

When China Strikes: Quantifying Australian Agricultural Companies' Stock Price Responses to China's Trade Restrictions

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Abstract

As of late 2019, China is Australia's largest trading partner and Australia is China's sixth-largest trading partner in terms of both imports and exports. Since early 2020, however, China and Australia have been in a quasi "tit-for-tat" trade war, leaving both countries suffering economic consequences, particularly under the COVID-19 pandemic. Leveraging data on daily stock returns from 14 publicly listed Australian firms across wine, barley, beef, timber, and coal, we provide the first systematic analysis of firm-level economic impacts of China's trade restrictions on Australian firms. We find the trade tension resulted in significant adverse effects on Australian firms' stock returns, leading to less than 20% loss within 10 trading days; however, most firms' stock returns immediately rebounded. Reaction to the first restriction announcement is usually more significant than the following announcements because it provides more unanticipated information. We also show that media coverage and trade dependence substantially impact Australian firms' stock returns. Our results suggest greater losses in Australian firms' stock returns for those in industries with stronger trade dependence on China. Furthermore, exports of barley, coal, and especially iron ore, to the rest of the world compensate for Australia's loss in wine, beef, and timber exports to China.

Keywords: Stock Markets; Abnormal Returns; Event Study; International Trade; Trade Tension

JEL Codes : Q13, Q17

1 Introduction

Since the 1990s, China and Australia have had a mutually profitable economic partnership under which China became Australia's largest international trade partner. In 2019, Australia's imports from China totaled US \$150 billion, accounting for one-third of Australia's total goods and services exports (Australian Bureau of Statistics, 2020). Australia exports around two-thirds of its agricultural products, and China is Australia's top agricultural export customer. Australian products increasingly appeal to China's growing middle class and their demand for commodities like wine and beef has helped drive Australia's economic prosperity. China-Australia relations, however, began to sour in 2018 when Australia banned Huawei's 5G network and further worsened in 2020 after Australia proposed independent international investigations on the origins of COVID-19 (BBC, 2018; ABC, 2020b). In 2020, China imposed restrictions on Australian imports such as beef, barley, timber, and wine.

Recent studies document that unraveling the bilateral relationship might also induce significant adverse effects on financial markets (Sriananthakumar and Narayan, 2015; Liu, 2020; Gong et al., 2020; Shi et al., 2021; He et al., 2021). However, the existing literature has not formally tested the firm-level economic effect of the trade tension, leaving this vital question unanswered. China's trade restrictions could negatively impact Australian firms' stock prices because they cannot sell products to their largest potential market. Public concerns about the performances of Australian agricultural companies could transform into negative stock price expectations, inducing panic sell-off and leading to stock price crashes.

This article examines the impact of China's trade restrictions on Australian agricultural companies from January 2020 to July 2021 by employing a well-established event study method (Fama et al., 1969; O'hara and Shaw, 1990; Aitken and Swan, 2010; Black and Kim, 2012). We use an autoregressive distributed lag specification (ARDL) of the market model to accommodate serial correlation and dynamic stock market performance (Pozo and Schroeder, 2016; Xiong et al., 2021). We focus on 14 publicly traded Australian firms specializing in

the production of beef, barley, timber, and wine, which we select because China official banned those products and Australia's markets rely heavily on exports to China (Reuters, 2020). Additionally, we use coal as an energy commodity for comparison (Reserve Bank of Australia, 2019).

China restricted imports of Australian beef on May 11, 2020, and officially recognized Australia as dumping wine on March 26, 2021. Thus, our sample period is from January 2020 to July 2021. We calculate abnormal returns (ARs) and cumulative abnormal returns (CARs) of the 14 selected firms' stock prices to measure the impact of China's trade restrictions on Australian stock markets. We further estimate a pooled ordinary least squares (OLS) model to quantify how China's trade restriction details and firm characteristics explain the magnitude of ARs (Pozo and Schroeder, 2016). Contributing factors include trading volume, media index, China's import dependence on Australia, and Australia's export dependence on China. Finally, we discuss the consequences of the China-Australia trade tension on other trades and sectors, such as Australia's education and tourism industries.

Our results show that, in general, the trade tension resulted in significant adverse effects on Australian firms' stock returns, leading to a near -20% loss within 10 trading days. The magnitude of the negative impact differs among selected commodities and firms. The trade restrictions affected Australian Vintage, Australia's second-largest wine-making group, the least due to low export dependence on China and capital injection from Chinese firms. On the contrary, the restrictions affected Treasury Wine Estates (wine), Australian Agricultural Company (meat), Midway (timber), and New Hope Corporation, South32, and Yancoal (coal) much more due to their closer ties to Chinese markets. The effect on our selected Australian barley firm was slight, and the firm recovered rapidly due to favorable weather conditions and higher grain exports. Calculated CARs for firms in the wine, beef, and timber industries, where China imposed two or more restrictions, also prove that related firms respond more to the first restriction than subsequent restrictions. Taking trade restriction details and firm characteristics into account, we find that firms' trading volumes and the

number of media articles related to China’s trade restrictions exert significant negative effects on stock returns in a shorter horizon. In contrast, we find China’s import dependence on Australia has a significant positive impact and Australia’s export dependence on China has a negative impact on stock returns regardless of time horizon.

This article contributes to the literature by providing a systematic analysis of how China’s restriction of Australian imports affect Australian firms’ stock prices. In the short run, we show that the trade tension likely exerts significant negative effects on stock prices. Some firms recover to positive returns within six trading days, while the remaining firms’ stocks suffer losses all throughout the event window, which indicates that trade restrictions do hurt some Australian firms. Furthermore, in the short run, public news likely raises investors’ concerns about Australian firms’ future stock prices, leading to negative stock returns. However, in the long run, China’s import dependence on Australian commodities and Australia’s export dependence on China are key determinants of stock returns.

The rest of this paper proceeds as follows. Section 2 provides a background on the China-Australia trade tension and China’s restrictions against Australia from January 2020, to July 2021. Section 3 describes the methodology and data we use. The calculated abnormal stock returns and regression results are presented and discussed in Section 4. Section 5 summarizes the study and draws the policy implications.

2 Background

2.1 The China-Australia trade tension

In December 2015, Since China and Australia signed the ”China-Australia Free Trade Agreement” (Australian Government, 2015), which initially expanded the scale of trade. According to Australia’s Bureau of Statistics, Australia-China trade surged 10.9% year-on-year to US \$158.97 billion in 2019, with Australia’s exports to China increasing by 18.3% to US \$103.9

billion and accounting for as much as 38.2% of its exports (Australian Bureau of Statistics, 2020).

However, in August 2018, Australia's federal government banned Chinese-owned Huawei and ZTE from taking part in 5G mobile infrastructure rollout over national security concerns and to cooperate with the United States (BBC, 2018). Furthermore, Australia assisted Pacific Island countries in building infrastructure and setting up embassies in Palau, Marshall Islands, and other places to curb China's influence in Oceania (Bergin et al., 2019).

In February 2020, Australia initiated an anti-dumping investigation against China, expanding the friction from national security to international trade. In March and April 2020, Australia launched two more anti-dumping investigations, one on cheap precision pipes from China, South Korea, Taiwan, and Vietnam and the other on A4 copy paper from China, Brazil, Indonesia, and Thailand (South China Morning Post, 2020).

In April 2020, Australia became one of the earliest and most vocal advocates of an independent investigation into the origins and early handling of the COVID-19 pandemic and began lobbying for support of investigations outside the WHO system (ABC, 2020b). China claims Australia's stance was a political maneuver against Beijing (The Guardian, 2020). A surge in racism toward the Chinese in Australia occurred after Australia made its recommendations, and China's ambassador to Australia warned that Australia's move would reduce the interest of mainland Chinese people in traveling to Australia, studying abroad, and enjoying Australian wine and beef (Opera News, 2021).

In May 2020, China imposed a series of trade restrictions on various Australian agricultural commodities (Reuters, 2020), as shown in Table 1. Looking at Table 1, China also unexpectedly imposed a restriction on Australian coal. China issued official announcements on the restrictions on barley, beef, wine, and timber, thus we have precise and reliable release dates for the event study analysis.

2.2 China's trades restrictions on Australian commodities

Barley. According to UN Comtrade data, in 2018, Australia's barley exports to China accounted for 75.6% (US \$1.053 billion) of its total export value (Figure 1). Australia has long issued subsidies to Australian barley export companies to protect agricultural income, thus those companies obtained competitive advantages in China's market, which affected China's domestic barley industry. In response, China's Ministry of Commerce announced anti-dumping and anti-subsidy investigations against imported Australian barley on November 19 and December 21, 2018, respectively.

On May 18, 2020, the ministry issued announcements detailing the anti-dumping and countervailing investigations and ruled that Australia was dumping barley (Ministry of Commerce, 2020a,b). On May 19, China imposed a five-year anti-dumping duty at a rate of 73.6% and a countervailing duty at a rate of 6.9% on barley.

China's trade restrictions significantly impacted Australia's barley export structure. According to UN Comtrade data, China's share of Australia's barley exports decreased from 75.6% in 2018 to 38.4% in 2020 (Figure 1). Australia's share of China's barley imports also decreased from 60.3% in 2018 to 19.3% in 2020. Furthermore, in 2021, China did not import any barley from Australia. However, in 2020, the trade value of Australia's total barley exports increased 25% over 2019 levels. More interestingly, in 2020, Australia's barley exports hit a new high (US \$1.76 billion)—up 142% from 2019—mainly due to the sharp rise in commodity prices in 2021. From a trade value perspective, this indicates minor negative impacts from China's trade restrictions in both 2020 and 2021.

Beef. Australia's beef exports to China increased from US \$439 million in 2016 to US \$1601 million in 2019 (Figure 2). In 2020, however, China's General Administration of Customs detected illegal drugs in Australian beef imports and began imposing sanctions on Australian beef.

On May 11, 2020, China suspended imports from four Australian beef plants—two JBS Australia Pty. Ltd. plants and Northern Co-Operative Meat Co. Ltd. and Kilcoy and

Pastoral Company Ltd. plants (General Administration of Customs, 2020b). On August 26, 2020, China detected chloramphenicol in Australian beef imports and subsequently prohibited imports from Australia's John Dee Warwick Pty. Ltd. (General Administration of Customs, 2020a). Finally, on December 7, 2020, China banned beef imports from Australia's Meramist Pty. Ltd. (General Administration of Customs, 2020c).

Australian beef exports decreased by 17.9% (loss of US \$865 million) from 2019 to 2020, mainly due to the 34.9% decline (loss of US \$558 million) in China's imports in 2020, compared with 2019 (Figure 2). However, Australian beef exports only decreased 7% in 2021 compared with 2020.

Timber. According to UN Comtrade data, since 2016, Australia's timber exports to China have accounted for about 91% of Australia's total exports (Figure 3). However, China's timber imports from Australia only accounted for 6.2% and 5.9%, of China's total lumber imports in 2019 and 2020, respectively. Thus, timber is an ideal commodity for China to counter Australia.

China's General Administration of Customs announced a suspension on importing logs from Queensland on October 31, 2020, and announced the same for logs from Victoria On November 11, 2020, Tasmania and South Australia on December 3, 2020, and New South Wales and Western Australia on December 24, 2020 (General Administration of Customs, 2020g,f,e,d).

China's trade restriction led to a significant negative impact on Australian timber exports. Figure 3 shows an apparent reduction in China's share of Australia's exports, which fell from 89.1% in 2020 to 1.3% in 2021 (loss of US \$349 million). In addition, Australia's timber exports fell 61.1% in 2021 compared with 2020 (loss of US \$241 million).

Wine. Australia ships nearly half of its wine worldwide, of which China occupies the largest market (Figure 4). At its peak in 2019, China's Australian wine imports accounted for 42.8% of Australia's total wine exports and almost one-third of China's wine imports. On August 18, 2020, China's Ministry of Commerce stated it received an anti-dumping

investigation application submitted by China Wine Industry Association on behalf of the domestic wine industry (Ministry of Commerce, 2020c). On November 27, 2020, the Ministry of Commerce announced that starting November 28, China would levy 107.1%–212.1% "anti-dumping duties" on Australian wine (Ministry of Commerce, 2020d).

On March 26, 2021, China's Ministry of Commerce officially recognized the dumping of Australian wines (Ministry of Commerce, 2021). Since March 28, 2021, China has officially imposed tariffs and comprehensive sanctions on Australian wine.

In 2020, China's trade restrictions on Australian wine led to a slight decrease in Australia's wine exports to China but did not affect its total exports (Figure 4). However, China's share of Australia's exports decreased from 38.4% in 2020 to 10.4% in 2021. Furthermore, in 2021, Australia's total wine exports fell by 26.7% (loss of US \$539 million) compared with 2020.

Coal. In addition to agricultural products, China has also adopted a severe sanction on Australian coal (Figure 5). China accounted for approximately 20% of Australia's total coal exports from 2016 to 2020 (Figure 5); however, during that time, Australia accounted for more than 50% of China's total coal imports. China did not announce an official ban on Australian coal—Chinese state-owned energy suppliers and steel mills received verbal notices to stop importing Australian coal on October 12, 2020 (The Sydney Morning Herald, 2020; The British Guardian, 2020). On November 25, 2020, China's Ministry of Foreign Affairs indicated that imported coal does not meet environmental protection standards (Ministry of Foreign Affairs, 2020).

According to UN Comtrade data, China's restriction reduced its Australian coal imports 99.1% in 2021 compared with 2020 (loss of US \$6.163 billion); however, Australia's coal exports increased by 25.8% in 2021 compared with 2020, mainly due to the sharp rise in commodity prices in 2021.

3 Methodology and Data

3.1 Event Study

The event study method is a well-established analytical tool to measure the impacts of a given event on a firm’s stock prices (Fama et al., 1969; O’hara and Shaw, 1990; Aitken and Swan, 2010; Black and Kim, 2012). The theoretical basis of the event study method is the efficient market hypothesis, which assumes that stock prices quickly incorporate new information as investors continually re-evaluate the market value of a firm (Fama et al., 1969). We apply the event study method to investigate stock price responses of Australian wine, barley, beef, timber, and coal producers to China’s restrictions on Australia from January 2020, to July 2021, as discussed in Section 2.

Following (Fama et al., 1969; O’hara and Shaw, 1990; Black and Kim, 2012), we divide the timeline for a specific restriction into two mutually exclusive sub-periods: the estimation window and the event window. The estimation window consists of a period of pre-restriction trading days $t \in [T_0, T_1]$, where T_0 and T_1 represent the start and end times of the estimation window, which we use to estimate the relationship between an Australian firm’s stock price movement and that of the market index in the absence of a restriction. Following (Pozo and Schroeder, 2016; Xiong et al., 2021), our estimation window consists of 254 trading days’ observations, approximately one trading year, before the specific restriction. For example, the estimation window for China’s trade restriction on Australian wine released on November 27, 2020, is the 245 trading days from November 26, 2019 (T_0) to November 26, 2020 (T_1), a period that does not contain a restriction on wine. For each restriction released on day T_2 , the event window period of $t \in [T_2 + 1, T_3]$ starts one day after each restriction event day and consists of the following 15 trading days ($T_3 = T_2 + 16$). China could release restrictions on Australian commodities at any time of the day, not just during trading times, thus the start date of the event window is set one day after the event day. For example, the event window for China’s trade restriction on Australian wine released on November 27, 2020, is

the 245 trading days from November 30, 2020 ($T_2 + 1$) to December 18, 2020 (T_3).

We assess the economic impacts of an event by estimating ARs through statistical regressions. We express the AR for firm i on trading day t as:

$$AR_{it} = R_{it} - E[R_{it}|I_t], \quad (1)$$

where $R_{it} = \ln(\frac{P_t}{P_{t-1}})$ is the actual stock return on trading day t , and $E(R_{it}|I_t)$ is the expected normal return conditional on information I_t , which enables us to predict the expected return without an event being at work. The market model (MM) is a well-established expected return model to estimate $E(R_{it}|I_t)$ (MacKinlay, 1997; Grewal et al., 2019). The MM assumes that stock returns are a function of an overall market index and expects a deviation from this relationship in the presence of an event. In the MM, for firm i on trading day t , returns are given by

$$R_{it} = \alpha_i + \beta_i \times R_{mt} + \epsilon_{it}, \quad \text{for all } t \in [T_0, T_1], \quad (2)$$

where R_{mt} is the index return of the stock market where the firm is listed on trading day t ; α_i and β_i are parameters to estimate; and, ϵ_i is the error term, which we assume is independent and normally distributed with zero mean.

Because of the probable serial correlation (Pozo and Schroeder 2016) and dynamic stock market performance, we use an ARDL of the market model in this study. In ARDL specification of MM, for firm i on trading day t , returns are given by

$$R_{it} = \alpha_i + \beta_i \times R_{mt} + \gamma_i \times R_{it-1} + \delta_i \times R_{mt-1} + \epsilon_{it}, \quad \text{for all } t \in [T_0, T_1], \quad (3)$$

where R_{mt-1} and R_{it-1} are the index return and stock return on trading day $t - 1$ and α_i , β_i , γ_i and δ_i are parameters to estimate;

After estimating each parameter of the ARDL specification of MM for each firm i , we estimate predicted errors over the event window by iterating the ARDL specification of MM

as follows:

$$E[R_{it}|I_t] = \hat{\alpha}_i + \hat{\beta}_i \times R_{mt} + \hat{\gamma}_i \times R_{it-1} + \hat{\delta}_i \times R_{mt-1}, \quad \text{for all } t \in [T_2 + 1, T_3] \quad (4)$$

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i \times R_{mt} + \hat{\gamma}_i \times R_{it-1} + \hat{\delta}_i \times R_{mt-1}), \quad \text{for all } t \in [T_2 + 1, T_3] \quad (5)$$

where AR_{it} is the AR of firm i for a specific trade restriction estimated by the ARDL specification of MM.

To evaluate the economic impacts of the trade restrictions overall, it is necessary to aggregate estimated ARs over time into CAR. For firm i 's stock return, calculated over a time interval $\tau = [\tau_1, \tau_2]$ consisting of one or more trading days, the CAR is:

$$CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{it} \quad (6)$$

where $T_2 + 1 \leq \tau_1 \leq \tau_2 \leq T_3$. The magnitude of $CAR_i(\tau_1, \tau_2)$ reflects the economic impact of a specific trade restriction on firm i 's stock returns.

We do not examine the average proportional impact of a specific trade restriction on all firms (that is, CAAR) by taking the mean of $CAR_i(\tau_1, \tau_2)$ over N firms as (Pozo and Schroeder, 2016), because China imposed trade restrictions on different sectors. As such, the CAARs have no economic meaning, and thus we do not calculate them or examine their significance. Instead, we concentrate on the obtained CAR, which reflects whether a firm's observed stock price movements are the result of specific trade restriction.

To examine whether the trade restriction affects a firm's stock returns or the presence of CARs, we focus on the following null and alternative hypotheses:

$$\begin{aligned} H_0 : CAR_i(\tau_1, \tau_2) &= 0 \\ H_1 : CAR_i(\tau_1, \tau_2) &\neq 0. \end{aligned} \quad (7)$$

The null hypothesis indicates that no CAR is statistically significant, and thus the trade

restriction does not have significant impacts on the firm’s stock returns. However, rejecting the null hypothesis reveals that the trade restriction has statistically significant impacts on firms’ stock returns and, consequently, a nonzero CAR. Intuitively, China’s trade restrictions on Australian commodities are ”negative” events for Australian firms producing these commodities. Hence, the trade restrictions may cause negative impacts on the firm’s stock returns, and the CARs may be negative. To test the null hypothesis (H_0), we use a Patell- t statistic proposed by Patell (1976) to test the statistical significance of calculated CARs. If the t -statistic is statistically significant at a given level, we can say the trade restriction significantly impacts the firm’s stock returns on average. we implement the above event study using Stata package *eventstudy2* (Kaspereit, 2015).

3.2 Pooled OLS model

In the event study, we quantify the magnitude of the economic impacts of China’s trade restriction on Australian firms’ stock performance. To achieve this goal, we estimate a pooled OLS model.

The pooled OLS model pools CAR observations for each restriction on each trading day over the event window to construct panel data. Long-horizon regressions in pooled OLS models capture more information and produce more precise results (Pozo and Schroeder, 2016). Note that pooled CAR used as the dependent variable may contain dynamic information, thus we estimate a generalized ARDL model here. For each restriction j and each firm i on each trading day t after a trade restriction where $t \in [1, 10]$, we estimate the following regression model:

$$CAR_{jit} = \alpha + \beta CAR_{ji,t-1} + \mathbf{X}'_{jit} \boldsymbol{\gamma} + \mathbf{X}'_{ji,t-1} \boldsymbol{\delta} + \mathbf{Z}'_{ji} \boldsymbol{\phi} + \varepsilon_{jit}, \quad (8)$$

where CAR is the rolling sum of AR obtained in the event study, and \mathbf{X} and \mathbf{Z} are vectors of time-varying and time-invariant variables, respectively.

We use CAR as the dependent variable of interest, and focus on the CAR values that accumulate ARs over 10 trading days after the release of the trade restriction. As for independent variables, X includes: (a) daily trading volume, as measured by the percentage of outstanding shares traded for that day, which captures firm size and capacity; (b) media index, which represents the number of press articles directly related to the China-Australia trade tension; (c) imports dependence, which represents China’s dependence on imports of commodity i from Australia; and, (d) exports dependence, which represents Australia’s export dependence on commodity i to China.

Tetlock (2007) suggests that high values of media pessimism lead to downward pressure on stock price returns. If China’s import dependence on Australia is considerable, then Australian investors’ concerns about China’s trade restrictions will be minor, and we expect imports dependence to have positive impacts on firms’ stock returns. On the contrary, if Australia’s export dependence on China is large, Australian investors’ concerns about China’s trade restrictions will be significant, and we expect exports dependence to have negative impacts on firms’ stock returns.

Following Xiong et al. (2021), we include day-since-restriction dummy variables to account for day-by-day unobserved shocks common to all restrictions flexibly. We further use month and year dummy variables to capture general macroeconomic and commodity fluctuations that contribute to firms’ stock returns.

3.3 Datasets

We use four different data sets—trade restriction data, firm data, media data, and bilateral trade data. We mainly collect trade restriction data from China’s Ministry of Commerce and General Administration of Customs websites. For event dates, we use November 27, 2020, and March 26, 2021, for wine; May 18, 2020, for barley; May 11, August 26, and December 7, 2020, for beef; October 31, November 11, December 3, and December 24, 2020, for timber; and, October 12, 2020 for coal, which we include for comparison (Table 1). Because China

did not announce an official ban on Australian coal, we identify the event day from the mainstream media (e.g., The British Guardian and Sydney Morning Herald).

As discussed, China only imposed restrictions on beef from select firms. However, not all these firms publicly trade on the Australian stock market. Thus, we collect firms' information for each sector under restrictions according to the Australian Securities Exchange's firm category. We select Australian Agricultural Company Ltd. (AAC.AX), Elders (ELD.AX), and Beston Global Food Company (BFC.AX). These firms have the best overall performance based on market share, stock trading volume, and company revenue for each sector. Only stocks with active transactions are suitable for an event study analysis; thus, we exclude some listed companies from our study.

For wine, we chose Treasure Wine Group (TWE.AX) and Australian Vintage Ltd. (AVG.AX), which are Australia's largest and second-largest winemaking groups, respectively. For barley, we choose GrainCorp Ltd. (GNC.AX), a comprehensive business that includes warehousing, logistics, grain marketing, food and animal feed, baby nutrition, and oilseed products. GrainCorp Ltd. is Australia's largest supplier of edible flour, and the largest producer of integrated edible oil and barley.

For timber, we select Midway Limited (MWY.AX), which is Australia's largest high-quality wood processing and export company. For coal, we select BHP Billiton Ltd. (BHP.AX), New Hope Corporation Ltd. (NHC.AX), RIO Tinto Group (RIO.AX), South32 Ltd. (S32.AX), Stanmore Resources Ltd. (SMR.AX), Washington H. Soul Pattinson and Co. Ltd. (SOL.AX), and Yancoal Australia Ltd. (YAL.AX). Overall, we identify 11 restrictions (events) corresponding to 14 different publicly traded firms (Table 2).

We collect daily stock price data and trading volumes from Yahoo Finance, and we use ASX 200, which is comprised of the 200 largest ASX listed stocks, as the market index to estimate the benchmark model in the event study. We use trading volume as a proxy for firm size and capacity, and we calculate daily trading volume as the percentage of outstanding shares traded that day. We collect the number of shares from 2019 annual reports publicly

available on the Australian Securities Exchange website.

We obtain bilateral trade data from UN Comtrade. For each commodity under restriction, we calculate China’s import dependence on Australia as Australia’s share of China’s 2019 imports. Similarly, for each commodity under restriction, we calculate Australia’s export dependence on China as China’s share of Australia’s 2019 exports.

We use an author-written spider program to collect daily media articles about the trade conflict from Reuters. Following Piggott and Marsh (2004), we construct the media index by linearly aggregating the number of articles issued per day in the event window.

4 Results and Discussions

4.1 Analysis of abnormal returns

Table 3 reports CAR values and corresponding t-statistics over different intervals of the event window. We find that, in general, the trade restrictions negatively affected Australian firms’ stock returns immediately after announcement ($\tau_2 = 1$), suggesting that the stock market reacts immediately to every trade restriction. On average, four to five days after the restriction, some stock returns become positive; however, some stock returns, such as coal and timber, remain negative during the whole event window ($\tau_2 \leq 10$). Focusing on the significance of the CARs, Treasury Wine Estates’ (TWE) stock responses to the trade restriction issued on November 27, 2020, are statistically significant within four trading days after the announcement at the 10% significance level. We observe a similar pattern in Australian Agricultural Company Ltd. (AAC), whose CARs induced by the first trade restriction issued on May 11, 2020, are significantly negative within five trading days and become positive after that. Midway’s stock responses to the second trade restriction on Victorian timber issued on November 11, 2020, are significantly negative at the 1% significance level during the whole event window. We observe similar results with New Hope Corporation’s and Stanmore Resources’ stock responses to the trade restriction on coal.

Figures 6-10 show the evolution of the calculated CARs of Australian firms for five commodities from the event study methods. Starting May 19, 2020, China imposed a five-year anti-dumping duty at a rate of 73.6% and a countervailing duty at a rate of 6.9% on Australian barley. We find the barley trade restrictions have a transient and slight negative impact on GrainCorp's stock returns, which dropped 4% within two trading days and recovered within four trading days. Figure 6 shows unanticipated surges of almost 10% in stock returns within 10 days after the announcement due to GrainCorp posting positive news on profits and exports on May 14. GrainCorp shares rose as much as 17.9%, which partly explains the trade restrictions' small negative impact on its stock returns in Figure 6.

China's General Administration of Customs issued three restrictions on Australian beef from May to December 2020. Figure 7 plots the estimated CARs of Australian Agricultural Company Ltd. (AAC), Beston Global Food Company Ltd. (BFC), and Elders Ltd. We find that the first restriction issued on May 11, 2020, led to the greatest negative impacts on all three firms, particularly AAC and Elders, which reveals that the response of firms' stock returns to the first firm-related event is usually larger than subsequent events. AAC's responses to the first restriction were significantly larger than the other two firms, which the close trade relations between AAC and China can partly explain. According to AAC's annual report, China accounted for 10% of AAC's annual revenue and was its third-largest consumer (US \$25.86 million) in 2019. Looking at Figure 7(c), Elders' stock returns dropped by almost 5% within two trading days after the first restriction issued on May 11, 2020. However, Elders' stock recovered within four trading days, and rose by 8% within five trading days. Elder's first half financial results released on May 18, 2020, partly explain the rapid increase in CAR.

China's General Administration of Customs issued four restrictions on Australian timber from October to December 2020. Figure 8 plots the estimated CARs of Midway. According to Midway's 2019 annual report, China's imports accounted for 75% (US \$190 million) of Midway's total revenue in 2019. Figure 8 shows that all restrictions negatively impacted

Midway's stock returns, except the December 24 restriction. The second restriction, issued on November 11, caused the most significant drops (approximately 15%) in Midway's CAR, mainly because it suspended the import of logs from Victoria, and Midway manages plantations predominantly in Victoria. Apart from the second restriction, the first restriction led to the largest negative impacts on Midway's stock returns, which reiterates that the first event usually provides more unanticipated and surprising information.

Figure 9 shows the CARs of TWE and Australian Vintage Ltd. (AVG). Both firms clearly saw a negative CAR immediately after the November 27, 2020, trade restriction announcement. A panic sell-off led to TWE's stock price falling 11% on November 27, 2020, forcing the firm to halt trading. On November 30, TWE's share price fell more than 10%, and TWE stated that it would adjust the sales direction of some wines from China to other markets (ABC, 2020a). AVG's stock returns dropped 2% in the first trading day after the announcement and recovered within three trading days. Compared to TWE, AVG's direct exposure to China's market is small, with less than 1% of all sales going to China in 2019. Both firms' responses to the second announcement issued on March 26, 2021, further reveal that TWE suffered more from the trade restriction. TWE's stock returns dropped 6% within 10 trading days, while AVG saw a positive CAR during the whole event window.

Figure 10 plots the estimated CARs of seven major coal producers in Australia. We find that this unofficial restriction led to negative impacts on all seven coal firms within six trading days. New Hope Corporation (NHC), South32, and Yancoal's CARs are generally statistically significant at the 10% level. NHC saw the largest negative impacts, with stock returns dropping 15% within five trading days and staying at that level within 10 trading days. Note that BHP Billiton Ltd. (BHP), the leading and largest resources firm, only saw a modest negative CAR. Furthermore, the largest drop in CAR within 10 trading days is less than 3%. BHP is the world's largest iron ore producer and China accounted for 62% (US \$26.576 billion) of BHP's total revenue in 2020. Given China's high imports dependence on BHP's iron ore, the unofficial restriction on coal only led to limited negative impacts on

BHP’s stock returns.

4.2 Explaining abnormal returns

We estimate pooled OLS models to examine the effects of China’s trade restrictions on the magnitude of ARs. Since we aggregate CARs over different intervals of the event window, we estimate these models using observations from the interval $[+1, +10]$ days. When examining the CAR that accumulates AR over 10 trading days shown in the previous subsection, we find that some other firm-related events, such as annual (or quarterly) reports inevitably occurred in the event window, which lead to a significant abnormal movement in the CAR values. Figure 7(c) shows Elders’ stock responses to the first trade restriction issued on May 11, 2020, which were negative within four trading days. However, Elders’ first half financial results, released on May 18, 2020, took one day to raise the stock by 8%. Thus, to evaluate the sensitivity of predicted effects over time, we estimate models using observations from different intervals or horizons. We first estimate the model using observations from intervals $[\tau_1, \tau_2] = [+1, +4]$ and then we use observations from intervals $[\tau_1, \tau_2] = [+1, +7]$ and $[+1, +10]$.

Table 4 presents results from pooled OLS models over different post-event horizons. In all models, regression diagnostics (i.e., analysis of variance inflation factors, correlation matrix) reject the presence of degrading multicollinearity. Adjusted R^2 values are approximately 0.8, indicating the explanatory variable examined in our pooled OLS model explains the majority of CAR variance. The coefficient of CAR_{t-1} is statistically positive at the 1% significance level in all models, which is consistent with the literature that past returns tend to carry a momentum to future returns (Fama et al., 1969; Savor, 2012). We find that firms with larger trading volumes in the stock market tend to enjoy greater stock returns following each trade restriction. Additionally, we observe a negative lagged effect of trading volumes on CARs in all models that are statistically significant at least at the 5% significance level in models 1 ($\tau_1 = 1; \tau_2 = 4$) and model 2 ($\tau_1 = 1; \tau_2 = 7$). The media index coefficient is significantly

negative in model 1 but not statistically significant in models 2 and 3. We also observe a negative lagged effect of media index on CARs in all models. Focusing on two trade-related explanatory variables, we find consistent results across all three models. To be clear, we observe a significantly positive effect of imports dependence on CARs at the 1% significance level in all models. Similarly, we find a significantly negative effect of exports dependence on CARs at 1% significance level in all models, consistent with our expectations.

4.3 Discussions

Focusing on the sectors where a series of restrictions were placed, we find that firms' responses to the first restriction were usually more significant than subsequent events. The absolute values of CARs for AAC, BGF, and Elders for the first restriction released on May 11, 2020, are all greater than the CARs for the following restrictions (Figure 7). When excluding the second restriction released on November 11, 2020, the responses of Midway's stock returns for the first restriction released on October 31 are also more significant than those following subsequent restrictions. Figure 8 shows Midway's stock responses to the November 11 restriction, in which China suspended log imports from Victoria, where Midway's main plantations are located. We exclude this restriction when examining whether firms have the largest response to the first announcement.

Firms' responses to restrictions differ significantly in the wine, beef, and coal sectors (Table 3). Generally, the closer the trade with China, the more significant the negative impact of restrictions. We also find a similar pattern in other sectors. According to ACC's 2019 annual report, China accounted for 10% of the firm's annual revenue and was the third-largest consumer (US \$25.86 million). BFC and Elders are less dependent on the Chinese market than AAC.

5 Conclusions and policy implications

China is Australia’s largest two-way goods and services trading partner in goods and services, and accounting for nearly one-third of Australian Australia’s global trade globally (Australian Government, 2021a). Since early 2020, however, China and Australia have been in a quasi “tit-for-tat” trade tension leaving both countries suffering economic consequences. Australia’s two-way trade with China declined 7% in the second half of 2020, compared to the second half of 2019 (Australian Government, 2021a). Under this context, this article aims to visualize the impact of China’s trade restrictions on Australian agricultural companies from January 2020 to July 2021 by using an event study method. Furthermore, we estimate a pooled OLS model to quantify how China’s trade restriction details and firm characteristics explain the magnitude of ARs calculated by the event study method. We find that the China-Australia trade tension significantly negatively affects Australian firms’ stock returns. The magnitude of the negative effect differs among the examined commodities and firms. Stock prices usually respond more to the first restriction announcement than subsequent announcements because the first provides more unanticipated information. Our results also reveal that high values of media pessimism lead to downward pressure on stock price returns. Additionally, we find a positive effect of China’s imports dependence on Australian commodities and a negative impact of Australia’s exports dependence on China on Australian firms’ stock returns.

Our findings of different responses of Australian firms following China’s trade restrictions have important policy implications. First, China’s trade restrictions have limited implications on Australia’s commodities exports other than timber (Figures 1-5 and Figures A.1-A.2). Except for coal and cotton, the trade tension barely affected Australia’s total export values in 2020 as compared with 2019, with a slight decline in barley, beef, timber, wine, and crustacean exports to China. Furthermore, in 2021, due to the commodity prices surges (Bloomberg News, 2021; CNBC, 2021b), Australia’s total exports of cotton hit a new high, and total exports of coal rebounded. For timber, in 2021, Australia’s exports to China

dropped to less than 1%, though, overall, the trade tension only appears to have a slight impact on Australia. Despite the souring relations between countries, China continued to be Australia's largest buyer in 2020 and 2021. Though Australia's exports of barley and coal to China collapsed, Australia seems to have found other markets for most of the lost trade (CNBC, 2021a), which may explain why Australia continued to decouple from China in 2021.

Second, China relies heavily on iron ore imports from Australia. Table 5 displays the importance and substitutability of the top 20 Australian products exported to China in 2019. According to UN Comtrade data, China accounted for 82.6% of Australia's total iron ore exports, totaling US \$54.9 billion, which ranks first among all commodities and near twice the summed value of the rest of the products. In the first eleven months of 2021, Australia's total exports increased by 40.88% compared with the same period in 2020. The increased trade indicates that exports of cotton, barley, and coal to the rest of the world, and especially global iron ore exports, compensated for Australia's loss in crustaceans, wine, beef, and timber exports to China. In 2021, commodity prices spiked, which means that the increase in Australia's export values resulted from soaring prices instead of growing volume (ABC, 2021). However, once commodity prices collapse, Australia will have difficulty covering the lost trade.

Third, the trade tension affected the Australia-China relationship beyond trade. According to the Australian Department of Education, Skills and Employment, there were 163,881 Chinese students in Australia from January to November 2021, which is down 11% compared with 2020, and 2020 was down 10% compared with 2019. Before June 2019, Chinese visitors accounted for more than 15% of Australia's total short-term travel market (BBC, 2020). According to the Australian Department of Education, Skills and Employment, the number of Chinese students in Australia was up to 169,881 from January to November in 2021, dropping by 11% compared with 2020, and the latter decreased by 10% compared with 2019. Meanwhile, Chinese tourists are also discouraged from visiting Australia when

Chinese students are urged to do a thorough risk assessment before applying for Australian universities (Study International, 2020). Before June 2019, Chinese visitors accounted for more than 15% of Australia's total short-term travel market—definitely a primary source of international tourists in Australia (Global Times, 2021a). Data show that in the financial year ending September 2021, there were 3,350 Chinese visitors in Australia—a 99.7% reduction compared with the previous year. Furthermore, Chinese visitors' spending in Australia decreased 98.5% (US \$4.9 billion), from nearly US \$5 billion to US \$76 million in the same time (Australian Government, 2021b).

Fourth, 2022 is the fiftieth year after establishing diplomatic relations between Australia and China, which raises great concern about how the two countries' bilateral ties will go. Before 2022, China's trade restrictions only slightly affected Australia since Australia's gain in cotton, barley, coal, and iron ore compensated for its loss of other exports due to commodity price spikes. Australia is China's largest iron ore supplier and relies excessively on exports to China, while China is heavily dependent on iron imports. In 2019, China bought 70% of Australia's total global iron ore exports (Table 5). Thus, Australia has no motivation to rebuild a positive relationship with China if the prices of commodities, especially iron ore, remain high. Experts predict that China-Australia relations are likely to get even worse due to Australia's 2022 federal election campaign, as candidates have made anti-China statements to win more votes (Global Times, 2021b). On the other hand, there are also some positive signs. China stated it wishes to join the Comprehensive and Progressive Agreement on Trans-Pacific Partnership (CPTPP), which will likely reduce tensions (John Menadue's Public Policy Journal, 2021). Moreover, the world's largest free-trade agreement—Regional Comprehensive Economic Partnership (RCEP)—entered into force on January 1, 2022. Both China and Australia signed RCEP, which presents an opportunity for trade between the two countries (Modern Diplomacy, 2021).

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Figures and Tables

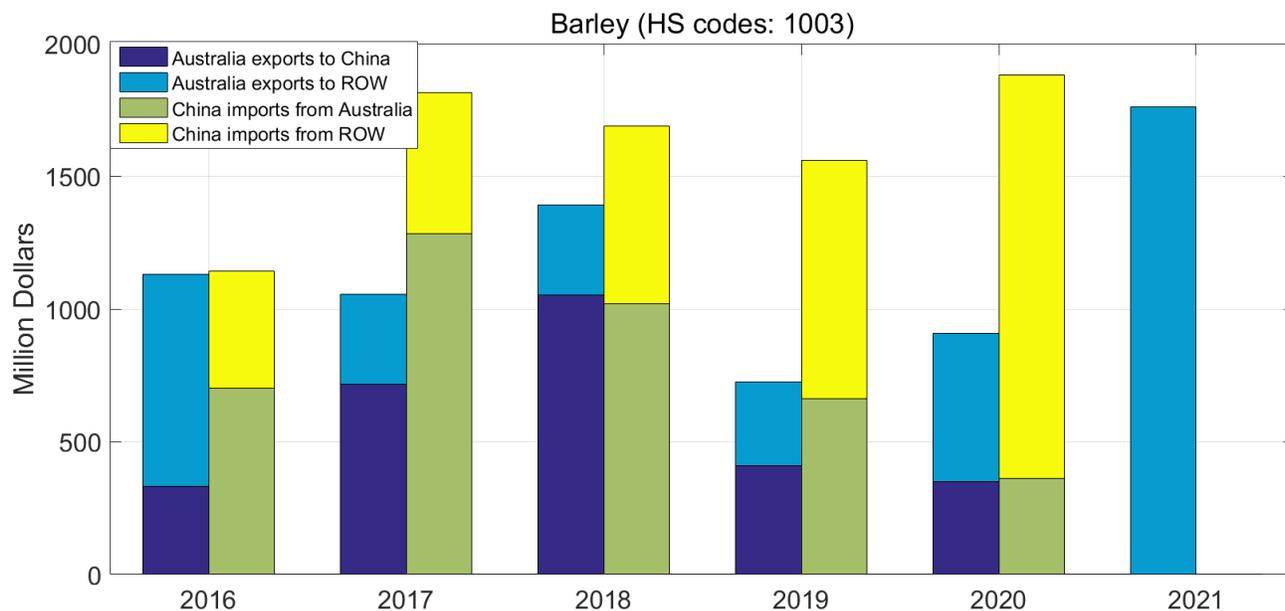


Figure 1: Barley trade between China, Australia, and the Rest of the World (ROW).

Source: UN Comtrade. We retrieve Australian exports data when Australia is the reporter, and we retrieve Chinese imports data when China is the reporter in UN Comtrade. Because Australian exports data for December 2021 and China's imports data for all of 2021 are not available in UN Comtrade, the Australian exports data for 2021 consists of January to November, and China's imports data are absent.

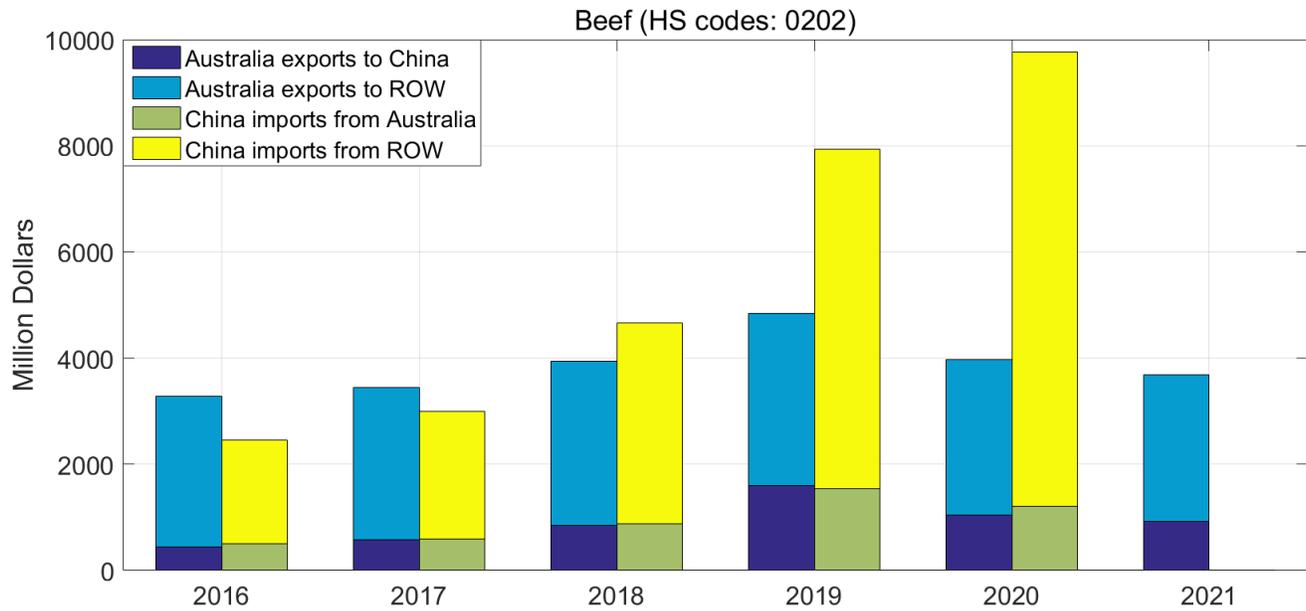


Figure 2: Beef trade between China, Australia, and the Rest of the World (ROW).

Source: UN Comtrade. We retrieve Australian exports data when Australia is the reporter, and we retrieve Chinese imports data when China is the reporter in UN Comtrade. Because Australian exports data for December 2021 and China's imports data for all of 2021 are not available in UN Comtrade, the Australian exports data for 2021 consists of January to November, and China's imports data are absent

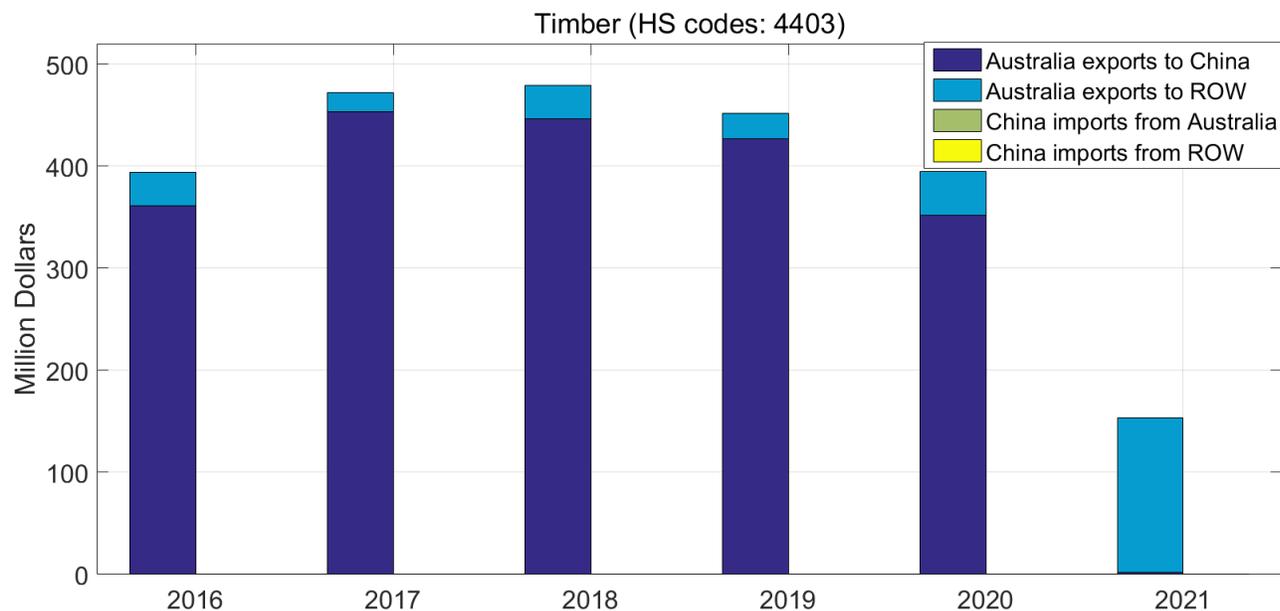


Figure 3: Timber trade between China, Australia, and the Rest of the World (ROW).

Source: UN Comtrade. We retrieve Australian exports data when Australia is the reporter, and we retrieve Chinese imports data when China is the reporter in UN Comtrade. Because Australian exports data for December 2021 and China's imports data for all of 2021 are not available in UN Comtrade, the Australian exports data for 2021 consists of January to November, and China's imports data are absent. China's trade values of timber imports from ROW from 2016 to 2020 are \$7.7, \$9.3, \$10.3, \$8.8, and \$7.9 billion dollars, respectively, which are much larger than Australian timber exports, and thus not shown in Figure 3

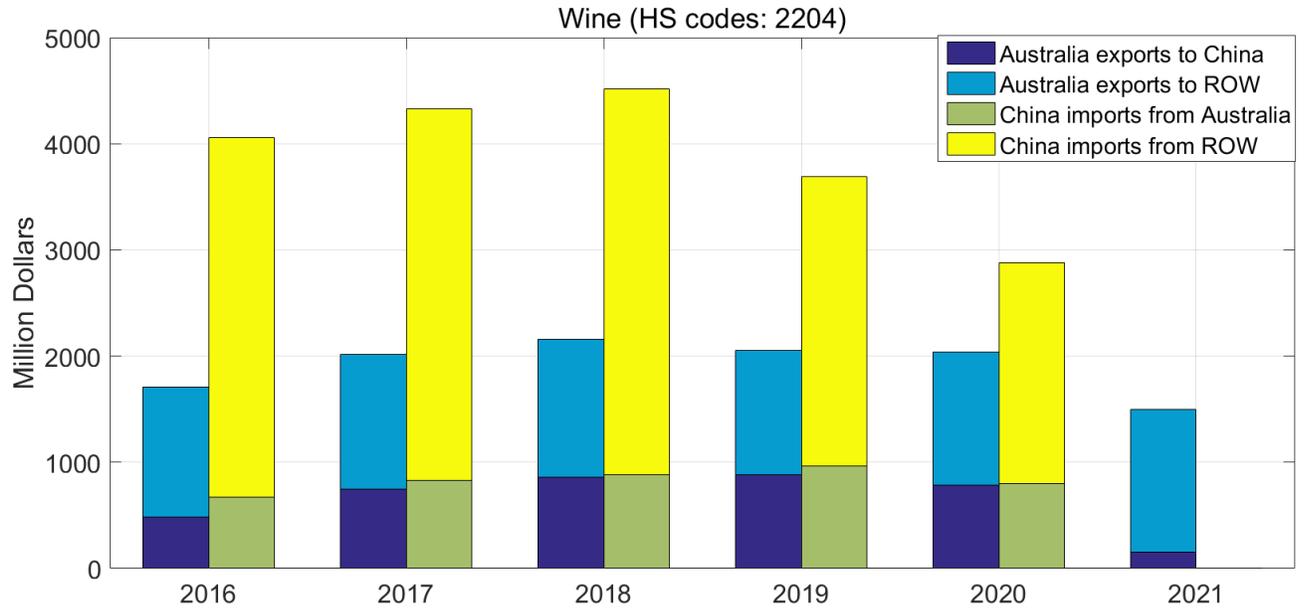


Figure 4: Wine trade between China, Australia, and the Rest of the World (ROW).

Source: UN Comtrade. We retrieve Australian exports data when Australia is the reporter, and we retrieve Chinese imports data when China is the reporter in UN Comtrade. Because Australian exports data for December 2021 and China's imports data for all of 2021 are not available in UN Comtrade, the Australian exports data for 2021 consists of January to November, and China's imports data are absent.

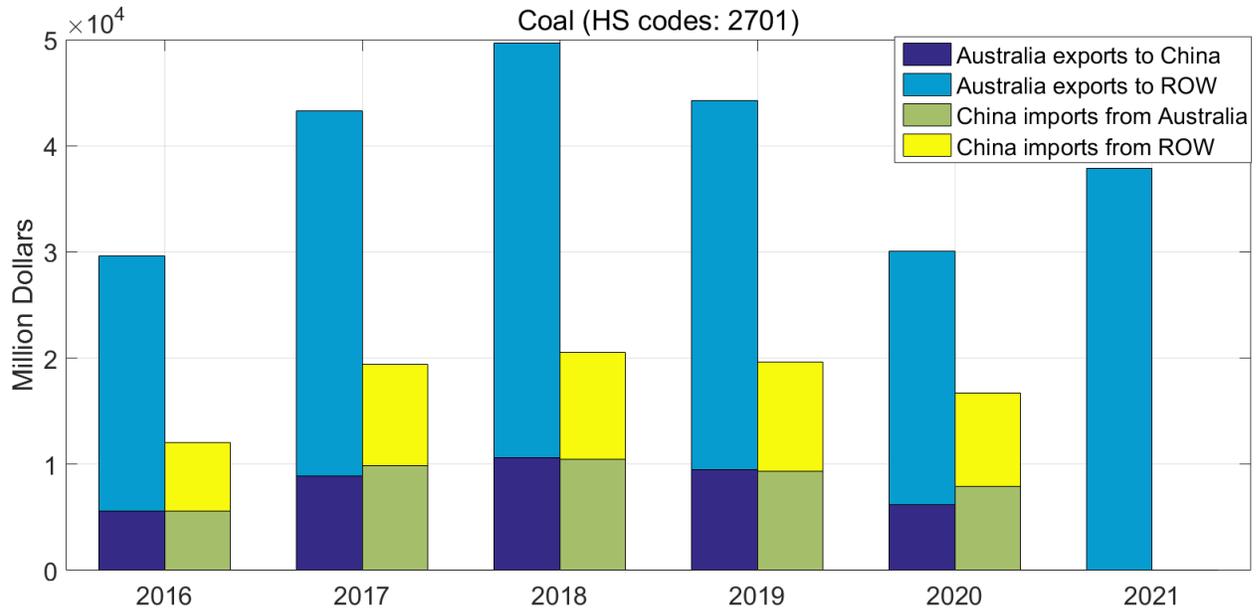


Figure 5: Coal trade between China, Australia, and the Rest of the World (ROW).

Source: UN Comtrade. We retrieve Australian exports data when Australia is the reporter, and we retrieve Chinese imports data when China is the reporter in UN Comtrade. Because Australian exports data for December 2021 and China's imports data for all of 2021 are not available in UN Comtrade, the Australian exports data for 2021 consists of January to November, and China's imports data are absent.

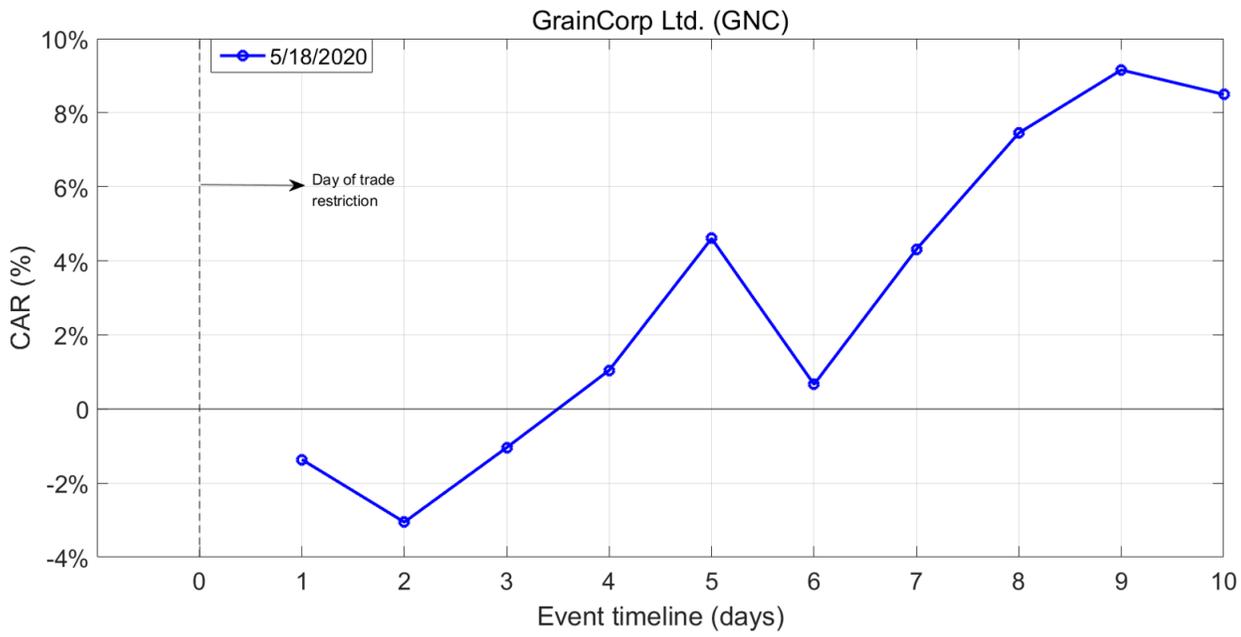


Figure 6: Cumulative abnormal returns (CAR) of Australian barley firms for China's trade restriction released on May 18, 2020.

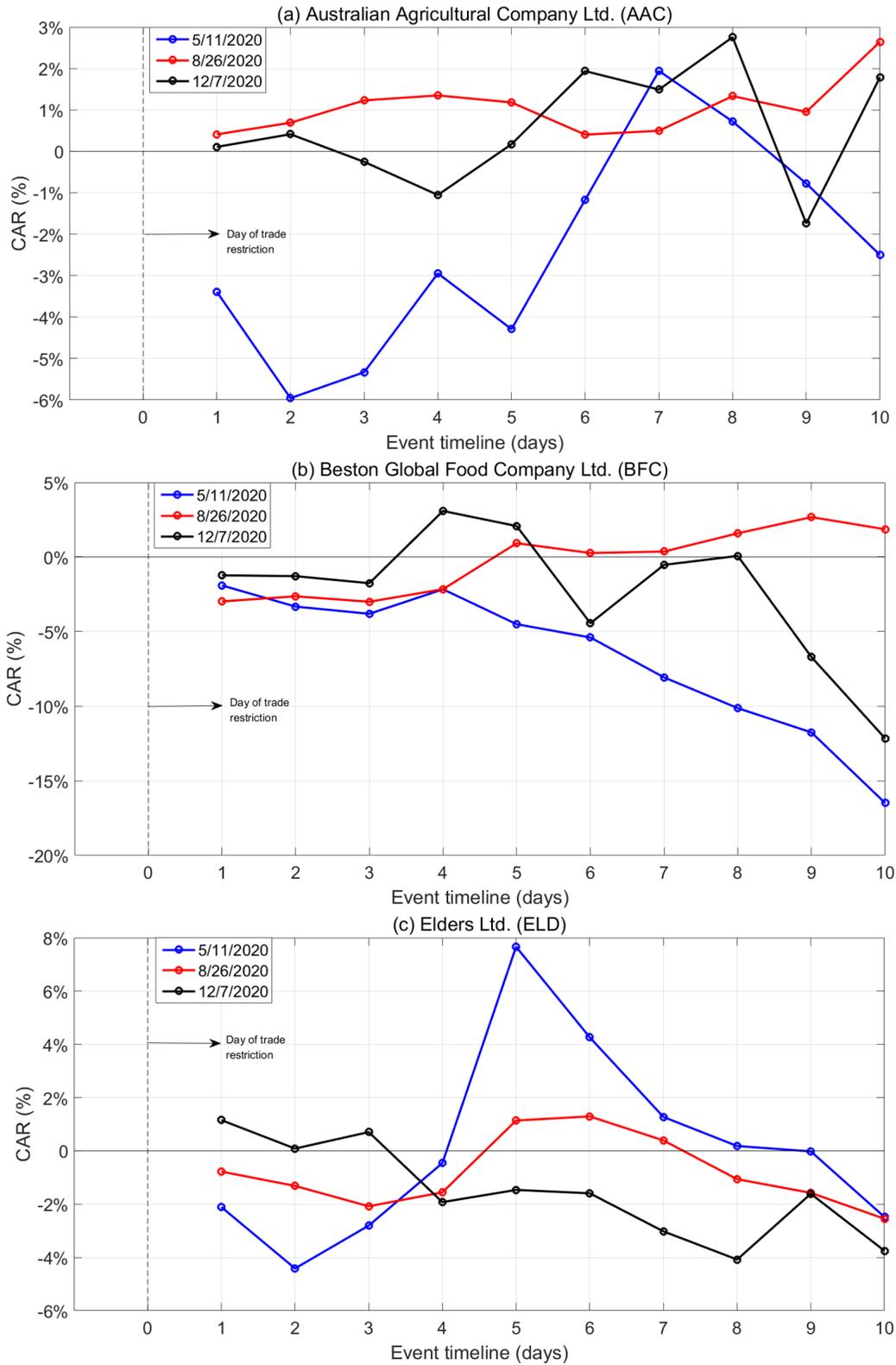


Figure 7: Cumulative abnormal returns (CAR) of Australian beef firms for three trade restrictions released on May 11, 2020, August 26, 2020, and December 7, 2020, respectively. (a) Australian Agricultural Company Ltd. (AAC) (b) Beston Global Food Company Ltd. (BFC) (c) Elders Ltd. (ELD)

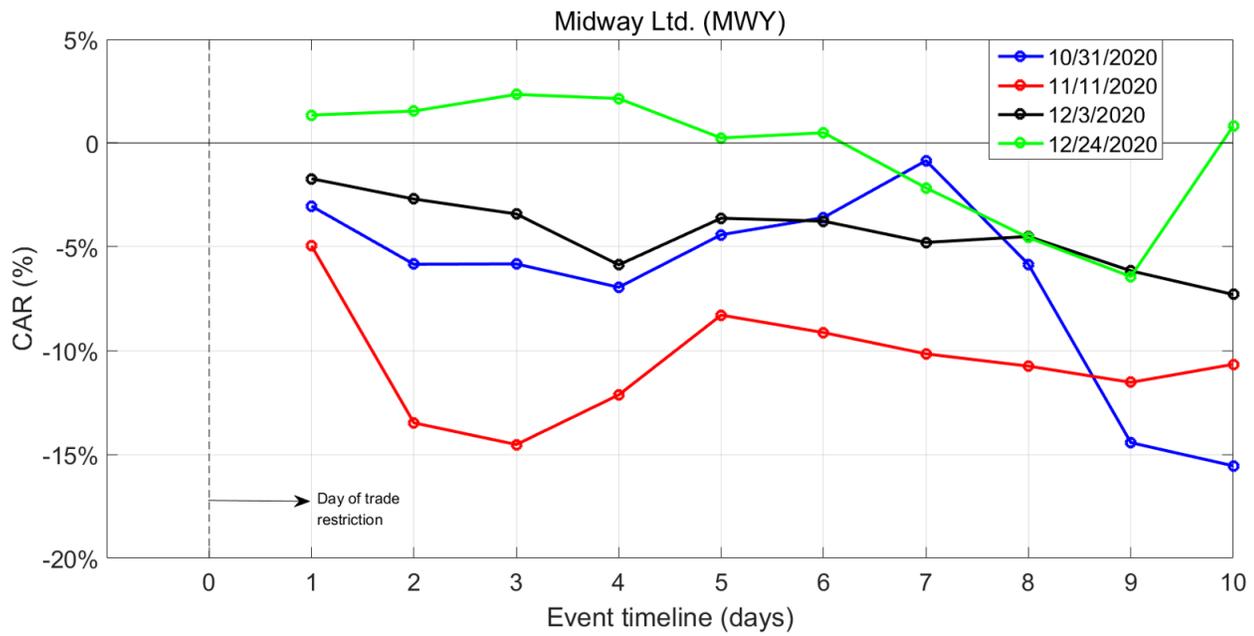


Figure 8: Cumulative abnormal returns (CAR) of an Australian timber firms for trade restrictions released on October 31, 2020, November 11, 2020, December 3, 2020, and December 24, 2020, respectively.

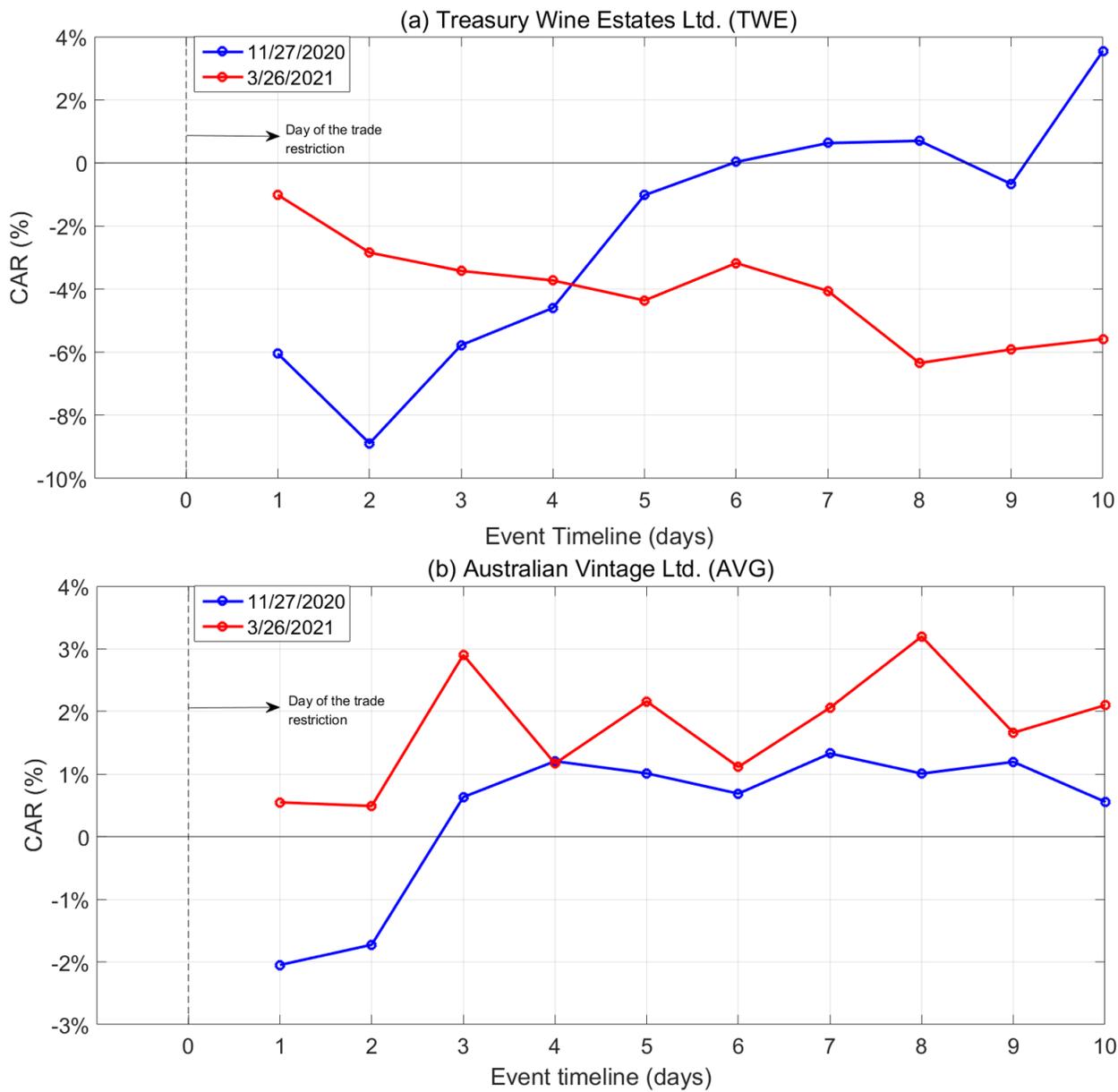


Figure 9: Cumulative abnormal returns (CAR) of Australian wine firms for trade restrictions released on December 27, 2020 and March 26, 2021, respectively.

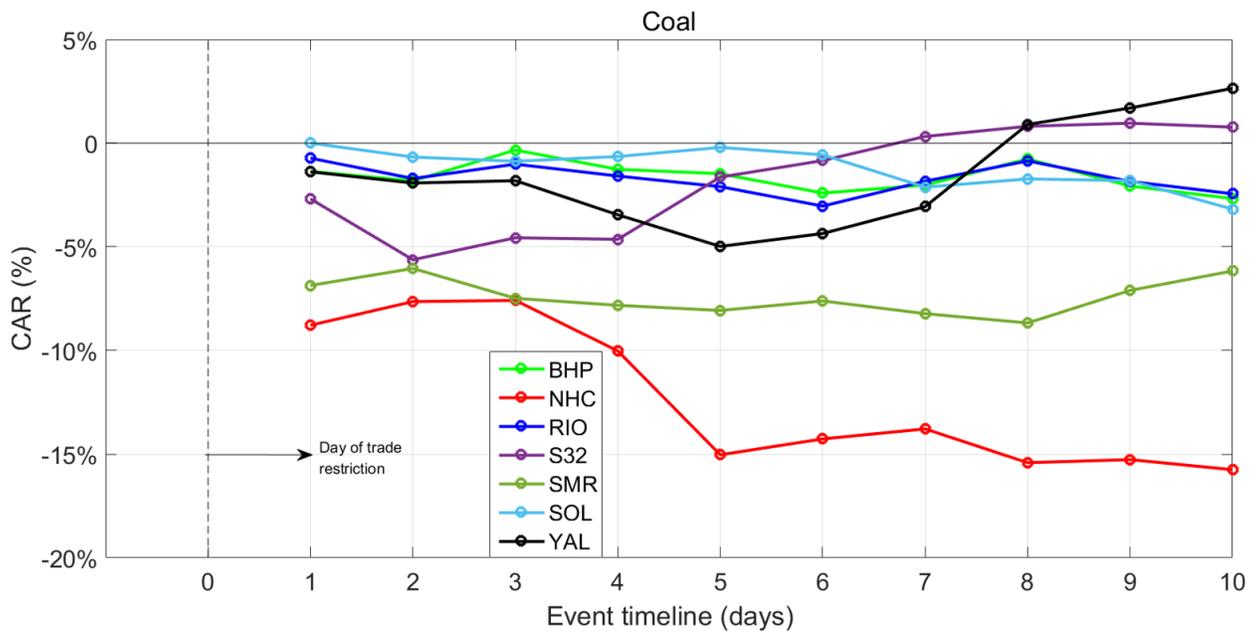


Figure 10: Cumulative abnormal returns (CAR) of seven Australian coal firms for China’s trade restriction released on October 12, 2020.

Notes: BHP, NHC, RIO, S32, SMR, SOL, and YAL represent BHP Billiton Ltd., New Hope Corporation Ltd., RIO Tinto Group, South32 Ltd., Stanmore Resources Ltd., Washington H. Soul Pattinson and Co. Ltd., and Yancoal Australia Ltd., respectively.

Table 1: Timeline of China’s Restrictions on Australian Commodities

Release Date	Effective date	Product	Target firm	Source	Details
5/11/2020	5/11/2020	Beef	JBS Australia Northern Co-Operative Kilcoy Pastoral	General Administration of Customs	Suspension on importing beef from these firms.
5/18/2020	5/19/2020	Barley	Not applicable	Ministry of Commerce	An anti-dumping duty at a rate of 73.6% and a countervailing duty at a rate of 6.9% on barley.
8/26/2020	8/26/2020	Beef	John Dee Warwick	General Administration of Customs	Suspension on importing beef from this firm.
10/12/2020	10/12/2020	Coal	Not applicable	Medias	Chinese state-owned energy suppliers and steel mills received verbal notices to stop importing Australian coal.
10/16/2020	10/16/2020	Cotton	Not applicable	Medias	Chinese cotton mills were told to stop buying Australian cotton.
10/31/2020	10/31/2020	Timber	Not applicable	General Administration of Customs	Suspension on importing logs from Queensland.
11/1/2020	11/1/2020	Lobster	Not applicable	Medias	Tons of live lobsters were stranded at Chinese airports and clearance houses while waiting to be inspected by Customs officials.
11/11/2020	11/11/2020	Timber	Not applicable	General Administration of Customs	Suspension on importing logs from Victoria.
11/27/2020	11/28/2020	Wine	Not applicable	Ministry of Commerce	An anti-dumping duty at a rate of from 107.1% to 212.1% on wine.
12/3/2020	12/3/2020	Timber	Not applicable	General Administration of Customs	Suspension on importing logs from Tasmania and South Australia.
12/7/2020	12/7/2020	Beef	Meramist	General Administration of Customs	Suspension on importing beef from this firm.
12/24/2020	12/22/2020	Timber	Not applicable	General Administration of Customs	Suspension on importing logs from New South Wales and Western Australia.
3/26/2021	3/28/2021	Wine	Not applicable	Ministry of Commerce	Final ruling of the anti-dumping investigation on wine.

Table 2: Publicly Traded Firms and Events Examined in This Study

Commodity	Code	Firm	Event date
Wine	AVG.AX	Australian Vintage Ltd.	11/27/2020 3/26/2021
	TWE.AX	Treasury Wine Estates Ltd.	11/27/2020 3/26/2021
Barley	GNC.AX	GrainCorp Ltd.	5/18/2020
Beef	AAC.AX	Australian Agricultural Company Ltd.	5/11/2020 8/26/2020 12/7/2020
	BFC.AX	Beston Global Food Company Ltd.	5/11/2020 8/26/2020 12/7/2020
	ELD.AX	Elders Ltd.	5/11/2020 8/26/2020 12/7/2020
			10/31/2020
			11/11/2020
Timber	MWY.AX	Midway Ltd.	12/3/2020 12/24/2020
Coal	BHP.AX	BHP Billiton Ltd.	
	NHC.AX	New Hope Corporation Ltd.	
	RIO.AX	RIO Tinto Group	
	S32.AX	South32 Ltd.	10/12/2020
	SMR.AX	Stanmore Resources Ltd.	
	SOL.AX	Washington H. Soul Pattinson and Co. Ltd.	
	YAL.AX	Yancoal Australia Ltd.	

Table 3: Petell t -test Results for CAR

	Firm	Event date	CAR ($\tau_1 = 1$)									
			$\tau_2 = 1$	$\tau_2 = 2$	$\tau_2 = 3$	$\tau_2 = 4$	$\tau_2 = 5$	$\tau_2 = 6$	$\tau_2 = 7$	$\tau_2 = 8$	$\tau_2 = 9$	$\tau_2 = 10$
Wine	AVG	11/27/2020	-2.05%	-1.73%	0.63%	1.20%	1.01%	0.69%	1.33%	1.01%	1.19%	0.56%
	AVG	3/26/2021	0.55%	0.49%	2.90%	1.17%	2.16%	1.11%	2.06%	3.20%	1.66%	2.10%
	TWE	11/27/2020	-6.04%*	-8.89%**	-5.77%*	-4.60%*	-1.02%	0.03%	0.63%	0.70%	-0.67%	3.53%
	TWE	3/26/2021	-1.02%	-2.84%	-3.42%	-3.72%	-4.35%	-3.17%	-4.06%	-6.34%	-5.91%	-5.58
Barley	GNC	5/18/2020	-1.37%	-3.05%	-1.04%	1.05%	4.60%	0.66%	4.31%	7.45%	9.15%	8.49%
	AAC	5/11/2020	-3.39%	-5.96%**	-5.33%**	-2.95%*	-4.29%**	-1.17%	1.94%	0.72%	-0.78%	-2.50%
Beef	AAC	8/26/2020	0.41%	0.69%	1.23%	1.35%	1.18%	0.40%	0.50%	1.33%	0.95%	2.64%
	AAC	12/7/2020	0.11%	0.41%	-0.25%	-1.05%	0.17%	1.94%	1.49%	2.75%	-1.74%	1.76%
	BFC	5/11/2020	-1.91%	-3.33%	-3.81%	-2.16%	-4.51%	-5.40%	-8.07%	-10.13%	-11.76%	-16.49%
	BFC	8/26/2020	-2.98%	-2.64%	-3.00%	-2.16%	0.92%	0.27%	1.59%	2.67%	1.86%	1.86%
	BFC	12/7/2020	-1.23%	-1.29%	-1.76%	3.09%	2.07%	-4.44%	-0.53%	0.07%	-6.71%	-12.16%
	ELD	5/11/2020	-2.11%	-4.41%*	-2.80%	-0.46%	7.66%	4.26%	1.27%	0.18%	-0.02%	-2.48%
	ELD	8/26/2020	-0.78%	-1.32%	-2.08%	-1.56%	1.14%	1.29%	0.39%	-1.06%	-1.58%	-2.55%
	ELD	12/7/2020	1.15%	0.09%	0.71%	-1.93%	-1.47%	-1.59%	-3.02%	-4.08%	-1.61%	-3.75%
Timber	MWY	10/31/2020	-3.04%	-5.84%	-5.82%	-6.95%	-4.42%	-3.59%	-0.85%	-5.84%	-14.44%**	-15.55%**
	MWY	11/11/2020	-4.95%	-13.48%***	-14.53%***	-12.13%***	-8.29%**	-9.13%**	-10.16%***	-10.75%***	-11.53%***	-10.66%***
	MWY	12/3/2020	-1.72%	-2.70%	-3.42%	-5.87%	-3.62%	-3.76%	-4.79%	-4.50%	-6.16%	-7.30%
	MWY	12/24/2020	1.35%	1.54%	2.34%	2.14%	0.25%	0.50%	-2.16%	-4.56%	-6.43%	0.82%
Coal	BHP	10/12/2020	-1.36%	-1.82%	-0.33%	-1.26%	-1.47%	-2.40%	-2.02%	-0.76%	-2.07%	-2.67%
	NHC	10/12/2020	-8.78%***	-7.64%***	-7.59%***	-10.03%***	-15.03%***	-14.27%***	-13.78%***	-15.42%***	-15.27%***	-15.75%***
	RIO	10/12/2020	-0.72%	-1.70%	-1.01%	-1.58%	-2.10%	-3.04%	-1.83%	-0.86%	-1.84%	-2.44%
	S32	10/12/2020	-2.69%	-5.62%**	-4.56%**	-4.64%**	-1.64%	-0.84%	0.32%	0.81%	0.96%	0.77%
	SMR	10/12/2020	-6.86%**	-6.04%*	-7.48%**	-7.82%**	-8.07%**	-7.61%**	-8.22%**	-8.67%**	-7.10%**	-6.17%*
	SOL	10/12/2020	0.01%	-0.67%	-0.87%	-0.64%	-0.20%	-0.56%	-2.12%	-1.72%	-1.81%	-3.18%
YAL	10/12/2020	-1.38%	-1.92%	-1.81%	-3.45%	-4.98%	-4.36%	-3.06%	0.90%	1.70%	2.65%	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Regressions of Cumulative Abnormal Returns

	Model 1 ($\tau_1 = 1; \tau_2 = 4$)	Model 2 ($\tau_1 = 1; \tau_2 = 7$)	Model 3 ($\tau_1 = 1; \tau_2 = 10$)
Intercept	-0.0078 (-0.0184)	-0.0256 (-0.0216)	-0.0454*** (-0.0171)
CAR_{t-1}	0.7947*** (-0.0806)	0.8470*** (-0.0584)	0.9254*** (-0.0438)
Trading volume	1.4521 (-1.4064)	1.7780* (-0.936)	0.8722 (-0.913)
Trading volume $_{t-1}$	-2.2116** (-1.0851)	-1.5732*** (-0.6424)	-0.6578 (-0.7167)
Media index	-0.0014** (-0.0006)	-0.0004 (-0.0004)	-0.0004 (-0.0004)
Media index $_{t-1}$	-0.0010*** (-0.0004)	-0.0003 (-0.0003)	-0.0002 (-0.0003)
Imports Dependence	0.3064*** (-0.0814)	0.1495** (-0.0842)	0.1985*** (-0.0681)
Exports Dependence	-0.1417*** (-0.0379)	-0.0513** (-0.0289)	-0.0476** (-0.0234)
Observations	75	149	225
Adjusted R ²	0.869	0.797	0.822
Day Dummies	Yes	Yes	Yes
Month Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes

Note: *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 5: Importance and Substitutability of Top 20 Australian Products Exports to China in 2019

Commodity	Importance to the Australia		Substitutability for China			Top exporters other than Australia
	Australian exports to China	China's share of Australian exports	Australia' share of China's im-ports	Australia' rank in China's im-ports	China's share in global imports	
Iron ores	54.9	82.60%	61.10%	1	70.00%	Brazil (22%), South Africa (4%)
Coal	10.58	21.30%	49.30%	1	14.20%	Mongolia (16%), Indonesia (15%)
Gold	2.08	12.80%	17.10%	2	13.30%	Switzerland (35%), South Africa (14%)
Wool	1.7	76.50%	74.20%	1	64.40%	New Zealand (8%), South Africa (7%)
Beef	1.6	33.10%	22.50%	3	31.00%	Brazil (26%), Argentina (23%)
Copper ores	1.59	36.80%	4.90%	5	56.80%	Chile (35%), Peru (27%)
Aluminum ores	1.07	97.60%	31.00%	2	71.80%	Guinea (49%), Indonesia (14%)
Copper	0.98	36.40%	3.90%	8	37.90%	Chile (30%), Kazakhstan (8%)
Zinc ores	0.94	55.00%	36.30%	1	25.00%	Peru (19%), Spain (7%)
Medicaments	0.92	47.90%	4.10%	8	5.40%	Germany (26%), France (10%)
Mineral substances	0.9	92.40%	80.90%	1	46.60%	USA (5%), Canada (4%)
Mutton	0.85	28.20%	41.70%	2	24.60%	New Zealand (56%), Uruguay (2%)
Wine	0.79	38.60%	35.40%	1	6.70%	France (29%), Chile (14%)
Cotton	0.77	70.90%	22.90%	2	26.90%	Brazil (27%), USA (20%)
Malt	0.71	68.80%	4.90%	6	26.40%	Netherlands (29%), New Zealand (23%)
Petroleum oils	0.67	15.90%	0.50%	22	22.10%	Saudi Arabia (17%), Russian Federation (15%)
Fuel wood	0.63	60.70%	33.40%	2	19.80%	Viet Nam (44%), Chile (12%)
Crustaceans	0.53	86.60%	7.80%	4	24.10%	Ecuador (26%), India (13%)
Timber	0.43	94.40%	6.20%	5	55.20%	New Zealand (24%), Russian Federation (10%)
Barley	0.41	56.60%	42.40%	1	25.20%	Canada (26%), France (18%)

HS commodity codes in the UN Comtrade database are 2601 (iron ore), 2701 (coal), 7108 (gold), 5101 (wool), 0202 (beef), 2603 (copper ores), 2606 (aluminum ores), 7403 (copper), 2608 (zinc ores), 3004 (medicaments), 2530 (mineral substances), 0204 (mutton), 2204 (wine), 5201 (cotton), 1901 (malt), 2709 (petroleum oils), 4401 (fuel wood), 0306 (crustaceans), 4403 (timber), and 1003 (barley). Australian exports to China are in US \$billion.

Online Appendix for
When China Strikes: Quantifying the Australian
Agricultural Companies' Stock Price Responses to
China's Trade Restrictions

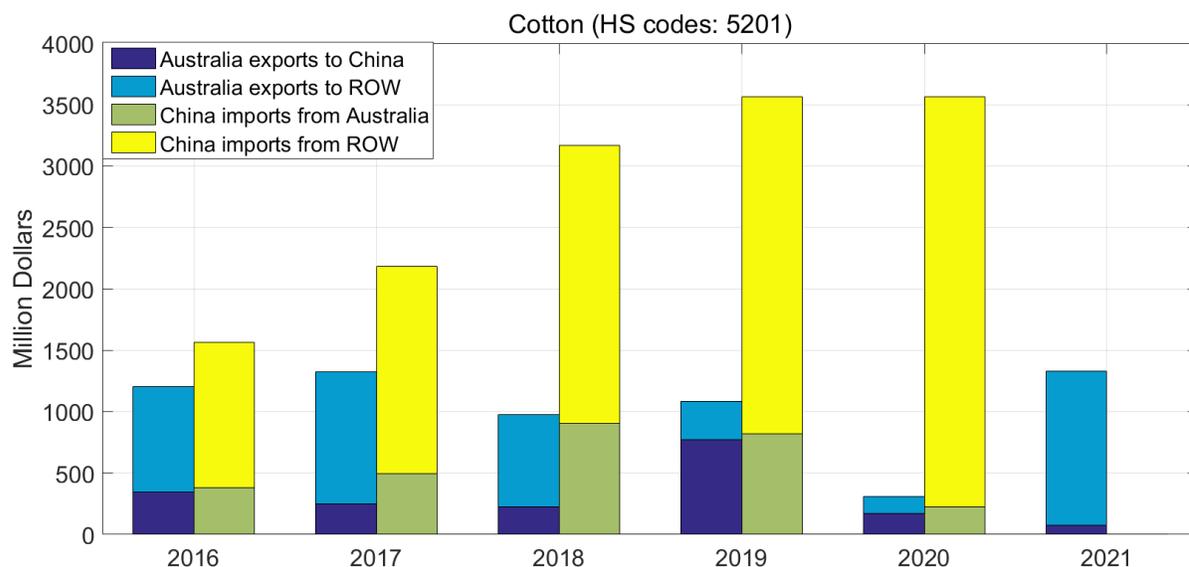


Figure A.1: Cotton trade between China, Australia, and the Rest of the World (ROW).
 Source: UN Comtrade. HS commodity code for cotton is 520. We retrieve Australian exports data when Australia is the reporter, and we retrieve Chinese imports data when China is the reporter in UN Comtrade. Because Australian exports data for December 2021 and China's imports data for all of 2021 are not available in UN Comtrade, the Australian exports data for 2021 consists of January to November, and China's imports data are absent.

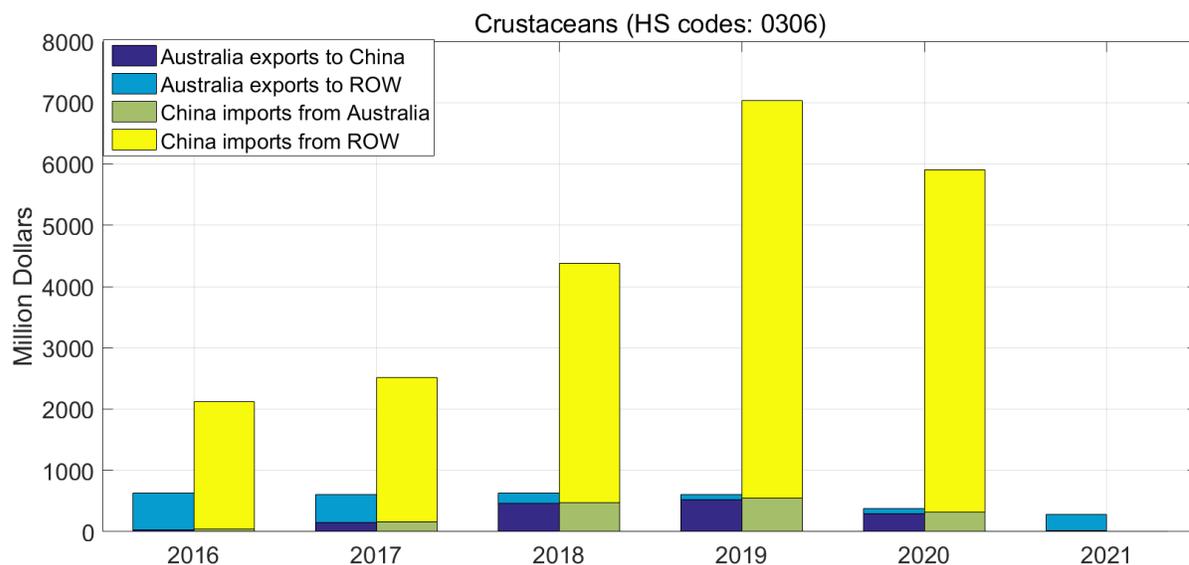


Figure A.2: Crustaceans trade between China, Australia, and the Rest of the World (ROW).
 Source: UN Comtrade. HS commodity code for crustaceans is 0306. We retrieve Australian exports data when Australia is the reporter, and we retrieve Chinese imports data when China is the reporter in UN Comtrade. Because Australian exports data for December 2021 and China's imports data for all of 2021 are not available in UN Comtrade, the Australian exports data for 2021 consists of January to November, and China's imports data are absent.