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研究課題名(和文) Impacts of tariffs of the US against China on the machinery exports of China and Japan to the US

研究課題名(英文) Impacts of tariffs of the US against China on the machinery exports of China and Japan to the US

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研究成果の概要(和文)：1. 中国変数は韓国の機械輸出に影響を与えるのか？ 2002年第1四半期から2021年第4四半期にかけて中国と韓国から米国に輸出される機械製品を分析し、貿易戦争や為替レートなど中国の変数が韓国の輸出数量と価格に及ぼす影響を把握した。TSLSの推定結果によると、人民元が1%下落すると、韓国の輸出額が0.28%減少する。貿易戦争は韓国の輸出に肯定的な影響を与え、中国の輸出には否定的な影響を与えた。2. 為替レートが日本の対米機械輸出価格に与える影響：大恐慌以降、円·ドル為替レートが日本の輸出価格に与える影響ははるかに小さく、統計的にも有意ではないことが分かった。

研究成果の学術的意義や社会的意義

The research shows that the trade war between China and the US had positive impacts on the exports of China's competitors such as Korea. It also shows that Japanese exporters do not decrease export prices despite cheaper Japanese currency, putting more weight on earnings.

研究成果の概要(英文)：1. Did Chinese variables affect the machinery exports from Korea to the US? This research analyzes machinery commodities which are exported from China and South Korea to the US from 2002Q1 to 2021Q4 to determine the impacts of Chinese variables such as trade war and exchange rates on the export quantity and price of Korea. The TSLS estimation results show that a 1% depreciation of the renminbi decreases the value of Korean exports by 0.28%. In contrast, trade war affected Korean exports positively while it affected Chinese exports negatively. 2. Was there a structural break in the impacts of exchange rates on the prices of Japanese machinery exports to the US? The results of the research shows that the impact of the yen-dollar exchange rates on Japanese export prices is much smaller and statistically insignificant after the Great Recession.

研究分野：Economics

キーワード：Trade war machinery exports Exchange rates Export prices

様式 C - 19、F - 19 - 1 (共通)

1. 研究開始当初の背景

Since President Trump announced tariffs on some machinery imports from China on January 22, 2018, the conflict between the US and China intensified. The media began to describe their conflicts as a “trade war.” Although the trade war between the two superpowers provoked world-wide concern, its impacts on the exports to the US from China and China’s competitors have rarely been scientifically explored.

2. 研究の目的

The purpose of this research is to investigate whether and to what extent the tariffs (or trade war) have affected the price and quantity of machinery exports from China and its competitors including Japan to the US. Although the tariffs were imposed mainly on Chinese exporters, it must affect not only Chinese exports but also exports of China’s competitors in the US market. Specifically, this research analyzes, by employing structural models of export supply and demand of China and Japan, the panel data of ten-digit level machinery commodities exported from China, Japan and South Korea to the US to determine the channels through which trade war influence the quantity and price of their exports.

3. 研究の方法

Although recent trade policies of the US mainly targeted Chinese exporters, the behavioral changes of Chinese exporters will alter the market strategies of China’s competitors, too. Then, their changes will lead to sequential changes of Chinese exporters and so on. Therefore, to include only Chinese variables in the model should mis-specify the dynamics caused by tariffs. Accordingly, this project will include not only China but also its major competitor, Japan and South Korea, as players in the structural model to alleviate the misspecification problem. The US machinery sector is the biggest foreign market for China, Japan and South Korea. The three countries export around 3000 commodities to the US machinery market (at the 10-digit level of HS code from 84 to 96), and more than 80% of them overlap. Accordingly, the structural model of the project involves simultaneous equations and a huge amount of panel data. Since preliminary estimation experiments showed that the impact of the tariff variable is not significantly detected for the sample period, possibly because the trade war is not just a matter of tariffs, the structural model adopted the trade war dummy as one of the explanatory variables.

Specifically, the export demand equation of a country has the following form:

$$q_{it}^j = \alpha_0^j + \alpha_1^j p_{it}^C + \alpha_2^j p_{it}^J + \alpha_3^j p_{it}^K + \alpha_4^j gdp_t^{US} + \alpha_5^j ppi_t^{US} + trend + recession\ dummy + trade\ war\ dummy + sector\ dummy + quarter\ dummy + \varepsilon_{it} \quad \text{--- (1)}$$

where q_{it}^j denotes the quantity of commodity i at time t exported from country j to the US. Country j is China (C), Japan (J) or Korea (K). Two price variables, p_{it}^C , p_{it}^J and p_{it}^K , are the export price of Chinese, Japanese and Korean commodity i , respectively. The superscripts, C, J and K, denote China, Japan and Korea, hereafter. The two variables, gdp_t^{US} and ppi_t^{US} , represent the real GDP and the producer price index of the US. The trend is also included as an explanatory variable. In addition, dummies for the Great Recession period (2009-2011), the trade war period (2019-2021) are included. The sector dummy is included not at the 10-digit level but at the 2-digit level so that the degree of freedom of the estimation will not be sharply reduced. Finally, the quarter dummy is included to capture seasonality.

The export supply equation of a country has the following form:

$$p_{it}^j = \beta_0^j + \beta_1^j q_{it}^j + \beta_2^j exr_t^C + \beta_3^j exr_t^J + \beta_4^j exr_t^K + \beta_5^j oil_t + trend + recession\ dummy + trade\ war\ dummy + sector\ dummy + quarter\ dummy + \delta_{it} \quad \text{--- (2)}$$

where the three variables, exr_t^C , exr_t^J and exr_t^K denote the exchange rate of country j 's currency against the US dollar. Just as in the demand equation, country j is either China (exr_t^C) or Korea (exr_t^K). The variable, oil_t , is the crude oil price. The trade war dummy is included in the supply equation, too, to capture the impacts of the trade war on export prices.

There are 6 simultaneous equations, a supply and a demand equation for each country. The quantity and price variables are endogenous, but they play a role as explanatory variables, too. Therefore, to resolve the endogeneity problem, the 6 demand and supply equations are simultaneously estimated by the two-stage least squares. Specifically, the STATA command "ivregress" was used.

4. 研究成果

Table 1. Estimation Results for the Demand Equation

Column	China	Japan	Korea
Dependent V. / Explanatory V.	q_t^C	q_t^J	p_t^K
c	-29.244*** (0.003)	-9.569 (0.421)	12.677*** (0.000)
p_t^C	-0.932*** (0.000)	0.344*** (0.000)	0.423*** (0.000)
p_t^J	0.082*** (0.000)	-1.272*** (0.000)	-0.059*** (0.000)
p_t^K	-0.240*** (0.000)	-0.051*** (0.000)	-1.289*** (0.000)
gdp_t^{US}	1.096*** (0.001)	0.607 (0.147)	
ppi_t^{US}	2.720*** (0.000)	1.559*** (0.000)	
$trend_t$	0.004** (0.034)	-0.015 (0.161)	0.007*** (0.034)
Recession dummy		-0.068** (0.016)	-0.167*** (0.000)
Trade war dummy.	-0.516*** (0.000)	0.108*** (0.002)	0.083*** (0.000)
Sector dummy	yes	yes	yes
Quarter dummy	yes	yes	yes
R^2	0.695	0.703	0.655
no. of obs	74,591	74,591	74,591

Notes: (1) Numbers in the parentheses are p-values. (2) The asterisks, *, **, and ***, means that the coefficient is significant at the 10, 5, and 1% significance level respectively. (3) "yes" indicates that the null hypothesis of zero coefficients in a F-test was rejected at the 5% significance level.

Table 2. Estimation Results for the Supply Equation

	China	Japan	Korea
Dependent V. / Explanatory V.	p_t^C	p_t^J	p_t^K
c			
q_t^C	-0.600*** (0.000)		
q_t^J		-0.645*** (0.000)	
q_t^K			-0.634*** (0.000)
exr_t^C	-1.049*** (0.000)	-0.544*** (0.000)	-0.510*** (0.000)
exr_t^J	-0.196***	-0.345***	

	(0.001)	(0.017)	
exr_t^K	-0.612* (0.082)	-0.485* (0.054)	-0.209** (0.019)
oil_t			
$trend_t$	0.014*** (0.000)		0.008*** (0.000)
Recession dummy		-0.078*** (0.002)	-0.145*** (0.000)
Trade war dummy.	-0.386*** (0.000)	-0.064*** (0.000)	-0.063** (0.025)
Sector dummy.	yes	yes	yes
Quarter dummy	yes	yes	yes
R^2	0.704	0.718	0.677
no. of obs	80,684	79,699	76,426

See the notes in Table 1.

The cross-price elasticity estimates show that Chinese and Japanese commodities substitute each other. In addition, Chinese commodities substitute Korean ones. Those findings imply competition of the three countries in the US market. In addition, the export prices of one country are affected not only by its own currency values but also by the currency values of its competitors.

The trade war is estimated to severely reduces both the quantity and price of Chinese machinery exports. On the contrary, it increases Japanese and Korean export quantities, while it decreases their export prices. However, because the increase in quantity is bigger than the decrease in price, it turns out that the trade war boosted Japanese and Korean machinery exports while it hurt Chinese machinery exports.

5. 主な発表論文等

〔雑誌論文〕 計0件

〔学会発表〕 計3件（うち招待講演 0件 / うち国際学会 3件）

1. 発表者名 Jung-Geun Yoo
2. 発表標題 The impacts of exchange rates on the machinery exports from China and Korea to the US
3. 学会等名 Korea Trade Research Association (国際学会)
4. 発表年 2022年

1. 発表者名 SaangJoon Baak
2. 発表標題 Exchange rate misalignments among major currencies
3. 学会等名 Korea and World Economy (国際学会)
4. 発表年 2022年

1. 発表者名 SaangJoon Baak
2. 発表標題 Was there a structural break in the impacts of exchange rates on the prices of Japanese machinery exports to the US?
3. 学会等名 The Japan Society of International Economics (国際学会)
4. 発表年 2024年

〔図書〕 計0件

〔産業財産権〕

〔その他〕

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6. 研究組織

氏名 (ローマ字氏名) (研究者番号)	所属研究機関・部局・職 (機関番号)	備考
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7. 科研費を使用して開催した国際研究集会

〔国際研究集会〕 計0件

8 . 本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関
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