Tracing Effects of Sanctions through the Value Chain: Evidence from the US Cotton Ban

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Abstract

Targeted sanctions aimed at curbing human rights abuses have increased over the past two decades. This paper investigates the trade effects of the US Cotton Ban on imports originating from Xinjiang, implemented in December 2020 as a measure to combat forced labour. Using a triple-differences approach, we find that the sanction reduced China's exports of cotton products to the US by 17% at the intensive margin and 5% at the extensive margin. Tracing domestic supply chains, we show that Xinjiang and other provinces reliant on Xinjiang's cotton suffered the largest losses. Moreover, despite the EU does not impose any sanctions against Chinese products, we identify significant and negative indirect effects on China's cotton-related exports to the EU. Our analysis suggests that these negative spillover effects likely stem from European firms' concerns about reputational damage associated with using cotton products sourced from China.

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1 Introduction

Since the 1990s, the use of sanctions has tripled (Morgan et al., 2023). The primary aim of imposing economic repercussions on other nations is to induce a shift in contested policies, steering clear of resorting to military intervention.[1] Although conventional economic sanctions have typically targeted entire states, a rising trend in the use of targeted or smart sanctions by policymakers has been witnessed. These measures seek to inflict economic harm specifically on individuals, businesses, or organizations deemed most accountable for the contested policies, while minimizing repercussions for non-targeted entities, such as the general population.

Recently, a novel category of targeted sanctions has emerged, aimed at addressing human rights violations and corruption. The spectrum of sanction policies spans a wide range, encompassing visa and travel bans, asset freezes, financial sanctions and trade embargoes. A salient example of such humanitarian sanctions is the import sanction imposed by the United States against Xinjiang-origin cotton since December 2020. Xinjiang is the largest cotton production base in China and it accounts for roughly 20 percent of global cotton production. In response to allegations of widespread repression of the Uyghur minority and the use of forced labour in Xinjiang, the US implemented a region-wide prohibition on the import of all cotton products containing Xinjiang-origin cotton.[2] To further strengthen efforts against the use of forced labour in the region, the United States enacted the Uyghur Forced Labor Prevention Act (UFLPA) on December 23, 2021, which took effect on June 21, 2022.[3] Despite the policy's significance and wide-reaching implications, there remains a lack of solid empirical evidence assessing the effectiveness of the US Cotton Ban. Specifically, the implementation of such extensive, targeted trade sanctions necessitates detailed information on the underlying global value chains of the sanctioned products. Such information demand that can pose significant practical challenges to the effectiveness of such sanctions.

This study investigates the impact of US Cotton Ban on Chinese exports of cotton-containing products, focusing on two key policy interventions: the withhold release order targeting Xinjiang ori-

[1] Notable instances include global sanctions against Iran's nuclear program (Draca et al., 2022; Ghomi, 2022; Moeeni, 2022) and Russia's invasion of Ukraine (Crozet and Hinz, 2020; Ahn and Ludema, 2020; Bělín and Hanousek, 2021; Chupilkin et al., 2023).

[2] The region-wide Cotton Ban restricts the import of all cotton products, including textiles, garments and apparel, containing Xinjiang cotton.

[3] The UFLPA introduced a rebuttable presumption that products entirely or partially manufactured in Xinjiang or by designated entities involved forced labour, making them ineligible for entry into the US. Therefore, in addition to cotton products, the UFLPA also prohibits the import of all goods produced in Xinjiang.

gin cotton implemented in December 2020 and the Uyghur Forced Labor Prevention Act (UFLPA) enforced since June 2022. Using product-level monthly trade flow data from the UN Comtrade and the General Administration of Customs of China, we apply a triple-differences strategy with a rich set of interactive fixed effects to identify the average effects of the sanction. This involves comparing the distinct changes in Chinese exports of cotton-containing products to the US relative to (1) exports of the same products to other countries and (2) exports of non-cotton textile and garment products to all destination countries, before and after the policy implementation. Using the UN Comtrade data, our baseline results indicate that the Cotton Ban had a statistically and economically significant negative effect on Chinese exports of cotton-containing products to the US. Specifically, we estimate a 17% decline in export value (intensive margin) and a 5% reduction in the likelihood of export (extensive margin), relative to their control counterparts.

We further decompose the impact of the Cotton Ban by examining domestic cotton supply chains within China. We construct a four dimensional balanced panel dataset that integrates provincial level trade flow data from China Customs with input-output linkages between Chinese provinces and Xinjiang. Using predetermined input-output linkages between Chinese provinces and Xinjiang, we classify provinces based on their reliance on Xinjiang for textile and garment inputs. Applying a quadruple-differences framework, we find that the Cotton Ban effectively curtailed exports of cotton products originating from Xinjiang. Moreover, provinces highly dependent on Xinjiang's inputs experienced a decline of 25% at the intensive margin and a reduction of 23% at the extensive margin. These negative effects are all statistically significant at conventional significance levels. This findings suggest that the target on cotton produced in Xinjiang was fairly effective through the cotton supply chains in China.

Next, we investigate the potential indirect effects of the Cotton Ban on Chinese exports to other destinations. Particularly, we focus on the impact on Chinese export to the EU. Our analysis shows that the US Cotton Ban had negative and significant effects on the export of Chinese cotton-containing products to the EU. Both the export flows and probability of export decreased by about 8% following the implementation of the Cotton Ban. That result may seem surprising since the EU did not impose any sanctions against Chinese cotton product. We therefore explore different mechanisms for the negative indirect effects of the Cotton Ban. We first rule out the decreasing market power mechanism, as the adverse indirect effects were primarily driven by a decrease in

quantity rather than a negative price effect. Similarly, we do not find evidence supporting the re-exporting potential mechanism. Instead, our finding suggests that the reputation concerns of European companies can explain the negative indirect effects at the intensive margin but not at the extensive margin. The reputational explanation becomes even more credible since both direct (on export to the US) and indirect (on export to the EU) effects became more pronounced for the products closer to consumers.

Our paper contributes primarily to the literature on the impact of international sanctions. An extensive set of empirical studies has documented: (1) The macroeconomic impacts of sanction on the targeted country (Hufbauer et al., 1990; Biglaiser and Lektzian, 2011; Neuenkirch and Neumeier, 2015; Afesorgbor and Mahadevan, 2016; Neuenkirch and Neumeier, 2016; Besedeš et al., 2017; Mirkina, 2018; Ghomi, 2022; Gutmann et al., 2023); (2) The microeconomic impacts on companies operating in the sanctioned country (Ahn and Ludema, 2020; Draca et al., 2022; Nigmatulina, 2023); (3) the economic impacts on firms operating in the sender country (Crozet and Hinz, 2020; Besedeš et al., 2021; Crozet, Hinz, et al., 2021; Efing et al., 2023). Specifically, our paper is closely related to the literature that investigates the nexus between sanction and trade performance. These studies include: (1) Cross-country analysis on aggregate trade performance (Felbermayr et al., 2020; Gutmann et al., 2023); (2) Firm level analysis under trade sanctions against Iran (Haidar, 2017); and (3) Firm / product level under trade sanctions between Russia and the EU since 2014 (Crozet and Hinz, 2020; Bělín and Hanousek, 2021; Miromanova, 2023; Egorov et al., 2025). Overall, these studies reveal that bilateral trade activities between sender and sanctioned countries decrease under sanction.

Our research distinguishes itself from the existing literature in two main aspects. On the one hand, we contribute new empirical evidence regarding the impact of sanction on export performance of targeted products by investigating the newly imposed import sanctions by the US against Xinjiang's cotton-containing products since December 2020. To our knowledge, our paper is the first empirical study to examine the trade consequences of this US sanction against China. Our estimation results reveal a negative effect of the Cotton Ban on Chinese exports of cotton-containing product. On the other hand, in addition to assessing the aggregate impact of sanction, we examine the distribution of impact across Chinese provinces. This estimation result offers new perspective on the effectiveness of targeting the economic interests of entities or regions planned to be subject

to sanctions. We observe pronounced negative impacts on the export of cotton-containing products from Xinjiang and the Chinese provinces which were highly dependent on Xinjiang's input. This finding suggests that the US Cotton Ban could effectively target Xinjiang's cotton.

Secondly, our study contributes to the body of work exploring the connection between political conflicts and trade performance. Previous studies have documented the negative association between political conflicts and bilateral trade activities (see, for example, Fuchs and Klann, 2013; Heilmann, 2016; Li et al., 2021). Moreover, Fajgelbaum et al. (2020) and Jiang et al. (2023) find that heightened tension in US-China trade relations leads to a decrease in their bilateral trade activities. Through the examination of the effect of US sanctions on the import of cotton-containing goods from Xinjiang, we contribute novel empirical evidence regarding the relationship between conflicts and trade performance, particularly in the context of escalating US-China geopolitical tensions.

Thirdly, our paper contributes to an emerging literature on the political consumerism. Recent studies offer empirical evidence that consumers are more likely to purchase from sellers who share a common political affiliation or a common position on controversial social issues (see, for example, McConnell et al., 2018 ; Schoenmueller et al., 2023; Liaukonytė et al., 2023; Conway and Boxell, 2024). However, the evidence regarding the effects of consumer boycott is mixed. In the second part of our empirical analysis, we document the indirect effects of the US sanctions on Chinese exports to other destinations. We focus on investigating the impact on Chinese export to the EU and we observe a negative and significant indirect effect of Cotton Ban at both margins. Our results show that the risk of reputational harms are enough for Chinese cotton exports to the EU to slow down despite the EU not having imposed any sanction. Our finding adds new evidence regarding the negative trade effect of consumer boycott.

The remainder of our paper is structured as follows. Section 2 provides the background of the implementation of the US region-wide Cotton Ban. Section 3 describes the data we used in the paper. Section 4 discusses the estimated impact of the US Cotton Ban on the export of Chinese sanctioned commodities to the US. Section 5 discusses the indirect effects of the Cotton Ban. Section 6 concludes.

2 Background

Since 2017, Xinjiang government has faced accusations of repressing Uyghurs and other ethnic minorities residing in the region (see, for example, Lehr, 2020; Bukharin, 2021; Murphy et al., 2022; Carlson and Weaver, 2022; United Nations Human Rights Office of the High Commissioner, 2022). These allegations include the massive establishment of detention camps, the extensive use of surveillance against minorities and the use of forced labours of ethnic minorities in Xinjiang. Despite strong denials from the Chinese government, allegations of crimes against humanity continue to persist. Lawmakers in the US have called for the imposition of sanctions on Chinese officials and entities who are deemed to be responsible for these human rights violations.[4] Consequently, from September 2019, the US implemented various economic sanctions, including financial and trade sanctions, against Chinese entities and senior Chinese officials for human right abuses in Xinjiang. This paper focuses on evaluating the trade effect of the region-wide Cotton Ban imposed by the US against Xinjiang-origin cotton since December 2020.

2.1 Chinese and Xinjiang's Cotton Production

Benefiting from favorable agroclimatic conditions and sustained policy support from the Chinese government, Xinjiang has gradually emerged as the most important cotton production base in China (see the discussions in Lehr, 2020 and Zenz, 2023). Cotton production in Xinjiang expanded significantly since the 2010s: from 2,479 thousand tons or 42% of total Chinese production in 2010 to 5,002 thousand tons or 85% in 2019. Most of these cotton were used to produce other goods, such as yarn, fabrics and consumer products (Lehr, 2020; Carlson and Weaver, 2022). In terms of production value, cotton production in Xinjiang reached RMB 78.8 billion, representing approximately 6% of Xinjiang's GDP in 2019.[5] Xinjiang Production and Construction Corps (XPCC), a paramilitary organization, is the largest single cotton producer in the region. XPCC's operations are characterized by large-scale, highly mechanized production systems (Lehr, 2020; Carlson and Weaver, 2022). In 2019, XPCC accounted for 41% of Xinjiang's total cotton production and 34% of China's overall cotton output.

[4] For example, in 2018, the US Senator Marco Rubio and Representative Chris Smith requested the Trump Administration for targeting corresponding Chinese officials.

[5] To calculate the total value of cotton production, we multiply the quantity of cotton produced in Xinjiang by the average price of cotton in China.

Xinjiang cotton is deeply embedded in global supply chains. As of 2019, China's exports of cotton products reached a total value of USD 40.1 billion, accounting for 25% of global exports.[6] Fabrics and consumer goods made up 97.6% of the these exports and and it is estimated that roughly half of these products incorporated cotton sourced from Xinjiang (Carlson and Weaver, 2022).[7]

Cotton and cotton-contained products production in Xinjiang have long been the subject of international suspicions due to persistent allegations of forced labour involving ethnic minority groups, particularly the Uyghurs (Lehr, 2020; Murphy et al., 2022; Zenz, 2023). The Chinese government has consistently denied these claims and underscored that there were no instances of coerced labour involved in the cotton production as well as in other products in the region.[8] Despite objections from the Chinese government, concerns over forced labour practices in Xinjiang have gained substantial traction in Western countries. Human rights organizations have advocated for consumer boycotts of products linked to Xinjiang cotton, targeting global apparel brands and retailers. Furthermore, there have been calls for formal sanctions against Xinjiang cotton. Ultimately, US has implemented a region-wide Cotton Ban and UFLPA to restrict the import of Xinjiang origin cotton.

2.2 US's Xinjiang Cotton Ban

To prevent the importation of cotton products suspected of being manufactured by forced labour, the US has implemented a series of targeted trade measures. For instance, the US Customs and Border Protection (CBP) issued nine withhold release orders (WROs) against goods imported from designated Chinese entities linked to forced labour practices. Table 1 lists these WROs. These early import bans only targeted individual Chinese entities rather than imposing a comprehensive ban on products originating from Xinjiang. In addition to these WROs, on July 1, 2020, four US government agencies, the Department of State, Department of the Treasury, Department of Commerce and Department of Homeland Security, jointly issued the Xinjiang Supply Chain Business Advisory.

[6] All these statistics are derived from the UN Comtrade data.

[7] Estimates of Carlson and Weaver (2022) are based on data in 2021.

[8] For instance, during a press conference in Beijing on April 9, 2021, Yilijiang Anayiti, the spokesperson of the Xinjiang government, asserted that there were no instances of forced labour in cotton production and other industries in Xinjiang, and that the employment of ethnic minorities in Xinjiang was entirely voluntary. Associated press releases can be accessible at http://de.china-embassy.gov.cn/zt/zgxj/202104/t20210415_9045932.htm.

This advisory explicitly highlighted the potential use of forced labour in the production of cotton and cotton products in Xinjiang. It urged US businesses and importers to assess legal, reputational and economic risks and exercise heightened due diligence before engaging in any transactions involving Xinjiang's cotton supply chains.

Following extensive negotiations among various stakeholders, the United States implemented import sanctions targeting Xinjiang-origin cotton since December 2020. Figure 1 outlines the timeline of key sanction measures imposed by the US. The first US regional cotton ban against Xinjiang cotton was announced on December 3, 2020 when CBP issued a WRO prohibiting the importation of all cotton and cotton products produced by the XPCC and its affiliated entities.[9] This restriction applied broadly to any product containing XPCC-produced cotton, including intermediate and final goods such as textiles, garments, and apparel.

Subsequently, on January 13, 2021, the CBP issued a second, more expansive WRO, extending the ban to all cotton and tomato products produced in Xinjiang. Effectively, this region-wide import restriction authorized CBP and all border controls to detain the shipments at all US ports of entry if they were found to contain cotton or tomato products originating from Xinjiang, regardless of the specific producer.[10]

One year after the implementation of the region-wide Cotton Ban, the US government further escalated its trade restrictions by enacting the Uyghur Forced Labor Prevention Act (UFLPA). Signed into law by President Biden on December 23, 2021, the UFLPA introduced a rebuttable presumption that all goods produced wholly or partially in Xinjiang, or by entities designated as associated with forced labour practices, were forbidden to enter the US. Under this presumption, it is incumbent upon importers to provide "clear and convincing evidence" that the goods were not produced using forced labour.

The legislation required the Forced Labor Enforcement Task Force (FLETF), chaired by the Department of Homeland Security, to develop and implement a strategy to strengthen the enforcement of restricting importation of Xinjiang products. Pursuant to the UFLPA, this strategy includes: (i) conducting a detailed assessment of the scope of imports associated with forced labour ; (ii)

[9]The effective date of this order was backdated to November 30, 2020. Press release of this withholding release order can be accessed via https://www.dhs.gov/news/2020/12/02/dhs-issues-detention-order-cotton-products-made-xinjiang-production-and-construction.

[10]Press release of this withholding release order can be accessed via https://www.cbp.gov/newsroom/national-media-release/cbp-issues-region-wide-withhold-release-order-products-made-slave.

establishing an official UFLPA Entity List and identifying high-priority sectors for enforcement; (iii) strengthening the capacity to trace and identify goods linked to forced labour; (iv) enhancing the utilize of legal authorities and enforcement tools at US ports of entry; (v) issuing guidance for importers to ensure compliance; and (vi) fostering interagency coordination and consultation between other governmental departments and non-governmental stakeholders (Office of Strategy, Policy, and Plans, 2022).

The UFLPA officially took effect on June 21, 2022, with the enforcement strategy implemented concurrently.[11] The enactment of the UFLPA demonstrated a significant intensification of the US government's efforts to curtail imports associated with forced labour. In particular, the legislation aimed both to expand the coverage of targeted product and to improve the efficacy of enforcement for products already under restriction. Designated as high-priority enforcement sectors under the UFLPA framework, the cotton, tomato, and polysilicon industries have each been assigned dedicated enforcement plans.

This study examines the impact of trade sanctions on products containing Xinjiang-origin cotton. For consistency across the sample period, we define a fixed set of cotton-related products as the targeted commodities, despite the broader scope of the UFLPA which applies to all goods produced in Xinjiang. Similarly, the set of control commodities used for comparison remains constant throughout our baseline analysis. To assess the robustness of our findings, however, we implement alternative definitions of both targeted and control product groups in supplementary analyses.

3 Data

3.1 UN Comtrade Database

Our dependent variable in the main analysis is the bilateral export flows from China to other destination countries. We access monthly bilateral trade flows data at the 6-digit level of Harmonized System (HS) of classification of commodities from the United Nations Comtrade database (UN Comtrade). Our specific focus lies in the bilateral trade flows related to Chinese exports which were reported by the destination countries between January 2019 and December 2022. We thoroughly examined the descriptions of all HS 6-digit level products and categorized a product as a

[11] The FLETF strategy was subsequently updated on August 1, 2023.

sanctioned product if it either itself is raw cotton or if it is a product manufactured using cotton, whether partially or entirely.[12] Following the classification in Carlson and Weaver (2022), we define 238 cotton products as commodities that were subjected to the US Cotton Ban . Of the total 238 sanctioned product, 5, 49, 126, 47, 11 of them are raw cotton products, yarn products, fabric products, apparel products, and other textile products, respectively.[13] To ensure comparability, we designate a specific set of products as the control commodities, consisting of 563 products. Among these products, there are 24 raw materials, such as silk and wool, along with 101 yarn products, 210 fabric products, 153 apparel products, and 56 other textile products, all of which are devoid of any cotton content.[14] Table A.1 shows the sample of commodities by type. Altogether, our sample commodities comprises 801 products. We only consider destination countries that had trade relations with China in any of the commodities included in our sample in 2019. There were 126 destination countries in our main analysis. Because of the UN Comtrade data might be categorized under different versions of the HS classification during the sample period, we followed the correspondence tables compiled by the United Nations Statistics Division and made several changes to mitigate the confounding impact due to reclassification.

The final sample is a balanced panel dataset with a total number of 4,844,448 observations, comprising 801 products exported to 126 destinations over a 48-month period between January 2019 and December 2022. All destination countries had at least one data record for importing sample commodity from China in 2019. Among all observations in the final sample, there are 1,225,708 positive export flows between China and destination countries. Summary statistics for the targeted and control commodities during a 12-month period in 2019 (prior to the Cotton Ban) are presented in Table 2. From January to December 2019, there were 2,141 positive commodity-month records for the to-be-sanctioned products exported to the US. The average monthly export volume of the to-be-sanctioned products amounted to about USD 3.5 million. The EU had a total of 27,629 instances of importing cotton-containing products from China, with an average volume of USD 0.1 million.[15] For the control products exported to all destinations and the sanctioned

[12]Because these sanctioned products are all cotton-containing products, we use "sanctioned", "targeted" and "cotton-containing" interchangeably throughout this paper.

[13]Three sanctioned yarn products are also defined as sanctioned fabric products.

[14]We consider three control commodities as both yarn and fabric products.

[15]This statistics does not encompass Austria as it was not included in our balanced dataset. Furthermore, it does not incorporate the UK.

products exported to non-US and non-EU countries, we recorded 350,056 positive product-month export flows with a mean export volume of USD 0.1 million. At the extensive margin, Chinese cotton-containing commodities had a 75% and 37% probability to be exported to the US and the EU, respectively, in 2019.

3.2 China Customs Database

Not all cotton-contained products imported from China were subjected to the sanction. The region-wide Cotton Ban imposed by the US solely focuses on restricting the import of cotton-contained products manufactured in Xinjiang as well as the products that were made with cotton-contained materials from Xinjiang but manufactured elsewhere. However, the UN Comtrade dataset does not provide trade flow data between individual Chinese provinces and destination countries.

To separately identify the potential impacts of US Cotton Ban on the products produced in Xinjiang and other Chinese provinces, we use provincial-level trade flow data provided by the General Administration of Customs of China. Monthly trade flow records are reported by the thirty-one regional customs offices in China. Consistent with our approach using the UN Comtrade data, we focus on the export flows of a sample set of 796 commodities between China and 126 destination countries within the period of January 2019 to December 2022.[16]

We construct a four-dimensional balanced panel dataset comprising 149,240,448 product-province-destination-month observations. Among all observations, 5,120,855, or approximately 3%, of them contained positive values. Table 3 displays the summary statistics of the China Customs dataset in 2019. When compared to the UN Comtrade dataset, the mean export volume of targeted commodities to the US, the export flows of targeted commodities to the EU, as well as, the export flows of all control commodities were smaller. The probabilities to export were also significantly lower, indicating that only a relatively small proportion of Chinese provinces engaged in the trading of the sampled commodities.

3.3 Other Datasets

We also utilize two auxiliary datasets in our paper.

[16] In our sample, there were five commodities that did not have any records in the China Customs dataset.

Inter-provincial input-output table in China To analyze the effects of the US Cotton Ban on the import of goods made with Xinjiang's cotton in other Chinese provinces, we unpack the supply chain within China. We utilize China's inter-provincial input-output table in 2017 compiled by Chen et al. (2023). This table provides data about the inter-provincial supply chain linkages among 42 industrial sectors in China. It utilizes a trade matrix derived from Chinese VAT invoices data to calibrate the multi-regional input-output table provided by the Development Research Center of the State Council.[17] Leveraging this inter-provincial supply chain linkage information allows us to proxy the degree of reliance that Chinese provinces had on Xinjiang's inputs and, in turn, helps us to approximate the level of exposure that different provinces have to the region-wide Cotton Ban.

Google Trends Data We evaluate and rank the level of awareness concerning human rights issues across EU countries using search intensity data from Google Trends. We select a set of keywords each representing a major human rights crisis that occurred during the 2010s. Subsequently, we gather the relative search intensity for each keyword against a control topic "Traffic" from Google Trends and create an aggregate index reflecting the awareness of human rights topics for each EU country.[18]

4 Direct Impact on Chinese exports to the US

4.1 Baseline specification

We estimate the direct impact of the US Cotton Ban on the export of Xinjiang cotton and Chinese cotton products made with Xinjiang origin cotton. Following Frazer and Van Biesebroeck (2010), we employ a triple-differences strategy with three sets of interactive fixed effects to identify the average sanction effect. Our baseline specification relies on the variations in exports between targeted product-destination pairs with their control counterparts before and after the implementation of the US Cotton Ban since December 2020. It is given by:

[17] For detailed methodology, please refer to the instructions in Chen et al. (2023).
[18] Details about Google Trends Data are presented in the appendix.

$$Y_{pdt} = \beta^{US} Ban_{pdt}^{US} + \gamma_{pd} + \gamma_{pt} + \gamma_{dt} + \epsilon_{pdt} \tag{1}$$

where p, d and t denote product, destination country and month correspondingly. This sample period can be divided into two parts: a pre-sanction period spanning from January 2019 to November 2020, and a sanction period from December 2020 to December 2022. The dependent variable, denoted Y_{pdt}, is either defined as the logarithm of export volume or a binary variable indicating positive export flow for a product-destination pair in each month. Furthermore, we decompose the impacts of sanctions on Chinese exports of sanctioned commodities into two components: export price and quantity. In this decomposition exercise, we use the logarithm of export price and the logarithm of quantity (net weights) as outcome variables. Parameters in equation (1) are estimated using OLS and Linear Probability Model (hereafter LPM).

A common issue when using export volume as the left-hand side variable is that they often contain numerous zero-value observations. Standard log-level OLS regressions may yield inconsistent estimates of the average sanction impact. Therefore, we extend our analysis by implementing a Poisson Pseudo Maximum Likelihood estimator (PPML), which can estimate consistent parameters even in the presence of zero-value observations and heteroskedastic error term (Silva and Tenreyro, 2006). The outcome variable for the PPML estimator is the export volume in level.

The unit of observation in this specification is at the product-destination-month level. The key independent variable, Ban_{pdt}^{US}, is a three-way interaction term which equals 1 if a cotton-containing commodity was exported from China to the US since December 2020, and zero otherwise. The estimated coefficient, β^{US}, serves as a triple-differences estimator, capturing the direct impact of sanctions under the assumption of the parallel trends. All products that were exported to non-US destinations and all non-cotton containing products that were exported to the US throughout the sample period, along with the cotton-containing products exported to the US before December 2020, comprise the control group in this specification.

The data structure and triple-differences strategy allow us to include a rich set of interactive fixed effects in our model to account for unobserved heterogeneity among product, destination and month dimensions. Firstly, we include HS6 product by destination fixed effects, γ_{pd}, to remove time-

invariant attributes of any product exported from China to any destination country. Secondly, we add a set of product by month fixed effects, γ_{pt}, to account for the overall evolution of any Chinese commodities exported to all destination countries at any time periods. These fixed effects also remove the potential spillover effect of Cotton Ban on control commodities. Lastly, γ_{dt} controls for the general variations in all commodities importing from China to any destination countries at any given time. We cluster standard errors of all regressions at the product-destination level as the sanction has been assigned at this level.

One potential threat to our strategy is the non-random allocation of US sanctions. Unlike Chinese high-tech products which have been targeted due to economic reasons, the imposition of US sanctions against Xinjiang origin cotton and cotton-related products were mainly driven by humanitarian and political considerations. Due to the nature of humanitarian sanctions, the allocation of sanctions in our study can be considered as exogenous (Ahn and Ludema, 2020; Nigmatulina, 2023). Furthermore, our model incorporates a comprehensive set of fixed effects that assist in addressing unobserved heterogeneity which may be correlated with the allocation of sanctions and the output variables.

The internal validity of our triple-differences strategy relies on the presence of comparable pre-sanction trends between the targeted and control product-destination pairs with respect to different outcome variables (Olden and Møen, 2022). In order to have a causal interpretation for the estimated sanction impact in our baseline specification, we test the parallel trends assumption for each outcome variable by running an event study with the following regression:

$$Y_{pdt} = \sum_{t=2019m1, t\neq 2020m11}^{2022m12} \beta_t^{US} Ban_{pdt}^{US} + \gamma_{pd} + \gamma_{pt} + \gamma_{dt} + \epsilon_{pdt} \tag{2}$$

where we set November 2020 as the base period. We visualize the estimated coefficients of individual interaction terms and conduct a joint-significance test for all pre-sanction coefficients to check for parallel trends.

4.2 Baseline result

Table 4 provides estimates of the average impact of the region-wide Cotton Ban imposed by the US on importation of cotton products from China. Column (1) reports the estimation result for

the sanction impact at the intensive margin. The point estimate of β^{US} is -0.188 and is significant at the 1% level. In terms of size of magnitude, after the imposition of the US Cotton Ban, export volume of sanctioned commodities from China to the US, on average, decreased by around 17%, relative to the control group. Considering that the total annual export volume of all Chinese cotton-containing products to the US in 2019 amounted to USD 10 billion, the aggregate annualized losses in Chinese exports resulting from the Cotton Ban reached USD 1.7 billion.

Column (2) examines the Cotton Ban effects on Chinese export at the extensive margin. Again, the estimate of β^{US} is negative and statistically significant at the 1% significance level. This impact is also economically significant: the probability of export for Chinese cotton-containing products decreased by 4 percentage points, representing a 5% reduction from the average export probability of 75% in 2019.

We switch to the PPML estimator and present the corresponding results in Column (3). Compared to the coefficient estimated in Column (1), the PPML estimate is smaller in magnitude (-0.087 *versus* -0.188). However, it remains negative and statistically significant at the 1% level. This finding indicates that the negative and significant effect of the Cotton Ban observed in Column (1) is robust to issues related to a high number of zero observations and heteroskedastic error terms.

For the causal interpretation of the estimated negative sanction impact, we test the parallel trends assumption for each of our outcome variables. Figure 2 plots all estimated coefficients for 47 individual interaction terms, along with the 95% confidence intervals, with respect to different outcome variables derived from equation (2). In all figures, except for the one for the PPML estimator, we observe parallel trends of outcomes between the Chinese export of cotton products to the US and the control product-destination pairs. Joint-significance tests indicate that all pre-sanction coefficients for the log-transformed export volume and export dummy are jointly insignificantly different from zero. The p-values for these coefficients range from 0.11 to 0.87. During the sanction period, the log-transformed export volume and probability of exports share similar trends. Whereas the estimated coefficients remained insignificant immediately after the implementation of the US Cotton Ban, significant and persistent declines occurred after the seventh and sixteenth months respectively.

The negative responses of export volume to the US sanction could be attributed to changes in

price, quantity or both. To investigate this, we rerun the baseline equation using log-transformed export prices and quantities. Table D.4 presents the result. We find that the estimated coefficient β^{US} for the export price is statistically insignificant in Column (1) but the estimated coefficient on the quantity is negative and statistically significant at the 1% level. Taken together, these results suggest that the negative impact of US sanctions on Chinese exports was driven solely by a decrease in quantity with price effects being negligible.

Alternatively, we apply the same triple-differences strategy to a dataset of US import flows from different origin countries. The trade flow data is again sourced from the UN Comtrade. The estimated coefficient reflects the change in US imports of cotton products from China, relative to imports of cotton products from control origins and imports of control commodities, as a result of the Cotton Ban's implementation. The dataset includes 203 origin countries, excluding China. In addition to the key interaction term capturing the effect of the Cotton Ban on US imports of cotton products from China, we categorize all other origin countries into four groups based on their share of cotton product imports from China in 2016 and 2017. We then include corresponding interaction terms in Equation 1. This approach allows us to account for the varying impacts of the Cotton Ban on different origin countries, depending on their reliance on Chinese cotton products in their supply chains. Table D.5 presents the results. In the first row, the point estimates capturing the direct effects of the sanctions on US imports of Chinese cotton products at both the intensive and extensive margins are negative and statistically significant at the 1%, although the estimator from the PPML model is insignificant. This result reaffirms that the Cotton Ban leads to a reduction in Chinese cotton products imported by the US The remaining rows present the estimated coefficients for US imports of cotton products from other origin countries, categorized by their varying levels of reliance on Chinese cotton products. A significant effect of the Cotton Ban on US's import from origin countries with greater reliance on Chinese cotton products is observed only at the extensive margin (shown in Column (2)).

4.3 Dynamic Impact of the Cotton Ban

We separate the 48-month sample period into four distinct time frames: (1) the pre-sanction period, from January 2019 to November 2020; (2) the period between December 2020 and November 2021; (3) the period from December 2021 to June 2022; and (4) the period following the implementation

of the UFLPA, from July 2022 onward. The US sanction tooks into effect between the second and fourth periods. Table 5 presents the results for the varying sanction effects over time. For the direct impact of the Cotton Ban, the magnitude of the effect progressively increased over time. For instance, the estimated impacts on the log-transformed export volume (Column (1)) decreased from -0.16 in the initial year of the Cotton Ban to -0.35 after the implementation of the UFLPA. Similarly, the estimated effects of sanctions on the probability of Chinese exports to the US dropped from -0.03 to -0.1 during the sanction period. This observed pattern may be attributed to the increased enforcement of the Cotton Ban and the gradual adjustment of supply chains by American importers.

4.4 How well targeted is the Cotton Ban through the Chinese cotton supply chains?

Our baseline results indicate that the region-wide Cotton Ban implemented by the US could have adverse effects on the export of Chinese cotton products at both intensive and extensive margins. However, as a targeted sanction, the US Cotton Ban is designed to prevent product containing Xinjiang origin cotton from entering US territories while minimizing unintended consequences for innocent products, such as Chinese textile and garment products without Xinjiang cotton content. Due to the data constraint of the UN Comtrade, the baseline results cannot fully capture the effectiveness of the Cotton Ban in halting the export of Xinjiang cotton and products made with Xinjiang cotton. In the extreme case, the negative impacts of the Cotton Ban observed in the baseline analysis could be driven solely by the decline in exports of Chinese cotton products that do not contain Xinjiang cotton and, therefore, should not be subject to the ban, with no significant effect on the export of cotton originating from Xinjiang. If this were the case, the region-wide Cotton Ban could be considered ineffective.

In this section, we examine the effectiveness of the Cotton Ban by analyzing its impact on the export of cotton-containing products across Chinese provinces. We hypothesize that an effective Cotton Ban should affect exports from different Chinese provinces to varying extents. Specifically, the export of cotton products from Xinjiang, as well as from provinces heavily reliant on cotton inputs from Xinjiang, would be most vulnerable to the sanction. To test this, we use provincial-level trade flow data from China Customs and estimate the following equation:

$$Y_{podt} = \beta^{US-XJ} Ban_{podt}^{US-XJ} + \sum_{k=1}^{4} \beta^{US-Qk} Ban_{podt}^{US-Qk} + \gamma_{pod} + \gamma_{pot} + \gamma_{dt} + \epsilon_{podt} \tag{3}$$

where p, o, d and t denote product, Chinese province, destination country and month. Unit of observation is at the product-province-destination-month level. The outcome variables are the log-transformed export flow and export dummy. Parameters are estimated by OLS and LPM respectively. The control group consists of three sets of commodities, encompassing (1) all commodities exported from any province to any destination other than the US in any month, (2) non cotton-containing products exported from any province to any destination in any month, and (3) cotton-containing commodities exported from any province to the US prior to the enforcement of the Cotton Ban.[19]

We include five interaction terms in equation (3). The variable Ban_{podt}^{US-XJ} takes the value of 1 if a sanctioned commodity was directly exported from Xinjiang to the US after the sanction have been implemented. For the other provinces, we calculate the input share derived from the province's own textile and garment industries that source materials from Xinjiang's agricultural and textile sectors using the Input-Output table complied by Chen et al. (2023).[20] Based on these share values, we categorize all provinces except Xinjiang into four quartiles. The binary variables, Ban_{podt}^{US-Qk}, are assigned a value of 1 if a cotton product is exported from a Chinese province in quartile k to the US after the implementation of the Cotton Ban. Specifically, Ban^{US-Q4} corresponds to the cotton products that are exported from the Chinese provinces sourcing the the highest proportion of Xinjiang's input. Figure 3 illustrates Xinjiang's input shares across the Chinese provinces. Overall, only a few provinces had input share values exceeding 0.75%, implying that Xinjiang's input represented a minor proportion of the total input used in the production of textile and garment products in China. Among all provinces, Chongqing, Beijing, Hebei, and

[19] We also estimate the average effect of the Cotton Ban on all exports of cotton products by China using the data derived from the China Customs. In panel A of Table D.6, we estimate the average direct effect of all Chinese export of sanctioned products using 3. All estimated coefficients of β^{US}, except the one for PPML, have the expected negative signs and remain statistically significant at 1% level. Alternatively, in panel B, we aggregate the export flows from all Chinese provinces and apply a triple-differences design in equation 4. All point estimates are negative but only the coefficient on log-transformed export flow is statistically significant at the 1% percent. This loss of significance of coefficient may reflect the discrepancies of trade flow data reported by exporter (China Customs) and importer (UN Comtrade).

[20] The calculation details have been presented in the appendix.

Shaanxi exhibit the highest share values, indicating a relatively higher dependency on Xinjiang's input. In contrast, Jilin, Heilongjiang, and Fujian recorded share values close to zero.

The corresponding estimators, β^{US-XJ} and β^{US-Qk}, capture the direct impact of the Cotton Ban on the export of cotton-containing products from Xinjiang and along the Chinese cotton product supply chain. We expect that an effective Cotton Ban would have more pronounced adverse effects on Xinjiang and provinces closely connected to Xinjiang through supply chains, compared to the average impact across all Chinese provinces.

We leverage a four-dimensional balanced panel dataset to include two sets of three-way interactive fixed effects in the specification. γ_{pod} accounts for any time-invariant unobserved heterogeneity specific to each product-province-destination triplet. γ_{pot} captures the overall change in provincial export of any product in any month but which is common to all destinations. Additionally, we include a set of two-way interactive fixed effects, γ_{dt}, in the regression. Standard errors are clustered at the product-province-destination level in all regressions.

Table 6 presents the estimation results for equation (3). In Column (1), we estimate the direct impact at the intensive margin. The estimated coefficients β^{US-XJ}, β^{US-Q4}, and β^{US-Q3} are all negative and statistically significant at the 1% level. The magnitudes are large. Specifically, after the implementation of the Cotton Ban, Xinjiang's export of cotton-containing products to the US decreased by 92% relative to their control counterparts. Similarly, Chinese provinces in the fourth and third quartiles with Xinjiang input shares experienced declines in their exports of cotton-containing products to the US by 25% and 16%, respectively.

In Column (2), we present the estimation results for the probability of export. The coefficient for β^{US-XJ} is -0.14 which is statistically significant at the 1% level. This suggests that the Cotton Ban effectively eliminated all exports of cotton-containing products from Xinjiang to the US, as the average export probability for Xinjiang in 2019 was just 1%. Additionally, β^{US-Q4} is statistically significant at the 1% level, indicating a 2.9 percentage point decrease in the probability of export or a 23% reduction relative to the mean probability in 2019.

In Column (3), we employ the PPML estimator and regress export flows at the provincial level using the same sets of interaction terms and fixed effects. Simirly, the point estimates for β^{US-XJ} and β^{US-Q4} remain negative and statistically significant at the 1% level. These results further confirm that the significant negative effects of the Cotton Ban on Chinese exports of cotton-

containing products are primarily driven by the sharp decline in exports from Xinjiang and the provinces most heavily reliant on inputs from Xinjiang.

5 The mirroring effect on cotton exports to the EU

The US region-wide Cotton Ban may have also influenced Chinese exports to other countries and regions. For example, although no formal sanctions were imposed on Chinese products, the European Union (EU) may have reduced imports of cotton-containing products from China as a consequence of the US Cotton Ban. We evaluate these potential indirect effects by incorporating an interaction term representing the export of Chinese cotton-containing products to EU into equation (1) and run the following regression:

$$Y_{pdt} = \beta^{US} Ban_{pdt}^{US} + \beta^{EU} Ban_{pdt}^{EU} + \gamma_{pd} + \gamma_{pt} + \gamma_{dt} + \epsilon_{pdt} \tag{4}$$

where β^{EU} equals 1 if a cotton-containing product was exported from China to EU after the implementation of Cotton Ban. Estimated coefficient β^{EU} captures any potential indirect effects of the sanction.

5.1 Indirect effect of cotton exports to the EU

We start by examining the average indirect effects of the US Cotton Ban on Chinese exports of cotton-containing products to the EU. Table 7 reports the estimation results. The coefficients for β^{EU} in Columns (1) and (2) are both negative and statistically significant at the 1% significance level, indicating that the US Cotton Ban had significant adverse effects on Chinese exports to the EU at both the intensive and extensive margins. At the intensive margin, Chinese exports of cotton products to EU countries declined by an average of 8% relative to the control group following the implementation of the Cotton Ban. Similarly, the probability of export decreased by 3 percentage points, equivalent to an 8% reduction relative to the average export probability in 2019. Furthermore, Column (3) presents the results from the PPML estimator. The estimated coefficient for β^{EU} remains negative and statistically significant at the 10% level, corroborating the

presence of an indirect effect.

To further assess the validity of our identification strategy, Figure 6 plots the estimated coefficients for the interaction terms of individual months concerning the indirect effect on the EU. Most of the pre-treatment estimates are statistically indistinguishable from zero, supporting the parallel trends assumption underlying our triple-differences design.

In additional to the indirect effects of the Cotton Ban on the Chinese exports to the EU, we also investigate the indirect effects on Chinese exports to a set of selected destination countries which we classify as either U.S. allies or Chinese allies. Figure 4 graphically illustrates the point estimates for each selected destinations along with the corresponding 95% confidence interval. We specifically choose the UK, Canada, and Japan as the US's allies and Brazil, Russia, India, and South Africa as the Chinese allies. Among these, Russia stands out as the only country that provided explicit support for China. After the implementation of the US Cotton Ban, the export of cotton products from China to Russia increased significantly at both intensive and extensive margins. In contrast, no statistically significant effects are found for the other BRICS countries. On the other hand, except for the EU, the negative impacts of the Cotton Ban on Chinese exports to the US allies are primarily concentrated at the extensive margin, with little impact at the intensive margin in general.

5.2 Sensitivity Checks

In this section, we present several robustness checks.

Alternative control group. Table 7 presents the estimation results based on alternative control group definitions. First, we broaden the control group by including all non-textile and non-garment commodities. While our baseline definition facilitates a cleaner comparison by focusing on products within textile and garment sectors, this classification may be problematic if certain destination countries, particularly the US and the EU, responded to the Cotton Ban by substituting toward non-cotton textile and garment imports from China. In such cases, product-by-month fixed effects may not fully absorb this variation. To account for this, we re-estimate the baseline specification using the expanded set of control commodities. The results, reported in Panel A of Table D.7, remain largely consistent with the baseline estimates.

Second, in Panel B, we refine the control group by excluding non-cotton textile and garment products that were exported from Xinjiang to the US prior to the Cotton Ban. While these products were not initially targeted, they became subject to import restrictions under the UFLPA since June 2021. Accordingly, we remove 103 such products from the control group. The resulting estimates are -0.22 and -0.05 for the US and EU respectively at the intensive margin in Column (1) and -0.04 and -0.02 at the extensive margin in Column (2). All coefficients are statistically significant at the 5% level or better. Column (3) shows that the PPML estimate remains negative and significant at the 1% level for both interaction terms.

Third, we use an alternative set of destination countries. The number of destinations reporting monthly trade data with China in the UN Comtrade declines over the sample period. It decreases from 126 countries in 2019 to 95 in 2022. As our balanced panel is constructed based on 2019 reporting countries, any systematic attrition correlated with the Cotton Ban could bias our estimates. To address this concern, we restrict the sample to countries that reported positive imports of sample commodities from China in 2022 and re-estimate the baseline specification. As shown in Panel C of Table D.7, the results remain consistent with our baseline findings.

Alternative treatment group. We further assess the robustness of our findings by exploring alternative definitions of the treatment group. First, rather than treating the 26 EU member states as individual destinations, we aggregate them into a single entity representing the entire EU. The corresponding results, reported in Panel A of Table D.8, remain negative and statistically significant and consistent with our baseline estimates.

Second, we evaluate the sensitivity of our results to an alternative definition of targeted commodities. Specifically, we fully adopt the classification proposed by Carlson and Weaver (2022), which identifies a narrower set of 195 cotton-containing products as subject to the Cotton Ban. Using this revised set of treated commodities, the estimates reported in Panel B of Table D.8 are similar to our baseline findings in both magnitude and statistical significance.

Alternative transformation approach. Furthermore, we apply the inverse hyperbolic sine (IHS) transformation to export flow, quantity, and price. Panel C of Table D.8 presents the corresponding estimation results. Notably, the implementation of the Cotton Ban continues to exert negative and statistically significant effects on both the IHS-transformed export flow and

quantity for exports to the US and the EU, respectively.

5.3 How to explain the mirroring effect of cotton exports to the EU?

The negative indirect effects of the US Cotton Ban on Chinese exports of cotton-containing products to the EU cannot be attributed to direct EU policy interventions, as no formal sanctions targeting Chinese commodities were implemented within the EU during the sample period. Moreover, supply-side factors, such as technological shocks affecting Chinese production, have been controlled by the inclusion of product-by-month fixed effects. Instead, we argue that a set of demand-side mechanisms may mediate the strength of the indirect sanction impacts on the EU countries. Specifically, we consider three potential channels: (1) the decreasing market power of Chinese exporters in the global cotton product market, (2) the reexport consideration by European importers aiming to avoid potential shipment detainment at the US border due to to the use of Chinese-origin cotton product, and (3) the reputational damage consideration among European companies associated with sourcing cotton from China.

Reduced market power The implementation of the US Cotton Ban resulted in to a decrease in the demand for Chinese cotton-containing products within the United States. As the US is one of the world's largest importers of cotton-containing commodities, the sanction would undermine the market power of Chinese cotton-containing products exporters in the international markets. A decline in market power could plausibly lead to downward pressure on export prices, which, in turn, might reduce export volumes to other markets such as the EU. However, the estimation results displayed in Table 8 demonstrate that there are no significant indirect effect of sanction on export prices (Column (2)). In contrast, the point estimates for export quantity (Column (3)) are negative and statistically significant. These findings suggest that a decline in Chinese exporters' market power is unlikely to be the primary mechanism behind the observed indirect effects of the Cotton Ban on Chinese exports to the EU.

Reduced re-exporting potential European companies may have faced practical obligations to comply with the US Cotton Ban. Prior to its enforcement, many European manufacturers sourced cotton-containing inputs from China and the goods manufactured with these Chinese inputs may

subsequently export to the US without restriction. However, following the implementation of the ban in December 2020, these companies were required to provide sufficient evidence to the US Customs and Border Protection (CBP) demonstrating that their Chinese origin cotton inputs were not derived from Xinjiang. Failure to meet this standard could result in shipment detentions by the CBP. Faced with uncertainty regarding the traceability of cotton origins within Chinese supply chains, European firms, particularly those reliant on export market in the US, may have opted to reduce their imports of cotton-containing products from China. Additionally, firms striving to maintain uniform product contents across US and European markets may have discontinued import from China.

To empirically assess this re-export channel, we use pre-determined export data to proxy the extent to which each EU country was xposed to the US market and consequently to the Cotton Ban. Our approach assumes that the EU country had a greater export market in the US for its cotton-containing textile and garment products, the more impacted this country was exposed to the US Cotton Ban. Specifically, we calculate each country's share of cotton-containing textile and garment exports to the US relative to its total global exports of such products during 2016–2017, as reported in the UN Comtrade. EU countries with shares above the 75th percentile are categorized as "High" exporters to the US. Figure 5 illustrates these shares. Portugal, Cyprus, Italy and Sweden were the countries most heavily engaged in exporting cotton textile and garment products to the US.

We incorporate an additional interaction term $Ban^{EU-High-US\ Exp}$ into equation (4). The coefficient $\beta^{EU-High-US\ Exp}$ captures any incremental effects of the Cotton Ban on EU countries with high pre-ban export exposure to the US, in addition to the average indirect effect β^{EU}. Table 9 reports the estimation results. While the coefficients on Ban^{EU} remain negative and statistically significant, those on $Ban^{EU-High-US\ Exp}$ are either unexpectedly positive in Column (1) or statistically insignificant in Columns (2) and (3). These findings do not support for the reduced re-exporting potential as the channel behind the observed decline in Chinese cotton exports to the EU.

Reputation concerns While allegations of human rights violations in Xinjiang have been circulating since 2017, the announcement of the US Cotton Ban could make the potential connection

between Xinjiang cotton and the use of forced labour more salient to European consumers. Consumers with higher awareness of human right issues may become more conscientious about the origins of the products they purchase. Therefore, continuously selling the products made with cotton from China after the US Cotton Ban in markets where there is heightened awareness of these human rights concerns could harm a company's reputation and erode its brand value. The elevated reputational risks associated with selling products containing Chinese cotton likely explain the negative indirect effects of the Cotton Ban on Chinese exports to the EU.

We examine this possibility by leveraging the variations in awareness of human rights issues across EU countries. We utilize Google Trends data to construct an index for each EU country, serving as a proxy for its overall attention to humanitarian topics. Specifically, we select three human right crises from the 2010s: the 'Yazidi genocide", "Rohingya genocide" and "Persecution of Uyghurs in China". For each crisis, we calculate the relative search share against a common control keyword "Traffic" from Google Trends.[21] Then, we take the average of the relative search share of these three crises to construct an index for each EU country. Seven EU countries are excluded when computing the index since the search volumes across all three human rights topics in these EU countries are low.[22] The remaining nineteen EU countries are ranked based on their index values, with countries above the 50th percentile categorized as "High" awareness countries. As shown in Figure 7, Germany, Finland, the Netherlands, and the Czech Republic exhibit the highest index values.

We present the estimation results in Table 10. In Column (1), the estimate of $\beta^{EU-High-Search}$ is -0.135 and is statistically significant at the 1% significance level. Conversely, after including $\beta^{EU-High-Search}$, β^{EU} loses its statistical significance, resulting in a negligible average indirect effect for all EU countries. Therefore, only the EU countries with higher awareness of human right issues reduced their imports of cotton-containing products from China at the intensive margin by approximately 12% on average. However, no similar pattern is observed in Column (2) when examining the sanction impacts at the extensive margin.

For robustness, we include two additional crises which are "Boko Haram" and "2019 Turkish offensive into Kurds" and construct a new index for each EU country. In general, the estimation

[21] Computational details are presented in the appendix.

[22] While these countries are omitted from the search index calculation, they are included in our sample when estimating the impact of sanctions.

results displayed in Table D.9 are consistent with those in Table 10.

Alternatively, we categorize all sample commodities into five subgroups. In Table 11, we estimate the impacts of sanctions on each product category and compare the magnitudes of the effects across them. We specifically focus on the estimated impact of Cotton Ban at the intensive margin in Column (1). For the direct effects, We find that the negative sanction impacts were most pronounced for Chinese fabric (-0.23) and apparel (-0.21) products. Similarly, the most significant indirect effects of the Cotton Ban were observed for apparel products (-0.12), which exceeded the average impacts (-0.08) on all products by nearly half. Overall, products closer to consumers are more vulnerable to the sanctions, supporting the reputation mechanism.

6 Conclusions

There has been a notable increase in the use of targeted trade sanctions aimed at addressing human rights abuses. However, the economic effects of such measures remain underexplored. In this paper, we examine the US region-wide ban on import of Xinjiang origin cotton, implemented in December 2020, as a case study to provide new empirical evidence on the trade impact of this emerging form of sanction.

First, to assess the impact of the US Cotton Ban, we employ a triple-differences strategy, comparing the export performance of sanctioned products from China to the US with that of all other Chinese exports to non-US destinations, as well as control products exported to the US before and after the implementation of the sanction. Our analysis reveals that the US sanction significantly decreased the export of sanctioned products to the US, both at the intensive and extensive margins. Notably, we find that the export volume and probability of export declined by 17% and 5% respectively. Moreover, we find that the direct impact of the Cotton Ban primarily stemmed from reduced exports from Xinjiang and other provinces that were heavily reliant on Xinjiang-origin cotton. Taken together, these results suggest that the US region-wide Cotton Ban effectively targeted Xinjiang cotton and the products derived from it, preventing their entry into US market.

Secondly, we investigate the potential indirect effects of the US Cotton Ban on Chinese exports to other countries. Our analysis reveals that exports of Chinese cotton-containing products to

the EU decreased by 8% at both the intensive and extensive margins as a consequence of the US Cotton Ban despite the EU has not imposed any sanctions. To examine the potential channel of the negative indirect effect, our findings suggest that reputational concerns among European companies offer the most plausible explanation for the observed export decline. Notably, the more pronounced impact on Chinese textile and garment exports, which are closer to end consumers, further supports the reputational concerns explanation.

Our study provides novel empirical evidence on the effectiveness of import sanctions aimed at humanitarian goals. While our findings indicate that the US Cotton Ban had negative impacts on the exports of targeted products, the paper also points to several areas for future research. First, although we examine the indirect effects of the Cotton Ban on Chinese exports to other countries, we do not explicitly analyze the potential trade diversion effects of the sanction. Second, we do not explore the potential consequences of the Cotton Ban for the sender country, the US. Specifically, the imposition of Cotton Ban could require significant adjustments to global value chains for American firms, which may result in both positive and negative economic outcomes.

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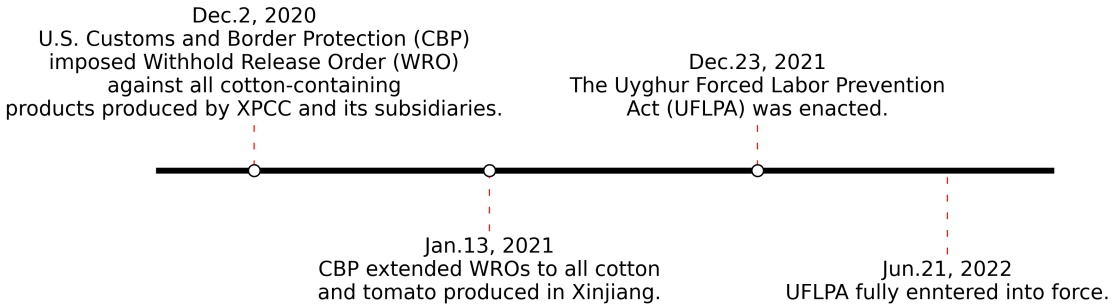
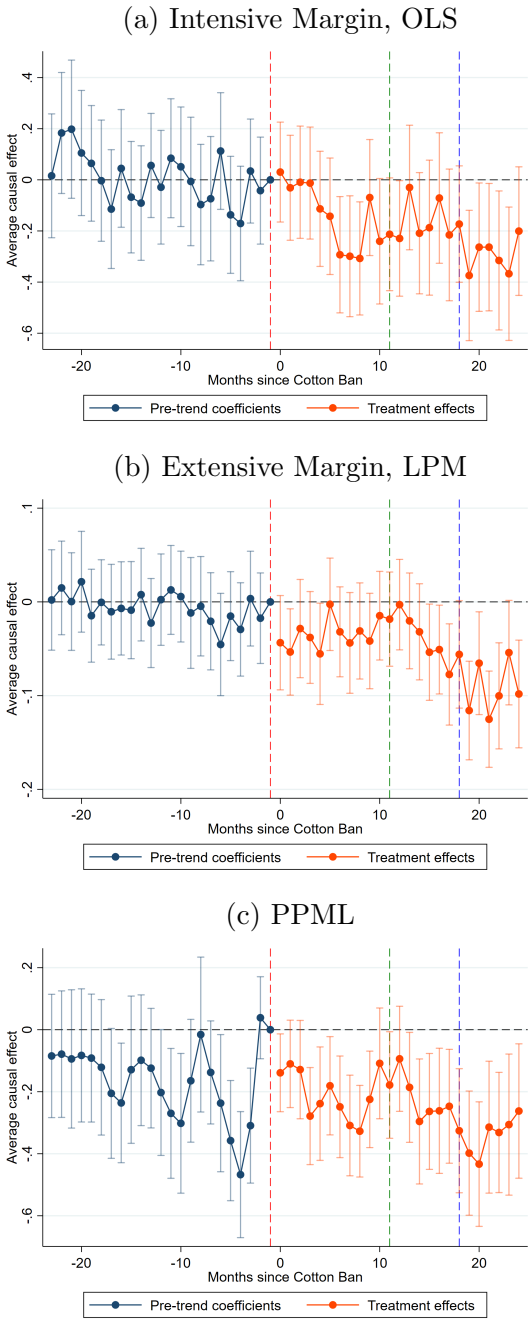
Figure

Fig. 1: Evolution of the region-wide cotton ban imposed by the US.



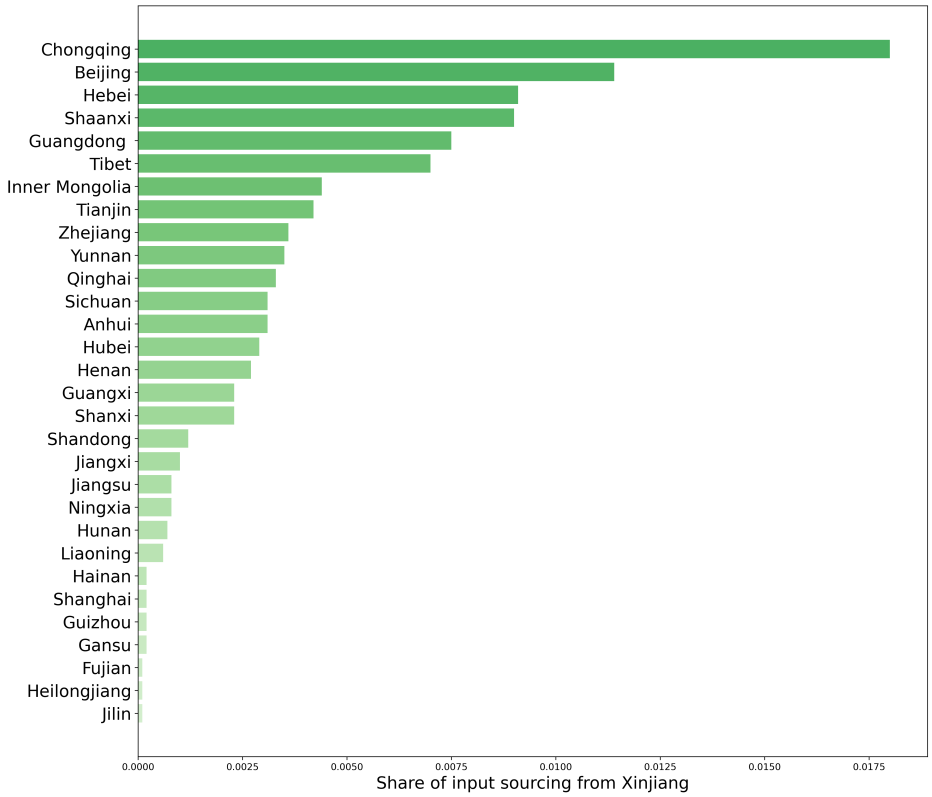
Notes: Compiled by authors based on information from the US Customs and Border Protection (2023) which is accessible at https://www.cbp.gov/trade/forced-labor/withhold-release-orders-and-findings).

Fig. 2: Direct impact: Event study estimates.



Notes: The figure illustrates the estimated coefficients for 47 individual interaction terms, along with their corresponding 95% confidence intervals, obtained by estimating equation (2). All regressions include product by destination fixed effects, product by time fixed effects, and destination by time fixed effects. Standard error are clustered at HS-6 digit product by destination level. Red, green, and blue vertical lines are positioned in November 2020, November 2021, and June 2022. All periods which are left to the red vertical line represent pre-sanction period. Baseline period is November 2020.

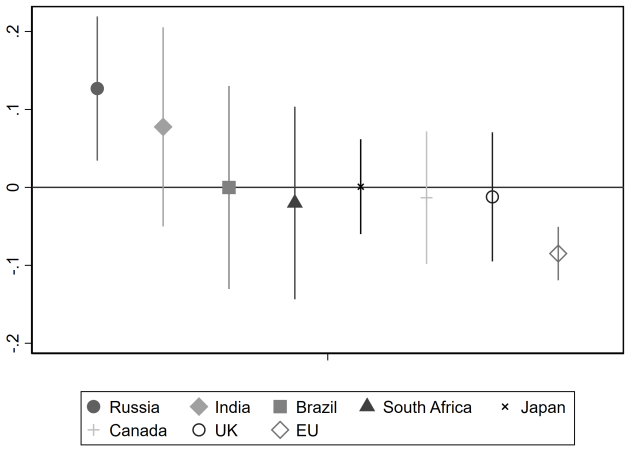
Fig. 3: Direct impact: Xinjiang's Share in Intermediate Input Used in Chinese provinces.



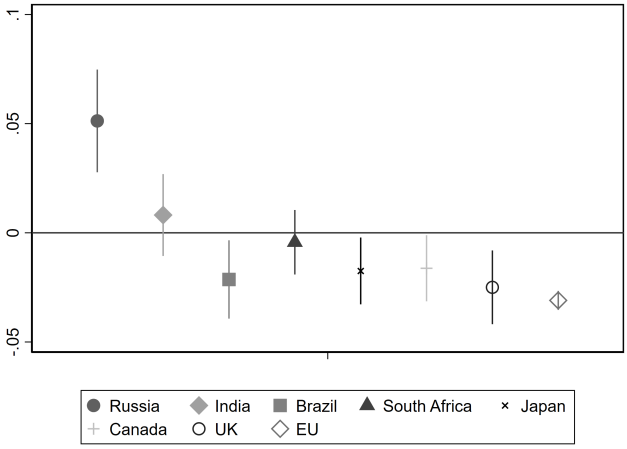
Notes: The figure illustrates Xinjiang's share in total intermediate input utilized in textile and garment products of each Chinese provinces in 2017, based on the interprovincial input-output table complied by Chen et al. (2023). We first compute the aggregate of agricultural, textile, and garment inputs sourced from Xinjiang that were used in the production of textile and garment products in each Chinese province. Then, we divide the value of Xinjiang's input by the total value of intermediate inputs used in textile and garment products for each Chinese province.

Fig. 4: Indirect impact by countries

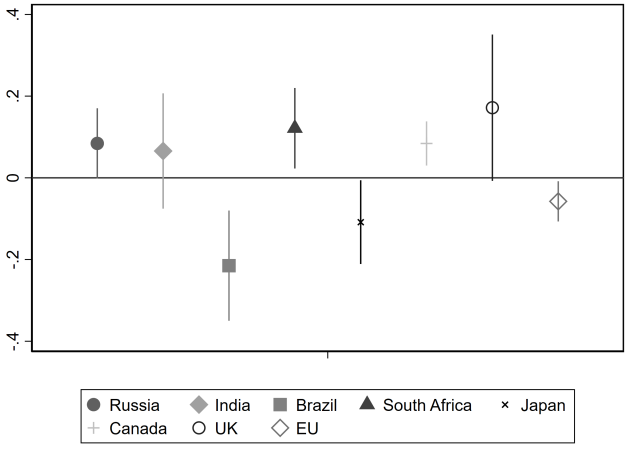
(a) Intensive Margin, OLS



(b) Extensive Margin, LPM

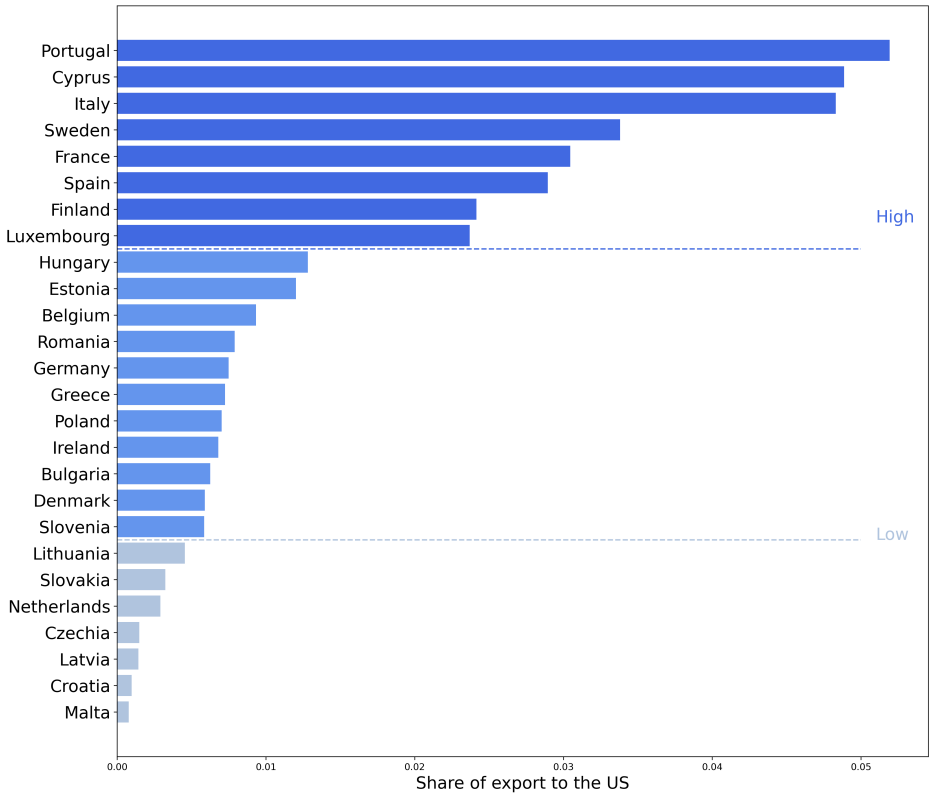


(c) PPML



Notes: The figure illustrates the estimated coefficients of $\beta^{Indirect}$ in equation 4, along with their 95% confidence intervals, for each of the destination. All regressions incorporate a three-way interaction term for the direct sanction effect and include a full set of fixed effects.

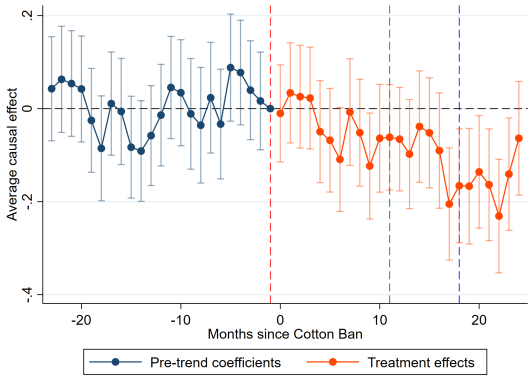
Fig. 5: Indirect impact: US's Share in Export of EU countries.



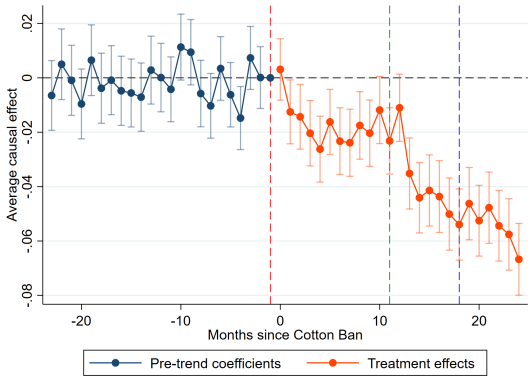
Notes: The figure illustrates the US's share in total export of cotton-containing textile and garment products of each EU countries between 2016 and 2017. We utilize the export flows data reported by each EU countries to the UN Comtrade. For each EU country (excluding Austria), we calculate the ratio by dividing the export value of cotton-containing textile and garment products to the United States by the total export value of the same products to the global market. Austria is excluded in our sample.

Fig. 6: Indirect impact: Event study estimates.

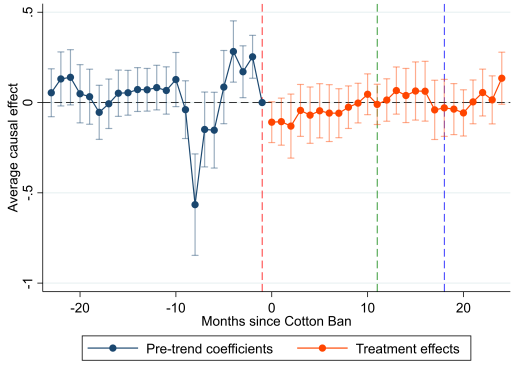
(a) Intensive Margin, OLS



(b) Extensive Margin, LPM

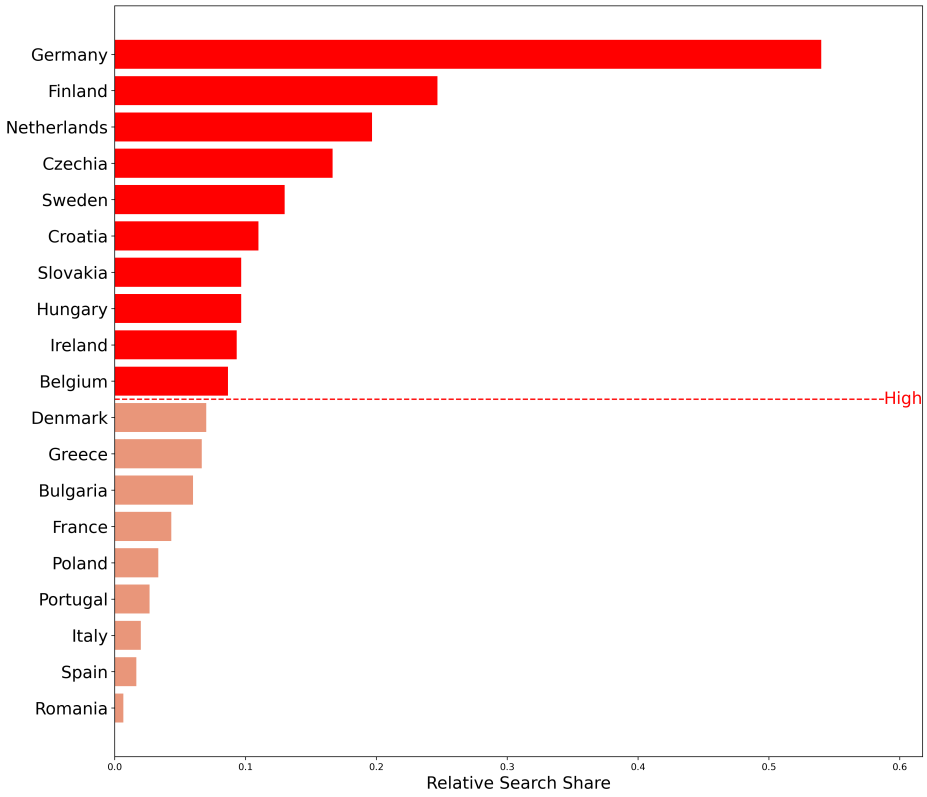


(c) PPML



Notes: The figure illustrates the estimated coefficients for 47 individual EU interaction term, along with their corresponding 95% confidence intervals, obtained by estimating equation (2). All regressions include product by destination fixed effects, product by time fixed effects, and destination by time fixed effects. Standard error are clustered at HS-6 digit product by destination level. Red, green, and blue vertical lines are positioned in November 2020, November 2021, and June 2022. All periods which are left to the red vertical line represent pre-sanction period. Baseline period is November 2020.

Fig. 7: Indirect impact: Relative Searching Intensity for Human Right Crises of EU countries.



Notes: The figure illustrates the relative search intensity for human right crises for each EU countries. We utilize the search intensity data provided by Google Trends. We choose three human right crises occurred in the 2010s. These crises are (1) the Yazidi genocide in 2014; (2) the Rohingya genocide in 2017; and (3) the Persecution of Uyghurs in 2019. We gather two-month relative search intensities around the peak global searches for each human rights crisis compared to a control topic, "Traffic", for each EU country. The search intensity for each crisis represents the share of search volume related to that human rights crisis compared to the combined search volume for both the crisis and "Traffic" topics. The value assigned to each EU country in this figure reflects the average of the search intensities for the three crises. Seven EU countries have been excluded due to being designated as low search volume regions by Google. Furthermore, Austria is not included in our sample.

Table

Table 1: Withhold release orders imposed by the US CBP against forced labours in Xinjiang before the announcement of region-wide Cotton Ban.

Announcement Date	Effective Date	Products	Targeted Entity
SEP 30, 2019	SEP 30, 2019	Garments	Hetian Taida Apparel Co., Ltd.
MAY 1, 2020	MAY 1, 2020	Hair	Hetian Haolin Hair Accessories Co., Ltd.
JUN 17, 2020	JUN 17, 2020	Hair	Lop County Meixin Hair Products Co., Ltd.
SEP 14, 2020	AUG 25. 2020	Hair	Lop County Hair Product Industrial Park
SEP 14, 2020	AUG 25. 2020	All	No. 4 Vocational Skills Education Training Center
SEP 14, 2020	SEP 3, 2020	Apparel	Yili Zhuowan Garment Manufacturing Co., Ltd.
SEP 14, 2020	SEP 3, 2020	Apparel	Baoding LYSZD Trade and Business Co., Ltd.
SEP 14, 2020	SEP 8, 2020	Cotton and Processed Cotton	Xinjiang Junggar Cotton and Linen Co., Ltd.
SEP 14, 2020	SEP 8, 2020	Computer Parts	Hefei Bitland Information Technology Co., Ltd.

Notes: The above information is obtained from the US Customs and Border Protection (2023) which is accessible at https://www.cbp.gov/trade/forced-labor/withhold-release-orders-and-findings.

Table 2: Summary statistics, as of 2019: US-Cotton Commodities *vs* EU-Cotton Commodities, the UNComtrade data *vs* All Control

	(1) US-Cotton			(2) EU-Cotton			(3) All Control		
	obs.	mean	sd	obs.	mean	sd	obs.	mean	sd
Panel A: ALL									
Export (USD 1,000)	2856	3535.62	15787.65	74256	127.83	982.68	951588	113.67	1247.55
Ln(Export)	2141	12.03	2.91	27629	9.62	2.93	350056	9.45	2.87
Export Dummy	2856	0.75	0.43	74256	0.37	0.48	951588	0.37	0.48
Panel B: Raw									
Export (USD 1,000)	60	0.59	1.85	1560	0.83	7.00	34452	8.86	189.35
Ln(Export)	11	7.61	1.09	238	6.14	2.29	1847	8.13	3.34
Export Dummy	60	0.18	0.39	1560	0.15	0.36	34452	0.05	0.23
Panel C: Yarn									
Export (USD 1,000)	588	12.55	66.88	15288	5.45	78.12	178200	47.85	506.85
Ln(Export)	145	9.32	1.73	1241	8.02	2.90	36500	9.37	2.91
Export Dummy	588	0.25	0.43	15288	0.08	0.27	178200	0.20	0.40
Panel D: Fabric									
Export (USD 1,000)	1512	236.75	866.69	39312	15.28	75.44	399168	89.08	1015.52
Ln(Export)	1293	10.64	1.90	11175	8.71	2.61	116328	9.73	2.78
Export Dummy	1512	0.86	0.35	39312	0.28	0.45	399168	0.29	0.45
Panel E: Apparel									
Export (USD 1,000)	564	15009.74	32243.52	14664	573.50	2144.08	55836	273.50	1828.35
Ln(Export)	560	15.28	1.74	12257	10.64	2.91	35388	9.59	2.97
Export Dummy	564	0.99	0.08	14664	0.84	0.37	55836	0.63	0.48
Panel F: Other Textile									
Export (USD 1,000)	132	9597.40	12824.23	3432	115.77	303.50	79596	124.88	795.88
Ln(Export)	132	15.14	1.53	2718	9.84	2.52	46655	9.21	2.80
Export Dummy	132	1.00	0.00	3432	0.79	0.41	79596	0.59	0.49

Notes: The EU encompasses all 26 member states, with the exception of Austria, which does not provide monthly trade flow data on UNComtrade. We follow and modify the method outlined in Carlson and Weaver (2022) to categorize the sample commodities into five different groups. All control includes: (1) all commodities imported by the destinations other than the US and the EU; (2) non-cotton containing commodities imported by the US and the EU.

Table 3: Summary statistics, as of 2019: US-Cotton Commodities *vs* EU-Cotton Commodities, China Customs data *vs* All Control

	(1) US-Cotton			(2) EU-Cotton			(3) All Control		
	obs.	mean	sd	obs.	mean	sd	obs.	mean	sd
Panel A: ALL									
Export (USD 1,000)	88164	128.37	1619.29	2292264	3.95	86.08	34929684	5.80	203.09
Ln(Export)	13904	10.46	2.96	70927	9.36	2.72	1130058	9.41	2.67
Export Dummy	88164	0.16	0.36	2292264	0.03	0.17	34929684	0.03	0.18
Panel B: Export from Xinjiang									
Export (USD 1,000)	2844	1.60	23.00	73944	0.19	10.47	1126764	4.65	275.59
Ln(Export)	31	10.61	2.47	183	9.48	2.16	7642	10.90	2.50
Export Dummy	2844	0.01	0.10	73944	0.00	0.05	1126764	0.01	0.08
Panel C: Export from "High" Chinese provinces									
Export (USD 1,000)	19908	141.30	2150.80	517608	4.16	114.41	7887348	3.70	137.31
Ln(Export)	2812	9.95	3.12	15464	8.46	3.26	239793	8.78	2.89
Export Dummy	19908	0.14	0.35	517608	0.03	0.17	7887348	0.03	0.17
Panel D: Export from "Low" Chinese provinces									
Export (USD 1,000)	68256	124.60	1427.46	1774656	3.89	75.85	27042336	6.41	218.57
Ln(Export)	11092	10.58	2.90	55463	9.60	2.50	890265	9.58	2.59
Export Dummy	68256	0.16	0.37	1774656	0.03	0.17	27042336	0.03	0.18

Notes: The EU encompasses all 26 member states, with the exception of Austria, which does not provide monthly trade flow data on UNComtrade. All control includes: (1) all commodities imported by the destinations other than the US and the EU; (2) non-cotton containing commodities imported by the US and the EU. We employ an interprovincial input–output table complied by Chen et al. (2023) to quantify the supply-chain linkages between Xinjiang and other Chinese provinces in 2017. Provinces with Xinjiang's input shares in their total intermediate input utilized for garment and textile products that above the 75th percentile of the distribution are considered as "High". Conversely, "Low" provinces have a share value that falls below the 75th percentile of the distribution.

Table 4: Direct impact of Cotton Ban

	(1)	(2)	(3)
	log(Exports)	Export Dummy	Export (PPML)
Ban^{US}	-0.188***	-0.044***	-0.087***
	(0.043)	(0.009)	(0.032)
Observations	1,666,206	4,844,448	3,024,448
Destination-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE		Product-Destination	

Notes: The table presents the estimation results for equation(1), with the unit of observation being product-destination-month. The sample period ranges from January 2019 to December 2022. Columns (1) and (2) show the results for the log of export flows and export dummy. In Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the US since the implementation of the region-wide cotton ban in December 2020. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table 5: Direct impact of Cotton Ban: Dynamic sanction impacts

	(1)	(2)	(3)
	log(Exports)	Export Dummy	Export (PPML)
$Ban^{US} \times first$	-0.148***	-0.028***	-0.043
	(0.044)	(0.008)	(0.037)
$Ban^{US} \times second$	-0.164***	-0.036***	-0.075*
	(0.059)	(0.012)	(0.042)
$Ban^{US} \times UFLPA$	-0.303***	-0.087***	-0.188***
	(0.064)	(0.015)	(0.043)
Observations	1,666,206	4,844,448	3,024,448
Destination-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE	Product-Province-Destination		

Notes: The table presents the estimation results for dynamic impacts of cotton ban, with the unit of observation being product-destination-month. The sample period ranges from January 2019 to December 2022. For Chinese exports to the US, we incorporate three sets of interaction terms that represent various time periods since the implementation of the region-wide cotton ban on the export to the US. Firstly, $first$ represents the period between December 2020 and November 2021, corresponding to the first year of the cotton ban. Secondly, *second* represents the period between December 2021 and June 2022. Lastly, $UFLPA$ stands for the period after the implementation of UFLPA from July 2022 onward. Columns (1) and (2) show the results for the log of export flows and export dummy. Column (3) present the estimation results for export flows in level using the PPML estimator. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table 6: Direct impact of Cotton Ban: Distribution of impact of Cotton Ban across Chinese provinces

	(1) log(Exports)	(2) Export Dummy	(3) Export (PPML)
Ban^{US-XJ}	-2.576***	-0.136***	-4.720***
	(0.352)	(0.009)	(0.583)
Ban^{US-Q4}	-0.291***	-0.033***	-0.340***
	(0.075)	(0.004)	(0.086)
Ban^{US-Q3}	-0.179***	0.009*	0.191**
	(0.052)	(0.005)	(0.079)
Ban^{US-Q2}	-0.027	0.026***	0.177***
	(0.071)	(0.005)	(0.063)
Ban^{US-Q1}	0.038	-0.042***	0.010
	(0.073)	(0.003)	(0.122)
Observations	4,982,841	149,240,448	49,673,921
Product-Province-Destination FE	Yes	Yes	Yes
Product-Province-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE	Product-Province-Destination		

Notes: The table presents the estimation results for equation(3), with the unit of observation being product-province-destination-month. The sample period ranges from January 2019 to December 2022. Dependent variables, as shown in the column headers, are the logarithm of export flow (in Column (1)), the export dummy (in Column (2)) and export flow in level (in Column (3)). There are two sets of interaction terms. First, Ban^{US-XJ} takes value of 1 if a commodity contained cotton and was exported from Xinjiang to the US since December 2020. Second, Ban^{US-QK} equals 1 when a cotton-containing product was exported from a Chinese province, which had a share value of Xinjiang's input (1) below the 25th percentile, (2) equal to or above the 25th and but below the 50th percentile, (3) equal to or above the 50th but below the 75th percentile, or (4) equal to or above the 75th percentile values of Chinese provinces to the US since December 2020. All model specifications include product by province by destination fixed effects, product by province by month fixed effects and destination by month fixed effects. Standard error, clustered at HS-6 digit product by province by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table 7: Indirect impact of Cotton Ban: Chinese exports to the EU

	(1)	(2)	(3)
	log(Exports)	Export Dummy	Export (PPML)
Ban^{US}	-0.214***	-0.051***	-0.107***
	(0.044)	(0.009)	(0.036)
Ban^{EU}	-0.085***	-0.031***	-0.058*
	(0.021)	(0.003)	(0.030)
Observations	1,666,206	4,844,448	3,024,448
Destination-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE		Product-Destination	

Notes: The table presents the estimation results for equation 4, with the unit of observation being product-destination-month. We examine the indirect effect of sanction on Chinese export of cotton-containing products to the EU countries. Ban^{EU} equals 1 if a commodity contained cotton and was exported from China to the EU since December 2020. The EU is represented by all 26 member states, except Austria. The UK is not include in the EU. The sample period ranges from January 2019 to December 2022. Columns (1) and (2) show the results for the log of export flows and export dummy.Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the US since the implementation of the region-wide cotton ban in December 2020. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table 8: Indirect impact of Cotton Ban: Decrease in market power

	(1)	(2)	(3)
	log(Exports)	log(Price)	log(Quantity)
Ban^{US}	-0.214***	0.040	-0.241***
	(0.044)	(0.025)	(0.055)
Ban^{EU}	-0.085***	0.009	-0.092***
	(0.021)	(0.011)	(0.025)
Observations	1,666,206	1,619,184	1,619,185
Destination-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE	Product-Destination		

Notes: The table presents the estimation results for equation 4, with the unit of observation being product-destination-month. We examine the indirect effect of sanction on Chinese export of cotton-containing products to the EU countries. Ban^{EU} equals 1 if a commodity contained cotton and was exported from China to the EU since December 2020. The EU is represented by all 26 member states, except Austria. The UK is not include in the EU. The sample period ranges from January 2019 to December 2022. Columns (1) show the results for the log of export flows . In Columns (2) and (3), the estimation results are for the log of export price and log of export quantity. All these regressions are estimated with OLS estimator. Ban^{EU} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the EU since the implementation of the region-wide cotton ban in December 2020. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table 9: Indirect impact of Cotton Ban: Reexport consideration

	(1)	(2)	(3)
	log(Exports)	Export Dummy	Export (PPML)
Ban^{US}	-0.213***	-0.051***	-0.107***
	(0.044)	(0.009)	(0.036)
Ban^{EU}	-0.137***	-0.031***	-0.071**
	(0.025)	(0.003)	(0.033)
$Ban^{EU-High-US\ Exp}$	0.163***	0.001	0.041
	(0.036)	(0.005)	(0.037)
Observations	1,666,206	4,844,448	3,024,448
Destination-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE		Product-Destination	

Notes: The table presents the estimation results for reexport explanation for indirect impact, with the unit of observation being product-destination-month. We classify an EU country as "High" if its value of US's share in total exports of a specific type of cotton-containing product between 2016 and 2017 exceeds the 75th percentile value of all EU countries. $Ban^{EU-High}$ equals to one if a cotton-containing product and was exported from China to a "High" EU country since December 2020. The sample period ranges from January 2019 to December 2022. Columns (1) show the results for the log of export flows . In Columns (2) and (3), the estimation results are for the log of export price and log of export quantity. All these regressions are estimated with OLS estimator. Ban^{EU} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the EU since the implementation of the region-wide Cotton Ban in December 2020. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table 10: Indirect impact of Cotton Ban: Reputational considerations

	(1)	(2)	(3)
	log(Exports)	Export Dummy	Export (PPML)
Ban^{US}	-0.214***	-0.051***	-0.108***
	(0.044)	(0.009)	(0.036)
Ban^{EU}	-0.032	-0.035***	-0.030
	(0.025)	(0.003)	(0.035)
$Ban^{EU-High-Search}$	-0.135***	0.013**	-0.055
	(0.037)	(0.005)	(0.036)
Observations	1,666,206	4,844,448	3,024,448
Destination-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE		Product-Destination	

Notes: The table presents the estimation results for profitability and reputational damage explanation for indirect impact, with the unit of observation being product-destination-month. We add additional interaction term, $Ban^{EU-High-Search}$, to equation (4). We classify an EU country as "High" if its relative search intensity for human right crises exceeds the 50th percentile value of the EU countries. $Ban^{EU-High-Search}$ equals to 1 if a cotton-containing product was exported from China to a "High" EU country since December 2020. The sample period ranges from January 2019 to December 2022. Columns (1) and (2) show the results for the log of export flows and export dummy. All these regressions are estimated with OLS estimator. Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the US since the implementation of the region-wide Cotton Ban in December 2020. Additionally, another interaction term, Ban^{EU}, equals to 1 if a commodity contained cotton and was exported from China to the EU since December 2020. The EU is represented by all 26 member states, except Austria. The UK is not include in the EU. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table 11: Indirect impact of Cotton Ban: Heterogeneous effects, by product type

	(1) log(Exports)	(2) Export Dummy	(3) Export (PPML)
Panel A: Raw			
Ban^{US}	-0.277	-0.163***	-2.263***
	(0.552)	(0.058)	(0.815)
Ban^{EU}	0.223	0.055***	0.721**
	(0.431)	(0.017)	(0.328)
Observations	8,220	175,392	39,006
Panel B: Yarn			
Ban^{US}	0.118	-0.038	-0.003
	(0.155)	(0.024)	(0.175)
Ban^{EU}	0.051	-0.047***	0.036
	(0.100)	(0.005)	(0.102)
Observations	169,341	907,200	423,797
Panel C: Fabric			
Ban^{US}	-0.234***	-0.063***	-0.164
	(0.068)	(0.0132)	(0.110)
Ban^{EU}	-0.093**	-0.033***	0.078
	(0.038)	(0.004)	(0.049)
Observations	551,367	2,032,128	1,225,454
Panel D: Apparel			
Ban^{US}	-0.210***	0.011	-0.127***
	(0.057)	(0.009)	(0.039)
Ban^{EU}	-0.127***	0.007	-0.096***
	(0.023)	(0.005)	(0.028)
Observations	701,876	1,276,128	984,623
Panel E: Other Textile			
Ban^{US}	-0.0843	0.0166	-0.159***
	(0.106)	(0.014)	(0.049)
Ban^{EU}	-0.006	0.039***	-0.137***
	(0.057)	(0.010)	(0.049)
Observations	218,046	405,216	311,111
Product-Destination FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE		Product-Destination	

Notes: The table presents the estimation results for heterogeneous sanction effects on different types of products, with the unit of observation being product-destination-month. We follow and modify the method outlined in Carlson and Weaver (2022) to categorize the sample commodities into five different categories. For comparison, we display the baseline estimation results, as depicted in Table (7), in panel A. Panel B displays the estimation results for raw materials. Panel C and D display the estimation results for yarn and fabric products. Lastly, in panel E and F, we show the estimation results for apparel and other textile products. The sample period ranges from January 2019 to December 2022. Columns (1) and (2) show the results for the log of export flows and export dummy. All these regressions are estimated with OLS estimator. Column (3) present the estimation results for export flows in level using the PPML estimator. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively. .

Appendix A Sample of Commodities

Table A.1: Commodities, by Type

HS 2-digit	Description	Raw	Yarn	Fabrics	Apparel	Other Textils
50	Silk	3	2	4	0	0
51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric	12	15	11	0	0
52	Cotton	5 (5)	49 (49)	70 (70)	0	0
53	Vegetable textile fibres; paper yarn and woven fabrics of paper yarn	9	7	7	0	0
54	Man-made filaments	0	36	34 (3)	0	0
55	Man-made staple fibres	0	24	84 (31)	0	0
56	Wadding, felt and nonwovens, special yarns; twine, cordage, ropes and cables and articles thereof	0	14	17 (1)	0	0
57	Carpets and other textile floor coverings	0	0	0	0	23
58	Fabrics; special woven fabrics, tufted textile fabrics, lace, tapestries, trimmings, embroidery	0	0	37 (9)	0	0
59	Textile fabrics; impregnated, coated, covered or laminated; textile articles of a kind suitable for industrial use	0	0	24	0	0
60	Fabrics; knitted or crocheted	0	0	44 (12)	0	0
61	Apparel and clothing accessories; knitted or crocheted	0	0	0	106 (25)	0
62	Apparel and clothing accessories; not knitted or crocheted	0	0	0	104 (22)	0
63	Textiles, made up articles; sets; worn clothing and worn textile articles; rags	0	3	4	1	47 (11)
65	Headgear and parts thereof	0	0	0	0	8
TOTAL		29(5)	150 (49)	336 (126)	211 (47)	78 (11)

Notes: The above information is obtained from the World Integrated Trade Solution (WITS) of the World Bank (2024) which is accessible at https://wits.worldbank.org/trade/country-byhs6product.aspx?lang=en. Based on the method outlined in Carlson and Weaver (2022), we categorize 801 commodities at the HS 6-digit level into five groups following . Numbers of cotton-containing commodities are displayed in parentheses. Moreover, three control commodities in 63 are classified as both *Yarn* and *Fabrics*.

Appendix B Interprovincial Input-Output Table in China

We calculate the supply chain linkage between Chinese provinces and Xinjiang by using the input-output table complied by Chen et al. (2023). This table provides data about the inter-provincial supply chain linkages among 42 industrial sectors in China. It utilizes a trade matrix derived from Chinese VAT invoices data to calibrate the multi-regional input-output table provided by the Development Research Center of the State Council.

Due to the prohibition of cotton-containing products made with Xinjiang cotton from entering the US, we consider the products in the sectors of 'Manufacture of Textiles' and 'Manufacture of Textile Wearing Apparel, Footwear, Leather, Fur, Feather and Its Products' produced in each Chinese province using Xinjiang's inputs from the sectors of (1) 'Farming, Forestry, Animal Production and Fishery', (2) 'Manufacture of Textiles', and (3) 'Manufacture of Textile Wearing Apparel, Footwear, Leather, Fur, Feather and Its Products' to be the targeted products.

For each Chinese province, we begin by calculating Xinjiang's inputs from the above-mentioned sectors used in its production of textile and garment outputs in 2017. Then, a share value for each Chinese province is derived by dividing the value of Xinjiang's inputs by the corresponding total intermediate input used in textile and garment outputs. Finally, we rank all Chinese provinces based on their share values and categorize them into four groups.

It is important to note that these broadly defined categories may encompass non-cotton-containing inputs from Xinjiang and textile and garment output produced in Chinese provinces but without Xinjiang cotton content.

Table B.2: Use of Xinjiang cotton-related resources, by category

	(1)	(2)	(3)	(4)	(5)	(6)
	Intermediate Usage		Domestic Consumption		Exports	Total
(in millions, RMB)	Xinjiang	Others	Xinjiang	Others		
Xinjiang Agricultural	96528	70531	47999	74140	2764	291962
	(33%)	(24%)	(16%)	(25%)	(1%)	(100%)
Xinjiang Cotton	20657	15094	10272	15866	592	62480
Xinjiang Textile	6547	19747	1105	1078	10506	38983
	(17%)	(51%)	(3%)	(3%)	(27%)	(100%)
Xinjiang Garment	249	0.3	1152	0.2	3820	5222
	(5%)	(0%)	(22%)	(0%)	(73%)	(100%)

Notes: We use the China interprovincial input–output (IPIO) database 2017 provided by Chen et al. (2023) to construct this table. In Column (1) - (5), Xinjiang's aggregate shares refer to the shares of commodity i originating from Xinjiang used as intermediate materials, domestic consumption (consumption + investment), and domestic export. In Row(3), we multiply the statistics in Row(1) by 0.214 to obtain the estimated statistics for 'Xinjiang Cotton'.

Appendix C Google Trends Data

Google provides a measure of the search activity level related to a specific keyword within a particular country and defined timeframe. This measure, however, does not represent the absolute search volume for the keyword. Instead, Google employs a two-step normalization process to convert the raw search volume. First, the daily search volume for the keyword is adjusted relative to the total daily search volume for all topics in the country. Secondly, the normalized daily search volume is further adjusted by the maximum daily search volume within the same search period. The resulting search intensity for a keyword falls within the range of 0 to 100, where a value of 100 represents the maximum or peak of daily search intensity in the defined timeframe.

In two keywords case, Google applies a similar normalization approach, with the distinction that the normalized daily search volume for a keyword is now normalized by the maximum daily search intensity between the two keywords within the same timeframe. Therefore, if the peak of keyword A exceeds that of keyword B, the resulting relative search intensity for A remains equivalent to the single keyword case. Conversely, the resulting relative search intensity for A reflects the relative prevalence of A compared to the peak of keyword B.

Furthermore, Google offers an alternative measure of relative prevalence for a keyword. Specifically, Google ranks different countries based on the share of a keyword's search volume to the total search volume of all topics within the respective country and defined timeframe. A country with a value of 100 represents the location where a keyword has the highest likelihood of being searched in comparison to other countries. In the case of two keywords, the resulting share represents the prevalence of a keyword in relation to the search volume of another keyword within a specific country and timeframe. Google excludes several countries/regions by default in calculating the shares due to low search volume.

In this study, we collected data on the relative search intensity related to various human rights crises. It is preferred to input each incident as a topic or an event, rather than as a search term in Google Trends. This approach facilitates capturing the impact of all relevant search terms, as opposed to a single search term. Additionally, "Traffic (Topic)" is selected as a control search topic for all EU countries. However, it is important to note that the choice of control topic may not be inconsequential.

The table below represents the five human rights crises for which we gathered relative search intensity data. In Table 10, we calculate an index for each EU country by averaging the 2-month relative search share (against "Traffic") of "Yazidi genocide", "Rohingya genocide", and "Persecution of Uyghurs in China". Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, and Slovenia are excluded from calculating the index because they had low volumes for all three crises.

In table D.9, we employ alternative approach to compute search intensity index for each EU country. These alternative measures are: (1) average of 2-month relative search share of the same three crises but including low-volume countries; (2) average of 2-month relative search share of the all five crises excluding 10 low-volume countries; and (3) average of 2-month relative search share of the all five crises including 10-low volume countries.

Table C.3: Google search intensity for human right crises

Episode	Keyword	Global Peak	1-month	2-month
Boko Haram	Boko Haram (Topic)	May 12, 2014	Apr 27, 2014 - May 27, 2014	Apr 13, 2014 – June 11, 2004
Yazidi genocide	Yazidis (People)	Aug 10, 2014	July 26, 2014 - Aug 25, 2014	July 12, 2014 – Sep 9, 2014
Rohingya genocide	Rohingya people (Ethnic group)	Sep 6, 2017	Aug 22, 2017 – Sep 21, 2017	Aug 8, 2017 – Oct 6, 2017
2019 Turkish offensive into north-eastern Syria	Kurds (Ethnic group)	Oct 10, 2019	Aug 22, 2017 – Oct 25, 2019	Aug 8, 2017 – Nov 9, 2019
Persecution of Uyghurs in China	Uyghurs (Ethnic group)	Dec 22, 2019	Dec 7, 2019 – Jan 6, 2020	Nov 23, 2019 – Jan 21, 2020

Notes: The above information is obtained from the Google Trends.

Appendix D Additional Estimation Results

Table D.4: Direct impact of Cotton Ban: Price *versus* quantity

	(1) log(Price)	(2) log(Quantity)
Ban^{US}	0.037	-0.213***
	(0.024)	(0.054)
Observations	1,619,184	1,619,185
Destination-Product FE	Yes	Yes
Product-Month FE	Yes	Yes
Destination-Month FE	Yes	Yes
Clustered SE	Product-Destination	

Notes: The table presents the estimation results for equation(1) with the dependent variables are log of price and quantity. The sample period ranges from January 2019 to December 2022. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the US since the implementation of the region-wide cotton ban in December 2020. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table D.5: Direct impact of Cotton Ban: Product-origin-month data

	(1)	(2)	(3)
	log(Exports)	Export Dummy	Export (PPML)
Ban^{China}	-0.333***	-0.036***	-0.0298
	(0.0561)	(0.00)	(0.0475)
$Ban^{Origin\ Q4}$	-0.036	-0.006***	0.057
	(0.044)	(0.002)	(0.044)
$Ban^{Origin\ Q3}$	-0.081*	-0.004***	0.104**
	(0.046)	(0.001)	(0.048)
$Ban^{Origin\ Q2}$	0.039	-0.000	0.229***
	(0.052)	(0.001)	(0.062)
$Ban^{Origin\ Q1}$	-0.092	0.000	0.0747
	(0.099)	(0.000)	(0.219)
Observations	611,454	7,814,016	1,634,293
Origin-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Origin-Month FE	Yes	Yes	Yes
Clustered SE		Product-Origin	

Notes: The table presents the estimation results for equation(1), with the unit of observation being product-origin-month. The sample period ranges from January 2019 to December 2022. Columns (1) and (2) show the results for the log of export flows and export dummy. In Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{China} is a triple interaction term taking value of 1 if a commodity contained cotton and was imported from China by the US since the implementation of the region-wide cotton ban in December 2020. We divide all origin countries, excluding China, into four quartiles based on each country's share of Chinese cotton product imports. The variable $Ban^{Origin\ Qk}$ is a triple interaction term that equals 1 if a cotton-containing commodity was imported by the U.S. after the implementation of the Cotton Ban from an origin country classified in the k-th quartile. All regressions include product by origin fixed effects, product by month fixed effects, and origin by month fixed effects. Standard errors, clustered at product by origin level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table D.6: Direct impact of Cotton Ban: Additional results with China Customs data

	(1) log(Export)	(2) Dummy	(3) Export (PPML)
Panel A: Triple differences, four dimensional panel dataset			
Ban^{US}	-0.121***	-0.015***	-0.003
	(0.042)	(0.002)	(0.039)
Observations	4,982,841	149,240,448	49,673,921
Product-Province-Destination FE	Yes	Yes	Yes
Product-Province-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE	Product-Province-Destination		
Panel B: Triple differences, Aggregated of all provinces			
Ban^{US}	-0.291***	-0.002	-0.003
	(0.061)	(0.010)	(0.039)
Observations	1,476,918	4,814,208	3,130,298
Product-Destination FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE	Product-Destination		

Notes: The table presents the additional results using China Customs data. In panel A, we estimate the average direct effect of the US Cotton Ban on the export of all Chinese sanctioned products. Regressions include product by province by destination fixed effects, product by province by month fixed effects and destination by month fixed effects. Standard error are clustered at HS-6 digit product by province by destination level. In panel B, we construct a three-dimensional balanced dateset by aggregating the export flows of all Chinese provinces from the China Customs data. Regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors are clustered at product by destination level. The sample period ranges from January 2019 to December 2022. Columns (1) and (2) show the results for the log of export flows and export dummy. In Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was imported from China by the US since the implementation of the region-wide cotton ban in December 2020. Clustered standard errors are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table D.7: Direct and indirect effects: Sensitivity tests I

	(1) log(Exports)	(2) Export Dummy	(3) (PPML)	(4) log(Price)	(5) log(Quantity)
Panel A: All control products, 4,880 control products					
Ban^{US}	-0.211***	-0.046***	-0.094***	0.043**	-0.252***
	(0.038)	(0.008)	(0.031)	(0.021)	(0.048)
Ban^{EU}	-0.098***	-0.012***	-0.091	0.019*	-0.113***
	(0.019)	(0.002)	(0.023)	(0.010)	(0.023)
Observations	9,526,580	30,953,664	17,077,148	9,099,696	9,099,709
Panel B: Reduced control products, 460 control products					
Ban^{US}	-0.215***	-0.040***	-0.084***	0.021	-0.232***
	(0.047)	(0.009)	(0.030)	(0.026)	(0.058)
Ban^{EU}	-0.046**	-0.020***	-0.063***	0.002	-0.052*
	(0.022)	(0.003)	(0.022)	(0.012)	(0.027)
Observations	1,264,978	4,221,504	2,542,597	1,253,515	1,253,516
Panel C: Reduced destinations					
Ban^{US}	-0.209***	-0.033***	-0.105***	0.045*	-0.242***
	(0.044)	(0.008)	(0.037)	(0.025)	(0.055)
Ban^{EU}	-0.080***	-0.014***	-0.056*	0.013	-0.091***
	(0.021)	(0.003)	(0.031)	(0.012)	(0.026)
Observations	1,474,464	3,652,560	2,645,562	1,430,767	1,430,768
Product-Destination FE	Yes	Yes	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes	Yes	Yes
Clustered SE	Product-Destination				

Notes: The table presents the estimation results for various specifications of equation (4), with the unit of observation being product-destination-month. In panel A, we included all commodities with zero cotton content as our control commodities, totaling 4,880. In panel B, we exclude the control commodities that Xinjiang exported to the US in 2019. In panel C, we define a reduced set of destination countries. These 95 countries reported positive export flows of textile and garment products from China in 2022. Outcome variables in columns (1), (2), (4), and (5) are log of export flows, export dummy, log of export price and log of export quantity respectively. All these regressions are estimated with OLS estimator. Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the US since the implementation of the region-wide cotton ban in December 2020. Additionally, another interaction term, Ban^{EU}, equals to 1 if a commodity contained cotton and was exported from China to the EU since December 2020. The EU is represented by all 26 member states, except Austria. The UK is not include in the EU. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table D.8: Direct and indirect effects: Sensitivity tests II

	(1) log(Exports)	(2) Export Dummy	(3) (PPML)	(4) log(Price)	(5) log(Quantity)
Panel A: Combined EU					
Ban^{US}	-0.226***	-0.051***	-0.108***	0.040	-0.250***
	(0.044)	(0.009)	(0.036)	(0.025)	(0.056)
Ban^{EU}	-0.079*	-0.014*	0.008	0.051***	-0.132***
	(0.040)	(0.008)	(0.035)	(0.020)	(0.047)
Observations	1,219,127	3,883,248	2,249,513	1,173,793	1,173,795
Panel B: Alternative definition of targeted products					
Ban^{US}	-0.195***	-0.052***	-0.106***	0.020	-0.199***
	(0.048)	(0.010)	(0.039)	(0.028)	(0.060)
Ban^{EU}	-0.089***	-0.032***	-0.057*	0.005	-0.093***
	(0.023)	(0.003)	(0.031)	(0.013)	(0.027)
Observations	1,580,346	4,542,048	2,841,401	1,535,079	1,535,080
Panel C: Inverse hyperbolic sine transformation					
Ban^{US}	-0.706***			0.033	-0.452***
	(0.096)			(0.023)	(0.127)
Ban^{EU}	-0.328***			0.010	-0.213***
	(0.025)			(0.009)	(0.020)
Observations	4,844,448			1,619,185	4,844,448
Product-Destination FE	Yes	Yes	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes	Yes	Yes
Clustered SE	Product-Destination				

Notes: The table presents the estimation results for various specifications of equation (4), with the unit of observation being product-destination-month.In panel A, we only include the EU, which is combined by all member states (excluding the UK), in the sample. All individual EU member states are omitted. In panel B, we adopt the definition used in Carlson and Weaver (2022) to construct a set of targeted products. In panel C, we apply inverse hyperbolic sine transformation to export flow, export price, and log of export quantity and treat them as outcome variables. The sample period ranges from January 2019 to December 2022. Except in Panel C, outcome variables in columns (1), (2), (4), and (5) are log of export flows, export dummy, log of export price and log of export quantity respectively. All these regressions are estimated with OLS estimator. Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the US since the implementation of the region-wide cotton ban in December 2020. Additionally, another interaction term, Ban^{EU}, equals to 1 if a commodity contained cotton and was exported from China to the EU since December 2020. The EU is represented by all 26 member states, except Austria. The UK is not include in the EU. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.

Table D.9: Reputational considerations: Alternative measure of search index

	(1) log(Exports)	(2) Export Dummy	(3) (PPML)
Ban^{US}	-0.214***	-0.051***	-0.108***
	(0.044)	(0.009)	(0.036)
Ban^{EU}	-0.043*	-0.034***	-0.030
	(0.024)	(0.003)	(0.035)
$Ban^{EU-High-Search}$	-0.103***	0.007	-0.055
	(0.037)	(0.005)	(0.036)
Observations	1,666,206	4,844,448	3,024,448
Destination-Product FE	Yes	Yes	Yes
Product-Month FE	Yes	Yes	Yes
Destination-Month FE	Yes	Yes	Yes
Clustered SE	Product-Destination		

Notes: The table presents the estimation results for profitability and reputational damage explanation for indirect impact, with the unit of observation being product-destination-month. In this robustness check, we construct an index for each EU country with 5 crises excluding low volume countries. We add additional interaction term, $Ban^{EU-High-Search}$, to equation (4). We classify a EU country as "High" if its relative search intensity for human right crises exceeds the 50th percentile value of the EU countries. $Ban^{EU-High-Search}$ equals to one if a cotton-containing product and was exported from China to a 'High' EU country since December 2020. The sample period ranges from January 2019 to December 2022. Columns (1) and (2) show the results for the log of export flows and export dummy. In Columns (4) and (5), the estimation results are for the log of export price and the log of export quantity. All these regressions are estimated with OLS estimator. Column (3) present the estimation results for export flows in level using the PPML estimator. Ban^{US} is a triple interaction term taking value of 1 if a commodity contained cotton and was exported from China to the US since the implementation of the region-wide cotton ban in December 2020. Additionally, another interaction term, Ban^{EU}, equals to 1 if a commodity contained cotton and was exported from China to the EU since December 2020. The EU is represented by all 26 member states, except Austria. The UK is not include in the EU. All regressions include product by destination fixed effects, product by month fixed effects, and destination by month fixed effects. Standard errors, clustered at product by destination level, are reported in parentheses with ***, **, and * represent significance at the 1%, 5%, and 10% level, respectively.