Trade Linkages and Firm Value: Evidence from the 2018 US-China "Trade War"

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Abstract

On March 22, 2018, Trump proposed to impose tariffs on up to $50 billion of Chinese imports, leading to a significant concern over the "Trade War" between the US and China. We evaluate the market responses to this event for firms in both countries, depending on their direct and indirect exposures to US-China trade. US firms that are more dependent on exports to and imports from China have lower stock and bond returns but higher default risks in the short time window around the announcement date. We also find that firms' indirect exposure to US-China trade through domestic input-output linkages affects their responses to the announcement. These findings suggest that the structure of US-China trade is much more complex than the simplistic view of global trade that engendered Trump's "Trade War" against China.

JEL Classification: F10, G12, G14, O24

Keywords: Stock returns, event study, trade policy, offshoring, input-output linkages, global value chains

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1. Introduction

On March 22, 2018, the Trump administration of the US unilaterally started what many considered as a trade war against China by issuing a presidential memorandum to propose substantial tariffs on imported Chinese products. The goal of such tariffs, according to the administration, was to curb the allegedly illicit intellectual property transfer to China[1] and close the wide and persistent US-China trade deficit.[2] The US government hoped that by raising the prices of imported Chinese goods in the US, the tariffs could weaken the competitiveness of Chinese firms. They believed that by weakening its economy, the Chinese government would eventually implement policies to create a more favorable environment for US firms operating or selling in China.

While the intention behind the imposition of tariffs is to put pressure on China to change its existing policies toward foreign business, the rationale is based on an outdated mindset about global trade that primarily focuses on the exchanges of final goods (Grossman and Rossi-Hansberg, 2006). In the world of global value chains, firms interact with each other in input-output relations. While tariffs can reduce competition from foreign firms at home, they can also raise the costs of imported inputs for domestic firms and hence backfire. Domestic consumers and firms that depend heavily on goods produced in a foreign country suffer the most. Moreover, the costs of import tariffs on production can get amplified as tariff-induced increases in input costs are compounded down the supply chains until the final stage when goods are sold to consumers. Thus, the overall economic effect of tariff protection in the world of global value chains is hard to predict.

In this paper, we examine the financial market impact of the various announcements about tariff hikes by both the US and Chinese governments in 2018. Specifically, we focus on the issuance of the presidential memorandum based on Section 301 of the *Investigation of China's Laws, Policies, Practices, or Actions* on March 22, 2018. For the most part, investors were largely surprised by the announcement of tariffs

[1] The US Trade Representative, based on a seven-month investigation, alleged that the Chinese theft of American intellectual properties costs the US between $225 billion and $600 billion per year. (Source: http://money.cnn.com/2018/03/23/technology/china-us-trump-tariffs-ip-theft/index.html)

[2] The Trump administration demanded that China cut its trade deficit with the US by $200 billion in two years. (Source: https://www.cnbc.com/2018/05/22/trumps-demand-that-china-cut-its-us-trade-deficit-is-impossible.html)

against China, in terms of the timing, magnitude, and coverage.[3] We exploit such a unique and abrupt policy announcement and apply the event-study approach to examine the heterogeneous effects of the trade war on market returns across publicly listed firms in both nations.

We compile several novel data sets to construct firm-level measures to assess a US (Chinese) firm's direct exposure to imports from and exports to China (US), at both the intensive and extensive margins. We quantify a firm's sales in China as disclosed in the financial reports. To measure a firm's imports from China, we use two data sources: (1) firms' mentions of purchasing inputs from China in the financial reports; (2) and firms' bill of lading records filed with US customs that contain the detailed information on firm's import transactions with China. Furthermore, we gauge a US firm's indirect exposure to trade with China through its engagement in global value chains, by constructing measures of its average exposure to imports from China across its upstream and downstream sectors in the US.

We find strong heterogeneous effects of the announcement of tariff hikes across listed firms in both countries. Around March 22, 2018, the date when the Trump administration made the first announcement that triggered a sequence of trade-war type events between the two nations, US firms having imports from or exports to China experience relatively lower stock returns. Specifically, in the 3-day window centered around the event date, our regression results show that controlling for standard firm-level characteristics, a 10 percentage-point increase in a firm's share of sales to China is associated with 0.8% lower average cumulative returns, while firms that directly offshore inputs from China have a 0.8% lower average cumulative return than those that do not. In addition, we document firms that are more exposed to the trade war fear experience lower bond performance and higher default risks gauged by the growth rate in implied CDS spreads in the short event window.

We also study whether firms' indirect exposure to trade with China through input-output linkages may also affect their reactions to the trade war's announcement. It is ambiguous that how import tariff hikes affect firm value. Import tariffs on the one hand reduce market competition in the same industry, but it can on the other hand raise the

[3] The targeted list of products covers $50 billion worth of imports from China.

costs of inputs and production. Thus, we need to measure the input-output structure of import tariffs, rather than just the overall levels, to study the financial market effects of the trade war (announcement). To this end, we construct three sectoral measures of exposure to trade with China, using US input-output tables and trade data, namely import competition from China in the same industry, average exposure to Chinese imports across upstream industries, and average exposure to Chinese imports across downstream industries.

We find that the extent of Chinese competition is not related to an industry's average returns around the announcement date. However, we find an industry that has a 10% higher average share of imports across its upstream industries is associated with a 1.2% lower average cumulative raw return, suggesting significant indirect effects of (perceived) tariff-induced increases in input costs. The share of imports from China across an industry's downstream industries, on the other hand, does not show a significant effect. In sum, in addition to firms' direct exposure to US-China trade, firms' indirect exposure through global value chains also matter.

To study the impact of the trade war on the Chinese financial market, we build a unique firm-level data set by merging the detailed customs data with financial data for the listed firms in China. We find that Chinese listed firms that are more dependent on sales in the US tend to have lower cumulative returns around the March 22 announcement date. However, there is no evidence that Chinese firms that import inputs from the US experience lower stock returns, partly because they appear to be much less exposed to US trade directly than the US firms are to China, according to our samples.

Although the financial markets have digested the news of the upcoming tariff hikes, investors are still uncertain at least about the details and the exact timing of the implementation of tariffs. We further evaluate subsequent events, such as Trump's proposal to identify $200 billion worth of Chinese goods for additional tariffs at a rate of 10 percent on June 18, using a similar event-study approach. We continue to find systematic patterns of heterogeneous firms' market responses based on individual firms' exposure to US-China trade to the announcement.

The paper proceeds as follows. Section 2 offers a literature review. In Section 3, we describe the institutional background of our study by listing the key events before and

after the March 22 presidential memorandum. We also lay out several testable hypotheses. In Section 4, we describe the various unique data sets we use to construct the main variables of interest, in particular, a firm's direct and indirect exposure to US-China trade. Section 5 reports the empirical results. The final section concludes.

2. Literature Review

This study adds to the literature on the firm-level responses to the trade policy and the financial outcomes of the firm's engagement in international trade. Prior studies show that firms respond to trade policy shocks in terms of employment (Autor, Dorn, and Hanson, 2013; Pierce and Schott, 2016), foreign market entry (Crowley et al., 2018a), technology adoption (Crowley 2006; Bloom et al, 2016), economic growth (Bloom et al, 2014) and the cost of debt (Valta, 2012). Firms' global engagement has been found to affect stock returns (Bekaert et al, 2016; Hoberg and Moon, 2018) and stock market liquidity (Levine and Schmukler, 2006). In line with those studies, we evaluate the financial market reactions to the most recent changes in the trade policy between the US and China.

Our paper adds to the burgeoning literature on networks in international trade. Recent research has shown how production networks propagate and amplify firm-level shocks to large business-cycle fluctuations (Acemoglu et al., 2012; Carvalho and Gabaix, 2013). Recently available buyer-seller linked data permit detailed analyses of firms' endogenous formation of production networks and the resulting macroeconomic implications (Atalay et al., 2011; Bernard, Moxnes, and Saito, 2017; Carvalho et al., 2017; Lim; 2017; Tintelnot et al., 2017; and Oberfield, 2018).[4] Contributing to this literature, our paper emphasizes the roles of input-output linkages and supply chain networks in shaping the impact of costly trade barriers on firms' financial outcomes. Our study is also related to the studies of the effects of supply chain relationships on firms' financial market outcomes (e.g. Hertzel et al., 2008; Houston, Lin and Zhu, 2016).

[4] Atalay et al. (2011) study both theoretically and empirically US publicly listed firms' production networks. Bernard, Moxnes, and Saito (2017) use Japanese buyer-seller linked data to analyze how improvement in transportation infrastructure can increase firms' input sourcing and hence their productivity. Carvalho et al. (2017) quantify the propagation of the Great East Japan Earthquake shocks in 2011 through firms' input-output linkages. Lim (2017), Tintelnot et al. (2017), and Oberfield (2018) respectively develop models of endogenous formation of production networks and the resulting macroeconomic implications.

The method in our paper draws heavily from an extensive literature that adopts the event-study approach (see the summary by Schwert, 1981, and MacKinlay, 1997). Relatedly, a recent study by Wagner, Zeckhauser, and Ziegler (2017) uses the event of Trump's election victory to study the effects of the policy changes about taxes and trade proposed during his campaign on US firms' financial outcomes. Another work by Crowley et al. (2018b) analyzes the announcement effect of import restrictions by the EU on a set of Chinese firms in the solar panel industry. We differ from those works by directly examining a series of realized US trade policies against China. Our evidence, established based on multiple sources of data from both the US and China, sheds new light on the economic consequences of trade policy along the global value chains for firms in both nations. By analyzing the impact on the bond returns and default risks, our study also adds to the recent literature that examines the financial implications for firms' bondholders (Ellul et al., 2011; Wei and Yermack, 2011).

3. Institutional Background and Hypotheses

During the presidential campaign, Trump repeatedly mentioned his plan to revive the US economy by bringing back manufacturing jobs from overseas. Part of the plan was to tax imports, specifically those from China, to protect domestic businesses. As expected, Trump's economic policies have been overall anti-trade, with China being the target in many of those policies. Trump's complaints about China's economic policies range from its currency manipulation to unfair practices against foreign businesses, with concerns about the continuous rise of China, partly supported by its hallmark "Made in China 2025" initiative and various outward-looking economic and foreign policies. But the most important of all is probably the persistent trade deficit the US has with China and the alleged technology transfers by Chinese individuals and firms through both licit and illicit means. To address these issues, the Trump administration decided to impose tariffs on Chinese products, particularly those in several key high-tech and R&D-intensive sectors, to hopefully induce its government to implement policies to improve the business environment for US exports to and investment in China.

3.1 Key Events

In this subsection, we discuss the key events that eventually led to the US-China trade war.

- January 2017: On his first day in office, Trump signed the executive order to withdraw the US from the Trans-Pacific Partnership Negotiations and Agreement (TPP). Trump also said that he would tax Chinese imports by 45%.
- April 2017: Trump asked the US Department of Commerce to investigate whether imports of steel from China and other countries hurt America's interest.
- August 2017: Trump started a second government probe on China. Led by US Trade Representative Robert Lightizer, the new investigation on China's alleged theft of American intellectual property estimated that the US lost between $225 billion and $600 billion each year because of such theft.
- January 2018: Washington imposed tariffs on imports of solar panels and washing machines, most of which were made in China. The moves were in line with Trump's "America First" policy to protect American manufacturers from foreign competition.[5]
- March 1, 2018: The Trump administration announced steep tariffs on steel and aluminum.
- March 8, 2018: Trump signed the order to impose tariffs of 25% on steel imports and 10% on aluminum after citing national security concerns. Trump exempted Canada and Mexico and gave other countries the chance to argue why he should exempt them. In the following weeks, the list of exempted countries included EU, Argentina, Australia, Brazil, and South Korea.
- March 22, 2018: The Trump administration issued a presidential memorandum in reference to Section 301 of the *Investigation of China's Laws, Policies, Practices, or Actions* that proposed to impose tariffs on up to $50 billion of Chinese imports as a response to China's alleged theft of US intellectual property. Trump gave US Trade Representative Robert Lighthizer 15 days to come up with a list of products to impose tariffs on. Lighthizer said he would draw from the goods that the Chinese government had said in various policy documents it wanted to dominate,

[5] Source: https://www.washingtonpost.com/news/wonk/wp/2018/01/22/trump-imposes-tariffs-on-solar-panels-and-washing-machines-in-first-major-trade-action/?utm_term=.cc8754164170

in particular those mentioned in the "Made in China 2025" plan. The rationales of the Trump administration behind such tariffs against China include:

1. The large trade deficit between the US and China;
2. China forced US technology-intensive firms to enter joint ventures with Chinese individuals and share their technology in return for market access;
3. China's alleged theft of American intellectual property;
4. Protection against foreign competition for domestic businesses based on national security concerns.

- March 23, 2018: In retaliation to the US tariffs on steel and aluminum, the Chinese government hit back with a list of 128 products that would face 15-25% tariffs should US-China trade negotiations fail. The list of products included but not limited to aluminum scraps, airplanes, automobiles, pork products, and soybeans (subject to a 25% tariff) as well as nuts, fruits, and steel piping (subject to a 15% tariff).
- April 2, 2018: China's Ministry of Commerce rolled out the tariffs on the 128 US products as proposed on March 23, 2018.[6]
- April 3, 2018: Following the March 22 presidential memorandum, the US Trade Representative Robert Lighthizer published the provisional list of imports that would be subject to new duties in retaliation to "the forced transfer of American technology and intellectual property." This list, which covered about 1,300 Chinese products, accounted for approximately $50 billion worth of US imports from China. It covered a wide range of sectors such as raw material, construction machinery, aerospace, agricultural equipment, electronics, medical devices, and consumer products. Lighthizer targeted the sectors mentioned in the "Made in China 2025" plan.[7]
- April 4, 2018: Shortly after the publication of the US list, the Chinese government responded by announcing the imposition of a 25% tariff rate on a list of products imported from the US, which also amounted to about $50 billion worth of imports.

[6] Source: http://www.mofcom.gov.cn/article/ae/ag/201804/20180402726864.shtml
[7] Source: http://www.businessinsider.com/trump-china-tariff-product-list-trade-war-2018-4

The 106 affected products included key American imports such as aircraft, whiskey, automobiles, and soybeans.[8]

- April 5, 2018: Trump issued a statement to announce that his administration would consider an addition $100 billion in tariffs, in light of China's unfair retaliation to his initial tariffs .[9]
- April 16, 2018: The US Commerce Department banned American firms from selling parts, software, and components to China's ZTE Corp, a multinational telecommunications equipment and system company, for seven years in response to its violation of an agreement not to sell US products to Iran.[10]
- May 20, 2018: US Treasury Secretary Steven Mnuchin announced a pause in the trade war.[11]
- May 29, 2018: Nine days later, the Trump administration announced it would go ahead with its proposal on April 3 to impose 25% tariffs on the $50 billion worth of imports from China.
- June 15, 2018: The U.S. announced tariffs on $50 billion of imports from China, with Trump threatening more if China retaliates.[12]
- June 18, 2018: Trump directed the United States Trade Representative to identify $200 billion worth of Chinese goods for additional tariffs at a rate of 10 percent.[13]
- July 6, 2018: Tariffs on Chinese products worth $34 billion in imports began.
- July 10, 2018: Trump administration announced tariffs on a new list of Chinese products that were worth $200 billion in imports.[14]

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[8] Sources: http://news.abs-cbn.com/overseas/04/05/18/timeline-of-a-month-of-escalating-us-china-trade-tensions; https://www.cnbc.com/2018/04/04/a-timeline-of-president-trumps-escalating-trade-war-with-the-world.html; http://money.cnn.com/2018/04/03/news/economy/us-tariffs-china/index.html?iid=EL ; http://foreignpolicy.com/2018/03/08/trump-knows-the-best-trade-wars-the-very-best-steel-aluminum-tariffs-232/; http://foreignpolicy.com/2018/03/01/here-comes-trumps-trade-war-steel-aluminum-tariffs-232/

[9] Source: https://www.whitehouse.gov/briefings-statements/statement-president-donald-j-trump-additional-proposed-section-301-remedies/

[10] Source: https://reuters.com/article/us-china-zte/u-s-ban-on-sales-to-chinas-zte-opens-fresh-front-as-tensions-escalate-idUSKBN1HN1P1

[11] Source: https://reuters.com/article/us-usa-trade-mnuchin/u-s-china-putting-trade-war-on-hold-treasurys-mnuchin-says-idUSKCN1IL0JG

[12] Source: https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/june/ustr-issues-tariffs-chinese-products

[13] Source: https://www.whitehouse.gov/briefings-statements/statement-president-regarding-trade-china-2/

[14] Source: https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/july/statement-us-trade-representative

3.2 Hypotheses

As discussed in the introduction, Trump's announcement of the trade war against China on March 22 was abrupt and unexpected, offering a unique real-world experiment for an event study. While one may want to wait until the detailed micro and macro data become available to assess the economic effect of the announced trade war, the event-study approach using daily stock market data on publicly listed firms is the most feasible and convincing. The approach is frequently used in the prior literature to evaluate the impact of a policy. In addition to the benefit of analyzing the real-time market responses to the announcement of a trade war, another advantage is that it can provide clean evidence on the impact of the policy. The estimation of the long-run economic impact can be biased by other confounding factors or subsequent events.

Since intuitively, firms that depend more on inputs from or exports to China should be more affected by the US tariffs on China, and vice versa, we expect to find heterogeneous effects across firms. Therefore, we empirically examine the following five hypotheses.

Hypothesis 1 (Direct effects on imported input costs)

In response to the US's announcement of tariffs against Chinese imports, the market returns of US firms that rely more on imported inputs from China will decline relatively more because such tariffs raise their prices of inputs and thus costs of production.

Hypothesis 2 (Direct effects on exports)

In response to the US (Chinese) government's announcement of tariffs against imports from China (US), the market returns of US (Chinese) firms that rely more on sales to China (US) will decline relatively more because such tariffs will raise the expectations of retaliation from the target country, lowering the expected sales there.

Hypothesis 3 (Direct effects of import competition)

In response to the US's announcement of tariffs against Chinese imports, the market returns of US firms that compete in the same sector in which Chinese firms are more

prevalent increase relatively more as the tariffs on Chinese imports raise the prices of imported Chinese products and thus US firms' profits in the same sector.

Hypothesis 4 (Indirect effects through upstream suppliers)

In response to the US's announcement of tariffs against Chinese imports, the market returns of US firms that depend more on inputs from the upstream sectors in which Chinese firms are more prevalent decline relatively more as tariffs weaken market competition in the upstream sectors, thus raising the prices of inputs.

The Trump's trade policy should have impacted not just stock returns but also the wealth of other stakeholders (such as bondholders). We posit that the fear about trade war could also increase the probability of default. On the one hand, investors could expect the worsened financial performance reflected in the stock prices can increase the chance of bankruptcy or other triggering events (Acemoglu et al., 2016). On the other hand, due to the uncertainty about the future of US-China trade tension, firms might adopt suboptimal strategies by delaying investment and other long-term plans (Bloom, 2009; Bloom et al., 2007). We capture the associated economic impacts using the changes in the firm's bond performance and implied default probability measures and test the following hypothesis.

Hypothesis 5 (Default risks)

In response to the US's announcement of tariffs against Chinese imports, the default risks of US firms that rely more on imported inputs from China or sales to China will be relatively higher due to the worsened financial performance and the uncertainty about the future of US-China trade tension.

4. Data and Variable Construction

We use data of publicly listed firms in the US. As reported in Table 1, our sample comprises 2,122 U.S. listed firms for which we can construct measures to gauge their exposure to US-China trade as well as their stock and bond performances (See Appendix 2 for detailed variable definitions). The sample consists of US firms that are both incorporated and headquartered in the US and operate domestically as identified by

Compustat. Daily stock return data and the implied CDS spreads are downloaded from Bloomberg. We retrieve the bond return data from DataStream.

To access the impact on the equity market, we define cumulative stock returns (CRR) as the main dependent variable of interest. Let us denote the event date as date 0. The variable *X* is the number of days before the event and *Y* represents the number of days after the event. The period between *X* and *Y* is the time window over which we will compute a firm's cumulative stock or bond returns.

Specifically, we construct the CRR over the (X+Y+1)-day window around the event date of March 22, 2018 as:

$$CRR_i[-X, +Y] = \sum_{t=-X}^{+Y} R_{it}, \quad (1)$$

where R_{it} is the cumulative return for stock *i* on date *t*. Given the abrupt nature of the announcement of tariff hikes by the US government, we choose X and Y both equal to 1 and use a firm's cumulative stock return over a 3-day window (i.e., CRR[-1,+1]) as our dependent variable of interest.

To adjust for systematic risks, we compute the cumulative abnormal return (CAR) of firm *i* as:

$$CAR_i[-X, +Y] = \sum_{t=-X}^{+Y} AR_{it}, \quad (2)$$

where AR_{it} is the abnormal return for firm *i*'s equities on date *t*, calculated using the market model. The risk-free rate is measured by the one-month Treasury bill rate. The market benchmark is the value-weighted returns for all firms in the Center for Research in Security Prices (CRSP) database. Following the standard practices in the literature (e.g., Schwert, 1981; MacKinlay, 1997), we estimate the firm-specific market model parameters (beta) in the period covering day -220 to day -21 relative to the event day (zero) and calculate the abnormal returns for each firm.

In our analysis, we focus on the raw returns as defined above, and use the factor-adjusted abnormal returns mainly for robustness checks for the following reasons. First, conceptually, by estimating the "normal" performance, factor models (such as Capital Asset Pricing Model (CAPM) or Fama-French 3 factor model) remove the portion of the

return that is unrelated to the impact of the regulation we investigate. For example, it is possible that firms underperform others because they are less exposed to general market movements (lower loadings on the market benchmark) according to CAPM. But those firms might also be the ones most sensitive to the expected impact of the trade policy *per se*, thereby making it difficult to separate out the real effect of the regulation. Second, market-wide regulations (such as the announcement of the trade war in our case) may fundamentally affect firms' risks, as indicated by the changes in the factor loadings estimated using sample before and after the event (Schwert, 1981). The abnormal returns based on factor models estimated using historical data thus become less accurate. In contract, using the raw returns tends to provide a relatively objective estimation and a more straightforward interpretation.

In addition to the reactions of the equity market, we also analyze whether the fear of trade war affects the wealth of bondholders. Consistent with the practice in Bessembinder et al. (2008), we construct a firm's cumulative abnormal bond return (CBAR) as:

$$CBAR_i[-X,+Y] = \sum_{t=-X}^{+Y} BAR_{it}, \qquad (3)$$

where the bond abnormal return for firm *i* is defined as $BAR_i = \sum_{k=1}^{J} BAR_k\, w_k$. *J* is the number of bonds outstanding for firm *i; w* stands for the market value weight of bond *k* relative to firm *i*'s total market value of outstanding bonds. The abnormal return of a bond (*k*) is estimated as $BAR_{k,m,t} = BR_{k,m,t} - \overline{BR}_{m,t}$, where $BR_{k,m,t}$ is the bond return for bond *k* on date *t* defined as $\frac{P_{k,t}-P_{k,t-1}}{P_{k,t-1}}$; $P_{k,t}$ is the bond's price on date *t*, and $\overline{BR}_{m,t}$ is the average bond return for bonds with the same rating (*m*) of bond *k* on date *t*.

We use four different data sources to construct our main independent variables that measure a firm's direct exposure to the US-China trade. The first data source we use is *Factset Revere* that tracks the information on a US publicly listed firm's foreign buyers and sellers. For each US firm in the database, we retrieve the information on its total sales in China, which we then use to construct the share of sales in China.[15] Specifically, the continuous variable, *Revenue_China*, is the revenue from China scaled by total revenue

[15] The information on a firm's input purchases from China is highly incomplete, preventing us from using it to gauge a firm's exposure to China on the input side.

in 2016. This variable measures the relative importance of the Chinese market for an individual US firm. Intuitively, firms depending on sales in China are expected to suffer from China's retaliation in a trade war.

The second data source is based on the SEC's electronic filings that provide us the opportunity to measure a firm's offshoring activities in a given foreign country. Building on firms' 10-K filings, Hoberg and Moon (2017) construct text-based indicators of US firms' sales to and purchases of inputs from any foreign country. Specifically, the *Hoberg-Moon Offshoring Repository* contains a variable *Offshore Input*, which is the number of times a firm mentions purchasing inputs from a country. We retrieve the information about a firm's imports from China[16] and construct *Input_China*, which is a dummy set to one if there is at least one mention about purchasing inputs from China in the financial reports in the past five years, zero otherwise.

The third data source is *the US Bill of Lading database*. The US Customs keeps track of every waterborne import or export transaction. Complementary to the *Hoberg-Moon* database, we use the information on US waterborne imports to construct a firm's exposure to China on the import side. For 2017, the database contains about 5 million bills of lading for imports from China. We perform a fuzzy-matching process to match consignee names with the names of listed firms using character similarity to filter out consignee names that obviously do not belong to listed firms. We then manually check the consignee names left with the names of listed firms sourced from Compustat. We find 105.9 thousand bills of lading for listed firms. We use this information to construct a dummy variable (*Procurement_China*) for each firm to indicate whether it has procurement from China.

The fourth data source is *the China customs database* that contains the detailed annual summary of foreign trade transactions for the entire universe of Chinese firms. Specifically, it provides the transaction value, the quantity, the product type, the country the firm imports from or exports to. We merge the company name with CSMAR database and construct two continuous variables: *Revenue_US* is the value of exports to U.S. in 2013 scaled by total revenue in 2013 for Chinese listed firms; and *Procurement_US* is the

[16] http://www-bcf.usc.edu/~hoberg/HobergMoonDataSite/index.html The database provides data until 2015.

value of imports to U.S. in 2013 scaled by total revenue in 2013 for Chinese listed firms.[17]

Table 1 reports the summary statistics of the dependent and independent variables of interest at both firm-level and industry-level, as well as the firm-level control variables including firm size (*SIZE*), market-to-book ratio (*MTB*), leverage (*LEV*), and the return-on-assets ratio (*ROA*). The financial data for US firms are from Compustat.[18]

5. Empirical Results

5.1 The Market-Wide Impact of the Trade War's Announcement

We first evaluate the market-wide impact of the events that amount to the significant concerns over the US-China trade war. Table 2 presents the market reactions to a series of major events for both US market (Panel A) and China market (Panel B). The detailed discussions on the events we consider are in section 3.1. We present the returns of S&P 300 index for the US market and CSI 300 index[19] for the China market. The event dates here (Panel A, columns 1 and 3) are the trading dates in the US market. But due to the time difference between the US and China, we consider the next trading day as the corresponding event date for the China market (Panel B, column 3).[20] Columns (4) and (5) report the market returns on the event date [0] and the three-day cumulative returns centered around the event date [-1,+1], respectively. The average raw returns aggregated from individual firm returns are also reported. Specifically, column (6) reports the average raw returns for sample firms on the event date [0]. Columns (7)-(9) present the mean, the median and the percentage of sample firms with negative returns, respectively.

Figure 1 (right scale) illustrates the trajectory of S&P 500 index showing that the sharp fall in the stock market index on March 22, 2018 suggests that the presidential

[17] The most updated version of China customs database only provides data until 2013. So we use the information in the most recent year to measure trade exposure.
[18] The financial data from Compustat is downloaded on March 21, 2018. The control variables are all based on the fiscal year 2016 as for some firms when the trade war was announced the financial reports for the fiscal year 2017 were not available yet.
[19] The detailed information about CSI 300 index can be found here: http://www.csindex.com.cn/en/indices/index-detail/000300
[20] Other than the time difference, the difference between the trading dates in US and China is also due to some public holidays in China (e.g. Qingming Festival: April 5-April 7; Duanwu Festival: June 16-June 18).

memorandum was a largely unanticipated event. As indicated in Table 2, S&P 500 index dropped by 2.5% on March 22, 4.8% from March 21 to March 23. 78% of our US sample firms suffer from losses in the three-day centered around the announcement. The market reaction in the China market shows a similar pattern. The CSI 300 index dropped by 2.9% on the event date and 4.5% in the three-day event window. 86% of Chinese sample firms had negative returns.

Figure 1 also plots the Google Trend that show public interests over the keyword "trade war". According to prior studies (e.g., Da et al., 2011), the trends in Google searches can be used to measure the investors' attention. Figure 1 (left scale) shows that public interest in the trade war peaked on March 22, the day when the Trump administration announced the aggressive tariff list on imports from China.[21] Similar sharp declines in S&P 500 index and corresponding spikes in public interests, despite by smaller magnitudes, are also observed for the other announcement dates (e.g. April 5: Trump proposed additional tariffs against China).

It is worth mentioning that the stock market also responds to the subsequent events. Specifically, on April 2, when China's Ministry of Commerce rolled out the tariffs on the 128 US products as proposed on March 23, 2018, US stock market index dropped by 2.2% and China market index dropped by 0.6%. On April 16, when the US Commerce Department banned American firms from selling parts, software, and components to China's ZTE Corp, China stock market dropped by 1.6%. After the U.S. announced tariffs on $50 billion of imports from China, with Trump threatening more if China retaliates on June 15 and Trump directed the United States Trade Representative to identify $200 billion worth of Chinese goods for additional tariffs on June 18, the China market fell sharply by 3.5%. Those market reactions amplify the impact of the trade war fear on the financial market. But several events are clustered (April 2-5) making the practice of evaluating the impact difficult. In our analysis, we mainly focus on the announcement date March 22, which marks the starting point of this unprecedented trade war between US and China, and briefly discuss the impact of other subsequent events.

[21] The previous spike at a much smaller magnitude happened when the US government announced on March 1, 2018, a 25% tariff on steel and a 10% tariff on aluminum from China and a few other countries.

5.2 Firms' Heterogeneous Stock Market Reactions to the Trade War's Announcement

As discussed above, we evaluate the market reactions on March 22, 2018 as it is the major event date for the Trade War announcement. In Table 3, we show the results of a univariate analysis of the relation between a firm's exposure to US-China trade and its market performance. We examine whether the cumulative returns are systematically lower for firms that have more trade exposure to China. As reported in the first two rows of Panel A in Table 3, U.S. listed firms that are above the median of the sample in terms of the share of sales in China have a 1% lower CRR and a 1% lower CAR over the three-day event window compared to firms with the share of sales in China that is below the median of the sample. In addition, we also find that the "above-median" firms are on average larger in terms of market value, more profitable in terms of ROA, but have lower leverage ratio compared to the "below-median" firms.

In Panel B of Table 3, we compare the means of these variables of interest between the two samples that are separated according to whether the firm's offshore inputs from China or not, according to the database from Hoberg and Moon (2017). We find that firms that report some offshoring activities in China have on average a 1% lower CRR and a 0.5% lower CAR compared to firms without any import exposure to China in the three-day window. We also find that firms that offshore inputs from China also appear to be bigger and associated with higher ROA.

Panel C shows the results for the same univariate analysis as in Panel B but we use the Bill of Lading database. Quantitatively similar to the results documented in Panel A, we find that firms that offshore inputs from China have a 1% lower CRR and a 1% lower CAR over the three-day window.

Next, we conduct our first event-study analysis by regressing firm's stock returns on the firm's trade exposure to China. As shown in Table 4, we find that firms selling proportionally more to China experience a relatively lower CRR around the three-day window. Column (1) shows that a 10 percentage-point increase in a firm's share of sales to China is associated with a 1% lower CRR. According to column (2), such correlation drops to 0.8% when the four firm-level characteristics (firm's size, market-to-book ratio, leverage, and ROA) are controlled for. When industry (Fama-French 30 industry portfolios) fixed effects are included as controls in column (3), the relation further drops

to 0.5%. This decline indicates that much of the variation in the firms' shares of sales in China and their CRR are captured by the characteristics of the industries they belong to, such as the relative comparative advantage between the US and China. That said, industry-level characteristics cannot sufficiently explain most of the firms' heterogeneous responses to the fear about the US-China trade war within each industry. There is substantial heterogeneity across firms within an industry regarding their exposure to US-China trade that is attributable to the differential effect of the US-China trade war on firms' market performance.

We repeat the same three regressions but with a firm's cumulative abnormal return (CAR) calculated with respect to the market model (CAPM), as described in Equation (2), as the dependent variable. As shown in the last three columns of Table 4, we find that the announcement of the US-China trade war still has a negative and significant effect on firms that derive proportionally more sales revenue from China. The magnitude of the coefficient on the regressor of interest drops slightly compared to those in columns (1) through (3), as expected. Specifically, controlling for industry fixed effects and the standard firm-level determinants of market returns, we find that 10 percentage-point increase in a firm's share of sales to China is associated with a 0.4% lower CAR in the 3-day period.

Next, we examine whether imports from, rather than exports to, China can also affect a US firm's financial market performance. To this end, we use two different ways to assess a firm's input exposure to China as discussed in subsection 4. The regression results are reported in Table 5. Based on the Hoberg-Moon indicators, we find that firms that purchase (offshore inputs) from China have lower average CRR than firms that do not, as Panel A shows. The negative correlation is statistically significant regardless of whether we control for firm characteristics or industry fixed effects. Specifically, as column (2) shows, within the same industry, the average CRR is 0.8% lower compared to firms that have zero imports from China.

In Panel B, we use the indicator for positive procurements from China based on information from the Bill of Lading database. We find consistent results that firms with imports from China tend to experience larger negative cumulative raw returns. Specifically, controlling for firm characteristics, firms that have some imports from

China experience a 0.7% lower CRR in the three-day window than firms that have no import from China. The coefficient becomes insignificant when industry fixed effects are included. The effect on cumulative abnormal returns is significant across all three models as shown in columns (4)-(6). For robustness, we also replicate our main results using the Fama-French 3-factor model and find in general similar results as shown in Appendix 3.

5.3 Bond Return Reactions to Trade War Fears

In this section, we explore how the potential trade conflicts with China affect firms' bondholders using firms' bond returns as reported in DataStream. We consider the firm's cumulative bond abnormal returns (CBAR[-1,+1]) as defined in Section 4.

Table 6 reports the regression results. We find that the coefficients on the variables for the firm's direct trade with China are all negative and largely statistically significant. Firms that sell proportionally more to China tend to have a lower abnormal bond return. Specifically, a 10 percentage-point increase in a firm's share of sales to China is associated with a 0.6% lower average abnormal bond return. Regarding a firm's offshoring relation with China, when we use the "import from China" dummy (*Input_China*) constructed based on the Hoberg-Moon database in column (2), we find that firms that have offshored inputs from China have an average 0.4% larger drop in their cooperate bond returns than those that do not. The results that are based on the Bill of Lading database to firms' importing activities from China (*Procurement_China*) are consistent (see column (3)).

5.4 Default Risks

In this subsection, we examine whether the fear of the US-China trade war can also affect the perceived risks of a firm's value. To this end, we use the growth rate of a firm's implied CDS spread in the three-day window around the event to measure a firm's default risk, following prior studies (e.g., Ismailescu and Kazemi, 2010):

$$Growth\ CDS_i[-1,+1] = \sum_{t=-1}^{+1} CDSR_{i,t}$$

where $CDSR_{i,t} = \frac{S_{i,t} - S_{i,t-1}}{S_{i,t-1}}$. The $S_{i,t}$ is the implied CDS spread that is constructed with the default probabilities that are based on the Merton (1974) model. The data on firms' (five-year implied) CDS spread are obtained from Bloomberg.

As reported in Table 7, we find that firms' exposure to both imports from and exports to China are associated with higher default risks. Specifically, as reported in column (1), a 10 percentage-point increase in the share of sales to China is associated with a 0.4% higher growth in a firm's implied CDS spread. Regarding a firm's offshoring relationship, when we use the *Input_China* dummy, we find that firms that have some offshoring activities in China have an average 0.2% higher growth in implied CDS spread. The indicator of a firm's offshoring activities in China based on the Bill of Lading data (*Procurement_China*) is both positively correlated with faster growth in the CDS.

In sum, not only do firms with a larger exposure to US-China trade experience bigger negative returns in the stock and bond markets in response to the March 22 announcement, investors perceive those firms to be riskier, as reflected by larger increases in the CDS spreads. The results on default risks complement the results on firms' bond returns as they both capture the potential impact on bondholders.

5.5 Import Competition and Sectoral Linkages

In this subsection, we go beyond a firm's direct engagement in trade with China to examine how a firm's indirect exposure to China through the global value chains can also affect its market performance. To this end, we construct three sectoral measures of exposure to trade with China, using US input-output tables and trade data: 1) import competition from China in the same industry, 2) average exposure to Chinese imports across upstream industries, and 3) average exposure to Chinese imports across downstream industries. We then show whether a firm's exposure to Chinese imports in the same industry through upstream suppliers and via downstream buyers can also affect its market reaction to the trade war's announcement on March 22. The analysis in this subsection is different from above in a sense that it is not based on a firm's trading activities with China. Instead, we consider to what extent an industry as a whole imports from China. We posit that the firm value would be indirectly affected by changes in China import penetrations in a sector.

Table 8 shows the industry average CRR and CAR over the three-day window for different samples of industries based on the three sector-level measures. Panel A shows that industries that are more exposed to import competition from China initially do not appear to react more positively to the US tariff announcement. If the goal of taxing foreign firms through tariffs is to transfer profits from foreign to domestic firms, firms in sectors with a higher share of imports from China should welcome such policies. Furthermore, investors should react by allocating their capital to such firms, which should drive up their stock prices, at least relative to those that are more isolated from trade with China. The finding of no statistically significant difference between the mean CRR of the two groups indicates that investors did not expect that the tariffs could reduce import competition with China sufficiently to raise the profits of US firms in the same industry. The comparison remains qualitatively identical when we use the sectors' average CAR as the variable of interest.

One possible reason behind the lack of a significant difference in the average market returns between the two groups reported in Panels A is that sectors with a larger share of imports from China might also be associated with a larger dependence on imported inputs from China. Panel B confirms this conjecture. Firms in the immediate downstream of industries that have a larger average share of imports from China tend to experience a larger decline in stock market returns.[22] In particular, the value-weighted average CRR of firms with upstream industries above the median in terms of exposure to Chinese competition is about 0.9% lower than those of firms with upstream industries below the median. Using CAR to account for the observable heterogeneity in firms, we still find a 0.8% lower return for the firms with upstream industries that have an above median import share from China. These results show that while firms do not expect tariffs to weaken competition with China and raise (perceived) US firms' profits, they perceive a shock to the costs of inputs and thus production of the US firms sharing the same global value chain with China, even when they do not involve in direct trade with China.

[22] Industry k's upstream average exposure to Chinese imports is the weighted average of the shares of imports from China across industry k's upstream industries, with the weight equal to the cost share of an upstream industry in total material cost of the industry k. This same measure has been used by Acemoglu, Akcigit and Kerr (2016), among others. See Appendix 4 and 5 for details.

In Panel C, we study whether the (initial) prevalence of Chinese firms in a firm's downstream (buying) industries can affect its market returns. To this end, for each industry *k*, we compute the weighted average of the share of imports from China across the linked downstream industries, with weights equal to each downstream industry's share of sales in relation to the total sales of industry *k* (See Appendix 5 for details). If tariffs can reduce Chinese competition facing downstream firms, the resulting increased profits should benefit their suppliers through increased demand for domestic inputs. That said, we find no relationship between the extent of firms' downstream industries' exposure to Chinese competition and their average market returns.

Based on the findings in Table 8, we further conduct regression analysis to examine how the structure of the supply chain affects the firm's market response to the announcement of tariffs on March 22. We include in the regressions not only the share of imports from China (in total imports) in the same industry but also the weighted averages of such shares across a firm's upstream and downstream industries. As reported in column (1) of Table 9, we find that after controlling for the industry's average firm size, market-to-book ratio, leverage, and ROA, an industry's (weighted) average CRR is negatively correlated to the average upstream or downstream industries' exposure to Chinese competition. Specifically, an industry that has a 10% higher average share of imports across its upstream industries is associated with a 1.2% lower average CRR. These values indicate significant indirect effects of (perceived) tariff-induced increases in input costs. On the other hand, the share of imports from China across an industry's downstream industries does not show a significant effect. A similar pattern is found in column (2) when the industry average CAR is used as the dependent variable

Consistent with the univariate analysis in Table 8, the extent of Chinese competition in the same industry is not related to an industry's average cumulative returns around the event window. It is not surprising as how import tariffs affect the profits of firms in the given industry is not clear. Since import tariffs can reduce market competition in the same industry on the one hand but raise the average costs of inputs on the other, the overall impact of import tariffs on firms' average performance is ambiguous and depends on the counteracting effects through its upstream and downstream channels.

In sum, our results in Tables 8 and 9 show that the structure of a firm's supply chain affects a firm's perception about the effects of tariff hikes regardless of whether the firm has any direct exposure to trade with China or not. However, the indirect effect is observed only for perceived increases in the prices of inputs from upstream sectors, but not through increased demand from downstream sectors due to weakened Chinese competition.

5.6 Stock Return Reactions of Chinese Firms

So far, we have examined firms' stock return reactions to the trade war's announcement using a sample of US publicly listed firms. Since trade is a two-way game, we should expect that US tariff hikes (and their announcement) should also affect the export sales of Chinese firms in the US and thus their stock market performance. Therefore, we use the Chinese counterpart of Compustat, the China Stock Market & Accounting Research Database (CSMAR), to conduct a similar set of event-study analyses from the perspective of the Chinese publicly listed firms. In addition, we use a unique China Customs database that contains detailed firm-level information about imports and exports to measure firms' trading activities with the US. The most updated version of the customs database is 2013. We merge the customs database with CSMAR based on the firm name.

Table 10 first offers a summary of the statistics for a sample of 2,588 Chinese publicly listed firms. The average CRR[-1,+1] around the March 22 event date is -4.1% with a standard deviation of 4.7%. Because the median firm in the Chinese sample does not import from or export to the US, the mean share of exports to the US in total sales is only 1.6%, while the share of imports in total material cost is only 0.2%.[23] There are about 19% of sample firms that have revenue from the US and 18% firms that have purchased from the US. These results show that the sample firms are not directly exposed to US trade as much as the US firms are to China. The sample means of size (measured in log value of total market value), market-to-book ratio, leverage ratio, and ROA are 23.0, 3.0, 0.4 and 0.04, respectively.

[23] The summary statistics are based on the fuzzy matching between the firm names in the customs database and the firm names in CSMAR database.

Panel B of the table shows the regression results of the event study around the announcement on March 22. Controlling for firm-level characteristics, we find that Chinese publicly listed firms that are more exposed to exports to the US react more negatively to the announcement. Specifically, Chinese firms with positive revenue from US (*Revenue_US_D*=1) experience a 0.9% drop in stock prices. The effect remains significant when industry fixed effects are considered.[24] Columns (3) and (4) use continuous variables as independent variables showing that a 10 percentage-point increase in the share of exports to the US in total sales (in 2013) is associated with a 0.4% larger drop in the firm's CRR in the three-day event window. This result remains robust and quantitatively similar when industry fixed effects are controlled for. When we use CAR[-1,+1] as the dependent variable, we continue to find a statistically significant and quantitatively similar correlation between a firm's export exposure to the US and its market return reactions. In particular, column (8) shows that after controlling for the four characteristics and industry fixed effects, a 10 percentage-point increase in the share of exports to the US in total sales (in 2013) is associated with a 0.3% larger drop in the firm's CAR in the three-day event window.

On the other hand, we do not find that a firm's purchases of inputs from the US, in terms of either the intensive or extensive margin, is related to its the reaction of its market return to the announcement. In sum, the analysis based on Chinese listed firms indicates that firms' export exposure instead of import exposure, in contrast to US firms, determines the heterogeneous firms' responses to the US's announcement of a "trade war".

5.7 Market Reactions to Later Events

In this subsection, we analyze firms' additional responses to the event on June 18 when Trump ordered to identify $200 billion worth of Chinese goods for additional tariffs at a rate of 10%. The main reason why we analyze this event is that this announcement triggers a large decline in the China market. Following the announcement, China stock market plummets by 3.5% (CSI index) on the single trading date. We

[24] We define an industry using the 2012-version classification of China Securities Regulatory Commission (CSRC). There are 74 industries in total in our sample.

consider the heterogeneous effect of this event according to the US-China trade linkages for firms in both countries. We regress the three-day cumulative returns on the three firm-level trade measures in a sample of US firms and Chinese firms. As shown in Panel A of Table 11, US firms that have revenue from China experience significant negative returns relative to other firms. US firms that have input from China feature 0.7% lower returns relative to other firms. A similar pattern is found in the China market. As indicated by Panel B of Table 11, Chinese firms that depend on the revenue from the US suffer additional losses in the equity market.

6. Conclusion

In this paper, we examine the financial market effects of the Trump administration's announcement of a trade war against China on March 22, 2018. The event triggered a sequence of trade-war type events between the two nations. Using an event-study approach, we find heterogeneous market responses to the announcement of tariff hikes across listed firms in both countries according to their direct and indirect exposures to US-China trade.

Specifically, we find that US firms that are more dependent on exports to and imports from China have lower stock and bond returns, but higher default risks in the short window around the "trade war" announcement. We also find firms in the immediate downstream of industries that have a larger average share of imports from China tend to experience a larger decline in stock market returns. The evidence is consistent with the adverse effect induced by the perceived increases in the prices of inputs from upstream sectors following the "trade war" announcement. We also conduct an analysis on Chinese listed firms, which reveals that firms' export exposure but not import exposure, in contrast to US firms, determines the heterogeneous firms' responses to the US's announcement of substantial tariffs against China.

These responses illustrate that the structure of US trade with China is a lot more complex than the simplistic view of global trade that warranted Trump's trade war against China. Our findings show that the winners and losers in the US-China trade war depend on their position (upstream or downstream) and their extent of participation in the global value chains shared by the two countries.

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Table 1. Summary Statistics

Variable	N	Mean	S.D.	P25	Median	P75
Stock market reactions						
CRR[-1,+1]	2122	-0.025	0.046	-0.050	-0.028	-0.004
CAR[-1,+1]	2122	0.017	0.050	-0.010	0.010	0.036
CBAR[-1,+1]	415	-0.002	0.015	-0.004	0.000	0.004
Growth CDS[-1,+1]	2122	0.011	0.023	0.000	0.008	0.021
Firm-level exposure						
Revenue_China	2122	0.025	0.055	0.000	0.000	0.025
Input_China	2122	0.307	0.461	0.000	0.000	1.000
Procurement_China	2122	0.196	0.397	0.000	0.000	0.000
Industry-level exposure						
Import_China	381	0.054	0.124	0.000	0.000	0.014
Import_China_Down	381	0.045	0.043	0.017	0.030	0.064
Import_China_Up	381	0.021	0.039	0.000	0.005	0.022
Controls						
SIZE	2122	6.423	2.062	4.897	6.545	7.905
MTB	2122	3.075	12.971	1.324	2.392	4.344
LEV	2122	0.269	0.279	0.016	0.226	0.401
ROA	2122	-0.053	0.411	-0.048	0.080	0.134

Notes: This table presents the summary statistics for the baseline sample of US firms used in this study. The sample is at the firm level and contains 2,122 listed domestic firms that are headquartered and incorporated in the US as identified by Compustat database with essential financial and stock price data. The sample construction can be found in Appendix 1. All variable definitions are in Appendix 2. Continuous variables are winsorized at 0.5% percentile.

Table 2. The Market-Wide Impact of Trade War

Panel A. US Market			S&P 500 returns		Firm raw returns			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Event Date (US Time)	Day of Week (US Time)	Trading Date (US Time)	1-day [0]	3-day [-1,+1]	1-day [0]	3-day [-1,+1]		
					mean	mean	median	% of firms with negative returns
2018-03-01	Thursday	2018-03-01	-1.33%	-1.93%	-0.37%	0.07%	-0.22%	52.31%
2018-03-22	Thursday	2018-03-22	-2.52%	-4.80%	-1.75%	-2.48%	-2.76%	77.62%
2018-04-02	Monday	2018-04-02	-2.23%	0.40%	-2.24%	-0.28%	0.05%	48.28%
2018-04-03	Tuesday	2018-04-03	1.26%	0.18%	0.74%	0.04%	0.06%	48.25%
2018-04-04	Wednesday	2018-04-04	1.16%	3.10%	1.51%	3.07%	2.84%	16.01%
2018-04-05	Thursday	2018-04-05	0.69%	-0.35%	0.79%	0.72%	0.36%	43.24%
2018-04-16	Monday	2018-04-16	0.81%	1.59%	0.72%	1.66%	1.81%	24.09%
2018-06-15	Friday	2018-06-15	-0.10%	-0.07%	0.14%	0.79%	0.65%	37.80%
2018-06-18	Monday	2018-06-18	-0.21%	-0.72%	0.33%	0.27%	0.02%	48.89%
Panel B. China Market			CSI 300 returns		Firm raw returns			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Event Date (US Time)	Day of Week (US Time)	Trading Date (China Time)	1-day [0]	3-day [-1,+1]	1-day [0]	3-day [-1,+1]		
					mean	mean	median	% of firms with negative returns
2018-03-01	Thursday	2018-03-02	-0.81%	-0.13%	-0.42%	1.60%	1.00%	31.29%
2018-03-22	Thursday	2018-03-23	-2.87%	-4.51%	-5.59%	-4.06%	-4.61%	86.05%
2018-04-02	Monday	2018-04-03	-0.63%	-1.12%	-0.99%	-1.09%	-1.48%	69.49%
2018-04-03	Tuesday	2018-04-04	-0.20%	-0.88%	-0.52%	-1.31%	-1.80%	72.02%
2018-04-04	Wednesday	2018-04-09	-0.05%	1.68%	0.20%	-0.11%	-0.20%	51.68%
2018-04-05	Thursday	2018-04-09	-0.05%	1.68%	0.20%	-0.11%	-0.20%	51.68%
2018-04-16	Monday	2018-04-17	-1.58%	-2.72%	-2.25%	-1.67%	-1.98%	75.69%
2018-06-15	Friday	2018-06-19	-3.53%	-3.66%	-7.38%	-8.60%	-9.25%	94.50%
2018-06-18	Monday	2018-06-19	-3.53%	-3.66%	-7.38%	-8.60%	-9.25%	94.50%

Notes: This table presents the market-wide impact of the trade-related policies between the US and China. Columns (1) and (2) present the event dates of interest. Column (3) indicates the corresponding trading date in the US or China market. Trading dates are different between the US and China because of the time

difference and non-trading dates due to public holidays. The market returns are measured using S&P 500 for the US market and CSI 300 for the China market, respectively. Column (4) reports the raw market return on the event date. The 3-day cumulative returns [-1,+1] centered on the event date are reported in column (5). Column (6) reports the average raw return for our sample firms. The summary statistics (mean, median, and percentage of firms with negative returns) for 3-day cumulative raw returns for our sample firms are presented in columns (7) - (9). The table reports the impact of 9 events. March 1, 2018: The Trump administration announced steep tariffs on steel and aluminum. March 22, 2018: The Trump administration issued a presidential memorandum in reference to Section 301 of the Investigation of China's Laws, Policies, Practices, or Actions that proposed to impose tariffs on up to $50 billion of Chinese imports as a response to China's alleged theft of US intellectual property. April 2, 2018: China's Ministry of Commerce rolled out the tariffs on the 128 US products as proposed on March 23, 2018. April 3, 2018: the US Trade Representative Robert Lighthizer published the provisional list of imports covering about 1,300 Chinese products, accounting for approximately $50 billion worth of US imports from China. April 4, 2018: the Chinese government announced the imposition of a 25% tariff rate on a list of products imported from the US, which also amounted to about $50 billion worth of imports. April 5, 2018: Trump issues statement that proposes an addition $100 billion in tariffs. April 16, 2018: The US Commerce Department banned American firms from selling parts, software, and components to China's ZTE Corp, a multinational telecommunications equipment and system company, for seven years in response to its violation of an agreement not to sell US products to Iran. June 15, 2018: the U.S. announces tariffs on $50 billion of imports from China, with Trump threatening more if China retaliates. June 18, 2018: Trump directed the United States Trade Representative to identify $200 billion worth of Chinese goods for additional tariffs at a rate of 10 percent.

Table 3. Univariate Analysis

Panel A. Revenue from China	Revenue_China				
	<=median (0)		>median (0)		
	N	Mean	N	Mean	Diff.
CRR[-1,+1]	1316	-0.021	806	-0.031	0.010***
CAR[-1,+1]	1316	0.021	806	0.011	0.010***
SIZE	1316	6.156	806	6.86	-0.704***
MTB	1316	3.087	806	3.055	0.032
LEV	1316	0.287	806	0.239	0.049***
ROA	1316	-0.12	806	0.057	-0.177***
Panel B. Input from China	Input_China				
	=0		=1		
	N	Mean	N	Mean	Diff.
CRR[-1,+1]	1471	-0.022	651	-0.032	0.010***
CAR[-1,+1]	1471	0.018	651	0.013	0.005**
SIZE	1471	6.256	651	6.801	-0.545***
MTB	1471	3.213	651	2.762	0.452
LEV	1471	0.271	651	0.265	0.005
ROA	1471	-0.091	651	0.032	-0.124***
Panel C. Procurements from China	Procurement_China				
			=1		
	N	Mean	N	Mean	Diff.
CRR[-1,+1]	1706	-0.023	416	-0.033	0.010***
CAR[-1,+1]	1706	0.019	416	0.009	0.010***
SIZE	1706	6.274	416	7.035	-0.761***
MTB	1706	3.081	416	3.049	0.032
LEV	1706	0.273	416	0.253	0.02
ROA	1706	-0.087	416	0.086	-0.173***

Notes: This table presents the univariate analysis. CRR [-1,+1] is the three-day cumulative raw return around March 22. CAR [-1,+1] is the three-day cumulative abnormal return around March 22 adjusted by the market model. Revenue_China is the revenue from China that is scaled by total revenue in 2016. Input_China is an indicator set to one if the number of mentions of firm purchasing inputs from China is more than zero, and zero otherwise. Procurement_China is an indicator set to one if the firm imports goods from China as indicated by the bill of lading database. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4. Revenue from China

	(1)	(2)	(3)	(4)	(5)	(6)
	CRR [-1,+1]			CAR [-1,+1]		
Revenue_China	-0.1027***	-0.0828***	-0.0488***	-0.0728***	-0.0551***	-0.0371**
	(-6.57)	(-5.60)	(-2.61)	(-5.12)	(-3.90)	(-2.04)
SIZE		-0.0042***	-0.0048***		-0.0010	-0.0014**
		(-7.23)	(-8.12)		(-1.64)	(-2.18)
MTB		-0.0000	-0.0000		0.0000	0.0000
		(-0.13)	(-0.04)		(0.30)	(0.50)
LEV		0.0138***	0.0093*		0.0142***	0.0104*
		(2.69)	(1.74)		(2.58)	(1.84)
ROA		0.0040	0.0050		-0.0063	-0.0024
		(0.94)	(1.04)		(-1.38)	(-0.46)
N	2122	2122	2107	2122	2122	2107
adj. R-sq	0.015	0.046	0.091	0.006	0.015	0.087
Industry FE	No	No	Yes	No	No	Yes

Notes: This table presents the effect of trade war fear on firms' values according to their revenue from China. Revenue_China is the revenue from China that is scaled by total revenue in 2016. The dependent variable, CRR [-1,+1], is the three-day cumulative raw return around March 22. CAR [-1,+1] is the three-day cumulative abnormal return around March 22 that is adjusted by the market model. The firm-level controls include size, market-to-book ratio, leverage, and ROA. The definitions of other variables are in Appendix 2. Industry fixed effects are based on Fama-French 30-industry definitions. The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5. Purchases from China

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A. Inputs from China					
	CRR [-1,+1]			CAR [-1,+1]		
Input_China	-0.0102***	-0.0084***	-0.0055***	-0.0054**	-0.0039*	-0.0030
	(-5.13)	(-4.31)	(-2.60)	(-2.49)	(-1.80)	(-1.31)
N	2122	2122	2107	2122	2122	2107
adj. R-sq	0.010	0.044	0.091	0.002	0.013	0.087
Controls	No	Yes	Yes	No	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes
	Panel B. Purchases from China (bill of lading information)					
	CRR [-1,+1]			CAR [-1,+1]		
Procurement_China	-0.0099***	-0.0071***	-0.0033	-0.0097***	-0.0075***	-0.0047*
	(-4.26)	(-3.06)	(-1.34)	(-4.07)	(-3.14)	(-1.83)
N	2122	2122	2107	2122	2122	2107
adj. R-sq	0.007	0.040	0.089	0.005	0.015	0.087
Controls	No	Yes	Yes	No	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes

Notes: This table presents the effect of trade war fear on financial markets according to firm-level variables that measure purchases from China. We first use Hoberg-Moon Offshoring Database to measure firm's inputs from China. Input_China is an indicator set to one if the number of mentions of the firm purchasing inputs from China in the financial reports is more than zero, and zero otherwise. Procurement_China is an indicator set to one if the firm imports goods from China as indicated by the Bill of Lading database. The dependent variable, CRR [-1,+1], is the three-day cumulative raw return around March 22. CAR [-1,+1] is the three-day cumulative abnormal return around March 22 that is adjusted by the market model. The firm-level controls include size, market-to-book ratio, leverage, and ROA. The definitions of other variables are in Appendix 2. Industry fixed effects are based on Fama-French 30-industry definitions. The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6. Bond Returns

	(1)	(2)	(3)
		CBAR[-1,+1]	
Revenue_China	-0.0640***		
	(-3.22)		
Input_China		-0.0040**	
		(-2.44)	
Procurement_China			-0.0036*
			(-1.76)
N	415	415	415
adj. R-sq	0.077	0.040	0.033
Controls	Yes	Yes	Yes

Notes: This table presents the effect of trade war fear on the bond performance. The dependent variable is the cumulative bond abnormal returns around the event window [-1,+1] with zero indicating March 22. $CBAR_i[-1,+1] = \sum_{t=-1}^{+1} BAR_{i,t}$, where the bond abnormal return for firm i is defined as $BAR_i = \sum_{k=1}^{J} BAR_k\, w_k$, where J is the number of bonds outstanding for firm i and w is the market value weight of bond k relative to the total market value of bonds outstanding for firm i. The bond abnormal return is estimated using the average return of a portfolio of bonds with the same rating, $BAR_{k,m,t} = BR_{k,m,t} - \overline{BR}_{m,t}$, where $BR_{k,m,t}$ is the bond return for bond k on date t defined as $\frac{P_{k,t}-P_{k,t-1}}{P_{k,t-1}}$, and $P_{k,t}$ is the bond's price on date t. $\overline{BR}_{m,t}$ is the average bond return for bonds with rating m on date t. Revenue_China is the revenue from China that is scaled by total revenue in 2016. Input_China is an indicator set to one if the number of mentions of the firm purchasing inputs from China in the financial reports is more than zero, and zero otherwise. Procurement_China is an indicator set to one if the firm imports goods from China as indicated by the Bill of Lading database. The firm-level controls include size, market-to-book ratio, leverage, and ROA. The definitions of other variables are in Appendix 2. The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7. Default Risks

	(1)	(2)	(3)
	Growth CDS [-1,+1]		
Revenue_China	0.0385***		
	(4.03)		
Input_China		0.0022**	
		(2.15)	
Procurement_China			0.0048***
			(4.06)
N	2122	2122	2122
adj. R-sq	0.143	0.137	0.142
Controls	Yes	Yes	Yes

Notes: This table presents the effect of trade war fear on default risk as measured by changes in the implied CDS spread from Bloomberg. Growth CDS [-1,+1] is the growth rate of the implied five-year Credit Default Swap (CDS) spread around the event window [-1,+1] with zero indicating March 22. $Growth\ CDS_i[-1,+1] = \sum_{t=-1}^{+1} CDSR_{i,t}$, where $CDSR_{i,t} = \frac{S_{i,t}-S_{i,t-1}}{S_{i,t-1}}$. $S_{i,t}$ is the implied CDS spread that is constructed using the default probabilities that are based on the Merton model. Revenue_China is the revenue from China that is scaled by total revenue in 2016. Input_China is an indicator set to one if the number of mentions of the firm purchasing inputs from China in the financial reports is more than zero, and zero otherwise. Procurement_China is an indicator set to one if the firm imports goods from China as indicated by the Bill of Lading database. The firm-level controls include size, market-to-book ratio, leverage, and ROA. The definitions of other variables are in Appendix 2. The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 8. Supply Chain Perspectives (Univariate Analysis)

	Panel A. Import_China				
	<=median (0)		>median (0)		
	N	Mean	N	Mean	Diff.
Industry CRR [-1,+1]	263	-0.03	118	-0.035	0.005
Industry CAR [-1,+1]	263	0.01	118	0.009	0.001
	Panel B. Import_China_Up				
	<median		>median		
	N	Mean	N	Mean	Diff.
Industry CRR [-1,+1]	191	-0.027	190	-0.036	0.009***
Industry CAR [-1,+1]	191	0.014	190	0.006	0.008**
	Panel C. Import_China_Down				
	<median		>median		
	N	Mean	N	Mean	Diff.
Industry CRR [-1,+1]	191	-0.029	190	-0.033	0.004
Industry CAR [-1,+1]	191	0.01	190	0.009	0.001

Notes: This table presents the declaration effect of the trade war fear on firms according to their industry-level China import penetration measures. The analysis is at the North American Industry Classification System (NAICS) industry level. Import_China is the total imports from China in 2016 that are scaled by total global imports. Import_China_Up is a sector's average exposure to imports from China across its upstream sectors in the US. Import_China_Down is a sector's average exposure to imports from China across its downstream sectors in the US. The table reports the univariate analysis. Industry CRR [-1,+1] is the value-weighted average of CRR [-1,+1] by using the firm's market value as the weight. Industry CAR [-1,+1] is the value-weighted average of CAR [-1,+1] by using the firm's market value as the weight. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9. Supply Chain Perspectives (Regression Analysis)

	(1) Industry CRR [-1,+1]	(2) Industry CAR [-1,+1]
Import_China	0.0051	0.0108
	(0.42)	(0.90)
Import_China_Up	-0.1150***	-0.0912**
	(-2.81)	(-2.26)
Import_China_Down	-0.0503	-0.0116
	(-1.54)	(-0.36)
N	381	381
adj. R-sq	0.070	0.044
Controls	Yes	Yes

Notes: This table presents the declaration effect of the trade war fear on firms according to their industry-level exposure to trade with China. The analysis is at the Naics industry level. Import_China is the total imports from China in 2016 that are scaled by total global imports. Import_China_Up is a sector's average exposure to imports from China across its upstream sectors in the US. Import_China_Down is a sector's average exposure to imports from China across its downstream sectors in the US. Industry CRR [-1,+1] is the value-weighted average of CRR [-1,+1] by using the firm's market value as the weight. Industry CAR [-1,+1] is the value-weighted average of CAR [-1,+1] by using the firm's market value as the weight. The effects of sectoral linkages are defined using 2007 BEA input-output matrix. The controls include industry averages of the firm size, market-to-book ratio, leverage, and ROA. Variables definitions are in Appendix 2. The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 10. Firm-level Trade Exposure for Chinese Firms

Panel A. Summary Statistics

Variable	N	Mean	S.D.	P25	Median	P75
CRR[-1,+1]	2588	-0.041	0.047	-0.067	-0.046	-0.021
CAR[-1,+1]	2588	-0.001	0.050	-0.028	-0.008	0.017
Revenue_US_D	2588	0.192	0.394	0.000	0.000	0.000
Procurement_US_D	2588	0.182	0.386	0.000	0.000	0.000
Revenue_US	2588	0.016	0.069	0.000	0.000	0.000
Procurement_US	2588	0.002	0.010	0.000	0.000	0.000
SIZE	2588	22.983	0.730	22.444	22.829	23.362
MTB	2588	3.039	2.644	1.230	2.297	3.984
LEV	2588	0.410	0.207	0.245	0.391	0.562
ROA	2588	0.043	0.057	0.014	0.039	0.072

Panel B. Event Study

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CRR[-1,+1]				CAR[-1,+1]			
Revenue_US_D	-0.0089***	-0.0063**			-0.0078***	-0.0052**		
	(-3.53)	(-2.46)			(-3.01)	(-1.97)		
Procurement_US_D	0.0020	0.0027			0.0019	0.0023		
	(0.73)	(1.00)			(0.69)	(0.85)		
Revenue_US			-0.0408***	-0.0339***			-0.0412***	-0.0320***
			(-3.38)	(-2.85)			(-3.39)	(-2.72)
Procurement_US			0.0724	0.0763			0.1099	0.1127
			(0.76)	(0.82)			(1.10)	(1.16)
N	2588	2588	2588	2588	2588	2588	2588	2588
adj. R-sq	0.011	0.090	0.010	0.091	0.013	0.087	0.014	0.088
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes

Notes: This table presents the declaration effect of the trade war fear on Chinese firms according to the Chinese customs database. Revenue_US is the value of exports to the US in 2013 that is scaled by total revenue in 2013. Revenue_US_D is a dummy for firms that have positive Revenue_US. Procurement_US is the value of imports to the US in 2013 that is scaled by total revenue in 2013. Procurement_US_D is a dummy for firms that have positive Procurement_US. CRR [-1,+1] is the cumulative raw return around the event date March 22 (March 23 for the Chinese market). CAR [-1,+1] is the cumulative abnormal returns adjusted by the market model around the event date March 22. The firm-level controls include firm size, market-to-book ratio, leverage, and ROA. Variables definitions are in Appendix 2. Industry fixed effects are based on the definitions of China Securities Regulatory Commission (CSRC). The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 11. Market Reaction on June 18

Panel A. US Firms

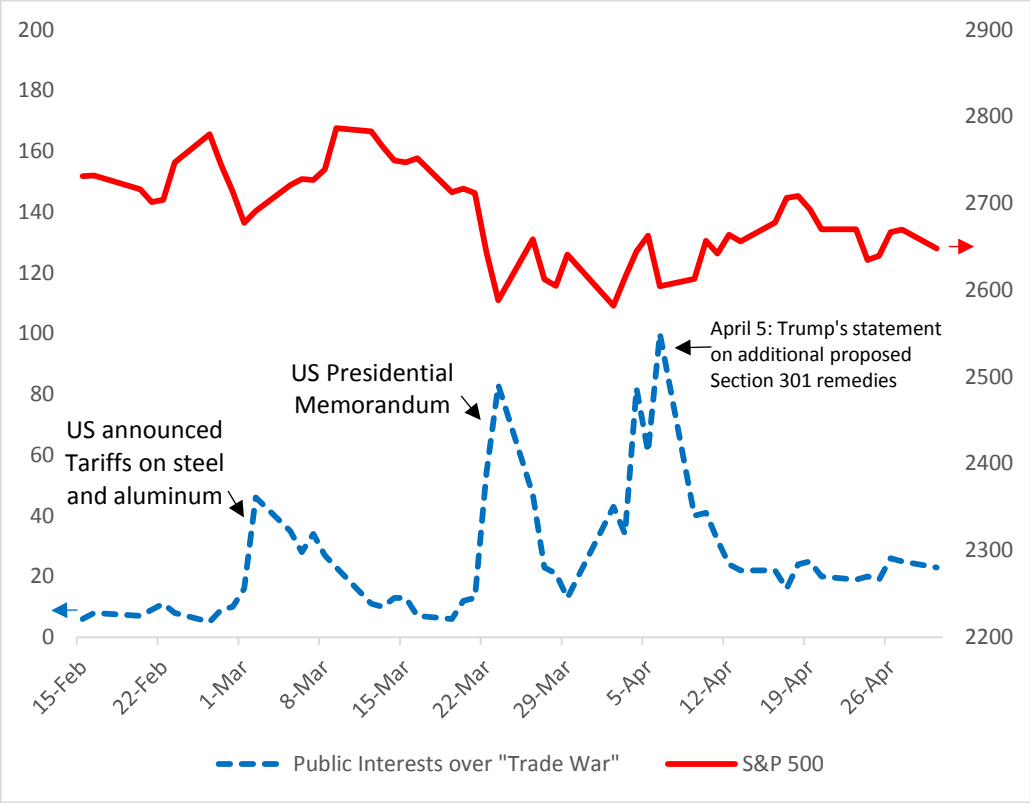
	CRR [-1,+1], June 18			CAR [-1,+1], June 18		
Revenue_China	-0.0720***			-0.0664***		
	(-3.97)			(-3.62)		
Input_China		-0.0067***			-0.0061***	
		(-3.12)			(-2.77)	
Procurement_China			-0.0028			-0.0026
			(-1.23)			(-1.13)
N	2068	2068	2068	2068	2068	2068
adj. R-sq	0.006	0.003	-0.001	0.008	0.005	0.002
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Chinese Firms

	CRR [-1,+1], June 18	CAR [-1,+1], June 18
Revenue_US	-0.0297**	-0.0292**
	(-2.00)	(-2.07)
Procurement_US	-0.0121	0.0083
	(-0.11)	(0.07)
N	2490	2490
adj. R-sq	0.073	0.071
Controls	Yes	Yes

Notes: This table presents the market reactions on June 18, 2018 when Trump directed the United States Trade Representative to identify $200 billion worth of Chinese goods for additional tariffs at a rate of 10 percent. Panel A presents the results for US firms. Panel B reports the results for Chinese firms. Revenue_China is the revenue from China that is scaled by total revenue in 2016. Input_China is an indicator set to one if the number of mentions of the firm purchasing inputs from China in the financial reports is more than zero, and zero otherwise. Procurement_China is an indicator set to one if the firm imports goods from China as indicated by the Bill of Lading database. The firm-level controls include firm size, market-to-book ratio, leverage, and ROA. Variables definitions are in Appendix 2. The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Figure 1. Public Interests over Trade War and Stock Returns



Notes: The red solid curve indicates the S&P 500 index (right scale). The blue dashed curve shows the public interest over trade war as measured by Google Trends (left scale). The information on Google Trends is accessed on July 11, 2018.

Appendix 1. Sample Construction

U.S. Firm-level Sample

This firm-level sample contains listed US firms that operate domestically. Firms headquartered or incorporated in other countries, multinational firms as indicated by Compustat, or financial firms (SIC codes between 6000 and 6999) are excluded. We only keep firms with essential financial information from Compustat and stock price data from Bloomberg. The final sample consists of 2,122 firms.

US Industry-level Sample

The industry-level sample is at the Naics level. The sample consists of 381 Naics industries with at least one sample firm in each industry.

China Firm-level Sample

The firm-level sample for Chinese firms contains 2,588 observations with essential financial information. Financial firms are excluded. The data is from CSMAR database.

Appendix 2. Variable Definition

Variable	Definition
CRR[-1,+1]	The cumulative raw returns around the event window [-1,+1] with zero indicating March 22. $CRR_i[-1,+1] = \sum_{t=-1}^{+1} R_{i,t}$, where $R_{i,t}$ is the stock return for firm *i* on date *t*. Source: Bloomberg
CAR[-1,+1]	The cumulative abnormal returns around the event window [-1,+1] with zero indicating March 22 adjusted by the market model (CAPM) estimated using the stock return over [-220,-20]. $CAR_i[-1,+1] = \sum_{t=-1}^{+1} AR_{i,t}$, where $AR_{i,t}$ is abnormal return for firm *i* on date *t* adjusted by market model with value-weighted return as market return. Source: Bloomberg & Ken French Data Library
CBAR[-1,+1]	Cumulative bond abnormal returns around the event window [-1,+1] with zero indicating March 22. $CBAR_i[-1,+1] = \sum_{t=-1}^{+1} BAR_{i,t}$, where bond abnormal return for firm *i* is defined as $BAR_i = \sum_{k=1}^{J} BAR_k\, w_k$, where *J* is the number of bonds outstanding for firm i and *w* is the market value weight of bond k relative to the total market value of bonds outstanding for firm i. The bond abnormal return is estimated using the average return of a portfolio of bonds with the same rating, $BAR_{k,m,t} = BR_{k,m,t} - \overline{BR}_{m,t}$, where $BR_{k,m,t}$ is the bond return for bond *k* on date *t* defined as $\frac{P_{k,t}-P_{k,t-1}}{P_{k,t-1}}$, and $P_{k,t}$ is the bond's price on date *t*. $\overline{BR}_{m,t}$ is the average bond return for bonds with rating *m* on date *t*. Source: DataStream
Growth CDS [-1,+1]	The growth rate of implied 5-year Credit Default Swap (CDS) spread around the event window [-1,+1] with zero indicating March 22. $Growth\ CDS_i[-1,+1] = \sum_{t=-1}^{+1} CDSR_{i,t}$, where $CDSR_{i,t} = \frac{S_{i,t}-S_{i,t-1}}{S_{i,t-1}}$. $S_{i,t}$ is the implied CDS spread constructed using the default probabilities based on the Merton model as the driving factor. Source: Bloomberg
Firm-level Measures	
Revenue_China	The revenue from China scaled by total revenue in 2016. Source:

	Factset Revere
Input_China	An indicator set to one if the number of mentions of the firm purchasing inputs from China in the financial reports between 2011 and 2015 is more than zero, zero otherwise. Hoberg-Moon Offshoring Database provides data up to 2015. Source: Hoberg-Moon Offshoring Database.
Procurement_China	An indicator set to one if the firm imports goods from China suggested by the bill of lading data; Source: the US Bill of Lading database
Revenue_US	The value of exports to the U.S. in 2013 scaled by total revenue in 2013 for Chinese listed firms. Similarly, Revenue_US_D is set to one if a firm has positive Revenue_US, and zero otherwise. Source: China Customs Database & CSMAR
Procurement_US	The value of imports to the U.S. in 2013 scaled by total revenue in 2013 for Chinese listed firms. Similarly, Procurement_US_D is set to one if a firm has positive Procurement_US, and zero otherwise. Source: China Customs Database & CSMAR
Industry-level Measures	
Import_China	The Naics-level measure is defined as the total imports from China in 2016 divided by total imports from the world. Source: UN Comtrade
Import_China_Down	$\text{Import\_China\_Down}_j = \sum_g w_{gj}^D \text{Import\_China}$, which is equal to the weighted average Import_China across all industries, indexed by *g*, that purchase from industry *j*. These weights w_{gj}^D are defined as $w_{gj}^D = \frac{\mu_{gj}^U}{\sum_{g'} \mu_{g'j}^D}$, where μ_{gj}^U is the 1992 "use" value in the BEA input-output matrix for the value of industry j's output purchased by industry g, such that the weight is the share of industry j's total sales that are used as inputs by industry g. Source: UN Comtrade
Import_China_Up	Similarly, $\text{Import\_China\_Up}_j = \sum_g w_{gj}^U \text{Import\_China}$, which is equal

	to the weighted average Import_China across all industries, indexed by *j*, that purchase from industry *g*. Source: UN Comtrade
Firm-level Controls	
SIZE	Log of market value. Source: Compustat
MTB	Market-to-book ratio. Source: Compustat
LEV	Leverage ratio. Source: Compustat
ROA	Return-on-assets. Source: Compustat

Appendix 3. Robustness Checks

	(1)	(2)	(3)
	Fama-French Adjusted CAR [-1,+1]		
Revenue_China	-0.0572***		
	(-4.01)		
Input_China		-0.0044**	
		(-2.02)	
Procurement_China			-0.0076***
			(-3.18)
N	2122	2122	2122
adj. R-sq	0.015	0.013	0.015
Controls	Yes	Yes	Yes

Notes: This table presents the robustness checks for the main results on market reactions using cumulative abnormal returns adjusted by the Fama-French 3-factor model. The Fama-French factors are downloaded from Ken French's online data library. Other variables constructions are in Appendix 2. The t-statistics based on robust errors are reported in the parenthesis. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Appendix 4. Construction of the Measures of Exposure to Chinese Imports along the Supply Chains

Consider industry *j* that uses inputs from industry *1, 2, ... K*. Let us denote the cost share of each input industry k in industry j's total input costs as α_{jk}. Notice that by definition, $\sum_{k=1}^{K} \alpha_{jk} = 1$.

Let us define the Chinese import share in industry k's total imports as

$$\theta_k^{Ch} = \frac{M_k^{China}}{M_k^{Total}}$$

The weighted average share of imports from China across upstream industries of industry *k* is defined as

$$Import_{Up}^{China} = \sum_{k=1}^{K} \alpha_{jk} \theta_k^{Ch}$$

Let us now define β_{jk} as the sales share of each downstream (buying) industry k in industry *j*'s total sales (i.e., $\sum_{k=1}^{K} \beta_{jk} = 1$). The weighted average share of imports from China across downstream industries of industry *k* is then defined as

$$Import_{Down}^{China} = \sum_{k=1}^{K} \beta_{jk} \theta_k^{Ch}$$

Appendix 5. Solving the Issues Related to NAICS-IO N-to-N Matching

Given the measure of exposure to China at the North American Industry Classification System (NAICS) level, denoted by k, as $\theta_k^{Ch} = \frac{M_k^{China}}{M_k^{Total}}$, we can compute the weighted average of exposure to China at the IO level as Ω_k

$$\lambda_n^{Ch} = \sum\nolimits_{k \in \Omega_n} \frac{M_k^{Total}}{\sum_{k \in \Omega_n} M_k^{Total}} \theta_k^{Ch}$$

where *n* stands for an IO code, and Ω_n is the set of NAICS categories matched to category *n*. Once we obtain λ_n^{Ch}, we can construct the upstream and downstream versions of λ using the two equations mentioned in Appendix 4.