Securing Technological Leadership? The Cost of Export Controls on Firms*

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August 2025

Abstract

To safeguard its technological leadership, the U.S. has restricted domestic suppliers from exporting cutting-edge technologies to selected Chinese firms. Domestic firms affected by these export controls halt sales to Chinese customers, as intended, but struggle to establish new relations with alternative customers domestically or in politically aligned regions. Consequently, domestic suppliers experience sizable losses in market capitalization, along with reductions in profitability, employment, and bank lending. Chinese firms are more proactive in reconfiguring supply chains, though not without costs. Overall, export controls impose larger costs on U.S. firms developing the very technologies these policies aim to protect.

JEL classification: G12, F51, F38.

Keywords: geopolitical risk, geoeconomics, export controls, decoupling.

*We thank Katharina Bergant, Zhi Da, Nuri Ersahin, Wei Jiang, Jean-Marie Meier, Chip Ryan, Luke Pettit, Massimiliano Onorato, Paul Triolo, Claire Celerier, Nandini Gupta, Emily Gallagher, and Ohad Kadan, as well as seminar and conference participants at the Columbia University Global Capital Allocation Project Annual Conference, Kiel Institute and CEPR Joint Conference on Geoeconomics, CEPR–Bocconi Geoeconomics Junior Workshop, Center for Strategic and International Studies Geoeconomic Meeting, American Finance Association AFFECT Workshop, Midwest Finance Association Conference, Financial Management Association Meeting, European Central Bank, and University of Connecticut for their comments. We also thank Martin Hiti, Xuan Zhou, Natalie Girshman, and Jasper Yang for expert research assistance. The paper previously circulated under the title "Geopolitical Risk and Decoupling: Evidence from Export Controls." The views expressed in this paper are those of the authors and do not necessarily represent those of the Federal Reserve Bank of New York, the Board of Governors of the Federal Reserve, the Federal Reserve System, or anyone associated with these institutions.

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1 Introduction

Throughout history, countries that maintain a technological edge have been able to assert global dominance, both militarily and economically. More recently, as the U.S. and China compete for technological leadership, particularly in artificial intelligence and semiconductors, the U.S. has attempted to safeguard its competitive edge by imposing export controls. These policies restrict U.S. firms from selling specific advanced technology to selected Chinese firms, diverging from the decades-long trend of global economic integration. Despite the broad political support for export controls, there is no systematic evidence on how these policies balance losses from fragmentation against potential national security gains—a key trade-off highlighted in the emerging theoretical literature on economic coercion (Clayton et al., 2025b).[1]

In this paper, we document the effects of export controls on the productive sector by leveraging newly hand-collected data matched with information on global firm-to-firm linkages. As intended, domestic firms affected by export controls stop selling products to Chinese customers. However, U.S. suppliers struggle to form new relations with alternative customers, either domestically or in politically aligned regions. These policy-induced disruptions result in a sizable drop in market capitalization, along with reductions in profitability, employment, and bank lending. Taken together, our findings highlight the significant costs of export controls on domestic firms at a time when the recent successes of Huawei and DeepSeek (e.g., Tedford, 2023; Yang, 2025) raise doubts about the effectiveness of export controls in preserving U.S.

[1] See Heifetz (2024) for an op-ed discussing the surprising lack of a comprehensive cost-benefit analysis.

technological leadership.

We start by analyzing the reconfiguration of domestic supply chains due to export controls. The Bureau of Industry and Security (BIS) under the U.S. Department of Commerce restricts U.S. companies from exporting certain goods and services to a list of Chinese firms, also referred to as Chinese targets, deemed a risk to national security and foreign policy interests. We identify these firms and their evolving supply chain relations using global supplier-to-customer linkage data from FactSet Revere, thus capturing the U.S. suppliers that export to the targeted Chinese firms over time. This unique setting allows us to identify the effect of export controls by comparing the behavior of firms supplying targeted Chinese customers relative to similar firms supplying non-targeted Chinese customers.

We find that export controls prompt an immediate, broad-based decoupling of affected U.S. suppliers from their Chinese customers. After the inclusion of Chinese targets in the BIS export control lists, affected suppliers are more likely to terminate relations with both targeted and non-targeted Chinese customers. Additionally, affected suppliers are less likely to establish new relations with other Chinese customers. While the immediate decoupling from the targeted Chinese firms confirms that U.S. firms comply with the policy, our findings of a broader decoupling suggest concerns among affected suppliers that non-targeted Chinese firms could re-export sensitive technology to targeted Chinese entities, potentially resulting in export control violations.[2]

Despite export controls achieving their primary purpose of reducing transfers of U.S.

[2]A U.S. exporter may be liable for the re-exports by its customer to a firm targeted by export controls.

strategic technology to Chinese targets, a key question arises as to whether such restrictions also trigger reshoring or friendshoring of supply chains—that is, the formation of new relations by U.S. firms with alternative customers domestically or in politically aligned countries, respectively. In the three years following the imposition of export controls, affected U.S. firms do not form new supply chain relations with alternative customers either domestically or in more politically aligned regions. Overall, the lack of reshoring or friendshoring among U.S. firms suggests that export controls might impose significant costs on them.

We next document such collateral damage on domestic firms. Using equity prices, we find that affected U.S. suppliers experience negative cumulative abnormal returns (CAR) following the addition of their Chinese customers to the BIS export control lists. The stock market reaction around the export control announcement is economically significant, representing a 3.6% abnormal decline in stock prices. Our estimates suggest that export controls cost the average affected U.S. supplier about $1 billion in market capitalization, with total losses across all affected suppliers reaching over $100 billion.

Using balance sheet data, we also find that affected suppliers experience adverse real effects following the imposition of export controls. Relative to similar firms, affected suppliers experience a decline in revenues, profitability, and employment. However, capital expenditures do not decrease. This suggests that export controls do not considerably change firms' long-term investment opportunities, but instead prompt short-term adjustments, such as cutting segments of their labor force. Using confidential loan-level data, we also find that U.S. firms affected by export controls face tighter bank lending conditions.

Finally, we analyze how targeted Chinese firms strategically respond to U.S. export

controls. On the extensive margin, Chinese targets offset the reduction in relations with U.S. suppliers by forming new connections with alternative Chinese suppliers. On the intensive margin, foreign firms (not affected by U.S. export controls) that supply goods to targeted Chinese firms experience increased revenues following the imposition of export controls. These results are consistent with Chinese firms actively trying to offset U.S. export controls by forming a new network of alternative suppliers and increasing purchases from their existing global suppliers unaffected by U.S. export controls. Despite a relatively more proactive supply chain reconfiguration by Chinese firms, stock market reactions to the announcements of export controls suggest that these adjustments are far from costless. Indeed, the total capitalization losses incurred by publicly listed Chinese targets are estimated to be around $18 billion at prevailing exchange rates. While sizable, the total Chinese stock market losses are four times smaller than those experienced by their U.S. suppliers.

It is important to note that export controls are a strategic tool used for a different purpose than tariffs or sanctions. Unlike tariffs, which target imports of consumer goods, or sanctions, which are used to penalize military aggression, export controls are designed to ensure continued U.S. strategic technology leadership.[3] If export controls are to remain the primary tool for safeguarding the competitive edge of the U.S. in advanced technologies, our findings suggest that they may need to be complemented with policies that stimulate domestic demand for the very same products under export control restrictions. The CHIPS Act of 2022 is consistent with this goal, authorizing $280 billion in funding to boost domestic research and manufacturing of semiconductors, even though such investments typically take

[3]For a description of the goals of export control policy, see https://www.trade.gov/us-export-controls.

years to generate productive capacity (VerWey, 2021).

Our results are unlikely to be driven by the 2018–2019 trade war between the U.S. and China, which saw a few waves of U.S. tariffs on Chinese imports followed by Chinese retaliatory tariffs on U.S. exports. While those tariffs were broad-based and did not target specific companies (Amiti et al., 2019; Fajgelbaum et al., 2020; Alfaro et al., 2024), our estimates rely on the identification of U.S. companies that are not allowed to export to certain Chinese entities. Granular fixed effects allow us to exploit variation within industry and size quartiles among firms that export to China and are thus unlikely to be affected by broad-based tariffs. Similarly, our results are unlikely to be driven by the August 2022 CHIPS Act, which provided subsidies to chip makers with operations in the U.S., or the August 2023 executive order, which limited U.S. investments to China in some sensitive sectors. Indeed, these policies apply to a broad set of firms (not just our set of affected suppliers) and are enacted at the end of our sample period.

Contribution to the literature. First, our empirical results contribute to the nascent theoretical literature in geoeconomics (Clayton et al., 2025b,c; Liu et al., 2024; Broner et al., 2024). On the topic of export controls, Clayton et al. (2025c) argues that these restrictions may be optimal for the hegemonic country even if they destroy some value for its domestic firms, while Liu et al. (2024) employs a calibrated model with technology transfers to show that comprehensive restrictions on semiconductors could raise domestic welfare. Our paper provides a well-identified empirical analysis of how the broader productive sector adjusts to export controls, documenting how this policy imposes significant collateral damage on the domestic firms producing the very same technologies that these policies attempt to protect.

Second, our analysis of export controls complements the literature on sanctions (e.g., Ahn and Ludema, 2020; Felbermayr et al., 2020; Crozet et al., 2021; Besedeš et al., 2021; Efing et al., 2023). Sanctions typically involve a combination of travel bans, asset freezes, restrictions on capital flows, and trade restrictions. Importantly, they are often imposed on small countries or a selected group of entities with a small global footprint, which tend to have limited effects on domestic firms. Consistent with this, Besedeš et al. (2021) finds little evidence of collateral damage to German firms. In contrast, U.S. export controls aim to protect domestic technological leadership by selectively decoupling critical supply chains from China—a significant trade partner of U.S. firms. Overall, sanctions and export controls are used for different strategic goals and, as we show, produce different outcomes.

Finally, by focusing on the geopolitical confrontation between the U.S. and China, our analysis is related to the literature on the labor and trade costs of U.S.-China trade wars (e.g., Benguria and Saffie, 2020, 2024; Flaaen et al., 2020; Fajgelbaum et al., 2020).[4] Broadly related to the policy-induced reconfiguration of supply chains documented in this paper, Alfaro and Chor (2023) documents how the COVID-19 pandemic and geopolitical tensions induced a shift in U.S. imports away from China and towards alternative locations, such as Vietnam and Mexico. More closely related to our analysis, Han et al. (2024) develops measures of technology dependence between the U.S. and China, documenting the effect of Chinese industrial policy and U.S. export controls on Chinese firms' innovation quality and productivity. Lastly, Clayton et al. (2025a) uses large language models to catalog how government apply geoeconomic pressure and how corporations respond to it. We complement

[4]See Caldara and Iacoviello (2022) for a measure of adverse geopolitical events and associated risks.

these findings by analyzing the effect of U.S. export controls on U.S. firms and global supply chains.[5]

2 Background

In this section, we provide some background on the regulations and policies surrounding export controls. The use of economic linkages and strategic dependencies as a weapon has many historical precedents, including Britain and France imposing blockades on Germany during World War I and Germany retaliating by endangering transatlantic commerce with the use of U-boats (Mulder, 2022). The Export Administration Act of 1979 formally authorizes the U.S. President to control exports of U.S. goods and technology to all foreign destinations for national security and foreign policy purposes. The 1979 Act is implemented via the Export Administration Regulations.

2.1 Export Administration Regulations

Title 15 of the United States Code contains regulations related to trade and commerce. In particular, Chapter VII introduces Export Administration Regulations (EAR). These are issued by the Bureau of Industry and Security, BIS, of the Department of Commerce to

[5]This paper is also related to the supply chain literature by documenting how firm-to-firm linkages respond to a policy aiming to induce a selective decoupling of critical supply chains. The empirical literature has primarily focused on two aspects: (i) how shocks propagate through the existing configuration of supply chains (Hertzel et al., 2008; Barrot and Sauvagnat, 2016; Cortes et al., 2019; Costello, 2020; Boehm et al., 2019; Carvalho et al., 2021; Bonadio et al., 2021; Alfaro et al., 2021; Crosignani et al., 2023; Franzoni et al., 2024) and (ii) how supply chains adapt to shocks (Elliott et al., 2022; Pankratz and Schiller, 2024; Ersahin et al., 2024).

control certain export activities. Part 774, Supplement No. 4, also known as the "Entity List", contains names of foreign persons, including businesses, institutes, and universities, subject to license requirements for the export, re-export, and in-country transfer of certain items. In other words, U.S. firms that intend to export, re-export, and transfer goods and services to foreign firms included in the Entity List must first obtain a license from the Commerce Department. These export controls apply to U.S. firms and foreign firms that use U.S.-origin components, manufacturing equipment, technology, and software.[6] The BIS license review policy indicates that, for the most part, there is a presumption of license denial.

The first Entity List was published in 1997 and was meant to limit exports to entities involved in producing weapons of mass destruction (WMDs). Since then, reasons for inclusion in the Entity List have expanded to include engagement in "activities contrary to the national security or foreign policy interests of the United States." In particular, items subject to EAR export controls include purely civilian items, items with both civil and military use (dual-use), terrorism or potential WMD-related applications, and items exclusively used for military applications.

On December 23, 2022, the BIS introduced an additional list, the Military End User (MEU) list, published in Part 774, Supplement No. 7. Entities are added to this list if they pose an "unacceptable risk of use in or diversion to a 'military end use' or 'military end user' in China, Russia, or Venezuela." This includes firms producing or mediating military technologies for these countries. Exporters of military items (listed in Part 744, Supplement

[6] See Part 734.9 Foreign-Direct Product Rules for more details.

No. 2) to entities included in the MEU list must receive a prior license.

Finally, the BIS also publishes the Unverified List (UVL) in Part 774, Supplement No. 6. Inclusion in the UVL generally occurs if the BIS cannot verify the legitimacy of the end-use and end-user of items subject to export controls. Removal from the UVL occurs when the BIS completes a pre-license check or post-shipment verification to confirm the end-user's legitimacy. If the BIS cannot complete an end-use check within 60 days, it will start a process to move the foreign party from the UVL to the Entity List. From the point of view of a U.S. firm trying to export goods and services to foreign companies, including such foreign companies in either the Entity List or the MEU list is more restrictive than including them in the Unverified List. Online Appendix B provides some case studies of Chinese firms included in the Entity List.

3 Data and Summary Statistics

We describe our data sources in Section 3.1 and present summary statistics in Section 3.2.

3.1 Data Sources

We use several data sources to examine the financial and real effects of export controls. First, information on export controls comes from the Bureau of Industry and Security, part of the U.S. Department of Commerce. It can be obtained online via the Federal Register (federalregister.gov) and the Code of Federal Regulations (ecfr.gov). We hand-collect additions and removals of Chinese companies from the Entity List (Part 774, Supplement No. 4), the

Military End Use List (Part 774, Supplement No. 7), and the Unverified List (Part 774, Supplement No. 6). For each entity, we collect the many aliases often provided, the dates when the notices of addition and removal are announced, the dates they become effective (usually five calendar days after the announcement), and the physical addresses of the entities and their aliases. For consistency, we focus only on Chinese entities, as they are the vast majority of the targets of export controls that can be matched with our supply chain data.

Excluding aliases from the 1,120 total Chinese entries, we have 732 unique Chinese entities. Of them, 470 are corporations, and 262 are universities and institutions. Moreover, 425 are from the Entity List, 58 from the MEU list, and 253 from the UVL. The total across lists is greater than the number of Chinese entities since some are listed in multiple lists at different times. For instance, some are listed in Entity and MEU lists, while others first included in the UVL end up permanently in the Entity List. The Entity List started in 1997, and most Chinese entities were added after 2014. The MEU list currently contains Chinese companies added on December 23, 2020, and January 14, 2021. The Unverified List started in 2002, with most Chinese entities included after 2019.

Second, information on supply chain relations comes from FactSet Revere, one of the most comprehensive sources of supply chain data available.[7] Each supply chain relation includes the names and identifiers of the customer and the supplier, as well as the start and end dates of the relation. The information is collected via public filings, investor presentations, websites, corporate actions, press releases, and news reports. We follow Gofman et al. (2020)

[7]For instance, Bloomberg and Capital IQ do not report the start and end dates of a supply chain relation at sufficiently high frequency, while Compustat Segments reports only the largest customers of a given supplier on an annual basis.

and Crosignani et al. (2023) and drop relations with start and end dates within a longer relation between the same two entities and combine multiple relations with time gaps shorter than six months into a continuous relation. Using International Securities Identification Numbers (ISINs) and name matching, we identify 90 Chinese entities subject to export controls (target firms) with supply chain relations with 351 affected suppliers. Of these, 176 have supply chain relations overlapping with the export control event dates.[8] Our sample for the supply chain reconfiguration analysis covers data up to the third quarter of 2023.

Third, we obtain daily stock price data from the Center for Research in Security Prices (CRSP daily stock file) and firm-level balance sheet data from Compustat (North America, fundamentals annual). We use the firm's CUSIP to match firm identifiers among CRSP, Compustat, and FactSet data. The final daily stock price sample has 250 events involving 156 affected suppliers from 2010 to 2022. The number of events is higher than that of affected suppliers because one supplier could be connected to multiple targeted Chinese firms. In addition, some Chinese target firms are included in BIS lists multiple times, often because some previously neglected subsidiaries are added later on.[9] On the other hand, the firm-level balance sheet annual panel runs from 2007 to 2022 and has a total of 655 firms, of which 126 are affected suppliers. We focus on firms that export to China and remove firms with less than $5 million in total assets. The Fama-French daily factor returns are obtained from the Fama-French website.

To assess whether Chinese firms manage to circumvent U.S. export controls by purchasing

[8]We allow one year buffer between the event date and supply chain relation year.

[9]For each affected supplier, we consider events that happen at least six months apart when estimating the pre-treated betas and cumulative abnormal returns.

similar goods from unaffected firms outside of the U.S., we also obtain balance sheet data on an international sample of firms from Capital IQ. Specifically, we obtain EBIT (universal net earnings before interest and taxes) and revenues (universal revenue attributable to the ongoing operations) for 6,068 suppliers of Chinese firms, 525 of which are connected to firms targeted by export controls. Moreover, Chinese stock price data come from Refinitiv and data on the Chinese stock market factors proposed by Liu et al. (2019) are obtained from Mingshi.

Finally, we obtain loan-level information on bank credit to U.S. firms from the corporate loan schedule (H.1) of the Federal Reserve's Y-14Q data.[10] These data have been collected since 2012 to support the Dodd-Frank Act's stress tests and assess bank capital adequacy for large U.S. banks. The credit register provides confidential information at a quarterly frequency on credit exposures exceeding $1 million for banks with more than $50 billion in assets. These loans account for about 75 percent of all commercial and industrial lending volume during our sample period. In addition to the committed credit for each bank-firm pair, the data set also contains information on the committed and drawn amounts on credit lines, the credit amount past due, and other loan characteristics, such as the interest rate spread, maturity, and collateral. We use the firms' CUSIPs to identify firms affected by export controls in the loan-level data and, as before, focus on firms that export to China, resulting in a sample of 331 firms—71 of which are subject to export controls—borrowing from 38 banks over the period from 2012:Q3 to 2023:Q3.

[10]Recent studies using the Federal Reserve's Y-14Q corporate loan-level data include Crosignani et al. (2023) or Sachdeva et al. (2025).

3.2 Summary Statistics

Panel A of Figure 1 shows the number of affected U.S. suppliers over time as the BIS includes Chinese customers in the Entity List. Most targeted Chinese firms belong to the telecommunication, transportation, and electronic equipment sectors, while most affected suppliers are in the electronics and industrial machinery equipment sectors (Figure 1, Panel B). Summary statistics on supply chain and balance sheet variables are presented in Tables 1 and 2, respectively. In the supply chain analysis, treated firms (affected suppliers) export to Chinese entities in the BIS lists, and control firms are firms that export to Chinese firms that are not included in the BIS lists. Affected suppliers tend to have more total customers than control firms and thus also terminate and form more customer relations than control firms. However, treated and control firms have a similar geographical distribution of their customer base. The average share of Chinese customers is 9.3% for treated and 5.9% for control firms, the European share is 13.6% for treated and 12.9% for control firms, and finally, the domestic share is 40.8% for treated and 51.3% for control firms.

Affected suppliers, being exporters to Chinese conglomerates, tend to be larger than unaffected firms. They also tend to be more profitable (greater cash flow and return on assets) due to higher operating income and lower interest payments over total assets. Once we split the sample by industry-year-specific size quartiles and focus on the sample of exporters to China, treated and control firms are more comparable, other than for the bottom size quartile (Table 3). Across all size quartiles, capital expenditure, interest expenses, and the number of employees are similar between treated and control firms. Since size quartiles are computed within each industry and year, treated firms may be on average larger than control ones

within each size quartile if treated firms are concentrated in industries with larger firms.[11] However, this is not a concern in our empirical analysis since we compare each treated firm to control firms within the same industry and industry-specific size quartile.

4 Decoupling and Supply Chain Dynamics

We now present evidence of the domestic supply chain reconfiguration after the imposition of export controls. Section 4.1 discusses our empirical strategy, Section 4.2 presents evidence of export controls inducing an immediate, broad-based decoupling, and Section 4.3 focuses on the domestic supply chain reconfiguration, indicating a lack of reshoring or friend-shoring.

4.1 Empirical Strategy

The BIS has been including Chinese entities in the various export control lists since the early 2000s in a staggered fashion. Due to the staggered nature of the shock (i.e., a Chinese customer is included in a BIS list), a standard differences-in-differences model may produce biased estimates of the treatment effects.[12] Hence, we employ the stacked regression estimator methodology developed by Gormley and Matsa (2011) and described in Baker et al. (2022). Specifically, we stack observations from multiple cohorts, where a cohort includes treated and control firms in a $[-3, 3]$ year window centered around an event. We restrict the control

[11] Additionally, treated firms in the second size quartile appear to be on average larger than treated firms in the third size quartile. This is simply because there are some treated firms in the second quartile of large industries, while many treated firms in the third size quartile belong to relatively smaller industries.

[12] See Roth et al. (2023), for instance, for a detailed review of the recent literature on staggered differences-in-differences designs.

group to firms that have either never been treated or are not yet treated. An event is defined as the time when a Chinese firm is included in a BIS export control list, while treatment refers to the first time a firm's customer is included in the BIS lists.

We then estimate the following stacked regression specification:

$$y_{ict} = \beta Affected_{ic} \times Post_{tc} + \mu_{ic} + \mu_{ckt} + \varepsilon_{ict}, \tag{1}$$

where c indicates a specific cohort (i.e., a round of export controls), i a firm, and t a year. y_{ict} is the outcome variable for firm i in cohort c and year t, including cash flow, EBIT, CapEx, revenue, and employees. When we analyze supply chain relation data and use count or count-like outcome variables, such as the number of terminated relations, we follow Cohn et al. (2022) and estimate Poisson regressions using the maximum likelihood approach of Correia et al. (2020). Affected_{ic} is an indicator variable equal to one if export control c is imposed on a Chinese customer of U.S. firm i and Post_{tc} equals one following the imposition of such export control. Each cohort includes observations from 3 years before to 3 years after the event. Each cohort c includes treated, never treated, and not yet treated units. To ensure that each treated unit is compared to units within the same cohort that are similar in industry and size, we include cohort-industry-size quartile-year fixed effects, μ_{ckt}. As customary in stacked regressions, we include firm-cohort fixed effects, μ_{ic}. Standard errors are double-clustered at the firm and year levels.

Sometimes, subsidiaries of the same Chinese parent company are added sequentially to the BIS lists. This happens because the Department of Commerce later discovers that

additional subsidiaries may acquire controlled technology for the same target parent company. Often, further subsidiaries are included just a few months later. We include events at least six months apart for a specific U.S. firm to avoid contamination of the CAR estimates. While each of these additions is treated as a separate event in the CAR study, multiple treatments are more cumbersome in a panel setting with yearly data. To only capture the specific Chinese entity with which U.S. firms conduct a meaningful amount of business, in our main yearly panel regressions (Eq. 1), we define the treatment as the first time that a parent company of a Chinese customer enters the BIS lists, conditional on the U.S. supplier having a sizable CAR response to such event.[13] To select the more stringent among all export controls, we restrict the sample to Chinese firms belonging to the Entity List and the MEU list ("Restrictive Sample") in some specifications, thus excluding the less restrictive and often temporary inclusions in the Unverified List.

In robustness tests, we also estimate the dynamic effects of export controls using both stacked regressions and the more standard (albeit potentially biased) two-way fixed effects (TWFE) model. The dynamic stacked regressions are estimated using the following model:

$$y_{ict} = \sum_{j=-3}^{j=3} \beta_j \mathbb{1}(J_{ict} = j) + \mu_{ic} + \mu_{ckt} + \varepsilon_{ict}, \tag{2}$$

[13]Specifically, if a Chinese customer of U.S. firm i is added multiple times under different aliases or subsidiary names to the BIS lists, we require that the first one of such events is also the one with the most negative CAR response for firm i. This requirement excludes 16 out of the 156 treatments. These are instances in which the first inclusion in the BIS list covers a limited number of goods or only includes a specific subsidiary with marginal importance to the U.S. firm. Using the entire sample that includes the first time the parent company enters a BIS list (without CAR response restrictions), results are qualitatively unchanged, albeit more noisy due to the inclusion of firms that are only marginally affected.

where $\mathbb{1}(J_{ict} = j)$ is an indicator variable equal to one if an export control c on a Chinese customer of firm i occurred j years apart from the event year. The interaction term for the year prior to treatment is excluded and thus constitutes the omitted group. Each cohort c includes treated, never treated, and not yet treated units. To ensure that each treated unit is compared to units within the same cohort that are similar in industry and size, we include cohort-industry-size quartile-year fixed effects, μ_{ckt}. As customary in stacked regressions, we include firm-cohort fixed effects, μ_{ic}. Standard errors are double-clustered at the firm and year levels. On the other hand, the dynamic TWFE model is specified as follows:

$$y_{it} = \sum_{j=-3}^{j=3} \beta_j \mathbb{1}(J_{it} = j) + \mu_i + \mu_{kt} + \varepsilon_{it}, \tag{3}$$

where y_{it} is an outcome of firm i in year t and $\mathbb{1}(J_{it} = j)$ is an indicator variable equal to one if an export control on a Chinese customer of firm i occurred j years from the event year. We consider a window of 3 years around the incident date ($-3 \leq j \leq 3$). The interaction term for the year prior to treatment is excluded and is thus part of the omitted group. We include firm and industry-size quartile-year fixed effects, namely μ_i and μ_{kt}, respectively. The latter fixed effects are included to ensure that the control group consists of firms in the same industry and of comparable size to the treated firms. Since treated firms are, by definition, exporting to China, we also require control firms to export to China (but not to the BIS-targeted entities) and belong to the same industry as the treated firms. Standard errors are double-clustered at the firm and year levels.

As shown later in the paper, our main results using the stacked regression approach of Eq.

(2) are qualitatively similar to those employing the TWFE model of Eq. (3), consistent with the fact that the TWFE bias is less likely to be a problem when the number of ever-treated units is small relative to the entire sample (Baker et al., 2022), as it is the case in our setting.

4.2 Decoupling

We now document how supply chain relations respond to export controls. By definition, affected suppliers must stop exporting critical goods to the Chinese customers included in the BIS export control lists. To ensure that control firms are comparable to the treated ones, we require control firms in each cohort to export to China in the pre-treatment period.

We explore various ways export controls may lead to a U.S.-China decoupling. Specifically, we study the effect of export controls on both termination and creation of relations with Chinese customers. Since the affected suppliers must terminate relations only with the Chinese firms targeted by export controls, we explore whether affected suppliers selectively terminate relations only with the targeted Chinese customers or, more broadly, with any of their Chinese customers. Terminating relations with Chinese customers not directly targeted by export controls could indicate concerns that these other Chinese firms (i) may end up being targeted by export controls shortly or (ii) may re-export the technology to the directly targeted firms, potentially violating BIS rules.

Notice that we cannot directly estimate whether affected suppliers are more likely to terminate relations with Chinese targets because control firms, by definition, do not have relations with those firms. As a result, we estimate the effect of export controls on the number of terminated relations with any Chinese customer and compare it to the effect on terminated

relations excluding the Chinese targets. If affected suppliers terminate relations only with the directly targeted firms, we should estimate a significant effect on total terminations but not on terminations excluding Chinese targets. If, on the other hand, affected suppliers terminate relations with both groups, we should estimate significant effects on terminations with any Chinese customer and terminations excluding Chinese targets, albeit with the latter effect being smaller in magnitude.

Finally, we study whether affected suppliers are less likely to form new relations with other Chinese customers following export controls. Indeed, concerns about re-export may make affected U.S. suppliers reluctant to sell critical technology to new Chinese customers. The supply chain variables, summarized in Table 1, are the total number of terminated or new relations. We use Poisson regressions on these count-like variables, as suggested by Cohn et al. (2022).

Table 4 presents the regression results using the preferred stacked regression approach of Eq. (1) and displays the main coefficient of interest, Affected × Post. The dependent variables are the number of terminated relations with Chinese customers in columns (1) to (3), with Chinese customers excluding the targeted ones in columns (4) to (6), and the number of new relations with Chinese customers in columns (7) to (9). In columns (3), (6), and (9), we also interact our fixed effects with the quartile of the lagged number of treated firms' total customers to control for differences in the richness of supply chain relations between treated and control firms. As a result, we compare firms with a similar number of customers one year prior.

The positive and significant coefficients of interest (Affected × Post) in columns (1)

to (3) indicate that export controls lead to more relations with Chinese customers being terminated. Once we exclude the Chinese customers directly targeted by export controls, the coefficients in columns (4) to (6) show that affected suppliers are more likely to terminate relations even with Chinese firms not directly targeted by export controls. The coefficients in columns (3) and (6) indicate that affected suppliers are more likely to terminate relations with Chinese customers targeted by export controls and other Chinese customers that are not directly targeted. Finally, columns (7) to (9) explore the formation of new relations with Chinese customers. After one of their customers is targeted by export controls, affected suppliers form fewer relations with new Chinese customers.

While the decoupling from the targeted Chinese firms constitutes the intended effect of export controls, the additional broad-based decoupling from other Chinese customers is not an obvious result ex-ante. This broad-based decoupling is consistent with a "wake-up call" whereby affected suppliers become more aware of geopolitical risk and the possibility of future controls. It is also consistent with fear that intermediate Chinese firms may purchase sensitive goods and sell them back to the targeted firms, violating export control laws. The decoupling effects are not only statistically but also economically significant. Export controls lead to an increase in terminations with Chinese customers by 51%-75% (columns 5 to 6) and a decline in the establishment of new Chinese customer relations by 38%-41% (columns 8 to 9).[14]

Our results are not driven by pre-trends. Figure 2 displays the coefficient plots for total terminations, terminations excluding targeted Chinese firms, and new relations with Chinese

[14]The interpretation of coefficients in a Poisson regression is equivalent to that of a linear regression where the outcome variable is in logs. Thus, we obtain these economic magnitudes by taking the exponential of the estimated coefficients and then subtracting one.

firms using the preferred stacked regression approach of Eq. (1) (Panels A, C, and E) and the TWFE model of Eq. (3) (Panels B, D, and F). The dynamic plots show no pre-trends, indicating that our results are not due to pre-existing supply chain dynamics unrelated to export controls. Consistent with our previous static results, the coefficient plots show that following export controls, there is a significant increase in the total number of terminations with Chinese customers, whether or not we include the targeted Chinese firms. At the same time, there is a significant decrease in the number of new relations formed with Chinese customers. The results are qualitatively similar between the stacked regression approach and the TWFE method. Finally, the decoupling results are robust to the use of the alternative NAICS classification for the industry fixed effects, as shown in Panel A of Online Appendix Table C.1.

4.3 Domestic Supply Chain Reconfiguration

Next, we explore whether affected suppliers reconfigure their supply chains and form new relations away from China to offset the drop in Chinese customers following export controls. The results are displayed in Table 5. The dependent variables are the total number of customers in columns (1) and (2) and the total number of domestic (U.S.) customers in columns (3) and (4). The negative and significant coefficients of Affected $\times$ Post in columns (1) and (2) indicate that affected suppliers experience a reduction in the overall number of customers. Hence, they cannot significantly offset the reduction in Chinese customers due to the imposition of export controls by finding alternative ones in the following 3 years. We also find no evidence of reshoring. Indeed, the insignificant coefficients in columns (3) and (4)

suggest that affected suppliers do not significantly change the number of domestic customers following export controls.

We further examine the effect of export controls on the customer shares of U.S. suppliers by region. The results are displayed in Table 6. In Panel A, the dependent variables are the share of customers from the U.S. and China, respectively. The positive and significant coefficient of Affected × Post in columns (1) to (2) shows that affected suppliers are more reliant on domestic customers as they reduce the reliance on Chinese customers (columns 3 to 4). As previously discussed, the greater reliance on domestic customers is simply because the number of total customers declines while that of domestic customers is unchanged. In Panel B, we examine customer shares of U.S. suppliers from other regions in Asia and Europe. The dependent variables are the share of customers from Asia (excluding China), Asia allies (South Korea, Japan, Taiwan, and Australia), and the European Union in columns (1) to (6). If U.S. suppliers reroute their customer base to politically friendly regions, we would expect an increase in customer shares from those regions. The negative and insignificant coefficients of Affected × Post in columns (1) to (6) suggest that firms are not friend-shoring and, in general, are not substituting the drop in Chinese customers with other international customers in the 3 years following export controls. The lack of meaningful short-run adjustments in supply chains is consistent with the findings in Boehm et al. (2019) that the short-run elasticity of substitution between different inputs is near zero.

Overall, the supply chain results of Tables 4, 5, and 6 suggest that affected suppliers cannot easily find new customers to make up for the decline in Chinese customers following the imposition of export controls. These supply chain rigidities suggest that export controls

may impose significant collateral damage on the domestic firms producing the very same technologies that these policies aim to safeguard.

5 Collateral Damage

We now present evidence of the collateral damage of export controls on domestic firms. Section 5.1 documents that domestic firms experience negative abnormal stock returns following the announcement of export controls on their customers. Section 5.2 shows consistent evidence using balance sheet characteristics—namely, reductions in cash flows, revenue, profitability, and employment. Section 5.3 shows that affected domestic suppliers experience tighter lending conditions after the imposition of export controls.

5.1 Evidence from the Stock Market

To study the stock market reaction to export controls, we estimate abnormal stock returns of affected suppliers around the announcement dates of their Chinese customers being added to the relevant BIS lists: Entity List, UVL, and MEU list. Affected suppliers are the U.S. firms that export to the Chinese entities included in the BIS lists. The same affected supplier can participate in multiple events if it exports to more than one target company or if the same target company enters the BIS lists more than once. The latter can happen when different subsidiaries of the same company are added at different times. For those reasons, we have 250 events and 156 unique affected suppliers. The main specifications estimate cumulative abnormal returns in a $[-10, 20]$ day window around the event date, using either

the Fama-French 3-factor model (Fama and French, 1993) or the Fama-French 5-factor model (Fama and French, 2015).[15]

Panels A and B of Figure 3 display the cumulative abnormal returns relative to the Fama-French 3-factor and 5-factor models, respectively. Upon announcement that Chinese entities are added to the BIS lists (the event), the U.S. suppliers of these targeted entities experience negative abnormal returns. While there is no evidence of abnormal returns in the 10 days preceding the event, the market seems to quickly incorporate the negative news for the affected suppliers once the inclusion of the targeted entities in the BIS lists is announced.

The stock market reaction indicates that export controls may create some collateral damage. By restricting the ability of domestic firms to export products to selected Chinese firms, export controls impose immediate valuation losses on the affected U.S. suppliers. On average, U.S. suppliers experience -3.6% cumulative abnormal return around the export control. This estimate implies that the average U.S. firm affected by export controls loses about $1 billion in market capitalization. Across all the firms in our sample, this translates to a decrease in market capitalization of $158 billion, which is economically significant.[16] The CAR results are quantitatively unchanged if we focus on the more restrictive export control events, namely those in the Entity and Military End Use lists (hence excluding events from the Unverified List), as shown in Online Appendix Figure C.1.

[15]We follow standard event study methods and use a $[-150, -50]$ day window to estimate betas and then estimate the out-of-sample abnormal returns during the event window $[-10, 20]$.

[16]The aggregate loss is estimated by multiplying the loss for the average affected supplier ($1.01 billion) by the number of affected suppliers, 156.

5.2 Evidence from Profitability, Employment, and Investment

We now document the real effects of export controls on affected suppliers. Consistent with our findings on the supply chain reconfiguration, export controls may lead to an economic loss for U.S. firms that export goods and services to the Chinese firms included in the BIS lists.

Our analysis is again based on the stacked regression Eq. (1). Table 7 displays the real effect of export controls on affected suppliers. The dependent variables are cash flow in column (1), revenues in column (2), EBIT in column (3), CapEx in column (4), and the number of employees in column (5). Panel A uses the main sample, while Panel B uses only the more restrictive export controls.

The collateral damage of export controls on U.S. suppliers is statistically and economically significant. The coefficient of column (1) in Panel A suggests that export controls lead to a decline in cash flow that is equal to 21% of its average value for treated firms. Revenues for treated firms decline by 8.9% after the imposition of export controls, as shown in column (2). The coefficient of column (3) in Panel A suggests that export controls lead to a decline in EBIT that is equal to 28% of its average value for treated firms. Affected suppliers seem to adjust to the negative consequences of export controls by reducing employment but not investment, as shown in columns (4) and (5). The effect on employment is statistically and economically significant, representing a 7.3% decline in the total number of employees. The asymmetric effect on investment and employment is consistent with export controls not significantly changing the long-term investment opportunities of affected firms while requiring short-term adjustments to the labor force. These collateral damage results are robust to the use of the alternative NAICS classification for the industry fixed effects, as shown in Panel B

of Online Appendix Table C.1.[17]

5.3 Evidence from Bank Lending Conditions

With both credit demand and supply likely shifting at the same time, it is not ex-ante clear how the quantity and pricing of bank loans to affected U.S. suppliers would respond to the imposition of export controls. If credit demand factors are the dominant force, one would expect loan quantities and pricing moving in the same direction. Instead, shifts in credit supply would likely result in loan quantities and pricing moving in the opposite direction. To examine this question, we employ confidential quarterly loan-level data for the U.S. obtained from the corporate loan schedule of the Federal Reserve's Y-14Q.

As before, we employ a stacked regression estimator and focus on firms that export to China, resulting in a sample of 331 firms—71 of which are affected by export controls—borrowing from a total of 38 banks from 2012:Q3 to 2023:Q3. Firm fixed effects absorb time-invariant firm characteristics, while industry-size-quarter fixed effects absorb common demand conditions within a given industry–size group, namely shocks affecting similar firms at the same time. Bank-quarter fixed effects capture time-varying, bank-specific shocks that shift credit supply at a given bank in a specific quarter across all borrowers. Thus, the coefficient of interest, Affected $\times$ Post, is identified from within-bank-quarter comparisons of affected

[17]The only noticeable difference when using NAICS fixed effects is that the increase in capital expenditure is now significant, indicating that affected suppliers may need to either change production processes to accommodate potential new customers or speed up the depreciation of existing assets that used to serve the targeted Chinese customers. Indeed, CapEx is the sum of changes in property, plant, and equipment plus current depreciation.

versus control firms within the same industry-size-quarter.

Table 8 presents the Poisson Pseudo Maximum Likelihood (PPML, columns 1 to 4) and OLS (columns 5 to 6) regression results when considering the effects on total credit commitments, the amounts of committed term loans and credit lines, the share of the credit line that is utilized, the interest rate spread, and the maturity of total commitment, respectively. We observe a reduction in banks' credit exposure to affected suppliers, driven by a reduction in the quantity of term loans but no change in credit line commitments and utilization. Banks also charge higher interest rate spreads and shorten the maturity of their credit exposures to affected suppliers following the imposition of export controls. The decline in the quantity of term loans together with a tightening of prices and other terms is consistent with a negative credit supply shift being the dominant factor in our setting.

6 Chinese Supply Chain Reconfiguration

Finally, we examine how Chinese firms respond to U.S. export controls designed to deny them access to U.S. cutting-edge technologies. We use again the stacked regression approach of Eq. (1), where the main regressor is now *Targeted*, which equals one for the Chinese firms directly targeted by export controls. In line with our previous results, we document a decoupling from U.S. suppliers and, in addition, find that Chinese targets find alternative domestic suppliers. Online Appendix Table C.2 reports the summary statistics for Chinese supply chain variables.

We first examine whether Chinese firms directly targeted by U.S. export controls decouple from the U.S. and whether they reshore by finding alternative suppliers domestically.

Table 9 shows the results. The dependent variables are the total terminations with U.S. suppliers in columns (1) to (2), new relations formed with Chinese suppliers in columns (3) to (4), and new relations formed with U.S. suppliers in columns (5) to (6). The positive and significant coefficients of Targeted × Post in columns (1) and (2) indicate that relations between targeted Chinese firms and their U.S. suppliers are more likely to be terminated after the export controls relative to unaffected Chinese firms. This decoupling between targeted Chinese firms and their U.S. suppliers is indeed the intended effect of U.S. export controls. What is unknown is how Chinese supply chains react to export controls. To this regard, we find that targeted Chinese firms increase new relations with domestic Chinese suppliers in columns (3) to (4). We also find in columns (5) to (6) that targeted Chinese firms reduce the number of new relations with U.S. suppliers following export controls, even though the effect is not statistically significant.

We examine the total number of suppliers and the change in supplier shares in Table 10. The dependent variables are the total number of suppliers in columns (1) to (2), the share of Chinese suppliers in columns (3) to (4), and the share of U.S. suppliers in columns (5) to (6). The total number of suppliers of the targeted Chinese firms does not change significantly after the export controls, indicating a substitution of new Chinese suppliers for the terminated U.S. suppliers. Indeed, the share of Chinese suppliers increases significantly in columns (3) to (4), while the share of U.S. suppliers decreases significantly in columns (5) to (6). These results indicate that Chinese firms directly targeted by U.S. export controls can quickly adjust their supply chain by forming new relations with domestic Chinese suppliers. In other words, decoupling is accompanied by reshoring for the Chinese firms targeted by U.S. export controls.

It is possible that Chinese firms reshore faster and more effectively than U.S. firms hit by export controls because large state-owned Chinese firms enjoy a more substantial degree of economic coordination. Figure 4 shows that these results are not driven by pre-trends.

In addition to forming new relations with alternative suppliers, targeted Chinese firms can also try to buy more goods similar to those denied to them by U.S. export controls from non-U.S. firms with whom they have a pre-existing relation. Notice that non-U.S. firms are exempt from U.S. export controls unless they have significant operations in the United States. We classify non-U.S. firms as exempt, which, if any, would bias our estimates toward finding a decline in revenues by non-U.S. firms that sell to Chinese targets. Table 11 displays the results. Non-U.S. firms that supply goods to Chinese targets experience higher revenues and profitability (measured by EBIT) following the inclusion of the Chinese targets in the U.S. export control lists, even though the effect is statistically significant only for revenues.[18] The results are stronger when we focus on non-U.S. firms headquartered in U.S.-allied countries, likely because these firms produce high-tech products more comparable with those produced by U.S. firms. Anecdotal evidence indeed suggests that Chinese firms engage in such strategic behavior. For example, faced with U.S. export controls on semiconductor technology, some large Chinese firms bought similar technology from ASML in the Netherlands for years before the Dutch government also restricted those exports to China (Kharpal, 2024).

Despite engaging in a more proactive supply chain reconfiguration relative to U.S. firms, the Chinese targets of U.S. export controls still face considerable costs. Figure 5 reports

[18]The sample of international firms used in Table 11 relies on data from CapitalIQ. The Cash Flow measure of Table 7 is not available in CapitalIQ and thus not used in Table 11.

CAR estimates for the publicly listed Chinese firms targeted by export controls using the China-specific three- and four-factor models of Liu et al. (2019), with Chinese stock price data obtained from Refinitiv.[19] On average, an affected Chinese firm experiences a CAR from −8.2% (Panel A) to −9.0% (Panel B) over the event window [−10, 20], corresponding to a total market capitalization loss across all publicly listed Chinese targets of $18 to $19 billion.

Overall, the total losses across listed Chinese targets are considerably smaller than those of their U.S. counterparts. Specifically, among the U.S. firms affected by export controls, the average CAR over the event window [−10, 20] is −3.6%, corresponding to a total market capitalization loss of $158 billion. These results reflect not just differences in firm size, with Chinese targets being smaller on average than U.S. firms, but also the supply chain structure of the targeted industries. Indeed, since each Chinese target is connected to multiple U.S. suppliers, there are considerably larger aggregate losses on the U.S. side. Even when focusing on the subsample of U.S. firms connected to these publicly listed Chinese targets, the total market capitalization loss is still $77 billion. In either case, total market capitalization losses of U.S. firms are considerably larger than those of Chinese firms—with the more conservative estimate pointing to losses four times as large.

[19]The three-factor model of Liu et al. (2019) includes (i) a China market factor, (ii) a size factor constructed after excluding the smallest 30% of firms, as these are often shells in reverse mergers to circumvent tight IPO constraints, and (iii) a value factor based on the earnings-to-price ratio, which dominates book-to-market in capturing value effects in China. We also use their four-factor model, which adds a turnover factor to capture sentiment effects.

7 Conclusion

Technological superiority is the dominant force shaping global power dynamics. Modern militaries rely on advanced technologies—from cyber warfare and unmanned systems to wireless communications—while economic leadership now hinges on semiconductors. In this context, the U.S. imposed export controls forbidding U.S. firms from exporting cutting-edge technologies to selected Chinese firms.

As intended, export controls prompt domestic suppliers to decouple from the targeted Chinese firms. On the U.S. side, this decoupling is not offset by the formation of new supply chain relations domestically or in other politically aligned countries. As a result, these supply chain rigidities are costly for domestic firms, which experience negative abnormal equity returns as well as sizable declines in revenues and profitability. Finally, we find that targeted Chinese firms offset the decline in U.S. suppliers by increasing reliance on domestic alternatives. We also find suggestive evidence that targeted Chinese firms increase purchases from non-U.S. firms. These adjustments on the Chinese side, however, are not without cost, resulting in a total capitalization loss of at least $18 billion across the publicly listed Chinese targets.

Overall, we document significant collateral damage imposed by export controls to the very same domestic firms producing the technologies this policy is aimed to safeguard. A full cost-benefit analysis, including national security gains and the differential effect on U.S. and Chinese innovation, is beyond the scope of this paper and thus left for future research.

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Figure 1: Number of Affected U.S. Suppliers. Figure 1 Panel A displays the number of affected U.S. suppliers over time as the BIS includes Chinese customers in the BIS List. The histogram shows the number of affected U.S. suppliers in a specific year. The blue line represents the cumulative number of affected U.S. suppliers over time. Symbolic Chinese firms that are included in the BIS List are highlighted with orange text. Panel B displays the top 10 most affected industries based on the total number of affected U.S. suppliers in each industry. The industry classification is based on the 2-digit SIC code.

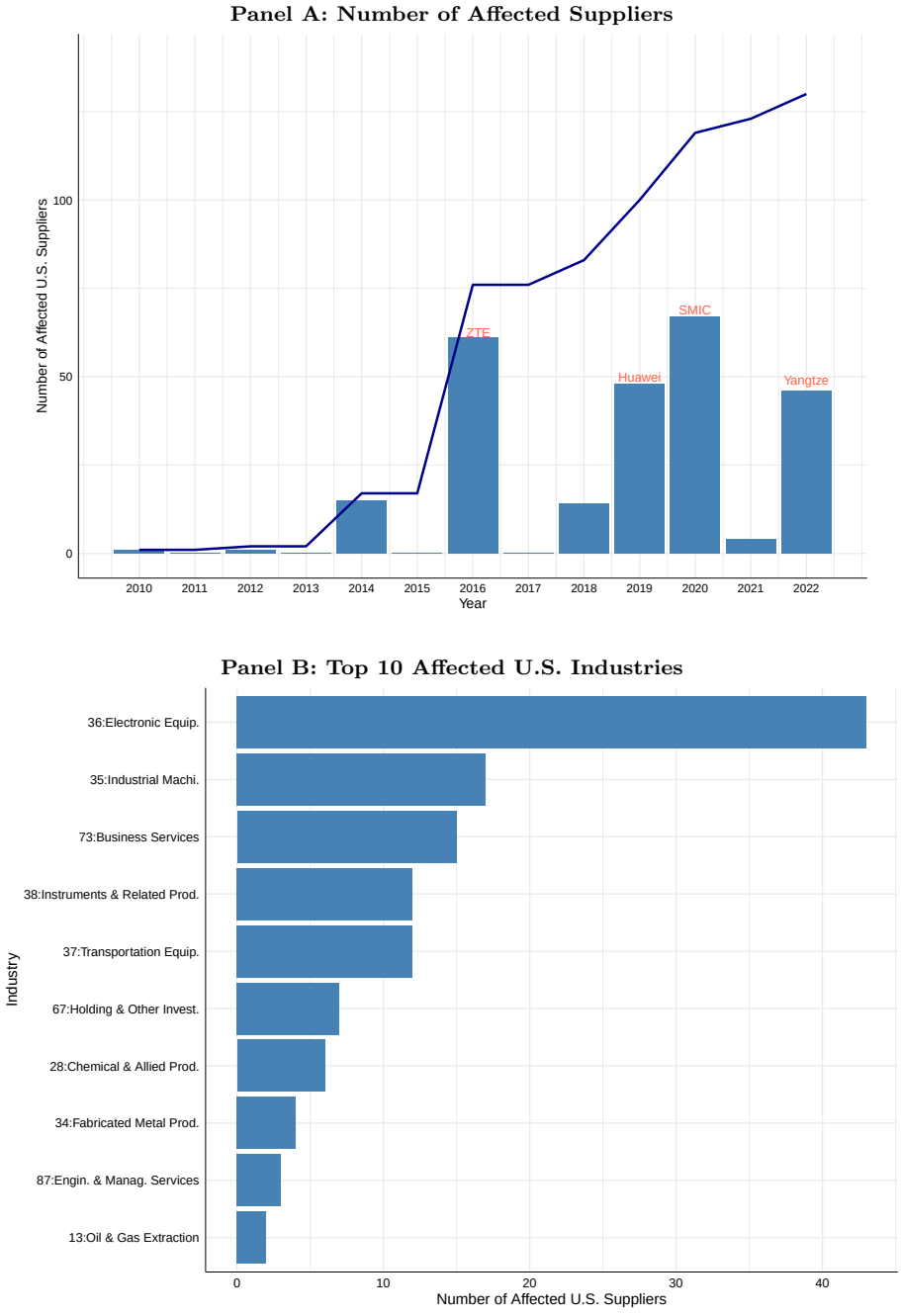
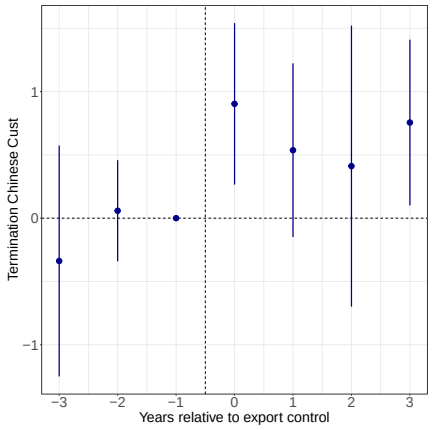
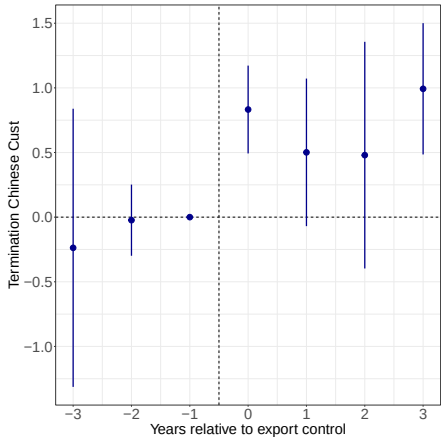


Figure 2: Decoupling from Chinese Customers. Figure 2 displays the dynamic effects of export controls on the number of terminated Chinese customers in affected suppliers. Panels A, C and E show the coefficient plots for the number of terminated Chinese customers using the Poisson Pseudo Maximum likelihood (PPML) regression on the stacked regression of Eq. (2) while Panels B, D and F employ the TWFE model of Eq. (3). Panels A and B display the results on the total terminations with Chinese customers. Panels C and D show terminations with Chinese customers, excluding the targeted ones. Panels E and F display the results on the new relation with Chinese customers. Regressions include firm and industry-size quartile-lagged customer number quartile-year fixed effects. In the stacked regressions, the fixed effects are further interacted with the cohort indicator variable. The blue bars indicate 95% confidence intervals around the estimated dynamic coefficient (blue dot).

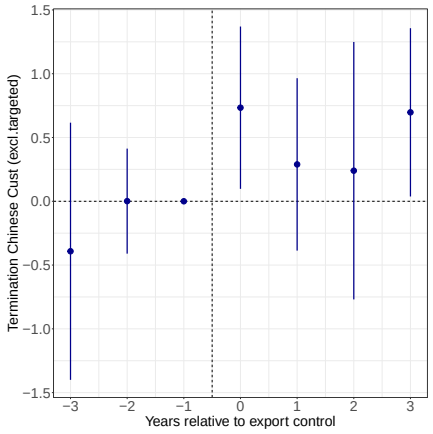
Panel A: Terminations (total), Stacked



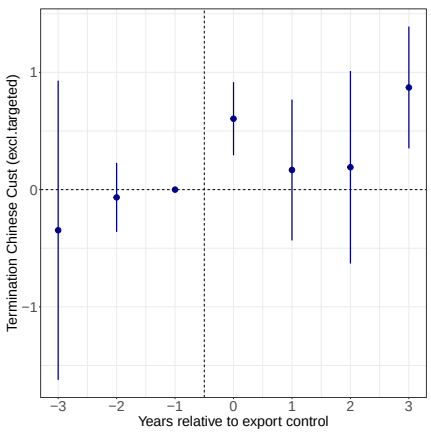
Panel B: Terminations (total), TWFE



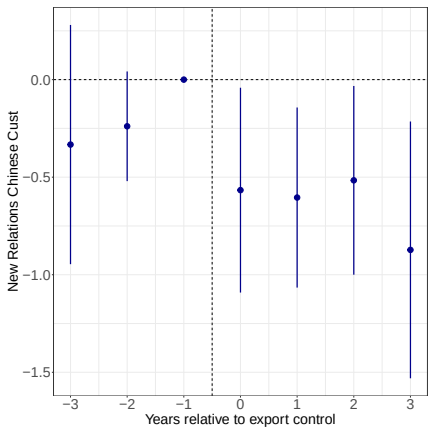
Panel C: Terminations (excl. targeted), Stacked



Panel D: Terminations (excl. targeted), TWFE



Panel E: New relation, Stacked



Panel F: New relation, TWFE

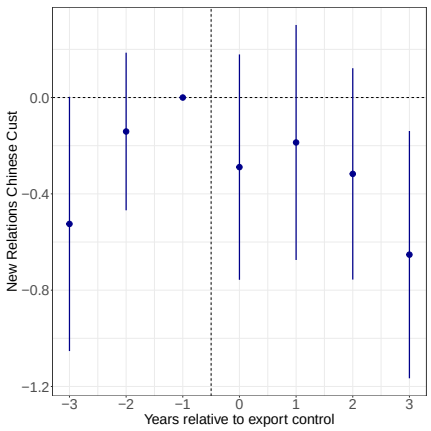


Figure 3: Cumulative Abnormal Returns around Announcement Dates. Figure 3 displays the cumulative abnormal returns (CAR) of affected suppliers in a $[-10, 20]$ day window around the announcement date of the inclusion of a target entity in the BIS lists. Panel A shows CARs using the Fama-French 3-factor model (Fama and French, 1993) while Panel B uses the Fama-French 5-factor model (Fama and French, 2015). On the vertical axis are the cumulative abnormal returns in percentages and on the horizontal axis the days relative to the announcement dates. The dashed vertical line represents the day before announcement date. The solid red line represents the average CARs and the dot-dash blue lines represent the 95% confidence intervals.

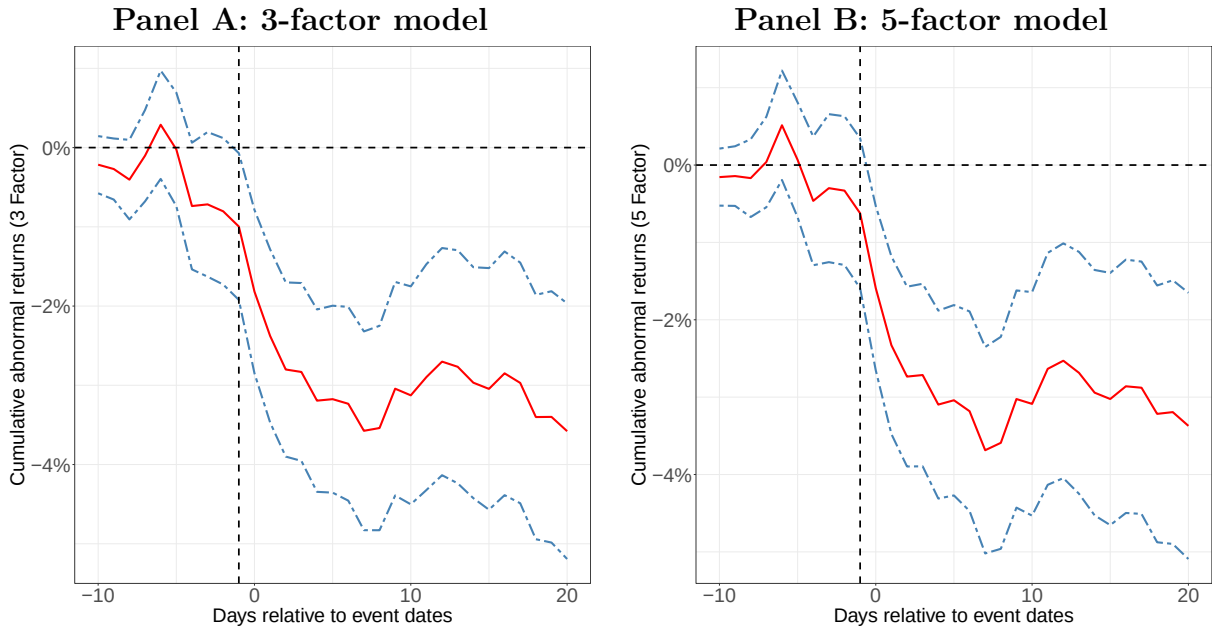


Figure 4: Chinese Firms' Supply Chain Reconfiguration. Figure 4 displays the dynamic effects of export controls on the supply chains of Chinese firms targeted by U.S. export controls. Panel A shows the coefficient plot for the terminations with U.S. suppliers using the Poisson Pseudo Maximum likelihood (PPML) regression on the stacked regression of Eq. (2). Panel B displays the dynamic effect on new relations with Chinese suppliers using the Poisson Pseudo Maximum Likelihood (PPML) regression on the stacked regression of Eq. (2). Regressions include cohort-firm and cohort-customer number quartile-year fixed effects. The blue bars indicate 95% confidence intervals around the estimated dynamic coefficient (blue dot).

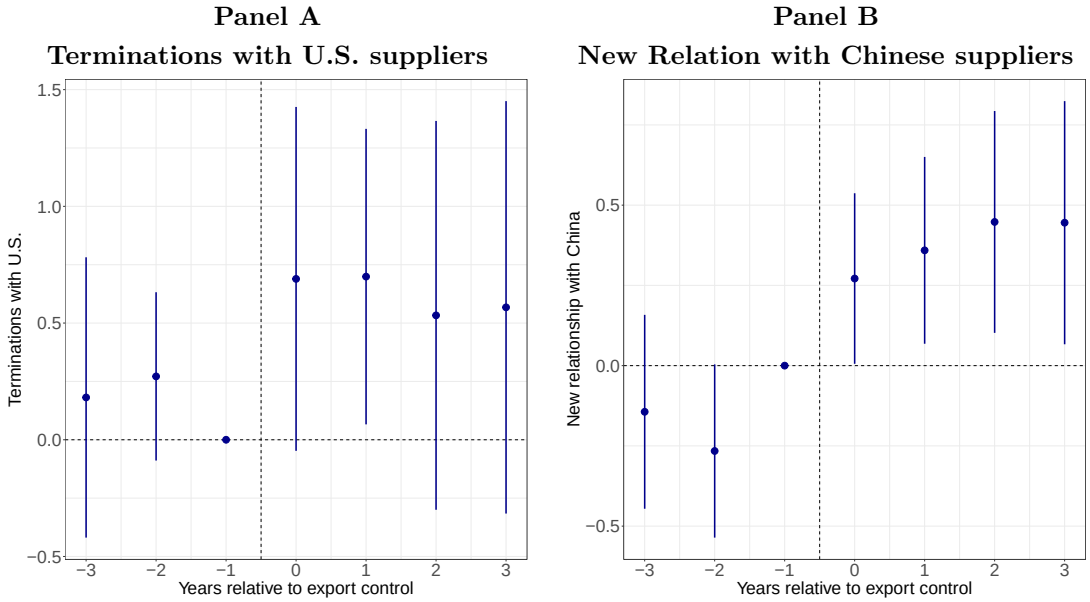


Figure 5: Cumulative Abnormal Returns on Targeted Chinese Firms. Figure 5 displays the cumulative abnormal returns (CAR) of targeted Chinese firms in a [−10, 20] day window around the announcement date of the inclusion of a target entity in the BIS lists. Panels A and B show CARs using the 3- and 4-factor models of Liu et al. (2019), respectively. On the vertical axis are the cumulative abnormal returns (in percentages), and on the horizontal axis are the days relative to the announcement dates. The dashed vertical line represents the day before the announcement date. The solid red line represents the average CARs and the dot-dash blue lines represent the 95% confidence intervals.

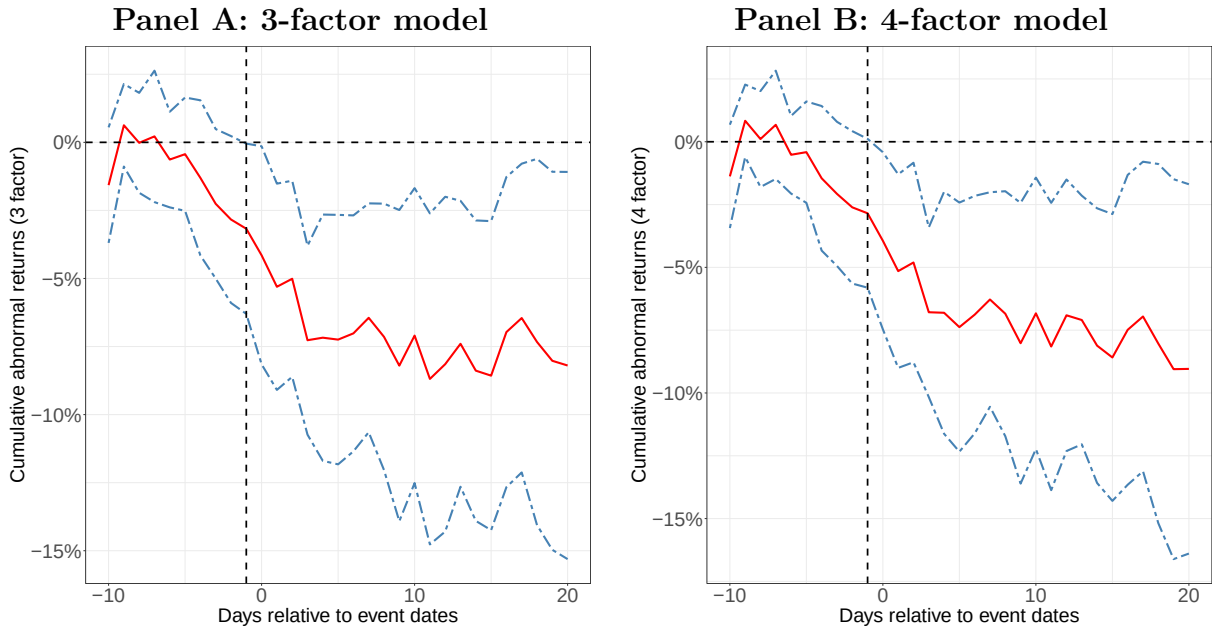


Table 1: Summary Statistics—Supply Chain Reconfigurations. Table 1 presents summary statistics for firms' supply chain relationships based on their treatment status (treated if they supply to Chinese entities in the BIS lists; control if they export to Chinese entities not in the BIS lists). Termination Chinese Cust is the total number of terminated relations with Chinese customers. Termination Chinese Cust (excl. targeted) is the total number of terminated relations with Chinese customers, excluding those targeted by the BIS lists. New Relations Chinese Cust is the number of new Chinese customers. Total Cust is the total number of customers. Domestic Cust is the number of domestic (U.S.) customers. Domestic Share is the ratio of the total number of domestic U.S. customers to the contemporaneous number of total customers. China share is the ratio of the total number of Chinese customers to the contemporaneous number of total customers. Asia share is the ratio of the total number of customers from Asian countries other than China to the contemporaneous number of total customers. Asia Friend Share is the ratio of the total number of customers from South Korea, Japan, Australia, and Taiwan to the contemporaneous number of total customers. EU share is the ratio of the total number of customers from European Union countries to the contemporaneous number of total customers. SD refers to standard deviation, Obs refers to the number of observations, and p(25), p(50), and p(75) refer to the 25^{th}, 50^{th}, and 75^{th} percentiles, respectively.

	Mean	SD	Obs	p(25)	p(50)	p(75)
Termination Chinese Cust	0.209	0.738	5,145	0	0	0
Treated	0.556	1.391	744	0	0	1
Control	0.150	0.534	4,401	0	0	0
Termination Chinese Cust (excl.targeted)	0.197	0.706	5,145	0	0	0
Treated	0.476	1.293	744	0	0	0
Control	0.150	0.534	4,401	0	0	0
New Relations Chinese Cust	0.451	1.313	5,145	0	0	0
Treated	1.172	2.454	744	0	0	1.2
Control	0.329	0.947	4,401	0	0	0
Total Cust	33.464	61.891	5,145	8	19	39
Treated	61.801	120.421	744	17	34	59
Control	28.674	43.252	4,401	7	18	37
Domestic Cust	15.534	25.072	5,145	3	9	19
Treated	24.535	44.189	744	6	13	23
Control	14.013	19.727	4,401	3	8	18
Domestic Share	0.498	0.246	5,050	0.333	0.500	0.667
Treated	0.408	0.175	740	0.303	0.399	0.500
Control	0.513	0.253	4,310	0.333	0.500	0.684
China Share	0.064	0.134	5,050	0.000	0.015	0.071
Treated	0.093	0.110	740	0.027	0.064	0.117
Control	0.059	0.137	4,310	0.000	0.000	0.059
Asia Share	0.180	0.184	5,050	0.024	0.143	0.267
Treated	0.232	0.170	740	0.114	0.217	0.321
Control	0.171	0.184	4,310	0.000	0.125	0.250
Asia Friend Share	0.149	0.173	5,050	0.000	0.100	0.218
Treated	0.201	0.168	740	0.074	0.167	0.294
Control	0.140	0.173	4,310	0.000	0.088	0.200
EU Share	0.130	0.127	5,050	0.000	0.111	0.192
Treated	0.136	0.099	740	0.062	0.130	0.198
Control	0.129	0.131	4,310	0.000	0.106	0.190

Table 2: Summary Statistics—Financial and Real Collateral Damage. Table 2 presents summary statistics for firms' balance sheet characteristics based on their treatment status (treated if they supply to Chinese entities in the BIS lists; control if they export to Chinese entities not in the BIS lists) and for the cumulative abnormal returns of Treated suppliers before and after the announcement of export controls. SD refers to standard deviation, Obs refers to the number of observations, and p(25), p(50), and p(75) refer to the 25^{th}, 50^{th}, and 75^{th} percentiles, respectively. Cash Flow equals operating income before depreciation minus interest and taxes, divided by lagged assets, Revenues is the logarithm of the total revenues (in millions), Sale is the logarithm of the total sales (in millions), ROA is return on assets, CapEx is capital expenditures divided by lagged assets, Income equals operating income before depreciation divided by lagged assets, EBIT is earnings before interest and taxes divided by lagged assets, Interest is interest expenses divided by lagged assets, and Employees is the logarithm of the total number of employees. 3-factor CAR is cumulative abnormal return using the Fama-French 3-factor model (Fama and French, 1993). 5-factor CAR is cumulative abnormal return using the Fama-French 5-factor model (Fama and French, 2015). The two event windows–[-10, -1] and [0, 20]–represent trading days relative to the event date.

	Mean	SD	Obs	p(25)	p(50)	p(75)
Balance Sheet Characteristics						
Assets, $m	11,946	48,333	5,119	222	1,019	4,624
Treated	14,891	41,328	741	442	1,854	7,588
Control	11,447	49,407	4,378	202	894	4,188
Cash Flow	0.015	0.279	5,092	−0.008	0.074	0.123
Treated	0.084	0.129	738	0.052	0.098	0.135
Control	0.003	0.295	4,354	−0.028	0.068	0.119
Revenues	6.533	2.221	5,082	5.116	6.699	8.114
Treated	7.119	2.019	740	5.831	7.155	8.589
Control	6.434	2.239	4,342	4.989	6.618	8.050
Sales	6.523	2.218	5,059	5.112	6.696	8.098
Treated	7.116	2.019	738	5.829	7.148	8.591
Control	6.422	2.234	4,321	4.976	6.615	8.034
ROA	−0.041	0.274	5,118	−0.075	0.027	0.081
Treated	0.031	0.141	741	0.002	0.048	0.092
Control	−0.053	0.288	4,377	−0.097	0.023	0.078
CapEx	0.034	0.042	5,089	0.012	0.023	0.042
Treated	0.038	0.056	738	0.013	0.024	0.041
Control	0.034	0.039	4,351	0.012	0.023	0.042
Income	0.036	0.263	5,092	0.006	0.098	0.154
Treated	0.107	0.131	738	0.074	0.122	0.165
Control	0.024	0.277	4,354	−0.015	0.092	0.151
EBIT	−0.001	0.272	5,095	−0.039	0.058	0.114
Treated	0.064	0.136	739	0.032	0.080	0.123
Control	−0.012	0.288	4,356	−0.057	0.052	0.111
Interest	0.014	0.028	4,602	0.002	0.008	0.017
Treated	0.010	0.011	679	0.004	0.008	0.013
Control	0.015	0.029	3,923	0.001	0.008	0.018
Employees	7.727	2.055	5,068	6.284	7.864	9.179
Treated	8.281	2.040	737	6.939	8.497	9.852
Control	7.633	2.043	4,331	6.210	7.722	9.083
Cumulative Abnormal Returns						
3-factor CAR						
[−10, −1]	−0.011	0.082	250	−0.053	−0.009	0.024
[0, 20]	−0.025	0.103	250	−0.081	−0.029	0.024
5-factor CAR						
[−10, −1]	−0.007	0.085	250	−0.047	−0.007	0.027
[0, 20]	−0.027	0.110	250	−0.086	−0.025	0.023

Table 3: Summary Statistics for China Exporters by Size Quartiles. Table 3 presents summary statistics for balance sheet characteristics of firms that export to China, broken down by size quartiles and treatment status (whether or not they were treated, namely suppliers of Chinese entities included in the BIS lists). SD refers to the standard deviation. Cash Flow equals operating income before depreciation minus interest and taxes, divided by lagged assets, Revenues is the logarithm of the total revenues (in millions), Sale is the logarithm of the total sales (in millions), ROA equals earnings before extraordinary items divided by lagged assets, CapEx is capital expenditures divided by lagged assets, Income equals operating income before depreciation divided by lagged assets, EBIT is earnings before interest and taxes divided by lagged assets, Interest equals interest expense divided by lagged assets, and Employees equals the logarithm of the total number of employees.

		Full	Size Q1		Size Q2		Size Q3		Size Q4	
	Stat.	Sample	Treated	Control	Treated	Control	Treated	Control	Treated	Control
No. Obs.	Tot.	5,119	31	240	141	829	196	1,418	373	1,891
Assets, $m	Mean	11,946	1,057	145	2,589	711	1,404	1,189	27,778	25,280
	Median	1,019	119	21	170	111	767	496	6,665	4,497
	SD	48,333	1,750	462	9,783	3,501	1,670	1,803	54,993	72,858
Cash Flow	Mean	0.015	-0.015	-0.286	-0.005	-0.068	0.086	0.001	0.125	0.072
	Median	0.074	0.07	-0.08	0.032	0.016	0.088	0.064	0.115	0.088
	SD	0.279	0.294	0.663	0.181	0.37	0.076	0.24	0.071	0.158
Revenues	Mean	6.533	5.474	3.17	5.005	4.702	6.42	5.981	8.417	7.914
	Median	6.699	4.8	2.884	5	4.64	6.375	6.02	8.26	8.001
	SD	2.221	1.714	1.741	2.067	1.728	1.178	1.652	1.298	1.706
Sale	Mean	6.523	5.474	3.17	5.004	4.702	6.42	5.983	8.418	7.898
	Median	6.696	4.8	2.884	5	4.64	6.375	6.021	8.27	7.986
	SD	2.218	1.714	1.741	2.064	1.728	1.178	1.655	1.298	1.703
ROA	Mean	-0.041	-0.085	-0.324	-0.046	-0.134	0.024	-0.06	0.074	0.022
	Median	0.027	0.011	-0.125	0	-0.036	0.036	0.011	0.069	0.045
	SD	0.274	0.373	0.616	0.191	0.369	0.087	0.238	0.074	0.157
CapEx	Mean	0.034	0.086	0.031	0.035	0.038	0.037	0.038	0.035	0.029
	Median	0.023	0.026	0.018	0.024	0.025	0.026	0.027	0.023	0.021
	SD	0.042	0.198	0.049	0.039	0.048	0.044	0.042	0.035	0.029
Income	Mean	0.036	0.005	-0.267	0.009	-0.055	0.106	0.023	0.154	0.098
	Median	0.098	0.073	-0.066	0.052	0.033	0.108	0.088	0.145	0.117
	SD	0.263	0.285	0.611	0.18	0.33	0.079	0.227	0.074	0.157
EBIT	Mean	-0.001	-0.057	-0.3	-0.025	-0.091	0.06	-0.016	0.111	0.064
	Median	0.058	0.02	-0.106	0.008	-0.014	0.065	0.044	0.102	0.079
	SD	0.272	0.322	0.614	0.19	0.36	0.081	0.235	0.07	0.162
Interest	Mean	0.014	0.012	0.023	0.01	0.016	0.009	0.014	0.01	0.014
	Median	0.008	0.009	0.005	0.004	0.005	0.008	0.007	0.01	0.009
	SD	0.028	0.017	0.073	0.018	0.035	0.009	0.027	0.007	0.016
Employees	Mean	7.727	6.778	4.58	6.25	6.062	7.656	7.23	9.502	8.968
	Median	7.864	6.057	4.382	6.186	5.945	7.647	7.127	9.582	8.975
	SD	2.055	1.702	1.632	2.09	1.675	1.373	1.447	1.398	1.558

Table 4: Decoupling from China. This table presents the Poisson Pseudo Maximum Likelihood (PPML) regression results of the effect of export controls on supply chain configurations. Termination Chinese Cust is the total number of terminated relations with Chinese customers. Termination Chinese Cust (excl. targeted) is the total number of terminated relations with Chinese customers, excluding those targeted by the BIS lists. New Relations Chinese Cust is the number of new Chinese customers. Affected equals one for firms that within the previous year had a customer included in the BIS lists (Entity List, UVL, and MEU list) and Post equals one after the inclusion of such customer in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. SIC refers to the 2-digit standard industrial classification (SIC) code. Size refers to the industry-specific size quartile of each firm. Custom refers to the classification of each firm into quartiles based on treatment firms' lagged total number of customers. We require all firms to be exporting to China in the pre-treatment period. We double cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Dependent variables:	Termination Chinese Cust			Termination Chinese Cust (excl.targeted)			New Relations Chinese Cust		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Affected× Post	0.572***	0.590**	0.702***	0.376*	0.414*	0.560**	-0.483***	-0.523***	-0.473**
	(0.209)	(0.234)	(0.261)	(0.223)	(0.242)	(0.262)	(0.139)	(0.153)	(0.187)
Fixed Effects:									
Cohort-Firm	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cohort-SIC-Year	✓			✓			✓		
Cohort-SIC-Size-Year		✓			✓			✓	
Cohort-SIC-Size-Custom-Year			✓			✓			✓
Observations	18,381	16,039	11,374	18,266	15,960	11,301	25,301	23,225	19,029

Table 5: Supply Chain Reconfiguration—Number of customers. This table presents the Poisson Pseudo Maximum Likelihood (PPML) regression results of the effect of export controls on supply chain configurations. Total Cust is the total number of customers. Domestic Cust is the number of domestic customers. Affected equals one for firms that within the previous year had a customer included in the BIS lists (Entity List, UVL, and MEU list) and Post equals one after the inclusion of such customer in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. SIC refers to the 2-digit standard industrial classification (SIC) code, and Size to the industry-specific size quartile of each firm. We require all firms to be exporting to China in the pre-treatment period. We double cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Dependent variables:	Total Cust		Domestic Cust	
	(1)	(2)	(3)	(4)
Affected×Post	-0.145**	-0.138**	-0.117	-0.097
	(0.064)	(0.070)	(0.075)	(0.084)
Fixed Effects:				
Cohort-Firm	✓	✓	✓	✓
Cohort-SIC-Year	✓		✓	
Cohort-SIC-Size-Year		✓		✓
Observations	32,301	32,166	31,810	31,646

Table 6: Supply Chain Reconfigurations—Customer Share. This table presents the Poisson Pseudo Maximum Likelihood (PPML) regression results of the effect of export controls on supply chain reconfigurations. Domestic Share is the ratio of the total number of domestic U.S. customers to the contemporaneous number of total customers. China Share is the ratio of the total number of Chinese customers to the contemporaneous number of total customers. Asia Share is the ratio of the total number of customers from Asia, excluding China, to the contemporaneous number of total customers. Asia Friend Share is the ratio of the total number of customers from South Korea, Japan, Taiwan, and Australia to the contemporaneous number of total customers. EU Share is the ratio of the total number of customers from European Union countries to the contemporaneous number of total customers. Affected equals one for firms that within the previous year had a customer included in the BIS lists (Entity List, UVL, and MEU list), and Post equals one after the inclusion of such customer in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. SIC refers to the 2-digit standard industrial classification (SIC) code. Size refers to the industry-specific size quartile of each firm. Custom refers to the classification of each firm into quartiles based on treatment firms' lagged total number of customers in each region. We require firms to export to China in the pre-treatment period. We double-cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Domestic Share and China Share

	Domestic Share		China Share	
	(1)	(2)	(3)	(4)
Affected×Post	0.084***	0.092***	-0.336***	-0.390***
	(0.029)	(0.032)	(0.075)	(0.120)
Fixed Effects:				
Cohort-Firm	✓	✓	✓	✓
Cohort-SIC-Size-Year	✓		✓	
Cohort-SIC-Size-Custom-Year		✓		✓
Observations	31,450	31,366	27,902	27,275

Panel B: Other Customer Share

	Asia Share		Asia Friend Share		EU Share	
	(1)	(2)	(3)	(4)	(5)	(6)
Affected×Post	-0.026	-0.003	-0.042	0.003	-0.080	-0.002
	(0.044)	(0.040)	(0.048)	(0.046)	(0.058)	(0.048)
Fixed Effects:						
Cohort-Firm	✓	✓	✓	✓	✓	✓
Cohort-SIC-Size-Year	✓		✓		✓	
Cohort-SIC-Size-Custom-Year		✓		✓		✓
Observations	29,027	28,823	28,207	27,855	27,751	27,313

Table 7: Real Effects of Export Controls. This table presents the stacked regression results of the effect of export controls on cash flow, revenue, EBIT, capital expenditure and employment. Cash Flow equals operating income before depreciation minus interest and taxes, divided by lagged total assets. Revenues is the logarithm of the total revenues (in millions), EBIT is earnings before interest and taxes divided by lagged assets, CapEx is capital expenditures divided by lagged assets, Employees is the logarithm of the number of employees, and Affected equals one for firms that within the previous year had a customer included in the BIS lists (Entity List, UVL, and MEU list). Post equals one after the inclusion of such customer in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. SIC refers to the 2-digit standard industrial classification (SIC) code, Size refers to the industry-specific size quartile of each firm. We require all firms to be exporting to China in the pre-treatment period. We double cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Full Sample

Dependent variables:	Cash Flow	Revenues	EBIT	CapEx	Employees
	(1)	(2)	(3)	(4)	(5)
Affected × Post	-0.018**	-0.093**	-0.018*	0.004	-0.076**
	(0.007)	(0.032)	(0.008)	(0.003)	(0.031)
Fixed Effects:					
Cohort-Firm	✓	✓	✓	✓	✓
Cohort-SIC-Size-Year	✓	✓	✓	✓	✓
Observations	31,613	31,605	31,615	31,570	31,459

Panel B: Restrictive Sample

Dependent variables:	Cash Flow	Revenues	EBIT	CapEx	Employees
	(1)	(2)	(3)	(4)	(5)
Affected × Post	-0.017**	-0.096***	-0.017*	0.004	-0.076**
	(0.008)	(0.030)	(0.008)	(0.003)	(0.030)
Fixed Effects:					
Cohort-Firm	✓	✓	✓	✓	✓
Cohort-SIC-Size-Year	✓	✓	✓	✓	✓
Observations	26,778	26,784	26,780	26,744	26,608

Table 8: Bank Lending to Affected U.S. Suppliers. This table presents the Poisson Pseudo Maximum Likelihood (PPML, columns 1–4) and OLS (columns 5–6) regression results of the effect of export controls on bank lending. Affected equals one for firms that within the previous year had a customer included in the BIS lists (Entity List, UVL, and MEU list) and Post equals one after the inclusion of such customer in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. SIC refers to the 2-digit standard industrial classification (SIC) code. Size refers to the industry-specific size quartile of each firm. We require all firms to be exporting to China in the pre-treatment period. We double cluster the standard errors at the firm and quarter level. *** p<0.01, ** p<0.05, * p<0.1.

Dependent variables:	Committed Total Credit	Committed Term Loans	Committed Credit Lines	Utilized Credit Lines	Spread	Maturity
	(1)	(2)	(3)	(4)	(5)	(6)
Affected × Post	−0.136*	−0.630**	−0.081	−0.197	0.179**	−4.874***
	(0.073)	(0.251)	(0.068)	(0.171)	(0.088)	(1.538)
Fixed Effects:						
Cohort-Firm	✓	✓	✓	✓	✓	✓
Cohort-SIC-Size-Quarter	✓	✓	✓	✓	✓	✓
Cohort-Bank-Quarter	✓	✓	✓	✓	✓	✓
Observations	356,012	356,012	356,012	356,012	174,368	202,016

Table 9: Decoupling from the U.S.—The Chinese Perspective. This table presents the Poisson Pseudo Maximum Likelihood (PPML) regression results of the effect of export controls on Chinese firms' supply chain reconfigurations. Termination U.S. Supp is the total number of terminated relations with the U.S. suppliers. New Relations Chinese Supp is the number of new Chinese suppliers. New Relations U.S. Supp is the number of new U.S. suppliers. Targeted equals one for Chinese firms that are included in the BIS lists (Entity List, UVL, and MEU list) and Post equals one after the inclusion of such firms in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. Custom refers to the classification of each firm into quartiles based on the targeted firms' total number of customers prior to the treatment. We require all firms to be importing from U.S. suppliers in the pre-treatment period. We double cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Dependent variables:	Terminations U.S. Supp		New Relations Chinese Supp		New Relations U.S. Supp	
	(1)	(2)	(3)	(4)	(5)	(6)
Targeted × Post	0.535*	0.498*	0.469***	0.517***	-0.179	-0.142
	(0.291)	(0.283)	(0.181)	(0.172)	(0.174)	(0.172)
Fixed Effects:						
Cohort-Firm	✓	✓	✓	✓	✓	✓
Cohort-Year	✓		✓		✓	
Cohort-Custom-Year		✓		✓		✓
Observations	156,913	156,004	183,178	183,036	172,944	172,931

Table 10: Decoupling from the U.S.—Customer Shares. This table presents the Poisson Pseudo Maximum Likelihood (PPML) regression results of the effect of export controls on Chinese firms' supply chain configurations. Total Suppliers is the total number of suppliers. China Supplier Share is the ratio of the total number of Chinese suppliers to the contemporaneous number of total suppliers. U.S. Supplier Share is the ratio of the total number of U.S. suppliers to the contemporaneous number of total suppliers. Targeted equals one for Chinese firms that are included in the BIS lists (Entity List, UVL, and MEU list) and Post equals one after the inclusion of such Chinese firms in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. Custom refers to the classification of each firm into quartiles based on the targeted firms' total number of customers prior to the treatment. We require all control firms to be importing from U.S. in the pre-treatment period. We double cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Dependent Variables:	Total Suppliers		China Supplier Share		U.S. Supplier Share	
	(1)	(2)	(3)	(4)	(5)	(6)
Targeted × Post	0.066	0.115	0.322***	0.318***	-0.373***	-0.328**
	(0.124)	(0.111)	(0.120)	(0.119)	(0.134)	(0.135)
Fixed Effects:						
Cohort-Firm	✓	✓	✓	✓	✓	✓
Cohort-Year	✓		✓		✓	
Cohort-Custom-Year		✓		✓		✓
Observations	239,597	239,597	172,889	172,888	182,475	182,473

Table 11: Supply Chain Circumvention. This table presents the regression results of the effect of export controls on the revenues and EBIT of suppliers from all regions (excluding the U.S.) and suppliers in allied regions (European Union, South Korea, Japan, Taiwan, Australia, and Canada). Revenues and EBIT are as defined in Table 7. Affected equals one for firms that within the previous year had a customer included in the BIS lists (Entity List, UVL, and MEU list) and Post equals one after the inclusion of such customer in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. SIC refers to the 2-digit standard industrial classification (SIC) code, and Size refers to the size quartile of each firm in each region (Europe, Asia, etc). We require all firms to be exporting to China in the pre-treatment period. We double-cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Treated firms in allied regions

Dependent variables:	Revenues		EBIT	
	(1)	(2)	(3)	(4)
Affected × Post	0.157***	0.127**	0.156	0.168
	(0.049)	(0.048)	(0.126)	(0.153)
Fixed Effects:				
Cohort-Firm	✓	✓	✓	✓
Cohort-SIC-Year	✓		✓	
Cohort-SIC-Size-Year		✓		✓
Observations	95,711	95,711	96,181	96,181

Panel B: Treated firms in all regions

Dependent variables:	Revenues		EBIT	
	(1)	(2)	(3)	(4)
Affected × Post	0.043*	0.024	0.036	0.039
	(0.023)	(0.024)	(0.027)	(0.030)
Fixed Effects:				
Cohort-Firm	✓	✓	✓	✓
Cohort-SIC-Year	✓		✓	
Cohort-SIC-Size-Year		✓		✓
Observations	328,588	328,588	329,418	329,418

Online Appendix

This appendix includes several sections of supplemental information. Appendix A contains definitions for the variables used in the paper, Appendix B introduces some case studies of Chinese firms included in the Entity List, and Appendix C includes additional results.

A Variable Definitions

Variable Name	Description
Terminations Chinese Cust	Total number of terminated relations with Chinese customers *Source:* Factset Revere.
Terminations Chinese Cust (excl.targeted)	Total number of terminated relations with Chinese customers, excluding those targeted by the BIS lists. *Source:* Factset Revere.
New Relations Chinese Cust	The number of new Chinese customers *Source:* Factset Revere.
Total Cust	Total number of customers. *Source:* Factset Revere.
Domestic Cust	Total number of domestic customers. *Source:* Factset Revere.
Domestic Share	Ratio of the total number of domestic U.S. customers to the contemporaneous number of total customers. *Source:* Factset Revere.
China Share	Ratio of the total number of Chinese customers to the contemporaneous number of total customers. *Source:* Factset Revere.
Asia Share	Ratio of the total number of customers from Asia, excluding China, to the contemporaneous number of total customers. *Source:* Factset Revere.
Asia Friend Share	Ratio of the total number of customers from South Korea, Japan, Taiwan, and Australia to the contemporaneous number of total customers. *Source:* Factset Revere.
EU Share	Ratio of the total number of customers from the Europe Union to the contemporaneous number of total customers. *Source:* Factset Revere.
Termination U.S. Supp	Total Number of terminated relations with the U.S. suppliers. *Source:* Factset Revere.
New Relations Chinese Supp	Number of new Chinese suppliers. *Source:* Factset Revere.
New Relations U.S. Supp	Number of new U.S. suppliers. *Source:* Factset Revere.
Total Suppliers	Total number of suppliers. *Source:* Factset Revere.
China Supplier Share	Ratio of the total number of Chinese suppliers to the contemporaneous number of total suppliers. *Source:* Factset Revere.

Continued on next page

Table A.1 – *Continued from previous page*

Variable	**Description**
U.S. Supplier Share	Ratio of the total number of U.S. suppliers to the contemporaneous number of total suppliers. *Source:* Factset Revere.
Assets	Total assets in $ million (at). *Source:* Compustat.
Cash Flow	Operating income before depreciation (oibd) minus interest (xint) and taxes (txt), divided by lagged assets. *Source:* Compustat.
ROA	Earnings before extraordinary items (ib) divided by lagged assets. *Source:* Compustat.
CapEx	Capital expenditures (capx) divided by lagged assets. *Source:* Compustat.
Income	Operating Income before depreciation (oibdp) divided by lagged assets. *Source:* Compustat.
Employees	Logarithm of the number of employees in thousands (emp). *Source:* Compustat.
Revenues	Logarithm of the Revenues in $ million (revt). *Source:* Compustat and Capital IQ
Sale	Logarithm of the Sale in $ million (sale) *Source:* Compustat
EBIT	Earnings before Interest and Taxes (ebit) divided by lagged assets. *Source:* Compustat and Capital IQ
Affected	Firm that supplied goods and services to a Chinese entity within one year of its inclusion in a BIS export control list. *Source:* FactSet Revere.
Targeted	Chinese entity that has been added to a BIS export control list. *Source:* FactSet Revere.

B Entity List Case Studies

We now provide examples of Chinese firms included in the Entity List to highlight the different motivations for export controls.

The Huawei case. Huawei is a Chinese company that specializes in telecommunications equipment and consumer electronics. It became the largest telecommunications equipment manufacturer in 2012 and the largest smartphone manufacturer in 2020. In January 2019, the U.S. Department of Justice (DOJ) unsealed an indictment alleging that Huawei circumvented U.S. sanctions on Iran and stole trade secrets from worldwide telecommunications companies, including T-Mobile. Shortly after, in May 2019, the BIS added Huawei and its subsidiaries to the Entity List because it violated U.S. sanctions on Iran by causing the export of goods, technology, and services from the U.S. to Iran without obtaining a license from OFAC. Several additions of Huawei's affiliates to the Entity List occurred until April 2022.

The SMIC case. Semiconductor Manufacturing International Corporation Incorporated (SMIC) is the largest semiconductor manufacturer in China. SMIC was added to the Entity List due to its activities with the Chinese military-industrial complex. "The Entity List designation limits SMIC's ability to acquire certain U.S. technology by requiring exporters, reexporters, and in-country transferors of such technology to apply for a license to sell to the company. Items uniquely required to produce semiconductors at advanced technology nodes of 10 nanometers or below will be subject to a presumption of denial to prevent such key enabling technology from supporting China's military modernization efforts."

The Jinhua case. Another motivation for including Chinese companies in the Entity List is intellectual property (IP) theft. On October 30, 2018, Fujian Jinhua Integrated Circuit Company (Jinhua) was included in the Entity List for being "involved in activities that could hurt the national security interests of the United States." On November 1, 2018, the

Department of Justice issued an indictment charging Jinhua with economic espionage and theft of intellectual property from Micron, a semiconductor company specializing in memory storage devices, including dynamic random-access memory.

C Additional Results

Figure C.1: Cumulative Abnormal Returns and Tighter Export Controls. This figure displays the cumulative abnormal returns (CAR) of affected suppliers in a $[-10, 20]$ day window around the announcement date of the inclusion of a target entity in the most stringent BIS lists, the Entity and MEU lists. Panel A shows CARs using the Fama-French 3-factor model (Fama and French, 1993) while Panel B uses the Fama-French 5-factor model (Fama and French, 2015). On the vertical axis are the cumulative abnormal returns in percentages and on the horizontal axis are the days relative to the announcement dates. The dashed vertical line represents the day before the announcement date. The solid red line represents the average CARs and the dot-dash blue line the 95% confidence intervals.

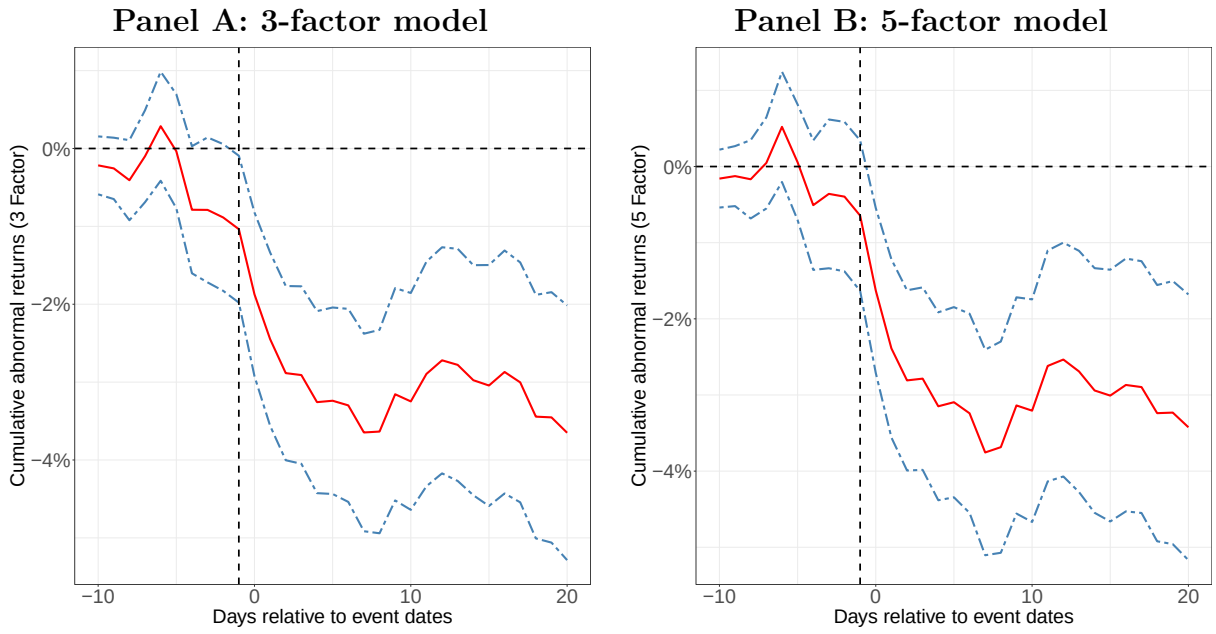


Table C.1: Robustness: Alternative Industry Classification. This table presents the stacked regression results of the effect of export controls on supply chain configuration and firms' fundamentals using NAICS industry classification. Panel A presents the Poisson Pseudo Maximum Likelihood (PPML) regression results of the effect of export controls on supply chain configurations. Panel B presents the stacked regression results of the effect of export controls on cash flow, revenue, EBIT, capital expenditure and employment. Termination Chinese Cust is the total number of terminated relations with Chinese customers. Termination Chinese Cust (excl. targeted) is the total number of terminated relations with Chinese customers, excluding those targeted by the BIS lists. New Relations Chinese Cust is the number of new Chinese customers. Cash Flow equals operating income before depreciation minus interest and taxes, divided by lagged total assets. Revenues is the logarithm of the total revenues (in millions), EBIT is earnings before interest and taxes divided by lagged assets, CapEx is capital expenditures divided by lagged assets, Employees is the logarithm of the number of employees, and Affected equals one for firms that within the previous year had a customer included in the BIS lists (Entity List, UVL, and MEU list). Post equals one after the inclusion of such customer in the BIS lists. For each cohort, the control group includes never treated and not yet treated firms. NAICS refers to the 4-digit NAICS industry code. Size refers to the classification of each firm in two groups based on whether lagged total assets are above or below the industry-specific median, and Custom refers to the classification of each firm into quartiles based on treatment firms' lagged total number of customers. We require all firms to be exporting to China in the pre-treatment period. We double cluster the standard errors at the firm and year level. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Terminations and New Relations

Dependent variables:	Termination Chinese Cust			Termination Chinese Cust (excl.targeted)			New Relations Chinese Cust		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Affected × Post	0.785***	0.680**	0.803***	0.599***	0.477*	0.528*	-0.489***	-0.555***	-0.388*
	(0.210)	(0.266)	(0.259)	(0.215)	(0.280)	(0.286)	(0.156)	(0.179)	(0.234)
Fixed Effects:									
Cohort-Firm	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cohort-NAICS-Year	✓			✓			✓		
Cohort-NAICS-Size-Year		✓			✓			✓	
Cohort-NAICS-Size-Custom-Year			✓			✓			✓
Observations	15,771	13,989	10,119	15,704	13,931	10,053	23,181	21,596	16,439

Panel B: Real Effects

Dependent variables:	Cash Flow		Revenues		EBIT		CapEx		Employees	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Affected × Post	-0.022**	-0.023**	-0.103**	-0.090**	-0.019**	-0.018*	0.007*	0.007**	-0.092**	-0.073*
	(0.009)	(0.009)	(0.039)	(0.038)	(0.008)	(0.009)	(0.003)	(0.003)	(0.040)	(0.036)
Fixed-Effects:										
Cohort-Firm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cohort-NAICS-Year	✓		✓		✓		✓		✓	
Cohort-NAICS-Size-Year		✓		✓		✓		✓		✓
Observations	31,613	31,613	31,605	31,605	31,615	31,615	31,570	31,570	31,459	31,459

Table C.2: Summary Statistics of Chinese firms' Supply Chain Reconfigurations. This table presents summary statistics for Chinese firms' supply chain relationships based on their treatment status (treated if they are included the BIS lists; control if they are not in the BIS lists). Termination U.S. Supp is the total number of terminated relations with U.S. suppliers. New Relations Chinese Supp is the number of new Chinese suppliers. New Relations U.S. Supp is the number of new U.S. suppliers. Total Suppliers is the total number of suppliers. China share is the ratio of the total number of Chinese suppliers to the contemporaneous number of total suppliers. U.S. share is the ratio of the total number of U.S. suppliers to the contemporaneous number of total suppliers. SD refers to standard deviation, Obs refers to the number of observations and p(25), p(50), and p(75) refer to the 25^{th}, 50^{th}, and 75^{th} percentiles, respectively.

	Mean	SD	Obs	p(25)	p(50)	p(75)
Termination U.S. Supp.	0.202	0.498	259,804	0	0	0
Treated	0.507	0.765	205	0	0	1
Control	0.201	0.498	259,599	0	0	0
New Relations Chinese Supp.	1.251	2.575	259,804	0	0	1
Treated	2.898	3.989	205	0	1	4
Control	1.250	2.573	259,599	0	0	1
New Relations U.S. Supp.	0.302	0.685	259,804	0	0	0
Treated	0.659	1.029	205	0	0	1
Control	0.302	0.685	259,599	0	0	0
Total Suppliers	6.815	11.266	259,804	1	2	7
Treated	14.971	16.591	205	2	7	22
Control	6.809	11.258	259,599	1	2	7
China Share	0.475	0.372	205,231	0.000	0.500	0.800
Treated	0.419	0.303	192	0.165	0.429	0.636
Control	0.475	0.372	205,039	0.000	0.500	0.800
U.S. Share	0.299	0.353	205,231	0.000	0.150	0.500
Treated	0.371	0.313	192	0.096	0.318	0.500
Control	0.299	0.353	205,039	0.000	0.150	0.500