Log(Asset)	-0.515 (-0.60)	-2.795*** (-3.62)	0.345 (0.80)	-3.011*** (-3.53)	-2.838*** (-3.84)
Cash	5.760* (1.90)	-4.227*** (-4.15)	-1.047 (-0.64)	-5.165*** (-5.36)	-3.451*** (-3.17)
Dividends	-13.643*** (-3.00)	-5.563 (-1.45)	-5.396* (-1.77)	-10.758 (-1.61)	-2.047 (-0.72)
Repurchases	-2.507 (-0.97)	2.197 (1.60)	-0.001 (-0.00)	-0.707 (-0.37)	9.897*** (2.87)
FreeCashFlow	-2.493 (-0.86)	-1.289 (-0.73)	-0.446 (-0.31)	-1.816 (-0.74)	-0.312 (-0.22)
Leverage	-3.353*** (-2.84)	-1.035** (-2.05)	-1.433** (-2.66)	-1.079 (-1.19)	-0.601 (-1.16)
Market-to-book	1.326*** (8.37)	1.197*** (4.86)	0.148** (2.37)	1.317*** (4.24)	1.106*** (5.92)
OperatingIncome	-15.711*** (-5.36)	-9.427*** (-4.54)	0.936 (0.41)	-8.691*** (-5.03)	-11.681*** (-3.86)
PriorRet	3.002*** (10.84)	0.509 (1.52)	0.330* (1.85)	0.540 (1.14)	0.546* (1.92)
SalesGrowth	0.479 (1.12)	-0.220 (-1.14)	0.039 (0.28)	0.222 (1.06)	-0.230 (-0.79)
ROA	6.697*** (8.37)	-0.104 (-0.18)	0.346 (0.88)	0.085 (0.07)	-0.842 (-0.70)
Intangibility	2.486 (0.88)	-2.734 (-1.00)	-3.275** (-2.32)	-3.095 (-1.41)	-1.092 (-0.32)
InstOwn	3.826*** (4.05)	0.297 (0.56)	1.201** (2.04)	0.697 (0.96)	0.231 (0.50)

Observations	15,377	15,377	15,377	7,474	6,555
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.469	0.842	0.589	0.816	0.851

Table 5: Tests for causality of import tariff cuts and RSI

This table presents the findings of the robustness of our baseline tests of changes in R&D investment and trade credit in response to import tariff cuts. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. (S) denotes that the variable measured is for supplier firms. R&DIntensity is defined as R&D divided by total assets and TradeCredit is defined as trade credit divided by total sales. Panel A reports the results of a stacked regression that uses event-specific datasets by identifying a clean control set of supplier that never realize import tariff cut during the sample period. for each rate cut, we identify an event window of -3 to +3 years around rate cuts and stack firm-years of the treated and control firms. We then conduct DiD estimation on the stacked sample using firm fixed effects and event-year fixed effects. Panel B reports the results of a timing test. Decdummy_{t-x} (Decdummy_{t+x}) is equal to one if the 3-digit NAICS industry faces a tariff cut of 10% or more in year $t-x$ ($t+x$). Decdummy1, Decdummy2, and Decdummy3 take a value of 1 if the 3-digit NAICS industry faces an import tariff cut of 2%, 15%, and 20% respectively. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. t -statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Stacked Regression

	(1)	(2)
	TradeCredit (S)	R&DIntensity (S)
Decdummy	1.660* (1.82)	-0.690*** (-2.69)
Observations	28,907	28,305
Firm Fixed Effect	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes
Event-Year Fixed Effect	Yes	Yes
Adj. R-squared	0.686	0.902

Panel B: Timing of tariff cuts and RSI changes

	(1)	(2)
	TradeCredit (S)	R&DIntensity (S)
Decdummy _{t-4}	-0.114 (-0.24)	0.715 (0.78)
Decdummy _{t-3}	0.573 (0.73)	0.761 (0.89)
Decdummy _{t-2}	0.100 (0.15)	-0.112 (-0.20)
Decdummy _{t-1}	0.344 (0.31)	-0.496 (-1.07)
Decdummy _t	1.388 (1.62)	-0.678*** (-3.20)
Decdummy _{t+1}	2.096*** (3.13)	-0.688*** (-2.87)
Decdummy _{t+2}	0.977 (1.25)	-1.013** (-2.56)
Decdummy _{t+3}	0.434 (0.64)	-0.620 (-1.19)
Decdummy _{t+4}	0.589 (0.66)	-0.245 (-0.98)
Observations	15,377	15,377
Firm Fixed Effect	Yes	Yes
Industry-Year Fixed Effect	Yes	Yes
Controls	Yes	Yes
Adj. R-squared	0.456	0.846

Table 6: Robustness: Pscore matching, entropy balancing, placebo, and alternate cutoffs

This table presents the findings of the robustness of our baseline tests of changes in R&D investment and trade credit in response to import tariff cuts. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. (S) denotes that the variable measured is for supplier firms. R&DIntensity is defined as R&D divided by total assets and TradeCredit is defined as trade credit divided by total sales. Panel A estimates baseline regression on propensity score matched sample and Panel B estimates it for entropy balanced sample. Panel C presents results from falsification tests where tariff cuts are assigned to random firm-years. Panel D presents robustness of Table 4 results for different levels of tariff cuts. Decdummy1, Decdummy2, and Decdummy3 take a value of 1 if the 3-digit NAICS industry faces an import tariff cut of 2%, 15%, and 20% respectively. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. *t*-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Propensity Score matched sample

	(1)	(2)
	TradeCredit (S)	R&DIntensity (S)
Decdummy	1.910* (1.77)	-0.660*** (-3.51)
Observations	1,460	1460
Firm Fixed Effect	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes
Adj. R-squared	0.677	0.927

Panel B: Entropy balanced sample

	(1)	(2)
	Entropy balanced sample	
	TradeCredit (S)	R&D intensity (S)
Decdummy	1.035** (2.01)	-0.510*** (-6.57)
Observations	15,377	15,377
Firm Fixed Effect	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes
Adj. R-squared	0.863	0.564

Panel C: Placebo tests

	(1)	(2)
	TradeCredit (S)	R&DIntensity (S)
Placebo	-0.294 (-0.68)	-0.171 (-0.93)
Observations	15,377	15,377
Firm Fixed Effect	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes

Table 7: Supplier response to tariff cuts and consequences

This table presents results from a difference-in-difference analysis of effect of supplier response to import tariff cuts on corporate outcomes. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. ProfitMargin is defined as net income divided by total sales, Relationsales/customer is defined as relationship sales divided by number of key customers reported, and #Customers is the number of key customers reported by the suppliers in a year. Panel A reports the results for RSI responses. Columns 1 and 2 report results for profit margin, Columns 3 and 4 present findings for Relationsales/#customer, and Columns 5 and 6 present estimates for the number of key customers. TradecreditInc (TradecreditDec) takes a value of 1 if suppliers increase (do not increase) trade credit YoY. R&DDec (R&DInc) takes a value of 1 if suppliers reduce (do not reduce) R&D investment YoY. Panel B reports results for alternte actions. ReduceCOGS takes a value of one if suppliers' COGS (divided by total sales) decreases Y-o-Y, DiversifyCust takes a value of one if number of customers increases Y-o-Y, Acquisitions take a value of one if supplier makes an acquisition during a year, CapexInc takes a value of one if capital expenditure increases Y-o-Y. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. *t*-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Consequences of RSI changes in response to increased foreign competition

	(1)	(2)	(3)	(4)	(5)	(6)
	ProfitMargin		Relationsales/customer		#Customers	
Decdummy *TradecreditInc	0.056 (1.18)		-7.440 (-0.73)		0.186** (2.51)	
Decdummy *TradecreditDec	-0.149*** (-3.10)		-46.536** (-2.03)		0.117 (1.44)	
Decdummy *R&Dinc		0.018 (0.49)		-32.827 (-1.58)		0.240* (1.73)
Decdummy *R&Ddec		-0.056*** (-4.34)		-14.562 (-1.25)		0.085 (1.51)
TradecreditInc	-0.024 (-1.61)		-14.223*** (-2.93)		-0.037* (-1.99)	
R&Ddec		0.098** (2.37)		4.758 (0.21)		0.054 (1.51)
Observations	15,377	15,377	15,377	15,377	15,377	15,377
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.662	0.663	0.855	0.855	0.629	0.193

Panel B: Consequences of alternate actions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ProfitMargin				Relationsales/customer			
Decdummy	-0.115*	-0.074**	0.022	0.021	-10.215	-27.176**	-12.765	-18.375*
	(-1.91)	(-2.01)	(1.01)	(0.64)	(-0.68)	(-2.07)	(-1.61)	(-1.68)
Decdummy * ReduceCOGS	0.122				-18.386			
	(0.94)				(-1.37)			
Decdummy * DiversifyCust		0.060				23.720		
		(0.55)				(1.54)		
Decdummy * Acquisition			-0.132***				-19.149	
			(-2.97)				(-1.19)	
Decdummy * CapexInc				-0.084				-2.087
				(-1.27)				(-0.18)
Observations	15,377	15,377	15,377	15,377	15,377	15,377	15,377	15,377
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.662	0.662	0.662	0.662	0.862	0.863	0.862	0.862

Table 8: Import tariff cuts and RSI substitution: cross sectional analysis

This table presents the findings of cross-sectional variation of our baseline results with suppliers' product market strength and customer holdup risks. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. (S) denotes that the variable measured is for supplier firms, whereas (C) denotes variables measured for customer firms. R&DIntensity is defined as R&D divided by total assets and TradeCredit is defined as trade credit divided by total sales. Decdummy is equal to one if the 3-digit NAICS industry faces a tariff cut of 10% or more in a year. Panel A presents the findings for variation in suppliers' product market power strength. Columns 1-3 (4-6) respectively define suppliers to have low market power if they have below median HHI, above median product fluidity and above median product similarity. Panel B presents the findings for variation in customer holdup risks. Columns 1-2 (5-6) define customers as high holdup if their leverage, and industry HHI is above median respectively. Columns 3 and 4 (7 and 8) define suppliers to be facing high holdup risk if they share low common block ownership (below median) with their customers and have below median relationship duration. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. t-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Cross-sectional variation with supplier market power

	(1)	(2)	(3)	(4)	(5)	(6)
	TradeCredit (S)			R&DIntensity (S)		
	HHI (S)	Product Fluidity(S)	Product Similarity (S)	HHI (S)	Product Fluidity(S)	Product Similarity (S)
Decdummy * LowMarketPower	2.818*** (4.90)	2.463*** (5.61)	3.089*** (8.32)	-0.754*** (-3.05)	-0.781** (-2.55)	-0.619** (-2.22)
Decdummy * HighMarketPower	0.407 (0.73)	0.632 (0.98)	0.138 (0.22)	-0.362*** (-3.07)	-0.099 (-0.64)	-0.437** (-2.32)
LowMarketPower	0.160 (0.36)	-0.613* (-1.89)	-0.615 (-0.91)	0.258** (2.07)	0.425 (1.67)	0.475 (1.17)
Observations	15,203	15,111	15,203	15,203	15,111	15,203
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.470	0.467	0.470	0.844	0.844	0.844

Panel B: Cross-sectional variation with customer holdup risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	TradeCredit (S)				R&DIntensity (S)			
	Leverage (C)	HHI (C)	BlockOverlap	Relationship Duration	Leverage (C)	HHI (C)	BlockOverlap	Relationship Duration
Decdummy * HighHoldUp	0.876* (1.89)	0.781 (1.20)	1.076** (2.31)	2.683*** (4.23)	-0.849*** (-8.39)	-0.746*** (-6.43)	-0.578*** (-3.99)	-0.396** (-2.24)
Decdummy * LowHoldUp	1.714*** (3.68)	2.070*** (4.99)	3.820*** (2.82)	0.117 (0.24)	-0.284 (-1.51)	-0.268 (-1.60)	-0.084 (-0.24)	-0.645*** (-9.11)
HighHoldUp	-0.155 (-0.44)	0.112 (0.30)	0.161 (0.68)	-0.948** (-2.05)	0.106 (0.63)	0.131 (0.51)	-0.004 (-0.02)	-0.354 (-1.51)
Observations	15,352	15,377	15,377	15,377	15,352	15,377	15,377	15,377
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.469	0.469	0.469	0.469	0.842	0.842	0.842	0.842

Table 9: Import tariff cuts and RSI complementarity: cross sectional variation with supply chain dependence

This table presents the findings of cross-sectional variation of our baseline results with firm’s supply chain dependence. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. TradeCredit is defined as trade credit divided by total sales and R&DIntensity is defined as R&D divided by total assets. Decdummy is equal to one if the 3-digit NAICS industry faces a tariff cut of 10% or more in a year. Columns 1-3 (4-6) respectively define suppliers to have high supply chain dependence if sales to key customers account for higher percentage of total sales (above median), they have a unique customer, and their size is below median assets. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. t-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	TradeCredit (S)			R&DIntensity (S)		
	UniqueCustomer	HighRelationsales	SmallSupplier	Unique Customer	HighRelationsales	SmallSupplier
Decdummy * HighDependence	1.814*** (3.21)	1.626*** (3.02)	2.090** (2.33)	-0.243 (-1.47)	-0.331 (-1.31)	-0.349 (-1.39)
Decdummy * LowDependence	0.957 (0.93)	0.882 (1.01)	0.559* (1.92)	-0.804*** (-5.82)	-0.704*** (-3.58)	-0.676** (-2.10)
SCDependence	-0.170 (-0.62)	-0.858** (-2.14)	1.856*** (3.86)	-0.319 (-1.10)	-0.223** (-2.06)	-1.042*** (-3.46)
Observations	15,377	15,377	15,377	15,377	15,377	15,377
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.469	0.469	0.469	0.842	0.842	0.843

Table 10: Import tariff cuts and RSI: variation with firms' financial strength

This table presents the findings of cross-sectional variation of our baseline results with customer default risk and supplier's financial strength. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. (S) denotes that the variable measured is for supplier firms, whereas (C) denotes variables measured for customer firms. TradeCredit is defined as trade credit divided by total sales and R&DIntensity is defined as R&D divided by total assets. Decdummy is equal to one if the 3-digit NAICS industry faces a tariff cut of 10% or more in a year. Panel A presents variation in our baseline results with customer default risk as measured by Altman Z-score. Panel B presents variation of main results with suppliers' financial strength. Columns 1-3 (4-6) respectively define suppliers to have high financial strength if they have below median leverage, above median Altman Z-score, and above median cash holding. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. *t*-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Variation with customer default risk

	(1)	(2)
	TradeCredit (S)	R&DIntensity (S)
Decdummy * HighZScore (C)	1.906** (2.22)	-0.597*** (-4.96)
Decdummy * LowZScore (C)	-1.101 (-0.94)	-0.270 (-1.30)
HighZScore	0.323 (0.57)	-0.396 (-1.59)
Observations	15,377	15,377
Firm Fixed Effect	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes
Adj. R-squared	0.467	0.842

Panel B: Variation with supplier's financial strength

	(1)	(2)	(3)	(4)	(5)	(6)
	TradeCredit (S)			R&DIntensity (S)		
	Leverage (S)	ZScore (S)	Cash (S)	Leverage (S)	ZScore (S)	Cash (S)
Decdummy * StrongFinance	1.957*** (3.38)	2.417*** (4.73)	2.100** (2.17)	-0.757 (-1.62)	-0.457 (-1.59)	-0.362* (-1.91)
Decdummy * WeakFinance	0.672 (0.93)	0.342 (0.26)	0.722 (1.52)	-0.322 (-1.65)	-0.598 (-1.38)	-0.744** (-2.29)
StrongFinance	0.088 (0.16)	-0.012 (-0.03)	0.946** (2.16)	-0.186 (-1.23)	0.244 (0.70)	-0.349** (-2.62)
Observations	15,377	15,377	15,377	15,377	15,377	15,377
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.469	0.469	0.468	0.842	0.842	0.842

Table 11: How do firms finance trade credit increases

This table presents the findings of tests that explore various sources of funds that firms use to finance trade credit increases. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. (S) denotes that the variable measured is for supplier firms. Our dependent variables are measured in the year $t+1$, i.e., one year after import tariff cuts. Decdummy is equal to one if the 3-digit NAICS industry faces a tariff cut of 10% or more in a year. TradecreditInc (TradecreditDec) takes a value of 1 if suppliers increase (do not increase) trade credit YoY. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. t -statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	Cash (S) _{t+1}	Leverage (S) _{t+1}	Payout (S) _{t+1}
Decdummy *TradecreditInc	0.002 (0.32)	-0.007 (-1.49)	-0.007*** (-4.10)
Decdummy *TradecreditDec	-0.003 (-0.33)	-0.001 (-0.09)	-0.001 (-0.48)
TradecreditInc	-0.023*** (-7.42)	0.007*** (3.05)	-0.004*** (-5.20)
Observations	15,377	15,377	15,377
Firm Fixed Effect	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes
Adj. R-squared	0.863	0.825	0.487

Table 12: Tests for alternate explanations: tariff cuts, RSI, and earnings management

This table examines earnings management as an alternate explanation of our main results. Our sample is aggregated at the supplier-year level for all firms that report major supply chain relation as captured by Compustat segment data. Our sample spans 1999 to 2022. (S) denotes that the variable measured is for supplier firms. R&DIntensity is defined as R&D divided by total assets and TradeCredit is defined as trade credit divided by total sales. Decdummy is equal to one if the 3-digit NAICS industry faces a tariff cut of 10% or more in a year. Columns 1 and 3 examine variation of baseline results with earnings accruals (HighAccruals take a value of one for above median accruals) and Columns 2 and 4 examine difference in our finding between suppliers that just miss (actual EPS misses analyst estimates by less than 1%) or just beat (actual EPS beats analyst estimates by less than 1%) earnings versus firms that meet earnings estimates (base case). Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. *t*-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	TradeCredit (S)		R&DIntensity (S)	
Decdummy	0.871 (1.44)	0.746 (1.33)	-0.652*** (-2.70)	-0.535*** (-3.80)
Decdummy *HighAccruals	1.033* (1.80)		0.260 (0.66)	
HighAccruals	1.316*** (5.68)		-0.247 (-1.40)	
Decdummy *JustMiss		2.258 (0.88)		-1.079 (-0.93)
Decdummy *JustBeat		1.122 (0.77)		0.598 (0.69)
JustBeat		-0.234 (-0.49)		-0.218 (-1.35)
JustMiss		-0.224 (-0.85)		0.191* (1.77)
Observations	15,377	10,359	15,377	10,359
Firm Fixed Effect	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adj. R-squared	0.470	0.536	0.842	0.861

Table 13: Import tariff cuts and alternate responses by suppliers

This table examines the relation between RSI (trade credit and R&D) changes and alternate actions such as cost cutting (as measured by changes in COGS/Sales), customer diversification (as measured by changes in number of key customers), equity investment in customers (as measured by changes in IVAO), mergers and acquisitions, increase in capital expenditure, and product innovation (as measured by decrease in Hoberg and Philip measure of product similarity) by suppliers.(S) denotes that the variable measured is for supplier firms. Control variables from Table 4 are included but not reported for brevity. All models include firm, and industry-year fixed effects. Appendix A1 provides detailed definitions of the variables. Standard errors are corrected for heteroskedasticity and are clustered at the 3-digit NAICS industry level. *t*-statistics are reported in parenthesis. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	TradeCredit (S)						R&DIntensity (S)					
Decdummy	-0.159	0.531	0.597	1.135*	1.549	2.298*	-0.417***	-0.441***	-0.331	-0.555***	-0.596***	-0.921***
	(-0.26)	(0.61)	(1.06)	(1.90)	(1.58)	(1.93)	(-2.83)	(-4.82)	(-1.62)	(-3.83)	(-3.91)	(-3.10)
Decdummy * ReduceCOGS	3.040*						-0.208					
	(1.96)						(-0.90)					
ReduceCOGS	0.312						-0.544***					
	(0.42)						(-3.83)					
Decdummy * DiversifyCust		2.120*						-0.245				
		(1.68)						(-1.07)				
DiversifyCust		1.267**						0.110				
		(2.50)						(0.81)				
Decdummy * IncEqInvestment			1.253***						-0.348			
			(3.03)						(-1.19)			
IncEqInvestment			0.324						0.255			
			(1.29)						(1.13)			
Decdummy * Acquisition				0.681						0.089		
				(0.89)						(0.20)		
Acquisition				-0.233						-0.324		
				(-0.28)						(-0.60)		
Decdummy * CapexInc					-0.366						0.147	
					(-0.34)						(0.66)	
CapexInc					0.315						-0.306**	
					(1.44)						(-2.20)	
Decdummy * LowProdSimilarity						-1.976						0.812**
						(-1.37)						(2.20)
LowProdSimilarity						-0.282						-0.088
						(-1.23)						(-0.89)

Observations	15,377	15,377	15,377	15,377	15,377	14,986	15,377	15,377	15,377	15,377	15,377	15,092
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.469	0.469	0.469	0.469	0.469	0.468	0.843	0.842	0.842	0.842	0.843	0.844

Appendix A1: Variable definition

USITC – import tariff data

Decdummy: The indicator variable equals one if the import duty is reduced by 10%.

Decdummyalt1: The indicator variable equals one if the import duty is reduced by 2%.

Decdummyalt2: The indicator variable equals one if the import duty is reduced by 15%.

Decdummyalt3: The indicator variable equals one if the import duty is reduced by 20%.

Relationship level Variables (Compustat customer-supplier segment data)

Relationship duration: The number of years since the initiation of the customer-supplier relation.

UniqueCustomer: Equals to one if supplier report only one firm as a key customer.

RelationshipSales/Dependence: Sales to the key customers as a fraction of total supplier sales.

Relationsales/#customer: RelationshipSales divided by number of key customers reported by the supplier.

R&DIntensity: R&D expenses (XRD) divided by book value of assets (AT), multiplied by 100.

TradeCredit: Total receivables (RECTR) divided by sales (SALE), multiplied by 100.

#customers: Number of key customers reported by a supplier in a year.

EquityInvestment: Total investment (IVAO) in equity of key customers by a supplier, divided by book value of total assets (AT), multiplied by 100.

Compustat

Size: Logarithm of total assets (AT).

Age: Logarithm of years since the firm appears for the first time on CRSP database.

Cash: Cash and short-term investments (CHE), divided by total assets (AT).

Dividend: Total common stock dividend (DVC), expressed as a fraction of firm's assets at the end of the previous year.

Repurchases: Repurchases are calculated as the expenditure on the repurchase of common and preferred stock (PRSTKC) minus any reduction in the value of preferred stock outstanding (PSTK), divided by the book value of assets (AT).

PriorRet: Buy-and-hold return over the prior year.

ProfitMargin: Net Income (NI) divided by total sales (Sale).

Market-to-Book: Market capitalization plus long-term debt (DLTT) plus debt in current liabilities (DLC) plus preferred stock (PSTK), divided by the book value of assets (AT).

Return on Assets (ROA): Return on assets is calculated as net income (NI) divided by total assets (AT).

Leverage: Leverage is calculated as the sum of long-term debt (DLTT) and short-term debt (DLC) divided by book value of assets (AT)..

Free Cash Flow (FCF): Free cash flow is calculated as the operating income before depreciation (OIBDP) minus interest, taxes, and dividends, divided by book value of assets (AT).

SalesGrowth: The percentage change in sales from the prior year to the current year.

OperatingIncome: Operating income (OIBDP), divided by book value of assets (AT).

HHI: Herfindahl-Hirschman Index of sales is calculated as the sales market share within SIC 4-digit industries.

InstOwn: The percentage of common shares outstanding held by 13F institutional investors

Intangibility: Intangible assets (INTAN) divided by the total assets.

Z-score: Altman Z-Score = $1.2 \cdot \text{NWC} + 1.4 \cdot \text{RE} + 3.3 \cdot \text{EBIT} + 0.6 \cdot \text{MarketCap} + 1.0 \cdot \text{Sales}$, where NWC is net working capital divided by total assets, RE is retained earnings divided by total assets, EBIT is earnings before interest and taxes divided by total assets, MarketCap is market value of equity divided by total liability, and sales is total sales divided by total assets.

BlockOverlap: The percentage of common shares outstanding held by common block holding institutions. A common block holding institution is defined if a block holding institution owns both customer and supplier in a given quarter. A block holding institution is defined as 13F institution holding more than 5% of common shares outstanding in a firm.

Product Fluidity: The product market fluidity measure by Hoberg and Phillips (2014), which captures how intensively the product market around a customer is changing each year. Measures of fluidity are customized to each firm based on each firm's unique product market vocabulary (from 10-K).

Product Similarity: The product market fluidity measure by Hoberg and Phillips (2016), which is based on firm-by-firm pair wise similarity of words in product description from 10-K in a year.

Accruals: $\Delta\text{Current assets (ACT)} - \Delta\text{Cash (CHE)} - \Delta\text{Current liability (LCT)} - \Delta\text{Short term debt (DLC)} - \Delta\text{Tax payable (TXP)} - \text{Depreciation (DP)}$, divided by assets (AT).

JustMiss: Indicator variable that takes a value of one if company reports EPS that misses analyst estimates by 1% or lower.

JustBeat: Indicator variable that takes a value of one if company reports EPS that beats analyst estimates by 1% or lower.

Appendix A2: Main Results with Additional Controls

	(1)	(2)
	TradeCredit (S)	R&DIntensity (S)
	Full sample	Full sample
Deedummy	1.042** (2.65)	-0.428*** (-4.77)
RelationshipSales	-2.561** (-2.60)	-0.027 (-0.09)
Avg_ZScore (C)	-0.001 (-0.64)	0.001 (1.07)
Avg_Leverage (C)	3.072* (1.70)	1.472 (1.53)
COGS/Sales (S)	-2.747*** (-7.26)	-0.324* (-1.69)
Observations	13,873	13,873
Other Controls	Yes	Yes
Firm Fixed Effect	Yes	Yes
Ind-Year Fixed Effect	Yes	Yes
Adj. R-squared	0.480	0.844