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The Effects of the United States–China Trade War During the COVID-19 Pandemic on Global Supply Chains: Evidence from Viet Nam

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Abstract: *The trade war between the United States (US) and China has affected their bilateral trade as well as that with other countries. This study investigates how Vietnamese firms performed during the COVID-19 pandemic under the shadow of this trade war. The change in the log of Vietnamese exports to the US from 2017 to 2020 is used to measure the impact of the trade war, and the change in the log of Chinese exports to the US is then used as an instrument for the Vietnamese export change during the same period. It is found that firms that faced more trade war exposure increased their investment, profit, and value added, which may be due to the market exit of unproductive firms. Moreover, the trade war impact is more pronounced for large firms. Foreign-invested firms gained less from trade war exposure. The pandemic weakened the trade war effect on firm performances; however, it exacerbated the trade tension effect on foreign-trade firms.*

Keywords: Trade diversion; Trade war; Pandemic

JEL: F14, F16, R23

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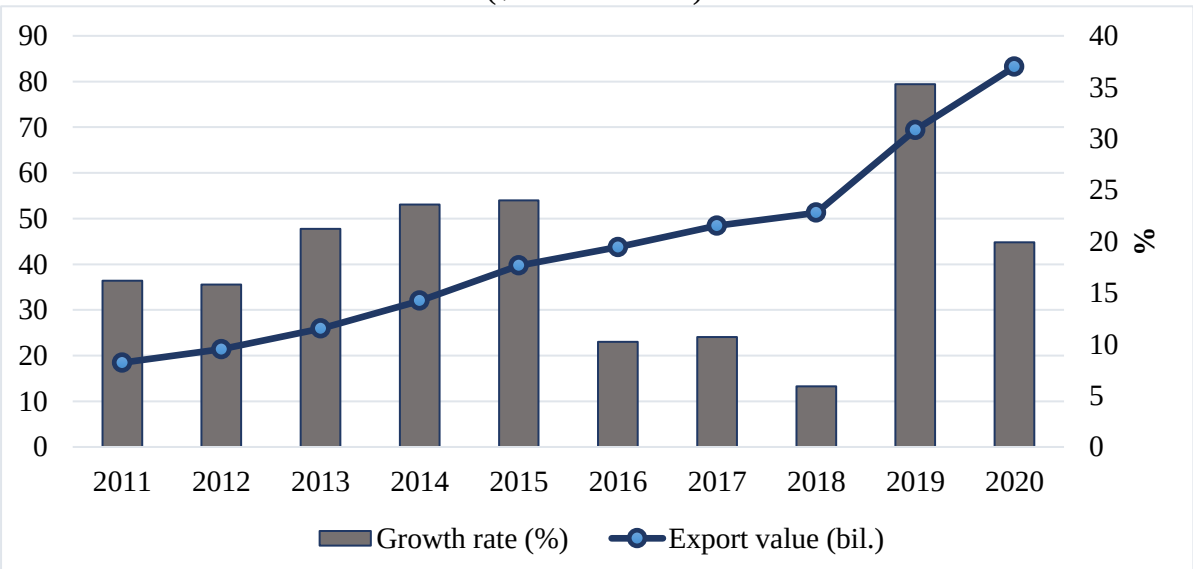
1. Introduction

The United States (US) and China have been engaged in a trade war that involves imposing tariffs on specific products imported from each other, affecting the trade patterns between them significantly. Moreover, the trade conflict has had spill-over effects on other countries through global value chains and trade diversion. Amongst countries that have benefitted from trade diversion due to this trade war, Viet Nam may emerge as the largest beneficiary (Lee, 2019).

The impact of the US–China trade war on Viet Nam is remarkable for several reasons. First, when China's exports to the US fell between 2018 and 2019 due to the trade tension, many countries saw their exports to the US surge, as US importers had to look for alternative sources that were not subject to the tariffs. Viet Nam emerged as the best option, because it also produces goods that China typically exports to the US (and thus face tariffs). As Vietnamese exports could replace these Chinese exports, computers, electronics, furniture, footwear, textiles, and garments saw significant increases in exports to the US.

Figure 1 shows that Viet Nam's exports to the US were growing steadily even before the US–China trade war, but the growth rate had slowed down – before suddenly increasing in 2018. Since 2019, the trend indicates that the rising trade flows between the US and Viet Nam has been likely influenced by the US–China trade war.

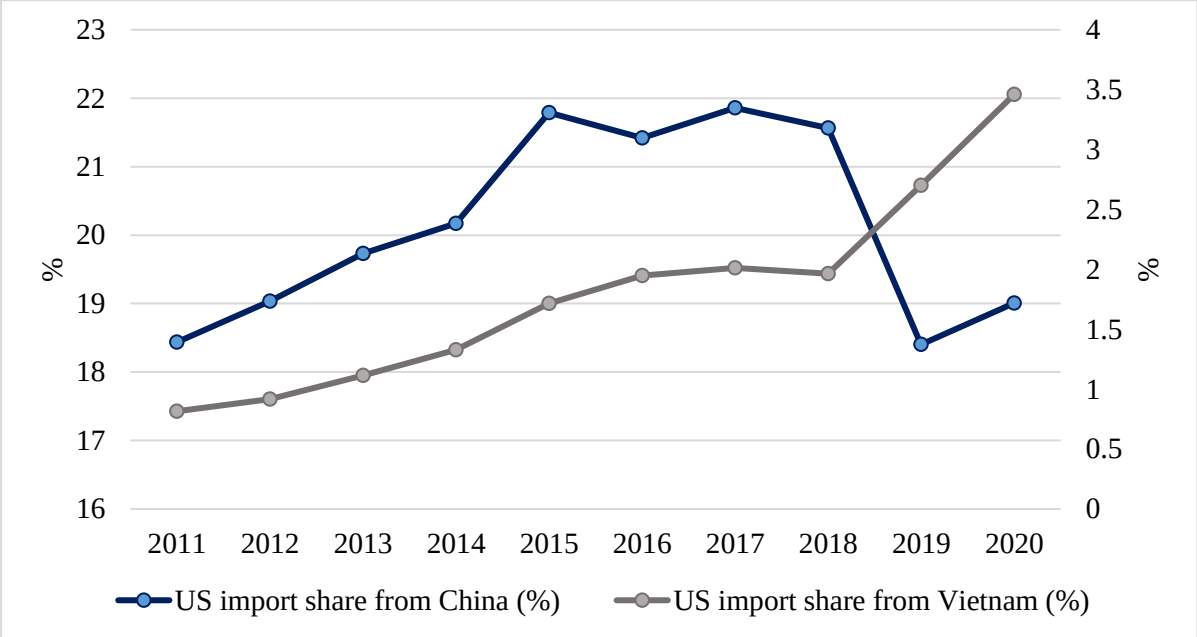
Figure 1: United States Imports of Goods from Viet Nam
($ billion and %)



Source: Authors' calculations from UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

As a result, Vietnamese exports have been taking the market share from Chinese products that face tariffs when exported to the US (Figure 3.2). Furthermore, Viet Nam is similar to China in terms of comparative advantage in labour-intensive industries, political stability, and economic growth. As the US–China trade war intensifies, many reports and analyses suggest that Chinese companies are diversifying or moving production operations out of China and into Viet Nam (e.g. Reed and Romei, 2019), which can lead to increased supply capacity for Viet Nam's exports to the US.

Figure 3.2: Share of United States Imports from China and Viet Nam
(%)



US = United States.
Source: Authors' calculations from UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

Some studies have been conducted to investigate the effects of the trade war on the economies of the US and China. According to Amiti, Redding, and Weinstein (2019), the changes in US trade policy towards China have resulted in higher domestic prices for US consumers and a reduction in overall US welfare. Balistreri, Böhringer, and Rutherford (2018), as well as Li, He, and Lin (2018) and Bellora and Fontagne (2019), reached similar conclusions. Cui and Li (2021) demonstrated that an increase in US import tariffs has resulted in a decrease in Chinese firm entry. He, Mau, and Xu (2021) showed that Chinese firms that are more vulnerable to US tariffs post fewer job openings and pay lower wages. This

reallocation is more prevalent amongst private firms, exporting firms, and non-foreign-invested firms (Ding et al., 2022).

Other studies have looked at the impact of the trade diversion on other countries (e.g. Bolt, Mavromatis, and van Wijnbergen, 2019). Nidhiprabha (2019) demonstrated that the trade war has reduced Thai exports. Prior research had already demonstrated the impact of trade policy shocks on firm employment (David, Dorn, Hanson, 2013; Pierce and Schott, 2016), technological innovation (Bloom, Draca, Van Reenen, 2016), and foreign market entry (Crowley, Meng, Song, 2018). However, the idea that bilateral trade disputes affect firm performances in third countries is rare. Only recently, Sun et al. (2020) investigated the impact of the US–China trade war on Japanese multinational corporations and discovered that their Chinese affiliates, who are more exposed to trade with North America, are experiencing lower sales. However, how the effects of the trade war evolved during the COVID-19 pandemic remains largely unexplored.

This study examines the firm-level impacts of the US–China trade war on Vietnamese firm performance, spanning 2017 to 2020. The change in the log of exports from Viet Nam to the US between 2017 and 2020 is used to measure the impact of the trade war when the US first imposed tariffs on many exports by China. Whether the impact of the trade war on firm performances was intensified during the COVID-19 pandemic is also explored by examining the effects of the trade war on the level of stringency of exporting countries to the US. To address potential endogenous problems, the change in the log of exports from China to the US is used as an instrument for the change in Vietnamese exports to the US in the same period. The potential mechanisms through which the trade war affects local firms are also considered.

This study makes several contributions to the literature. First, it adds to the growing body on US–China trade tensions (e.g. Huang et al., 2018; Amiti, Redding, Weinstein, 2019; Fajgelbaum et al., 2020). Additional evidence is provided of how the trade war affects countries other than the US and China. Second, it contributes to studies on the growth and performance of manufacturing firms in response to trade shocks. This is one of the first attempts to investigate the indirect effects of the US–China trade war on developing countries at the firm level. Third, previously unexplored interactions between the trade war and the COVID-19 pandemic on firm performance is explored.

The rest of the paper is organised as follows. In the next section, background information is provided on the evolution of the US–China trade war and the COVID-19 pandemic. In Section 3, a conceptual framework for the study is provided. Section 4 describes

the data and presents the empirical modelling strategy. Section 5 presents the results and discusses the tests of potential mechanisms. Section 6 concludes.

2. The US–China Trade War and COVID-19 Pandemic

The US has claimed that China has been engaging in unfair trade practices and stealing intellectual property for a long time and that the Government of China requires US companies to transfer their technology to China. To force China to change its behaviours, then-US President Donald Trump started to impose tariffs and other trade barriers on Chinese goods. Trump asked the United States Trade Representative (USTR) to investigate imposing tariffs on $50 billion worth of Chinese imports. China's Ministry of Commerce responded to this action on 2 April 2018 by imposing tariffs on 128 US products, including a 25% tax rate on aluminium scrap, aircraft, automobiles, pork products, and beans and soybeans as well as 15% on fruit, nuts, and steel pipes. On 3 April, the USTR released a list of more than 1,300 Chinese imports – worth $50 billion – that would be subject to tariffs, including satellites, batteries, flat-screen televisions, medical equipment, and weapons. China retaliated by increasing tariffs on cars, planes, and soybeans – the top agricultural exports from the US to China – by 25%. On 5 April, Trump instructed the USTR to consider imposing tariffs on an additional $100 billion of goods in response to China's actions.

The US–China trade dispute escalated when China withdrew an order for US soybeans. In May 2019, the US officially applied a 25% tariff on Chinese goods worth $200 billion according to List 3. China announced that it would soon retaliate. In September 2019, the US formally imposed additional tariffs on Chinese imports worth $125 billion (i.e. List 4A), including flat-screen televisions, shoes, food, and watches. China responded by increasing tariffs on US goods according to List 1. By the end of 2019, the US had levied tariffs on Chinese imports totalling about $350 billion, including those on List 4B, while China had levied tariffs totalling about $100 billion on US imports (Fajgelbaum and Khandelwal, 2022).

Meanwhile, the World Health Organization declared COVID-19 a global pandemic in March 2020 as it spread rapidly across the globe. By the end of 2020, more than 79 million people had been infected, and more than 1.7 million had died from COVID-19 globally (WHO, 2020). Many countries implemented various measures such as lockdowns, travel bans, and social distancing to try to control the pandemic with limited success.

Viet Nam was one of the few countries that managed to contain the pandemic effectively and to minimise its economic impact. It acted swiftly and decisively to implement

strict containment measures, such as active contact tracing, targeted testing, and isolation of suspected COVID-19 cases. These measures resulted in very low recorded infection and mortality rates per capita in 2020 (Dang, 2022). Viet Nam also supported its economy with timely policy interventions that helped it achieve one of the highest growth rates in the world in 2020, driven by a strong export performance (Dabla-Norris and Zhang, 2021).

3. Conceptual Framework

3.1. Hypothesis 1: Trade War Increases Business Growth

According to this hypothesis, the trade diversion due to the US–China trade war results in greater increases in output and employment in industries with higher exports compared to industries with smaller increases in trade volume. Furthermore, the effects of export expansion differs between firms within an industry. If firms' underlying profitability differs due to differences in marginal costs of production and faces a fixed cost of exporting, higher export demand disproportionately raises the profitability of firms with lower marginal costs of production (Melitz, 2003; Demidova and Rodriguez-Clare, 2013). Firm-specific marginal cost differences result from differences in manager entrepreneurial ability (Lucas, 1978; Gollin, 2008) or underlying productivity (Melitz, 2003).

Against this setting, more productive firms benefit from policy-induced decreases in variable export costs, because only they earn high enough variable profits from increased exports to cover the fixed cost of exporting. As a result, the expansion of exporting markets increases product and labour demand – and profitability – amongst these more productive firms, while increasing labour costs and decreasing the profitability of inefficient firms that only serve the domestic market. This shifts the market share and employment composition away from less productive employers and towards more productive firms (McCaig and Pavcnik, 2018a).

The trade war also forces foreign firms to relocate their supply chain activities away from China, particularly at the final product assembly and finishing stages; companies can either diversify their sourcing strategies or exit China entirely. Most businesses may not be able to afford to relocate their factories out of China or to replace their Chinese-sourcing vendors. This is because supply chain infrastructure takes time to establish, and China is central to the majority of the world's production, sourcing, and procurement needs. Rather, they may reallocate a portion of the supply chain or open new plants in another country, allowing firms trading with the US to manage their 'origin of supply' while maintaining their

relationships with other markets – but based out of China. In this way, the employment of existing foreign firms may be increased.

3.2. Hypothesis 2: Trade War Affects Firm Exit and Entry into the Market

Here, the trade war harms third-country industries supplying intermediate goods or those that are part of the global value chain. Meanwhile, if growth in the US and China slows, demand for their exports falls. Trade destruction has a significant impact on the economy, which increases firm exit and harms firm entry and survival. However, the US–China trade war also creates opportunities for firms in the third countries to substitute Chinese goods targeted by tariffs in the US market or US products targeted by tariffs in the Chinese market, thereby enabling the expansion of their export markets, increasing firm entry, and decreasing firm exit. The magnitude of the benefit is determined by how quickly supply chains are redirected to new suppliers and whether firms perceive the trade war as a permanent or transitory phenomenon. It also depends on how substitutable the goods that China sells to the US are in comparison to the exports of other countries (Benguria, 2022).

3.3. Hypothesis 3: The Pandemic Intensifies the Impact of the Trade War

The social distancing in many countries hurts their exports to the US, creating an opportunity for Viet Nam – which was less affected by the pandemic in 2020 – to export more to the US. In this regard, the COVID-19 pandemic prompts global supply chain restructuring, including reallocation of production to reduce concentration risk and diversification of production bases, which reinforces the impact of the trade war on business performance.

4. Empirical Methodology

4.1. Data Description

This study uses three main datasets: firm data from Vietnam Enterprise Surveys, Oxford COVID-19 Government Response Tracker (OxCGRT) dataset, and trade data from the UN Comtrade Database.

4.1.1. Vietnam Enterprise Survey Data

The primary dataset used is drawn from Vietnam Enterprise Surveys. These surveys have been conducted annually since 2000 by the General Statistical Office and cover all enterprises with more than 100 employees, a 50% representative sample of firms with 50–99 employees, 15%–20% with 10–49 employees, and 10% with less than 10 employees. The

firms are tracked over time via a unique firm identifier, allowing some to be followed over time to observe whether they grow, enter, or exit. The surveys provide comprehensive information about firms and their activities, including information on demographics, ownership, business activities, employment, wages, assets, capital, business performance, revenue, and profit. They also have information on whether firms buy or sell goods and services from or to abroad. The years 2017 are taken as pre-trade war and 2020 as post-trade war and when the pandemic happens.

Table 1 shows the descriptive statistics of the main variables. Nineteen percent of firms have trading activities with foreign markets. Foreign-invested firms account for about 1%; 72% of firms report that they have an internet connection, and 8% have websites. The average age of firm owners is 44 years, and 75% are male.

Table 1: Descriptive Statistics of Firms

Variables	N	Mean	SD	Min	Max
Δ Trade war exposure	78,902	8.29	9.21	–6.85	31.81
Ln (Investment)	78,902	5.02	4.10	0	18.88
Ln (Employment)	78,902	2.46	1.56	0.41	11.01
Ln (Income)	78,902	7.73	3.41	0	20.14
Ln (Value Added)	78,902	7.73	3.45	–4.61	20.21
Whether firms have foreign trade(:=1)	78,902	0.19	0.39	0	1
Whether firms are foreign-invested(:=1)	78,902	0.01	0.08	0	1
Whether firms are small (:=1)	78,902	0.29	0.46	0	1
Whether firms have internet (:=1)	78,902	0.72	0.45	0	1
Whether firms have a website (:=1)	78,902	0.08	0.28	0	1
Age of firm owner	78,902	44.39	10.19	16	94
Sex of firm owner (Male:=1)	78,902	0.75	0.43	0	1
Education of firm owner	78,902	5.51	1.93	1	9

Note: Δ Trade war exposure is calculated by taking the change in log of United States imports of goods from Viet Nam from 2017 to 2020. Small firms have less than 100 employees.
Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

4.1.2. COVID-19 Stringency Index

The stringency index, which measures government response to the pandemic, is collected from the OxCGRT dataset. It is argued that US imports were affected not only by its COVID-19 situation but also by how the rest of the world handled the pandemic. Therefore, the COVID-19 variables of US trading partners are considered. Specifically, the stringency index is the level of stringency of the rest of the world in 2020, weighted by country *j*'s import share of product k in 2017 from all countries to the US except Viet Nam. The index formula is:

$$SI_{kj} = \sum_{j=1}^{N} \frac{IM_{kj2017}}{IM_{k2017}} \times SI_{j2020}$$

4.1.3. UN Comtrade Data

Data on Vietnamese exports to the US are taken from the UN Comtrade Database using Harmonized System (HS) codes. This is an international database of five-digit product-level information on all bilateral imports and exports between any given pair of countries. HS-coded commodities that Viet Nam exports to the US are matched with corresponding industry codes by Vietnamese manufacturing firms.

ΔTW_{kj}^{US} is constructed as the change in the log of exports of product k in sector j from Viet Nam to the US between 2017 and 2020 – which may be driven by the trade tension – to measure the impact of the trade war exposure.[1] ΔTW_{kj}^{covid} measures the joint impact of the trade war and pandemic in 2020.

$$\Delta TW_{kj}^{covid} = \Delta TW_{kj}^{US} \times SI_{kj}$$

4.2. Empirical Approach

First, the firm outcomes relating to the trade war and pandemic use the following equations:

$$y_{ij} = \mu + \gamma \Delta TW_{kj}^{US} + \eta X_{ij} + \varepsilon_{ij} \qquad (1)$$

[1] One possibility that the higher Vietnamse exports are due to higher US consumption demand. In fact, according to surveys conducted by the US Bureau of Labor Statistics (BLS), consumer expenditures were substantially affected by the COVID-19 pandemic, which began in March 2020. Average annual expenditures for all consumer units decreased by 2.7% in 2020 compared to 2019. The largest decrease in spending was observed for apparel and services (–23.8%), followed by personal care products and services (–17.8%), alcoholic beverages (–17.4%), and education (–11.9%) (BLS, 2021).

$$y_{ij} = \alpha + \beta \Delta TW_{kj}^{US} + \gamma SI_{kj} + \delta \Delta TW_{kj}^{covid} + \theta X_{ij} + \varepsilon_{ij} \quad (2)$$

where y_{ij} is the outcome variable (e.g. log of employment, log of investment, log of income, and log of value-added of firm i in sector j in 2020), ΔTW_{kj}^{US} is the trade war exposure measured by the change in the log of exports of product k in sector j from 2017 to 2020 from Viet Nam to the US, and ΔTW_{kj}^{covid} measures the interaction impact of the trade war exposure and pandemic in 2020. X_{ij} are firm characteristics. Standard errors are clustered by sector level.

This analysis is performed for all firms as well as separately for foreign-invested firms and firms with foreign trading. The potential role of foreign-invested firms in the expansion of employment in the enterprise sector is particularly interesting. The results of this analysis will show whether growth in the number of firms and employment in response to market expansion is specific to a particular type of firm.

4.3. Instrumental Variable Method

The goal is to identify γ and δ in equations (1) and (2). If the change in the log of exports is exogenous, the ordinary least squares (OLS) estimate of γ and δ indicates the impact of exports to the US and the interaction with the pandemic on outcomes. The positive value of γ and δ implies that the trade war and pandemic promote firm performance; otherwise, they do not have a beneficial effect. However, certain unobserved firm attributes can be correlated with firms' interested outcomes as well as the main interested variable. These factors can make the OLS estimation of γ and δ biased and inconsistent.

To mitigate the endogeneity bias, an instrumental variable (IV) approach is adopted. The change in Chinese exports to the US is taken as an IV. The first-stage specification is:

$$\Delta TW_{kj}^{US} = \alpha + \gamma \Delta CHI_{kj}^{US} + \theta X_{ij} + \varepsilon_{ij} \quad (3)$$

$$\Delta TW_{kj}^{covid} = \mu + \pi \Delta CHI_{kj}^{covid} + \vartheta X_{ij} + \epsilon_{ij} \quad (4)$$

where the variable ΔCHI_{kj}^{US} is the change in exports of product k in sector j from China to the US between 2017 and 2020. ΔCHI_{kj}^{covid} is the multiple of ΔCHI_{kj}^{US} and SI_{kj}, and X_{ij} are firm characteristics.

This measure may satisfy the conditions of a valid IV. It is expected to be highly correlated with the level of Chinese exports to the US. It is less likely to have a direct impact on Vietnamese firm performance.

4.4. Potential Mechanism

4.4.1. Business Exit

The US–China trade war may create opportunities for firms in third countries to substitute Chinese goods targeted by tariffs in the US market or US products targeted by tariffs in the Chinese market, thereby expanding their export markets, increasing firm entry and reducing firm exit. To test this hypothesis, 2017 business data are used for panel businesses, and an indicator variable is constructed for a business that exits. This indicator is then regressed on the change in trade war exposure according to the following equation:

$$y_{ij} = \alpha + \beta \Delta TW_{kj}^{US} + \theta X_{ij} + \varepsilon_{ij} \quad (5)$$

where y_{ij} is the outcome variable (which is an indicator variable for firm i in sector j exiting between 2017 and 2020), and ΔTW_{kj}^{US} is the change in the log of exports of product k in sector j from Viet Nam to the US between 2017 and 2020.

4.4.2. Business Entry

To empirically examine the hypothesis that business entry is influenced by the trade war, equation (5) is employed using a sample of businesses operating in 2020. The dependent variable is an indicator variable for whether the business entered between 2017 and 2020. This analysis will reveal whether greater trade tension and the pandemic are associated with the expansion of industry employment and whether this may, in part, have occurred through the net entry of firms.

5. Empirical Results

The OLS results are presented as a benchmark. In Table 2, an OLS regression is presented with the different firm outcomes as the dependent variables. The main independent variable is a change in the log of US imports of goods from Viet Nam from 2017 to 2020 as a proxy for change in trade war exposure. Standard errors are clustered at the sector level. The regression begins by relating the change in trade war exposure and firm performance outcomes without other control variables. In the upper panel, it is found that the higher the

firm exposure is to the trade war, the better the firm performance – with higher employment, investment, and income.

Table 2: Trade War Exposure and Firm Performance

(ordinary least squares estimates)

	(1)	(2)	(3)	(4)
VARIABLES	**Ln(Employment)**	**Ln (Investment)**	**Ln (Income)**	**Ln (Value Added)**
Δ Trade war exposure	0.021**	0.039***	0.044***	0.044***
	(0.009)	(0.015)	(0.010)	(0.010)
Other variables	No	No	No	No
Δ Trade war exposure	0.015*	0.024**	0.030***	0.030***
	(0.008)	(0.011)	(0.007)	(0.007)
Other variables	Yes	Yes	Yes	Yes
Observations	78,902	78,902	78,902	78,902
R-squared	0.290	0.240	0.213	0.212

Notes:

1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.
3. Δ Trade war exposure is calculated by taking the change in log of United States imports of goods from Viet Nam from 2017 to 2020.
4. Other variables include age, sex, and education level of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

To check the robustness of the results, some exogenous firm characteristics are controlled for, such as age, sex, and education level of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership. The estimates in the lower panel are almost similar.

The results in column (1) in the lower panel show that a higher change in trade war exposure is associated with a higher level of employment. Similarly, it increases the investment, profit, and value-added of firms as shown in columns (2)–(4). The magnitude of the coefficient in column (1) demonstrates that an additional 1% of change in exports increases the number of employees by 0.015%. At the same time, it increases firm investment and income by 0.024% and 0.030%, respectively.

The possible endogeneity bias that may arise from omitted time variables and measurement errors leads to IV estimation, which takes into account unobserved factors that may simultaneously correlate with trade war exposure and firm performance. Equation (1) is

estimated using an IV, which is the change in Chinese exports to the US from 2017 to 2020 (Table 3).

Table 3: Trade War Exposure and Firm Performance
(instrumental variable estimates)

VARIABLES	(1) Ln (Employment)	(2) Ln (Investment)	(3) Ln (Income)	(4) Ln (Value Added)
Δ Trade war exposure	0.026*	0.037*	0.043***	0.043***
	(0.015)	(0.019)	(0.013)	(0.013)
First-stage estimation	Dependent variable: Δ Trade war exposure			
Δ China's trade war exposure	–2.32***	–2.32***	–2.32***	–2.32***
	(0.62)	(0.62)	(0.62)	(0.62)
Other variables	Yes	Yes	Yes	
Observations	78,902	78,902	78,902	78,902
R-squared	0.286	0.239	0.211	0.211
Kleibergen-Paap Wald F statistic: 13.81				

Notes:
1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. Δ Trade war exposure is calculated by taking the change in log of United States (US) imports of goods from Viet Nam from 2017 to 2020.
3. Δ China's trade war exposure is the change in Chinese exports to the US from 2017 to 2020.
4. Other variables include age, sex, and education of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership.
5. In the first stage of the regression, (i) Δ China's trade war exposure is used as an instrument for Δ Trade war exposure; and (ii) Stock-Yogo weak ID test critical values are 8.96 (15% maximal instrumental variable size).
6. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

As seen in the lower panel, the first-stage coefficient is negative and statistically significant. It shows that a lower value of China's exports to the US resulted in less competitive pressure on Vietnamese exports, so Vietnam could export more to the US. The Kleibergen-Paap Wald F statistic in all specifications is 13.80 – well above the Stock-Yogo weak ID test critical values of 8.96.

Consistent with the results presented above, the findings – shown in the upper panel of Table 3 – confirm the effect of the change of trade war exposure on firm performance. The estimated effect in column (1) is statistically significant and indicates that 1% of change in exports increases the number of employees by 0.026%, which is larger than the OLS estimate. In addition, it increases firm investment and income by 0.037% and 0.043%, respectively, as indicated in columns (2)–(3). The larger trade war exposure coefficients indicate that not controlling for unobservables and measurement errors underestimates the true size of the effect of trade war exposure on firm performance.

5.1. Heterogeneity

Foreign-trade firms that are directly linked to the global value chain may be exposed more to the trade war. The impact of trade exposure on foreign-trade firms is investigated in Table 3. The results in columns (1)–(2) indicate that there was no difference in the effects of trade war exposure on foreign-trade firms compared to other firms. Even the results in columns (3)–(4) show that foreign-trade firms benefited less, such as through lower income and value added, than others.

These results seem counterintuitive; it is expected that the trade diversion would result in greater increases in output and employment in industries with higher exports compared to industries with lower exports. One possible explanation is that foreign-trade firms may face lower demand from other markets due to a decline in international trade, although they may benefit from less competition pressure from Chinese exports. The IV results in the lower panels confirm the OLS results, showing that foreign-trade firms have not benefited more than others.

Table 4: Trade War Exposure and Foreign-Trade Firm Performance

	(1)	(2)	(3)	(4)
VARIABLES	**Ln(Employment)**	**Ln (Investment)**	**Ln (Income)**	**Ln (Value Added)**
OLS estimate				
Δ Trade war exposure × whether firms have foreign trade	–0.008	–0.001	–0.024***	–0.022***
	(0.008)	(0.013)	(0.007)	(0.007)
IV estimate				
Δ Trade war exposure × whether firms have foreign trade	–0.003	–0.008	–0.023**	–0.021*
	(0.014)	(0.020)	(0.011)	(0.011)
Other variables	Yes	Yes	Yes	Yes
Observations	78,902	78,902	78,902	78,902
Kleibergen-Paap Wald F statistic: 6.56				

IV = instrumental variable, OLS = ordinary least squares.

Notes:

1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. Other variables include Δ Trade war exposure; an indicator of whether firms engage in foreign trade; age, sex, and education level of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership.
3. Δ Trade war exposure is calculated by taking the change in log of United States imports of goods from Viet Nam from 2017 to 2020.
4. In the first stage of the regression, (i) Δ China's trade war exposure is used as an instrument for Δ Trade war exposure; and (ii) Stock-Yogo weak ID test critical values are 4.58 (15% maximal instrumental variable size).
5. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

Firms may have different capacities in capturing the benefits from trade war exposure, depending on their size. Larger firms are more likely to be involved in global value chains than smaller ones, and they may better capture the benefits resulting from the trade war. To test this possibility, trade war exposure interacts with a dummy for small firms. The regressions exploring the relationship between trade war exposure with firm size and firm performance have the same specifications as previous regressions (Table 5).

Table 5: Trade War Exposure and Firm Performance by Firm Size

	(1)	(2)	(3)	(4)
VARIABLES	Ln(Employment)	Ln (Investment)	Ln (Income)	Ln (Value Added)
OLS estimate				
Δ Trade war exposure × whether firms are small	–0.019**	–0.043***	–0.039***	–0.039***
	(0.008)	(0.015)	(0.012)	(0.012)
IV estimate				
Δ Trade war exposure × whether firms are small	–0.023**	–0.061**	–0.042**	–0.042**
	(0.011)	(0.025)	(0.016)	(0.017)
Other variables	Yes	Yes	Yes	Yes
Observations	78,902	78,902	78,902	78,902
Kleibergen-Paap Wald F statistic: 6.83				

IV = instrumental variable, OLS = ordinary least squares.
Notes:
1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. Other variables include Δ Trade war exposure; an indicator of whether firms are small; age, sex, and education level of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership.
3. Δ Trade war exposure is calculated by taking the change in log of United States imports of goods from Viet Nam from 2017 to 2020.
4. Small firms have less than 100 employees.
5. In the first stage of the IV regression, (i) Δ China's trade war exposure is used as an instrument for Δ Trade war exposure (Δ China's trade war exposure × whether firms have foreign trade is used as an instrument for Δ Trade war exposure × whether firms have foreign trade); and Stock-Yogo weak ID test critical value is 4.58 (15% maximal IV size).
6. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

The results in Table 5 confirm that the impacts of the trade war differed according to firm size. They indicate that the impacts of the trade war on firm performance were more profound on large firms, supporting the hypothesis that large firms benefitted more than smaller ones. In the lower panel of Table 3.5, the impacts of the trade war are estimated separately for different firm sizes using IV estimation. Columns (1) – (4) confirm that the

effects of the trade war were more pronounced for large firms, with larger magnitudes of coefficients.

This analysis is performed separately for foreign-invested firms, as their potential role in the expansion of employment in the enterprise sector is interesting (Table 6). The findings in columns (1) and (2) show that there was no difference between foreign-invested and domestic firms in facing an increased level of trade war exposure. However, foreign-invested firms tended to have lower incomes and value added than domestic firms facing a higher level of trade war exposure as presented in columns (3) and (4).

The lower panel shows the IV estimates for foreign-invested firms. Consistent with the OLS findings, the results in columns (1) to (4) reveal that foreign-invested firms benefited less from the trade war. These results may be due to exports to the US (e.g. garments, textiles, furniture, and dried fish) being largely provided by domestic firms, which were previously processed in China before Trump's tariff hikes.

Table 6: Trade War Exposure and Firm Performance by Firm Ownership

	(1)	(2)	(3)	(4)
VARIABLES	**Ln(Employment)**	**Ln (Investment)**	**Ln (Income)**	**Ln (Value Added)**
OLS estimate				
Δ Trade war exposure × whether firms are foreign-invested	–0.011	–0.025	–0.039***	–0.043***
	(0.008)	(0.017)	(0.013)	(0.014)
IV estimate				
Δ Trade war exposure × whether firms are foreign-invested	–0.032*	–0.065***	–0.077***	–0.086***
	(0.018)	(0.023)	(0.027)	(0.027)
Other variables	Yes	Yes	Yes	Yes
Observations	78,902	78,902	78,902	78,902
Kleibergen-Paap Wald F statistic: 6.90				

IV = instrumental variable, OLS = ordinary least squares.

Notes:

1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. Other variables include Δ Trade war exposure; an indicator of whether firms are foreign-invested; age, sex, and education level of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership.
3. Δ Trade war exposure is calculated by taking the change in log of United States imports of goods from Viet Nam from 2017 to 2020.
4. In the first stage of the IV regression, (i) Δ China's trade war exposure is used as an instrument for Δ Trade war exposure (Δ China's trade war exposure × whether firms have foreign trade is used as an instrument for Δ Trade war exposure × whether firms have foreign trade); and (ii) Stock-Yogo weak ID test critical value is 4.58 (15% maximal IV size).
5. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

5.2. Trade War Impacts in the COVID-19 Context

Whether COVID-19 strengthened the impact of the trade war on firm performances is explored by estimating equation (2). The OLS results are shown in the upper panel of Table 7. The results in columns (1) to (4) indicate that the pandemic did not significantly affect firm performance. It also did not change the effects of trade war exposure on firm performance.

The lower panel examines the impacts of trade war exposure and the pandemic using IV estimation. The results show that the pandemic resulted in a lessened effect of the trade war on firm performance such as investment, income, or value added. However, the magnitude of the coefficients is small.

Table 7: Trade War Exposure During the Pandemic and Firm Performance

	(1)	(2)	(3)	(4)
VARIABLES	Ln(Employment)	Ln (Investment)	Ln (Income)	Ln (Value Added)
OLS estimate				
Δ Trade war exposure × stringency	0.0000	–0.0003	–0.0002	–0.0003*
	(0.0001)	(0.0002)	(0.0001)	(0.0002)
IV estimate				
Δ Trade war exposure × stringency	0.0000	–0.0006*	–0.0004**	–0.0005**
	(0.0001)	(0.0003)	(0.0002)	(0.0002)
Other variables	Yes	Yes	Yes	Yes
Observations	78,902	78,902	78,902	78,902
Kleibergen-Paap Wald F statistic: 5.75				

IV = instrumental variable, OLS = ordinary least squares.

Notes:

1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. Other variables include Δ Trade war exposure; a stringency measure; age, sex, and education level of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership.
3. Δ Trade war exposure is calculated by taking a change in log of United States (US) imports of goods from Viet Nam from 2017 to 2020.
4. The stringency measure is the average stringency of the rest of the world in 2020, weighted by country *j*'s import share of product *k* in 2017 from all countries to the US except Viet Nam.
5. In the first stage of the IV regression, (i) Δ China's trade war exposure is used as an instrument for Δ Trade war exposure (Δ China's trade war exposure × stringency invested is used as an instrument for Δ Trade war exposure × stringency); and (ii) Stock-Yogo weak ID test critical value is 4.58 (15% maximal IV size).
6. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

Table 8 presents the results of the analysis of the impacts of the trade war on foreign-trade firm performance during the pandemic. The coefficients of the main variable in columns (1) to (4) are statistically significant and indicate that a higher level of stringency led to a

greater effect on firm performance. This confirms the conjecture that stringency in exporting countries negatively impacts their exports to the US, thereby creating favourable conditions for Vietnamese exports to the US. However, the magnitudes of coefficients in columns (1) and (4) are small. The IV estimation shows similar results, although some of the main coefficients are not statistically significant.

Table 8: Trade War Exposure During the Pandemic and Foreign-Trade Firm Performance

	(1)	(2)	(3)	(4)
VARIABLES	**Ln(Employment)**	**Ln (Investment)**	**Ln (Income)**	**Ln (Value Added)**
OLS estimate				
Δ Trade war exposure × stringency	0.0006***	0.0004**	0.0003***	0.0003***
	(0.0001)	(0.0002)	(0.0001)	(0.0001)
IV estimate				
Δ Trade war exposure × stringency	0.0007***	0.0002	0.0002*	0.0002
	(0.0003)	(0.0003)	(0.0001)	(0.0001)
Other variables	Yes	Yes	Yes	Yes
Observations	14,732	14,732	14,732	14,732
Kleibergen-Paap Wald F statistic: 7.12				

IV = instrumental variable, OLS = ordinary least squares.
Notes:
1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. Other variables include Δ Trade war exposure; a stringency measure; age, sex, and education level of firm owner; an indicator of whether firms have internet; an indicator of whether firms have websites; and dummies for firm ownership.
3. Δ Trade war exposure is calculated by taking the change in log of United States (US) imports of goods from Viet Nam from 2017 to 2020.
4. The stringency measure is the average stringency of the rest of the world in 2020, weighted by country *j*'s import share of product *k* in 2017 from all countries to the US except Vietnam.
5. In the first stage of the IV regression, (i) Δ China's trade war exposure is used as an instrument for Δ Trade war exposure (Δ China's trade war exposure × stringency invested is used as an instrument for Δ Trade war exposure × stringency); and (ii) Stock-Yogo weak ID test critical value is 4.58 (15% maximal IV size).
6. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

5.3. Testing for Potential Mechanisms

One of the possible channels – based on Melitz's model that the US–China trade war may affect firm performance in third countries – is that the trade war induces more productive firms to enter the market, while some less productive firms continue to produce only for the domestic market and simultaneously force the least productive firms to exit. This is tested for by examining the effect of the trade war on firm entry and exit. To avoid the possibility that

the results are effects of sampling, only the sample that covers all Vietnamese firms with no less than 100 employees is used.

The results in both OLS and IV estimations are reported in Table 9. In columns (1) and (3), the estimated coefficients for the change in trade war exposure are positive and show that the trade war may have stimulated firm entry. However, the coefficients are not statistically significant. Similarly, as shown in columns (2) and (4), a change in trade war exposure increased the probability of firms exiting markets. In addition, the coefficient in column (4) is statistically significant, although its magnitude is small. This may be because the sample does not cover small firms that are likely to be less productive than larger ones. In addition, these estimates only reflect a short-term effect. The effects of trade war exposure could be larger if the trade war is prolonged.

Table 9: Potential Channels

	(1)	(2)	(3)	(4)
	OLS Estimates		IV Estimates	
VARIABLES	**Whether Firms Enter 2020**	**Whether Firms Exit 2020**	**Whether Firms Enter 2020**	**Whether Firms Exit 2020**
Δ Trade war exposure	0.0005	0.0004	0.0008	0.0008*
	(0.0007)	(0.0003)	(0.0013)	(0.0005)
Observations	27,510	41,719	27,510	41,719
R-squared	0.0002	0.0009	0.0000	–0.0003

IV = instrumental variable, OLS = ordinary least squares.

Notes:

1. Standard errors are robust to heteroskedasticity, and those clustered at the sector level are reported in parentheses.
2. The sample only includes enterprises with 100 employees or more.
3. Δ Trade war exposure is calculated by taking the change in log of United States imports of goods from Viet Nam from 2017 to 2020.
4. *** = significant at the 1% level, ** = significant at the 5% level, and * = significant at the 10% level.

Source: Authors' calculations from GSO (2022) and UN, UN Comtrade Database, https://comtradeplus.un.org/ (accessed 30/10/2022).

6. Conclusion

The US–China trade war has created new export opportunities for firms in other countries that induced labour and market share reallocation from less to more productive firms within an industry, generating additional aggregate output gains. While empirical studies have confirmed that trade reallocates employment towards more productive uses and increases aggregate productivity through the reallocation of labour and market shares from less to more productive firms in high-income countries, substantially less is known about this topic in developing ones.

To examine this issue, a higher tariff imposed by the US on many export products by China was used as an exogenous shock to investigate their impacts on Vietnamese firms. The change in the log of exports from Viet Nam to the US between 2017 and 2020 was used to measure the impact of the trade war. Whether the impact of the trade war on firm performances grew during the COVID-19 pandemic was examined through the effects of the interaction of the trade war with the level of stringency of exporting countries to the US. To address potential endogenous problems, the change in the log of exports from Viet Nam to the US was used as an instrument for the change in Vietnamese exports to the US in the same period. The potential mechanism through which the trade war may affect local firms was also tested.

It is found that a higher trade war exposure increased the investment, profit, and value added of firms. The effects of trade war were more pronounced for large firms. Foreign-invested firms benefited less from the trade war. The trade war impacted the local market by increasing the probability of firms exiting markets. The pandemic resulted in a lower effect of the trade war on firm performance; however, it strengthened the effect on foreign-trade firms – although it is small.

This paper expects to complement other studies showing that the reduction in the share of Chinese exports to the US may impact the growth of businesses in developing countries. In addition, these effects could be magnified by the pandemic. The impacts of the trade war and pandemic on the dynamics of enterprises and firm performance also provide insight into understanding transitions and reallocation of resources across industries. The results imply that governments should support domestic firms in expanding markets through export promotion.

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