Research Article

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The Value-Added Effects of Exchange Rates on Global Trade

Myoung Shik Choi

Department of Economics,
Kyonggi University, 154-42 Gwanggyosan-ro,
Woncheon-dong, Yeongtong-gu, Suwon-si,
Gyeonggi-do, South Korea

Hun Dae Lee

Department of Economics,
Kyonggi University, 154-42 Gwanggyosan-ro,
Woncheon-dong, Yeongtong-gu, Suwon-si,
Gyeonggi-do, South Korea
Corresponding Author

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Abstract

This study is an investigation of view about the gross, bilateral, and value-added trades adjusting to exchange rate and income within global value chains. Various difference between aggregate and value-added trade flows is introduced. We adopt the traditional trade models and test them using time-series analysis on value-added exports and imports. We find that currency depreciation has negative effects on gross exports in the US and Korea due to intermediate goods imports, but positive effects on value-added exports in Japan and Korea. On the other hand, currency appreciation has negative effects on gross imports in the US, China, Japan and Korea due to intermediate goods exports, but positive effects on value-added imports in Japan. All income effects are positive as we expect. Also, we find the similar effects of exchange rate on bilateral trade flows. On the whole, depreciation has negative effects on gross exports but positive effects on value-added exports while appreciation has negative effects on gross imports but positive effects on value-added imports. With this study, the main contribution is further evidence on the value-added trade analysis. Practical implications reducing uncertainty could be an important policy objective to achieve higher growth.

Keywords: *Exchange Rate, Exports, Value-Added Trade, Vertical Specialization*

1. Introduction

Nowadays, trade flows within global value chains (GVCs) represent around 70% of all world trade. Value-added trade provides important insights on widespread industry specialization trade along GVCs. This study is an investigation of view about the value-added trades adjusting to exchange rate and income within GVCs. Various difference between aggregate and value-added trade flows to exchange rate changes is introduced.

In simple definition, domestic value-added exports are defined as aggregate exports minus foreign value-added exports. Foreign value-added imports are aggregate imports minus domestic value-added imports. In this manner, each country's value-added exports get smaller with more foreign value-added exports. Figure 1 indicates the dependence of Korean economy on external economies during the 2000s. Overall, both gross trade to GDP and value-added trade to GDP ratios have steadily increased. Value-added trade to GDP ratio is much less than gross trade to GDP ratio. Recently, their gap gets a little bigger in widespread GVCs.

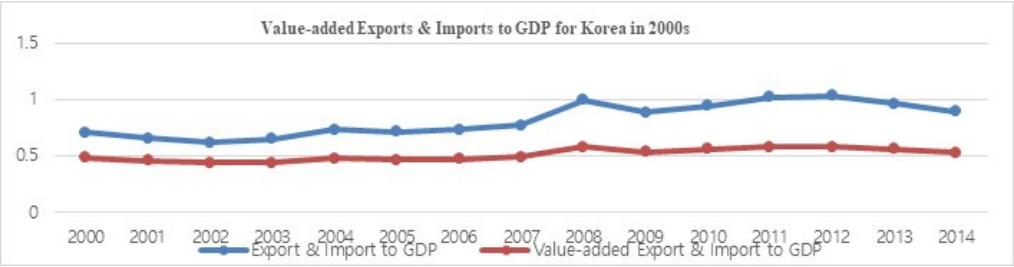

Figure 1. Movement of Value-Added Trade to GDP

IMF (2015) focuses on the exchange rate connected with international trade in GVCs. Cole & Nightingale (2016) confirm that intermediate goods imports do not respond to changes in the exchange rate, thus lowering the trade effects of the exchange rate. Also, Amiti et al. (2014) represent that exporters with large imports have low exchange rate pass-through but small exporters with no imports have complete pass-through.

On the value-added trade including intermediate goods trade, Leontief and Strout (1963) pays the first attention to the value-added trade. About twenty years later, Sanyal and Jones (1982) consider the importance of intermediate products in trade. Dixit and Grossman (1982) and Sanyal (1983) introduce the intra-industry vertical specialization trade where inputs cross borders and move along value chains. Furthermore, Hummels et al. (2001) measure the value-added trade. Koopman et al. (2008, 2010, 2014) propose the first fully decomposition of the value-added trade. Los, et al. (2016) comment that the approach of Koopman et al. (2014) provides a clear definition of value-added trade in basic accounting identities. Wang et al. (2014) perform the decomposition of the value-added bilateral trade while Timmer et al. (2014) decompose the country's value-added income.

Empirically, Johnson and Noguera (2012b) compute the value-added trade and find the large difference between gross and value-added exports. Johnson (2014) find that the value-added trade to gross trade has decreased for the period 1970s to 2008 due to increased double counting in trade. Johnson and Noguera (2012a) find that the trade imbalance of US-China is fairly decreased by using the value-added exports. Choi (2013) also indicates that explanatory power in value-added is smaller than that in gross value because OECD (2015) represents the foreign content of exports risen in most countries. But Guilhoto et al. (2015) analysis on trade determinants in gravity model and Olczyk and Kordalska (2016) analysis on export determinants in traditional and new trade models, represent that impacts of both value-added and gross determinants are very similar.

On the other hand, the doubt of Klau and Fung (2006) indicates that conventional real effective exchange rate (REER) could not be used as a measurement for the external competitiveness because of the trade weights ignoring vertical specialization. Therefore, Bems and Johnson (2012, 2015) propose a value-added REER (VAREER) because both intermediate and final goods are important in computing REER. Patel et al. (2014) represent that imported inputs and sectoral heterogeneity are important in computing REER. Yang, et al. (2014) find that conventional REER overestimates the external competitiveness of China. These imply that VAREER can be a better index.

We adopt the traditional trade models and test them using time-series analysis on value-added

exports and imports; we empirically examine that the effect of value-added exchange rate (VAREER) on the value-added trade flows is better than the effect of exchange rate (REER) on the aggregate trade flows.

The rest of the paper is organized as follows. In the next section, we provide the models focusing on the value-added perspective. Section 3 reports testing results. The recent findings are examined. Section 4 concludes the paper with discussing some implication.

2. Materials and Models

This section reviews briefly the existing trade models adjusting to exchange rate and assesses the effect of exchange rate on international trade in value-added. Our interest is exploring the value-added responses of exports and imports to domestic currency changes.

Under the flexible exchange rate regime, what both exports and imports react traditionally depends on two things: how much the elasticity of substitution between domestic and foreign goods is with the J-curve and the Marshall-Lerner condition. How much the pass-through of exchange rate to consumer prices at the fixed export prices is. Also, Smith (2004) remarks that exports respond to price or exchange rate changes and changes in demand conditions in the short-run while exports respond to constraints of supply conditions in the long-run. And the effects of the exchange-rate misalignment on the trade flows are insignificant in the long-run because they can't change relative prices while the exchange rate misalignment changes the relative prices and affects the trade flows in the short-run.

In the conventional fashion, a domestic currency depreciation boosts exports and reduces imports, and then improves trade balance. As featured under the free markets for capital flow and trade, a currency depreciation improves trade balance and increases domestic absorption unless price effect causes an increase in imports and a slump in exports, which could result in a weaker decrease in investment and consumption and decrease domestic absorption due to the rise in import prices and production costs.

In the recent globalized value-chained open economy, particularly, the value-added effect of exchange rate on the trade flows might be smaller than the effect of exchange rate on the trade flows because of the segmentation of GVCs-traded production. Nowadays, the value-added trade approaches are increasingly studied.

A possible way to assess the relative contribution of domestic currency devaluation by applying the traditional trade model to the value-added domain is described as follows.

$$VX_t = f(VR_t, Y_t^f), \quad \frac{\partial X}{\partial VR} < 0, \quad \frac{\partial X}{\partial Yf} > 0$$
$$VM_t = f(VR_t, Y_t), \quad \frac{\partial M}{\partial VR} > 0, \quad \frac{\partial M}{\partial Y} > 0 \qquad (1)$$

Where VX_t is domestic value-added exports at time t, VM_t is foreign value-added imports at t, VR_t is value-added index for REER (VAREER) at t as a useful summary measure of external competitiveness, Y_t^f is foreign income at t, Y_t is domestic income at t, and f(.) indicates the functional notation expressed in value-added terms. The aggregate trade model is also used as a compatible bilateral trade model where VX_t is the bilateral value-added exports, VM_t is the bilateral value-added imports, and Y_t^f is the foreign partner's income.

Signs indicate the expected signs of regression coefficients as a partial derivative. The elasticity of exports or imports implies a sizeable impact of VAREER on value-added exports or imports. Here, shares of imported intermediates that are finally exported are important. The domestic content embodied in gross exports or value-added exports is smaller when imported intermediate inputs used for exports increase.

Especially, we calculate VAREER using the value-added trade weights, which is made based on

the narrow method of BIS plus China.[1] Recent heavy reliance on oversea outsourcing represents that the foreign value-added in bilateral exports has become relatively large and the domestic value-added has become relatively small although the relative importance of trading partner remains unaffected.

Even small difference between gross trade and value-added trade weights may be worth highlighting. And the GDP deflator is adopted instead of CPI as an expression for country-level value to compute the value-added REER because the price of goods in value-added fully reflects the cost structure of global production.

The value-added model of equation (1) is written as follow. A regression model explains the relationship between one outcome variables and several main input variables.

$$VX_t = \alpha + \beta_1 VR_t + \beta_2 Y^f_t + \varepsilon_t$$

$$VM_t = \alpha + \beta_1 VR_t + \beta_2 Y_t + \varepsilon_t \quad (2)$$

Where VX_t represents the logarithmic value-added exports at time t, VM_t represents the logarithmic value-added imports at t, VR_t represents the logarithmic VAREER at t, Y_t represents the logarithmic domestic GDP at t, Y^f_t represents the logarithmic foreign GDP at t, α is constant, β is coefficients, and ε_t is error term at t. Also, the aggregate trade model is compatible with the bilateral trade model.

Empirically, we examine the gross versus value-added models as well as aggregate versus bilateral models on the US, China, Japan, and Korea, using the yearly data of OECD-WTO for value-added trade statistic and of FRED (Federal Reserve Economic Data-St. Louis Fed) for other economic statistics during the sample period between 1998 and 2014 after Asian crisis. We analyze the US, China, Japan, Korea, and not a wider range of countries to consider any different effects between the vehicle currency of USD, the major currency of JPY, the non-major currency of KRW, and the recent rising major currency of CNY beyond data limitation.

3. Testing Results

This section reports econometric procedures and summarizes our empirical findings. Various time series methods are employed based on the log-linearized form of the above equation (2). We test if time series data are stationary by using unit root tests. And then, we confirm if there is a stable long-run relationship between exchange rate and trade flow by using cointegration methods to deal with the non-stationary time series. Finally, we test directly if the derivative of trade flow with respect of its independent variable is greater than zero.

First, in the stationarity testing stage, the unit root tests are performed to examine the long-run equilibrium of major series. We use the common unit root tests of Dickey and Fuller (1979). The results using the augmented Dickey-Fuller tests are presented in Table 1.

[1] *The value-added trade weights are computed by* $w_j = (\frac{m_j}{x_i + m_i}) w_j^m + (\frac{x_i}{x_i + m_i}) w_j^x$ *where wj is the home(i)'s value-added weight with foreign country j,* m_i *is the value-added imports,* x_i *is the value-added exports,* $w_j^m = (\frac{m_i^j}{m_i})$ *is the value-added import ratio of foreign country j,* m_i^j *is the value-added import from foreign country j,* $w_j^x = [(\frac{x_i^j}{x_i})(\frac{y_j}{y_j + \sum_k x_k^j}) + \sum_{k \neq j}(\frac{x_i^k}{x_i})(\frac{x_j^k}{y_k + \sum_k x_k^k})]$ *is the value-added export ratio of foreign country j,* x_i^j *is the value-added export to foreign country j,* y_i *is the domestic manufacturing supply in foreign country j,* $\sum_k x_i^j$ *is the value-added exports to foreign country j except home country i,* x_i^k *is the value-added exports to third foreign country k except foreign country j,* y_k *is the domestic manufacturing supply in foreign country k,* $\sum_k x_i^k$ *is the value-added exports to third foreign country k except home i and foreign country j, and* x_i^k *is the value-added exports of foreign country j to foreign country k except home i.*

Table 1. Results of Unit Root Tests

	Level Variables							
	X	**M**	**R**	**VX**	**VM**	**VR**	**Y**	**Y^f**
USA	0.0	-1.3	-1.2	0.2	-1.6	-1.0	-1.7	-0.4
China	-1.2	-1.7	0.5	-0.9	-1.6	-0.2	0.8	-0.4
Japan	-1.4	-1.0	-1.0	-1.5	-0.9	-2.5	-1.8	-0.4
Korea	-0.8	-1.6	-2.3	-0.7	-2.2	-3.2*	-2.0	-0.4
	First Difference Variables							
	X	**M**	**R**	**VX**	**VM**	**VR**	**Y**	**Y^f**
USA	-3.8*	-4.2*	-3.0*	-3.3*	-4.1*	-3.1*	-2.3	-3.1*
China	-3.2*	-3.4*	-2.4^	-3.3*	-3.7*	-2.3	-2.3	-3.1*
Japan	-4.7*	-4.6*	-2.8^	-4.6*	-4.5*	-2.8^	-2.8^	-3.1*
Korea	-3.9*	-4.2*	-3.0*	-3.8*	-4.1*	-3.6*	-3.6*	-3.1*

*Note: X=exports, M=imports, R=real effective exchange rate, VX=value-added exports, VM=value-added imports, VR=value-added real effective exchange rate, Y=GDP, Y^f=foreign (world) GDP. All variables are logarithmic variables. ** Note: * represents significant meaning at the 5% level (critical value= -3.0) and ^ represents significant meaning at the 10% level (critical value=-2.6) in the model with intercept and trend.

Table 1 reports that all level variables are found to be non-stationary during the sample, and most variables are first-difference stationary. This indicates that we can use the first-difference stationary variables or the cointegrated level variables.

Second, in the long-run equilibrium testing stage, cointegration tests are performed by using the cointegration procedure of Engle and Granger (1987). The results represent that all the null hypotheses of no cointegration for the level variables in equation (2) are not rejected at the 5% level (critical value=-4.3) except Korean gross exports, and confirm that all the first stationary variables are cointegrated.

Finally, in order to avoid any spurious regression problem, we use the first-difference stationary data to estimate the trade models. Table 3 represents the testing results of aggregate regressions for gross and value-added trade flows.

Table 2. Aggregate Trade Flow: Gross versus Value-added Models

Gross Aggregate Model	**Exports**		**Imports**	
	R	**Y^f**	**R**	**Y**
USA	1.71 (0.01)*	2.56 (0.0)*	-0.89 (0.02)*	3.54 (0.0)*
China	-0.46 (0.25)	1.93 (0.0)*	-2.01 (0.0)*	1.13 (0.0)*
Japan	0.24 (0.28)	2.27 (0.0)*	-2.08 (0.0)*	2.78 (0.0)*
Korea	0.33 (0.05)*	2.01 (0.0)*	-1.59 (0.02)*	2.22 (0.0)*
Value-added Aggregate Model	**Value-Added Exports**		**Value-Added Imports**	
	VR	**Y^f**	**VR**	**Y**
USA	0.62 (0.01)*	1.36 (0.0)*	0.04 (0.89)	4.04 (0.0)*
China	0.10 (0.40)	2.02 (0.0)*	-0.08 (0.68)	0.64 (0.16)
Japan	-1.20 (0.02)*	2.02 (0.0)*	4.57 (0.0)*	2.43 (0.0)*
Korea	-2.82 (0.0)*	1.33 (0.0)*	3.21 (0.41)	1.58 (0.01)*

*Notes: VR= VAREER of domestic country, R= REER of domestic country, Y = domestic income, Y^f = foreign income (World income). And the values in parentheses are p-values for the explanatory variables. ** Note that * indicates the significance of 5% significant level. Estimators indicate statistically significant meanings. *** R is the index of BIS narrow method, VR is the value-added real effective exchange rates with the narrow method plus China where the value-added export ratio of foreign country *j* is computed by the simple equation of $w_j^x = (\frac{x_i^j}{x_i})$ for convenience.

For the exchange rate effects on aggregate trade flows in Table 2, domestic currency depreciation has negative effects on gross exports in the US and Korea since the influence of intermediate imports while

currency depreciation has positive effects on value-added exports in Japan and Korea as we expect but negative effects on value-added exports in the US because of the transaction costs of trade.

On the other hand, domestic currency appreciation has negative effects on gross imports in the US, China, Japan and Korea since the influence of intermediate exports while currency appreciation has positive effects on value-added imports in Japan as we expect.

For the income effects on aggregate trade flows in Table 2, foreign income has positive effects on both gross exports and value-added exports in all countries as we expect. And domestic income also has positive effects on both gross imports and value-added imports except statistically insignificant value-added imports of China. This represents an income-elastic demand.

In details, the foreign income effects on gross exports are bigger than the foreign income effects on value-added exports in the US, Japan and Korea. China goes by contraries since the influence of economic structure efficiency and foreign import demand. On the other hand, the domestic income effects on gross imports are smaller than the domestic income effects on value-added imports in the US because of the influence of economic structure efficiency and domestic import demand. But the domestic income effects on gross imports are bigger than the domestic income effects on value-added imports in Japan and Korea as we expect.

Table 3 represents the testing results of bilateral regressions for gross and value-added trade flows.

Table 3. Bilateral Trade Flow: Gross versus Value-added Models

Gross	**Exports**		**Imports**	
Bilateral Model	**R**	**Y^f**	**R**	**Y**
USA-China	-1.05 (0.11)	0.36 (0.40)	-1.19 (0.01)*	3.16 (0.0)*
USA-Japan	-1.01 (0.14)	0.30 (0.32)	-0.75 (0.29)	4.44 (0.0)*
USA-Korea	-0.74 (0.25)	0.79 (0.0)*	-1.07 (0.10)^	3.02 (0.02)*
China-USA	-0.73 (0.18)	3.21 (0.0)*	-1.04 (0.07)^	0.95 (0.02)*
China-Japan	-0.91 (0.17)	0.47 (0.15)	-3.02 (0.0)*	1.28 (0.0)*
China-Korea	-0.47 (0.72)	0.88 (0.13)	-2.76 (0.0)*	0.95 (0.02)*
Japan-USA	0.46 (0.09)^	5.48 (0.0)*	-1.28 (0.0)*	1.75 (0.0)*
Japan-China	0.23 (0.58)	0.51 (0.46)	-1.86 (0.0)*	2.41 (0.0)*
Japan-Korea	0.72 (0.01)*	1.38 (0.0)*	-2.10 (0.0)*	3.37 (0.0)*
Korea-USA	-0.04 (0.92)	3.91 (0.04)*	-0.66 (0.23)	1.45 (0.0)*
Korea-China	0.58 (0.19)	0.56 (0.38)	-1.64 (0.07)^	2.28 (0.0)*
Korea-Japan	0.74 (0.05)*	1.49 (0.0)*	1.16 (0.80)	1.48 (0.05)*
Value-added Bilateral Model	**Value-Added Exports**		**Value-Added Imports**	
	VR	**Y^f**	**VR**	**Y**
USA-China	0.41 (0.44)	0.66 (0.10)^	-0.56 (0.23)	4.03 (0.0)*
USA-Japan	0.39 (0.41)	0.53 (0.03)*	0.89 (0.10)^	4.27 (0.0)*
USA-Korea	0.69 (0.12)	0.88 (0.0)*	0.55 (0.24)	3.53 (0.0)*
China-USA	0.02 (0.88)	3.92 (0.0)*	-0.07 (0.65)	0.55 (0.13)
China-Japan	0.10 (0.61)	0.67 (0.02)*	-0.12 (0.69)	0.32 (0.63)
China-Korea	-0.15 (0.61)	1.11 (0.0)*	0.02 (0.92)	-0.16 (0.74)
Japan-USA	-1.48 (0.02)*	4.57 (0.0)*	2.37 (0.02)*	1.39 (0.0)*
Japan-China	-2.41 (0.02)*	0.50 (0.37)	3.62 (0.0)*	1.89 (0.0)*
Japan-Korea	-2.29 (0.0)*	1.43 (0.0)*	1.84 (0.17)	1.61 (0.0)*
Korea-USA	-3.51 (0.02)*	2.01 (0.05)*	-0.21 (0.94)	0.95 (0.04)*
Korea-China	-3.14 (0.10)^	0.13 (0.79)	11.06 (0.02)*	2.62 (0.0)*
Korea-Japan	-3.53 (0.0)*	0.80 (0.0)*	-2.62 (0.55)	1.19 0.09)^

*Notes: Y^f = foreign counter-partner income. The values in parentheses are p-values for the explanatory variables. ** Note that * indicates the significance of 5% significant level and ^ represents significant meaning at the 10% level. Estimators indicate statistically significant meanings.

*** We need to read the exports as country A exports to country B, and the imports as A imports from B.

For the exchange rate effects on bilateral trade flows in Table 3, domestic currency depreciation has negative effects on gross exports in Japan's exports to the US, Japan's exports to Korea and Korea's exports to Japan while currency depreciation has positive effects on value-added exports in Japan's exports to the US, Japan's exports to China, Japan's exports to Korea, Korea's exports to the US, Korea's exports to China and Korea's exports to Japan.

On the other hand, domestic currency appreciation has negative effects on gross imports in the US imports from China, the US imports from Korea, China's imports from the US, China's imports from Japan, China's imports from Korea, Japan's imports from the US, Japan's imports from China, Japan's imports from Korea and Korea's imports from China. But domestic currency appreciation has positive effects on value-added imports in the US imports from Japan, Japan's imports from the US, Japan's imports from China and Korea's imports from China. In addition, we confirm that our estimation results reflect the fitness of model with reasonable coefficients of determination and the feasibility of OLS regression with proper residual diagnostics.

For the income effects on bilateral trade flows in Table 3, foreign counter-partner's income has positive effects on both gross exports and value-added exports in most bilateral cases. And domestic income also has positive effects on both gross imports and value-added imports in most bilateral cases.

In details, the foreign counter-partner's income effects on gross exports are bigger than the foreign counter-partner's income effects on value-added exports in the case of Japan's exports to the US, Korea's exports to the US and Korea's exports to Japan. On the contrary, the foreign counter-partner's income effects on gross exports are slightly smaller than the foreign counter-partner's income effects on value-added exports in the case of the US exports to Korea, China's exports to the US and Japan's exports to Korea.

On the other hand, the domestic income effects on gross imports are bigger than the domestic income effects on value-added imports in the case of the US imports from Japan, Japan's imports from the US, Japan's imports from China, Japan's imports from Korea, Korea's imports from the US and Korea's imports from Japan. But the domestic income effects on gross imports are smaller than the domestic income effects on value-added imports in the case of the US imports from China, the US imports from Korea and Korea's imports from China.

4. Conclusion

This paper investigates the value-added effects on exports and imports adjusting to exchange rate and income within GVCs after Asian financial crises. We find the difference between aggregate and value-added trade flows; currency depreciation has negative effects on gross exports in the US and Korea due to intermediate goods imports, but positive effects on value-added exports in Japan and Korea, while currency appreciation has negative effects on gross imports in the US, China, Japan and Korea due to intermediate goods exports, but positive effects on value-added imports in Japan. Also, we find the similar effects of exchange rate on bilateral trade flows. Our results will give a clear answer to whether the value-added trade statistic may be more suitable for the creation of an appropriate trade policy.

Regarding the exchange rate effects on aggregate trade flows, domestic currency depreciation has negative effects on gross exports in the US and Korea since the influence of intermediate imports. But currency depreciation has positive effects on value-added exports in Japan and Korea as we expect while currency depreciation has negative effects on value-added exports in the US because of the transaction costs of trade.

On the other hand, domestic currency appreciation has negative effects on gross imports in the US, China, Japan and Korea since the influence of intermediate exports. But currency appreciation has positive effects on value-added imports in Japan as we expect.

For the exchange rate effects on bilateral trade flows, domestic currency depreciation has negative effects on gross exports in Japan's exports to the US, Japan's exports to Korea and Korea's exports to Japan. But currency depreciation has positive effects on value-added exports in Japan's exports to the US, Japan's exports to China, Japan's exports to Korea, Korea's exports to the US, Korea's exports to

China and Korea's exports to Japan.

On the other hand, domestic currency appreciation has negative effects on gross imports in the US imports from China, the US imports from Korea, China's imports from the US, China's imports from Japan, China's imports from Korea, Japan's imports from the US, Japan's imports from China, Japan's imports from Korea and Korea's imports from China. But domestic currency appreciation has positive effects on value-added imports in the US imports from Japan, Japan's imports from the US, Japan's imports from China and Korea's imports from China.

Regarding the income effects on aggregate trade flows reflecting an income-elastic demand, positive foreign income effects are greater in gross exports than in value-added exports in the US, Japan and Korea as we expect. But positive foreign income effects are smaller in gross exports than in value-added exports in China, leading more domestic investments and employments because of the influence of economic structure efficiency and foreign import demand. Positive domestic income effects are greater in gross imports than in value-added imports in Japan and Korea as we expect. But a positive domestic income effect is smaller in gross imports than value-added imports in the US because of the influence of economic structure efficiency and domestic import demand.

For the income effects on bilateral trade flows, foreign positive counter-partner's income effects are greater in gross exports than in value-added exports in the case of Japan's exports to the US, Korea's exports to the US and Korea's exports to Japan. However, foreign positive counter-partner's income effects are smaller in gross exports than in value-added exports in the case of the US exports to Korea, China's exports to the US and Japan's exports to Korea since the influence of relative economic efficiency of exporting country and relative importing demand. On the other hand, positive domestic income effects are greater in gross imports than in value-added imports in the case of the US imports from Japan, Japan's imports from the US, Japan's imports from China, Japan's imports from Korea, Korea's imports from the US and Korea's imports from Japan while the domestic income effects on gross imports are smaller than the domestic income effects on value-added imports in the case of the US imports from China, the US imports from Korea and Korea's imports from China.

The main contribution is further evidence on the aggregate and bilateral trade analyses, which distinguish the currency depreciation on the value-added trade from the depreciation on the gross trade. Practical implications reducing uncertainty could be an important policy objective to achieve higher growth. Future research may test other countries to avoid any extrapolated outcomes.

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