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The Effect of Exchange Rates on Exports in the Era of Global and Regional Value Chains

ABSTRACT

The rise of global value chains (GVCs) has made the relationship between exchange rates and exports more complex and less predictable. The extensive use of imported intermediate inputs associated with GVC participation weakens the link between exchange rate movements and export performance. Furthermore, the global financial crisis (GFC) has led to a shift in trade patterns from a predominantly global orientation toward more regionalized trade. This study examines the effects of these shifts in value chains on the relationship between exchange rates and exports in two regional economic that are highly involved in GVCs but differ in their degree of economic integration, namely the European Union (EU) and ASEAN. The results show that both GVCs and regional value chains (RVCs) significantly affect the exchange rate–export relationship in the EU. In contrast, neither GVCs nor RVCs exhibit a significant effect in ASEAN. These findings imply that economic integration plays a crucial role in enabling countries or regions to fully benefit from participation in GVCs and RVCs.

Keywords: export, exchange rate, value chains, crisis
JEL Classification: F14, F15, F41

ABSTRAK

Peningkatan *global value chains* (GVC) telah menyebabkan hubungan antara nilai tukar dan ekspor menjadi sulit diprediksi. Peningkatan penggunaan bahan baku impor akibat GVC menyebabkan terjadinya diskoneksi antara nilai tukar dan ekspor. Lebih lanjut, *global financial crisis* (GFC) menyebabkan pola perdagangan berubah, dari yang awalnya bersifat global menjadi regional. Penelitian ini menganalisis efek pergerseran *value chains* tersebut terhadap ekspor dan nilai tukar di dua kawasan regional ekonomi yang paling banyak terlibat dalam GVC, namun memiliki perbedaan tingkat integrasi ekonomi, yaitu EU dan ASEAN. Hasil analisis menunjukkan bahwa GVC dan RVC berpengaruh signifikan terhadap hubungan antara nilai tukar dan ekspor di EU. Di sisi lain, baik GVC maupun RVC tidak memiliki pengaruh yang signifikan di ASEAN. Hasil analisis tersebut mengimplikasikan pentingnya integrasi ekonomi agar suatu negara/kawasan dapat memperoleh manfaat dari GVC dan RVC.

Kata kunci: ekspor, nilai tukar, rantai nilai, krisis
Klasifikasi JEL: F14, F15, F41

INTRODUCTION

Classical economic theory suggests that exchange rate depreciation leads to an increase in exports and a decrease in imports. Exchange rate depreciation will make price of domestic goods cheaper in international market, so the demand of domestic goods increase, and so do export. On the other hand, exchange rates apreciation will make domestic goods more expensive, so the demand will decrease. However, recent studies show that currency depreciation is not always followed by an increase in exports (Ahmed et al., 2017; Bang & Park, 2018; Tan et al., 2019). One of the key factors contributing to the disconnection between exchange rates and export is the increase in Global Value Chains (GVC). GVC is a production process that involves several countries, with each country adding value at different stages of production. The involvement of many countries in the production process makes the effect of exchange rates on exports unclear. When the exchange rate of a country participating in GVC depreciates, its effect on exports depends on the country's position in GVC. If the country relies on imported intermediate inputs to produce goods, a depreciation of the exchange rate makes imports more expensive, thereby increasing production costs. As a result, the positive impact of exchange rate depreciation on exports is offset by higher production costs arising from more expensive imported inputs. Conversely, if a country does not rely on imported inputs in its production process, exchange rate depreciation is expected, in theory, to enhance export performance.

Several studies have shown that a country's participation in GVC weakens the relationship between exchange rates and exports. This disconnection between exports and exchange rates is evident in countries with high levels of GVC participation, such as South Korea (Bang & Park, 2017). In addition, Ahmed et al. (2017) provide similar evidence, suggesting that deeper involvement in GVCs reduces the impact of exchange rate movements on exports. However, the

effect of GVC participation on the exchange rate–export relationship varies across countries, reflecting differences in the degree of participation and countries' positions within GVCs.

A country's involvement in GVC is measured by the GVC participation index (Ahmed et al., 2017; Bang & Park, 2018). GVC participation can be classified into forward participation and backward participation. If a country exports intermediate inputs that will be further processed into finished goods in another country, then the country is participating in forward participation. On the other hand, if a country imports intermediate inputs that will be processed into finished goods domestically, then the country is participating in backward participation.

A country's participation in GVC is expected to act as a buffer against exchange rate fluctuations. In theory, an appreciation of the domestic currency reduces a country's exports by lowering price competitiveness. However, when a country is integrated into GVC, an exchange rate appreciation reduces the cost of imported intermediate inputs, thereby lowering production costs. This reduction in production costs can offset the loss of price competitiveness, allowing export prices to remain relatively competitive despite currency appreciation. Consequently, exchange rate uncertainty becomes a less important factor in determining a country's export performance.

However, GVC have gradually shifted toward RVC following the global financial crisis (GFC). This shift has been driven by heightened vulnerability of highly fragmented global production networks to global shocks, increased trade and coordination costs, and firms' efforts to reduce supply chain risks by shortening production distances and relying more on regional partners to withstand global shocks and mitigate similar risks in the future (Vicard, 2011; Thangavelu, 2024).

The shift of value chains from global to regional is expected to have significant implications for countries that are members of a regional

economic. Such a shift in value chains should, in principle, lead to an increase in intra-regional trade. However, existing studies have not yet explored the impact of this value chain reconfiguration on regional economic.

Several studies, such as Ahmed et al. (2017) and Hagemejer et al. (2022), focus primarily on examining the effect of GVC on the exchange rate elasticity of exports across a broad set of countries. However, these studies do not account for the shift of value chains from global to regional configurations following the GFC. Meanwhile, Tan et al. (2019) investigate the role of GVC participation in shaping the relationship between exports and exchange rates only in ASEAN countries. On the other hand, other studies concentrate on country-specific analyses of the impact of GVC participation on the exchange rate–export nexus, such as Rondeau & Yoshida (2023) and Bang & Park (2017).

Previous studies on the impact of GVC on the relationship between exchange rates and exports have primarily focused on estimating how GVC participation alters the exchange rate–export relationship. However, research examining the effects of shifts in value chains on the relationship between exchange rates and exports remains limited. This is notable given that such shifts have significant implications for global trade patterns. The transition of value chains from a global to a regional orientation is expected to increase intra-regional trade volumes, yet its implications for the exchange rate–export relationship require further investigation.

The shift in trade patterns from global to regional is also expected to affect value chains within regional economic blocs that are most deeply integrated into global value chains, namely the European Union (EU) and ASEAN (Antràs, 2020). The GFC caused the demand for ASEAN and the EU exports declined. The decline was caused by global shock that occurred during the GFC. So, ASEAN and the EU try to strengthen their intra-regional trade through several ways. ASEAN have begun to accelerating economic integration through the ASEAN Economic

Community (AEC) and the Regional Comprehensive Economic Partnership (RCEP) to increasing intra-ASEAN trade. On the other hand, the EU is increasing their intra-regional trade by re-allocation their production to main markets in Europe as well as investing in logistics infrastructure and technological innovation (Baldwin, 2011; Kimura, 2011); Javorcik, 2015; Gereffi, 2014; Eurofound, 2019).

Although ASEAN and the EU have tried to strengthen their intra-regional trade due to the GFC, but the two regions have different characteristics. The EU has reached the highest level of integration, namely the use of a single currency, while ASEAN is still in the FTA stage. These differences will result different levels of trade integration and FDI flows (Crescenzi & Harman, 2022).

The differences in the degree of integration in the two regions certainly have implications for intra-regional trade in each region. The higher the level of integration, the stronger intra-regional trade will be. In addition, the EU has applied the same external tariffs for each member country, thus encouraging trade creation among member countries. On the other hand, ASEAN has not yet implemented the same external tariffs, which could encourage trade deflection among member countries. Thus, the shift in trade patterns from GVC to RVC will have different impacts on the EU and ASEAN. Accordingly, further research is warranted to determine whether the two regions with differing characteristics exhibit distinct effects.

However, research about the effects of the shift in trade patterns from GVC to RVC on the relationship between exchange rates and exports is still limited. Whereas, it is important to conduct a study on the impacts of shifts in value chains on the relationship between exchange rates and exports. First, international production and trade patterns have undergone a transformation, in which a single product is now manufactured through production processes spread across multiple countries. This inevitably affects the impact of exchange rates on exports due to the high reliance on imported inputs. Second, GFC which occurred in 2008–2009 shifted value chain patterns from

being predominantly global to increasingly regional. However, there has been limited research examining how this shift has influenced the relationship between exchange rates and exports. Third, the transition from GVCs to RVCs has important implications for the two regional economic most engaged in GVC—namely, the EU and ASEAN. These two regions, however, exhibit distinct characteristics, particularly in their degree of economic integration. Such differences are likely to lead to different effects of exchange rate on exports between the two regions.

Based on these considerations, this study aims to analyze the effects of exchange rates on exports in the GVC and RVC era in two regions that most involved in value chains, ASEAN and the EU. In particular, this study seeks to analyze how much GVC affects the relationship between exchange rates, analyze the role of regional integration in moderating exchange rate and export relations, and compare the different effects of exchange rate movements on exports in ASEAN and the EU, given their different economic structures and trade policies.

METHOD

Empirical Specification

The exchange rate used in this study is the real effective exchange rate (REER) because REER takes into account the real exchange rate between one country and its major trading partner. In addition, export demand also depends on the GDP growth of trading partner countries. Thus, in general, export demand can be modeled as follows:

$$\Delta X_{s,t} = \alpha + \beta_1 \Delta REER_{s,t} + \beta_2 \Delta Y^*_{s,t} + \varepsilon \quad (1)$$

where X is the export volume and Y^* is the GDP growth of the partner countries. Furthermore, initial production is also an important factor that affects exports (Bang & Park, 2018; Ahmed et al., 2017). So, the equation becomes as follows:

$$lnX_{s,t} = \gamma_0 + \gamma_1 lnREER_{s,t-1} + \gamma_2 Y^*_{s,t-1} + \gamma_3 lnQ_{s,t-1} + v_{s,t} \quad (2)$$

where $Q_{s,t-1}$ is initial production, which is the average output produced in the previous year. Initial production

is used as the proxy of output in the current year.

Equation (2) is a general equation that does not include the effect of GVC. With the existence of GVC, a country's participation in GVC also affects the effect of exchange rate on exports. The participation of a country in the GVC can be calculated in the following way (Ahmed et al., 2017):

$$FP = \frac{\sum_{k=1}^{n} IV_{s,k}}{\sum_{k=1}^{n} EXP_{s,k}} \quad (3)$$

$$BP = \frac{\sum_{k=1}^{n} FV_{s,k}}{\sum_{k=1}^{n} EXP_{s,k}} \quad (4)$$

where FP is forward participation, BP is backward participation, $IV_{s,k}$ is input that produced domestically and exported to partner countries to be processed into output, $FV_{s,k}$ is imported input that processed into output by domestic producers (subscripts s and k indicates the country and sector). The GVC participation index is the sum of forward and backward participation. Thus, to see the effect of GVC on the elasticity of exports to the exchange rate, the empirical equation is as follows:

$$lnX_{s,t} = \beta_0 + \beta_1 lnREER_{s,t-1} + \beta_2 Y^*_{s,t-1} + \beta_3 lnQ_{s,t-1} + \beta_4 GVC_{s,t-1} + \beta_5 lnREER_{s,t-1} xGVC_{s,t-1} + \lambda_s + z_{s,t} \quad (5)$$

Furthermore, some literature has stated that the GFC caused a shift from GVC to RVC. The level of RVC can be measured using the Regional Trade Introversion Index (RII) which describes the level of integration of a region (Stöllinger et al., 2018; Development Bank, 2015). Based on Plummer et al. (2010), RII index can be calculated as follow:

$$RII_i = \frac{HI_i - HE_i}{Hi_i + HE_i} \quad (6)$$

where HI_i *and* HE_i can be calculated as follows:

$$HI_i = \frac{T_{ii}/T_i}{T_{Oi}/T_O} \quad \text{and } HE_i = \frac{[1 - T_{ii}/T_i]}{[1 - T_{Oi}/T_O]} \quad (7)$$

where T_{ii} is total intra-trade of region i, T_i is total trade of region i to the world, T_{oi} is total trade of region i to outsiders, and T_o is total trade of outsiders. Therefore, to see the effect of GVC and RVC on the elasticity of exports to the exchange rate, the empirical equation is as follows:

$$lnX_{s,t} = \delta_0 + \delta_1 lnREER_{s,t-1} + \delta_2 Y^*_{s,t-1} + \delta_3 lnQ_{s,t-1} + \delta_4 GVC_{s,t-1} + \delta_5 RVC_{s,t-1} + \delta_6 lnREER_{s,t-1} xGVC_{s,t-1} +$$

$$\delta_7 lnREER_{s,t-1} xRVC_{s,t-1} + \lambda_s + \theta_{s,t} \quad (8)$$

Equation (8) demonstrates the novelty of this research relative to prior studies, as it integrates the RVC variable into the model to examine whether the occurrence of the GFC prompted a shift in trade patterns from GVCs to RVCs.

To examine whether there are differences in the effect of exchange rates on exports between the periods before and after the GFC, a crisis dummy is added to Equation (8). The crisis dummy is used to capture differences in export responses to exchange rate changes during the pre-crisis, crisis, and post-crisis periods. Accordingly, equation (8) is modified as follows:

$$\begin{aligned} lnX_{s,t} = {} & \alpha_0 + \alpha_1 lnREER_{s,t-1} + \alpha_2 GVC_{s,t-1} + \\ & \alpha_3 lnREER_{s,t-1} xGVC_{s,t-1} + \alpha_4 D_t^{GFC} + \\ & \alpha_5 D_t^{Post} + \alpha_6 lnREER_{s,t-1} xD_t^{GFC} + \\ & \alpha_7 lnREER_{s,t-1} xD_t^{Post} + \\ & \alpha_8 GVC_{s,t-1} xD_t^{GFC} + \\ & \alpha_9 GVC_{s,t-1} xD_t^{Post} + \\ & \alpha_{10} lnREER_{s,t-1} xGVC_{s,t-1} xD_t^{GFC} + \\ & \alpha_{11} lnREER_{s,t-1} xGVC_{s,t-1} xD_t^{Post} + \\ & \alpha_{12} RVC_{s,t-1} + \\ & \alpha_{13} lnREER_{s,t-1} xRVC_{s,t-1} + \\ & \alpha_{14} RVC_{s,t-1} xD_t^{GFC} + \\ & \alpha_{15} RVC_{s,t-1} xD_t^{Post} + \\ & \alpha_{16} lnREER_{s,t-1} xRVC_{s,t-1} xD_t^{GFC} + \\ & \alpha_{17} lnREER_{s,t-1} xRVC_{s,t-1} xD_t^{Post} + \\ & \alpha_{18} Y^*_{s,t-1} + \alpha_{19} Q_{s,t-1} + \lambda_s + u_{s,t} \end{aligned} \quad (9)$$

where X denotes real exports, $REER$ is the real effective exchange rate, Y^* represents the GDP growth of partner countries, Q is GDP, GVC is the GVC participation index, RVC is the RVC index, D_t^{GFC} is the dummy for the GFC period, D_t^{Post} is the dummy for the post-GFC period, λs denotes country-specific fixed effects, and u is the error term.

Data and Method

To estimate the effects of GVC and RVC on the relationship between exports and exchange rates, the method used in this study is panel fixed effects, as used in Amiti et al. (2014), Bussiere et al. (2017), and Ahmed et al. (2017). The fixed effects approach is appropriate given the presence of unobserved, time-invariant country-specific characteristics—such as production structure, institutional quality, and trade specialization—that are likely to be correlated with exchange rates and value chain participation. Moreover, the analysis focuses on the structural

effects of exchange rate movements rather than short-run dynamics, making a static specification more suitable than dynamic panel estimators such as GMM. Given the relatively long-time dimension of the data, the use of GMM may also lead to instrument proliferation and biased estimates.

The data used in this study is secondary data taken from OECD TiVA, Bank for International Settlements (BIS), and World Development Indicators (WDI). The dependent variable is real export, which obtained by transforming the value of exports in USD into local currencies using the nominal exchange rate and then deflated by the consumer price index (CPI), as conducted in the study Ahmed et al. (2017), Freund & Pierola (2008), and Eichengreen & Gupta (2013). Meanwhile, the independent variables are REER, GDP growth of partner countries, initial production, GVC participation index, and RVC index.

The object of this study are countries that included in the EU and ASEAN. The time span used in this study is from 2000 to 2019, because in 2000 the global economic conditions had recovered from the Asian financial crisis that occurred in 1997-1998. In addition, the global economic relatively stable until 2019, before the Covid-19 caused shocks to the global economy.

RESULT AND DISCUSSION

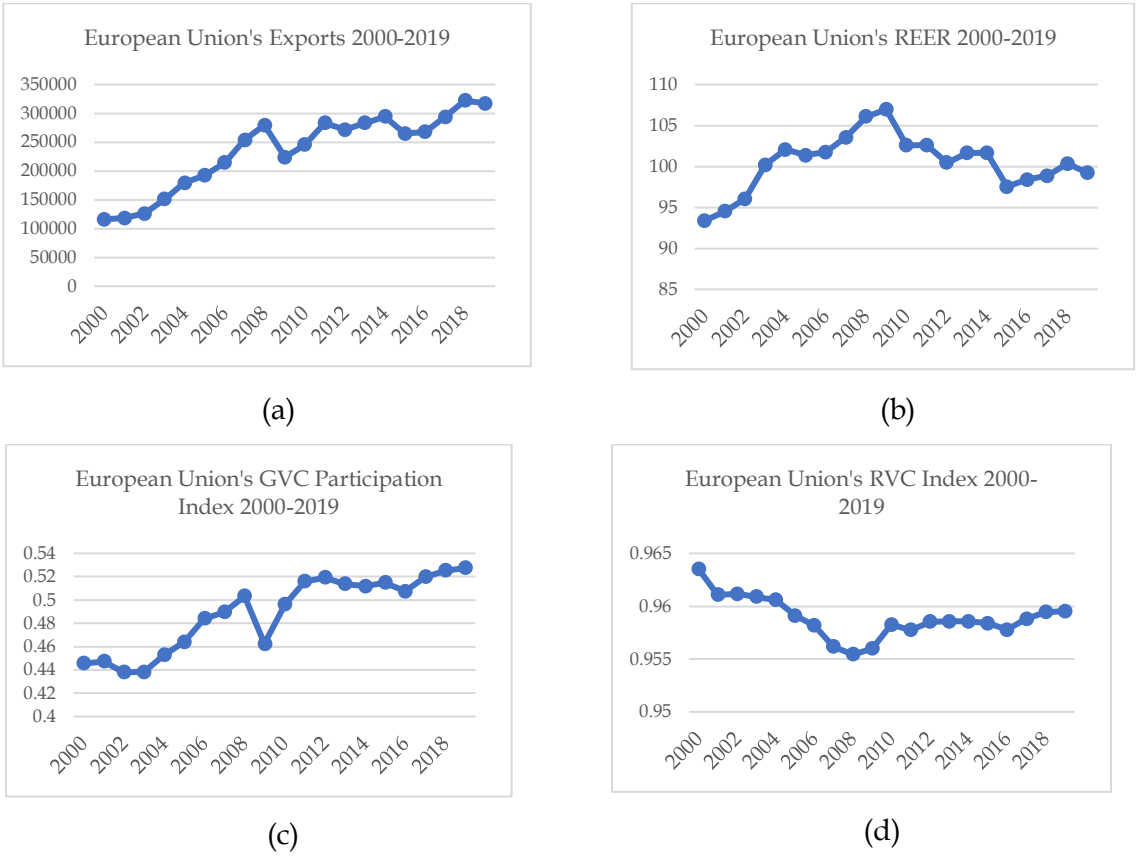
Descriptive Analysis

During 2000-2019, the EU's real exports and REER exhibit a positive trend. This may also serve as an early indication of a disconnect between the exchange rate and exports, as exports continue to rise despite an appreciation of the REER. Meanwhile, the GVC participation index after the GFC was higher compared to the pre-GFC period. This indicates that GVC participation rose in the post-GFC period. The figure also illustrates that the GFC had a significant impact on GVC, as participation dropped steeply at the time of the crisis.

On the other hand, the EU's RVC index after the GFC was lower than before the GFC. Furthermore, in the pre-GFC period, the RVC index continued to decline, reaching its

lowest point during the GFC. However, afterwards, the EU's RVC index began to rise and its trend remained relatively stable. This suggests that, in the pre-GFC period, the EU was more focused on global trade rather than regional trade.

Figure 3.1: EU Exports, REER, GVC Participation Index, and RVC Index



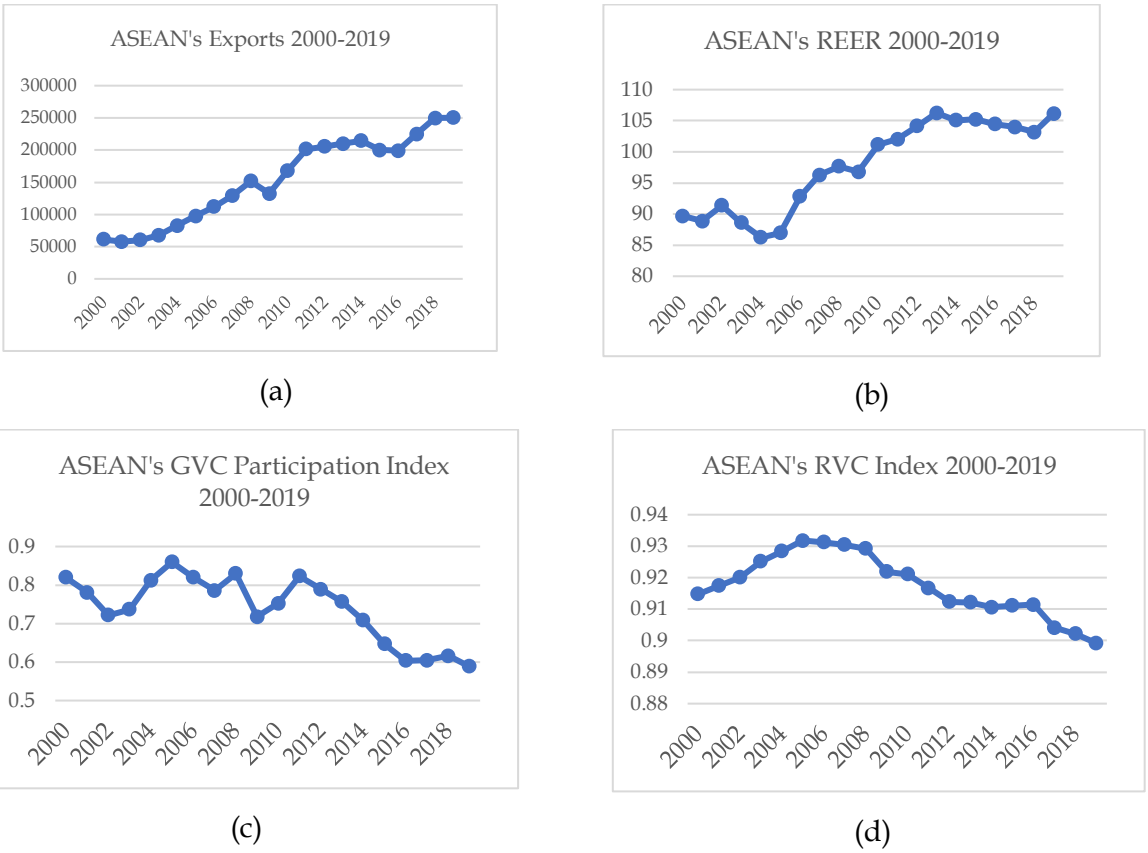
Data source: OECD TiVA & BIS (processed)

ASEAN's real exports and REER also show a positive trend. This may serve as an early indication of a potential disconnect between the exchange rate and exports, as exports continue to rise despite an appreciation of the REER. Meanwhile, the GVC participation index after the GFC was higher compared to the pre-GFC period.

However, ASEAN's GVC index in the post-GFC period shows a negative trend, particularly after 2012. On the other hand, ASEAN's average RVC index in the post-GFC period was actually lower compared to the pre-GFC period. Moreover, in the post-GFC period, the RVC index continued to decline. This suggests that, in the post-GFC period, ASEAN was more

focused on global trade rather than regional trade.

Figure 3.2: ASEAN Exports, REER, GVC Participation Index, and RVC Index



Data source: OECD TiVA & BIS (processed)

Panel Fixed Effects Analysis

Before analyzing the impact of GVC and RVC on the elasticity of exports to the exchange rate, the year of the GFC occurrence was first identified. This was done using the Markov switching method and looping dummy approach. The results indicate that the GFC occurred between 2007 and 2009. The detailed results of the Markov switching and looping dummy analyses can be found in Appendix 1 and Appendix 2.

Before conducting fixed effect regression, classical assumption test was first conducted. The results show that there is heteroscedasticity and autocorrelation in the data (see Appendix). To overcome this issue, this study adopted cluster-robust standard errors method. Cluster-robust standard errors allow

heteroscedasticity and autocorrelation among units within a cluster, but not between clusters.

This analysis will be divided into several parts. First, the regression will be conducted without GVC and RVC to see whether there has been a disconnect between the exchange rate and exports. Second, the regression will be conducted by added GVC variable and its interaction with REER to see the effect of GVC participation on the relationship between exchange rates and exports. Third, the regression is conducted by adding RVC variable and the interaction between REER and RVC to see the effect of RVC on the relationship between exchange rates and exports. Finally, the regression will be conducted by including the GVC and RVC variables simultaneously to see whether the results obtained are consistent or not.

a) The EU

Table 3.1. shows the regression results for the EU. Column (1) shows the regression results without the GVC and RVC variables, column (2) shows the results when the GVC variables and their interactions with REER are included in the model, and column (3) shows the regression results when the GVC and RVC variables and their interactions with REER are included in the model. In column (1), when the regression is performed without including the GVC and RVC variables, the REER coefficient is positive and significant. This indicates that a one percent appreciation in the REER will increase EU exports by 0.939 percent in the pre-GFC period. However, after the GFC, the relationship between the exchange rate and exports is in accordance with theory, where a one percent appreciation in the REER will cause EU exports to decrease by 0.094 percent in the post-GFC period (obtained from the sum of the REER and *REERxpostGFC* coefficients, namely 0.939-1.033). After adding the *REERxGVC* interaction variable in column (2), the results are similar to those in column (1). The estimation results show that before the GFC, REER had a positive and significant effect on exports, with a coefficient of 1.093. This means that REER appreciation encouraged an increase in exports. However, the interaction between REER and GVC before the

GFC had a coefficient of –0.090, although it was not statistically significant. This indicates that before the GFC,

Table 3.1. Fixed Effects Regression Results fo EU

Dependent Variable: Real export	(1)	(2)	(3)
	Without GVC and RVC	With GVC	With GVC and RVC
REER	**0.939*****	**1.093*****	0.615
	(0.183)	(0.183)	(0.389)
GVC		0.117	0.108
		(0.510)	(0.447)
REERxGVC		-9.014*	**-11.991*****
		(4.320)	(3.755)
Dummy GFC	0.147***	0.165***	0.160**
	(0.037)	(0.045)	(0.611)
Dummy post-GFC	0.191***	0.219***	0.212***
	(0.041)	(0.048)	(0.054)
REERxGFC	-1.267***	-1.033**	-0.881
	(0.210)	(0.375)	(0.492)
REERxpostGFC	**-1.033***	**-1.051****	-0.516
	(0.538)	(0.454)	(0.437)
GVCxGFC		0.502	0.613
		(0.419)	(0.365)
GVCxpostGFC		0.345	0.291
		(0.356)	(0.310)
REERxGVCxGFC		3.202	**8.250****
		(4.569)	(3.489)
REERxGVCxpostGFC		**12.437****	**17.772*****
		(5.290)	(4.394)
RVC			-9.498***
			(1.933)
REERxRVC			15.082*
			(7.906)
RVCxGFC			0.445
			(0.951)
RVCxpostGFC			1.766**
			(0.686)
REERxRVCxGFC			-7.619
			(13.336)
REERxRVCxpostGFC			**-27.569*****
			(9.154)
GDP mitra	0.043***	0.039***	0.045***
	(0.006)	(0.008)	(0.006)
Initial production	1.266***	1.203***	1.112***
	(0.084)	(0.109)	(0.142)
Number of observation	320	320	320
R-squared	0.8507	0.8580	0.9221

Note: significant at level *** 1%, ** 5%
Source: STATA (processed by author)

involvement in GVCs did not play a significant role in moderating the relationship between exchange rates and exports. In contrast, after the GFC,

there was a significant change in the dynamics. The REER coefficient decreased drastically to –1.033, and remained significant. This indicates that post-GFC, exchange rate appreciation tended to reduce exports. However, the interaction between REER and GVC after the GFC became positive and significant, with a coefficient of 0.124. This means that the higher a country's involvement in GVCs, the less negative the effect of REER appreciation on exports, and it could even become positive. This reflects the increasing complexity of the global production structure after the crisis, where countries that are increasingly deep in GVCs tend to import many inputs for export, so that exchange rate appreciation no longer automatically reduces the price competitiveness of exports.

Furthermore, when the GVC and RVC variables are entered simultaneously into the model, the results are as shown in column (3). In both the pre- and post-GFC periods, REER itself does not have a significant effect on exports. However, involvement in GVCs and RVCs does influence REER on exports, especially in the post-GFC period. This indicates that the effect of the exchange rate on exports depends on the level of GVCs and RVCs. In the pre-GFC period, EU involvement in GVCs actually caused exports to decline by 0.119 percent when the REER appreciated by one percent. This is inconsistent with the hypothesis that involvement in GVCs is expected to moderate the relationship between exchange rates and exports.

b) ASEAN

Table 3.2. shows the regression results for the European Union. Column (1) shows the regression results without the GVC and RVC variables, column (2) shows the results when the GVC variables and their interactions with REER are included in the model, and column (3) shows the regression results when the GVC and RVC variables and their interactions with REER are included in the model. Based on the regression results, neither GVC nor RVC have a significant effect on the relationship between the exchange rate and exports. When the regression is run without the inclusion

of the GVC and RVC variables (column (1)), neither the REER nor

Tabel 3.2. Fixed Effects Regression Results for ASEAN

Dependent Variable: Real export	(1)	(2)	(3)
	Without GVC and RVC	With GVC	With GVC and RVC
REER	0.884	0.931**	0.730
	(0.694)	(0.262)	(0.592)
GVC		4.196***	3.756***
		(0.716)	(0.809)
REERxGVC		2.301	-0.966
		(2.675)	(7.361)
Dummy GFC	0.283*	0.138***	0.152
	(0.122)	(0.030)	(0.075)
Dummy post-GFC	0.387	0.416***	0.412**
	(0.248)	(0.070)	(0.105)
REERxGFC	0.189	0.038	0.297
	(0.184)	(0.197)	(0.375)
REERxpostGFC	0.498	-0.375	-0.443
	(0.778)	(0.235)	(0.320)
GVCxGFC		0.659	0.759
		(0.749)	(0.975)
GVCxpostGFC		1.021	0.804
		(1.074)	(1.611)
REERxGVCxGFC		2.025	1.218
		(6.874)	(6.897)
			(0.068)
REERxGVCxpostGFC		-1.762	2.269
		(7.218)	(14.813)
			(0.148)
RVC			-2.207
			(4.069)
REERxRVC			-1.786
			(19.308)
RVCxGFC			0.758
			(2.104)
RVCxpostGFC			0.011
			(4.669)
REERxRVCxGFC			-3.142
			(15.881)
REERxRVCxpostGFC			7.592
			(19.745)
GDP mitra	0.037	0.018	0.020
	(0.025)	(0.013)	(0.018)
Initial production	0.572	0.425**	0.448***
	(0.296)	(0.132)	(0.234)
Number of observation	120	120	120
R-squared	0.8238	0.9042	0.9058

Note: significant at level *** 1%, ** 5%
Source: STATA (processed by author)

REERxpostGFC coefficients are exchange rate has no significant effect significant. This indicates that the on exports in ASEAN. To further

analyze whether this is due to ASEAN's involvement in GVC and RVC, the regression is continued by including the GVC variable, as in column (2). After including the GVC variable, the results obtained are also similar to those in column (1). The results in column (2) indicate that REER still has no significant effect on exports. Furthermore, ASEAN's involvement in GVC also has no significant effect on the relationship between the exchange rate and exports. This indicates that the disconnect between the exchange rate and exports in ASEAN is not caused by GVC. When the regression also includes the RVC variable, the results are similar to those in columns (1) and (2). Neither GVC nor RVC have a significant effect on the exchange rate and exports in ASEAN. This also shows that the disconnection between exchange rates and exports in ASEAN is also not caused by RVC.

DISCUSSION

In the pre-GFC period, GVC participation had yet to moderate the relationship between exchange rates and exports in the EU, as most EU countries' exports still had low value-added content. This can be seen from the substantial gap between forward and backward participation (Appendix 3). Backward participation of Ireland, Luxembourg, Malta, and Slovakia was significantly higher than their forward participation. This indicates that these countries imported a large share of raw materials, while domestic production generated only limited value-added, resulting in low overall gains. Although exchange rate appreciation made imported raw materials cheaper, the low domestic value-added in production meant that export prices remained uncompetitive when the currency appreciated.

On the other hand, intra-regional trade within the EU did not have a significant effect on the elasticity of exports to exchange rates during the pre-GFC period. This finding is consistent with Figure 3.1. (d), which shows that intra-regional trade continued to decline during the pre-GFC period. In this period, EU countries were more focused on global value chains rather than regional ones, as illustrated in Figure 3.1. (c).

Consequently, RVC had no significant effect during this period.

In the post-GFC period, participation in GVCs was able to moderate the relationship between exchange rates and exports. This finding supports the hypothesis that participation in GVCs can moderate the relationship between exchange rates and exports. Following the GFC, the EU restructured its GVCs, particularly through technological innovation and investment in logistics infrastructure. In addition, developed countries such as Germany, Italy, and France began relocating parts of their value chains to Central and Eastern European countries. Consequently, these countries became integrated into the value chains of advanced economies in Western Europe. These efforts successfully increased the value-added content of EU exports, such that exchange rate appreciation ultimately had a positive impact on exports.

The GFC made many countries aware of the importance of intra-regional trade as a buffer in the event of a global crisis. The EU also began relocating its value chains to Central and Eastern European countries, which in turn boosted intra-regional trade. This is supported by Figure 3.1. (d), which shows that the trend of intra-regional trade in the EU increased relative to the pre-GFC period. However, regression results indicate that RVC would actually reduce exports by 0.275 percent when the REER appreciates by one percent, compared to the pre-GFC period. This is because, despite the increase in intra-regional trade after the GFC, intermediate input exports between EU countries remained relatively unchanged. In other words, there was still no clear specialization among EU countries. For example, both Netherlands and Ireland export chemical and pharmaceutical raw materials. Thus, when Ireland's REER appreciates, its export prices become more expensive, prompting buyers to switch to Netherlands products, thereby reducing Ireland's exports.

On the other hand, GVCs do not significantly influence the relationship between exchange rates and exports in ASEAN due to differences in GVC structures among

ASEAN countries. For example, Indonesia's forward participation is much higher than its backward participation because Indonesia's exports are predominantly raw natural materials. Conversely, Singapore and Vietnam's backward participation far exceeds their forward participation because both countries act as assemblers of final goods with low added value. Furthermore, the ASEAN GVC participation index declined post-GFC, as can be seen in Figure 3.2. (c). This is one of the effects of the reshoring policy implemented by developed countries. The shift of production to locations closer to developed countries automatically reduced ASEAN countries' participation in GVCs.

On the other hand, the RVC also does not have a significant impact on the relationship between exchange rates and exports in ASEAN. Low intra-regional trade within ASEAN means that the RVC's effects have not yet been felt by ASEAN countries. Based on Figure 3.2. (d), intra-regional trade in ASEAN declined sharply after the GFC. This indicates that ASEAN countries are more focused on the global market than on regional markets. Low intra-ASEAN trade is also due to the still low degree of regional integration. Therefore, the RVC does not have a significant impact in ASEAN.

CONCLUSION

This research shows that the elasticity of exports to the exchange rate is also determined by the level of participation in GVCs and RVCs, particularly for the EU. Furthermore, the effect of GVCs and RVCs on the relationship between exchange rates and exports changed as a result of the GFC. Before the GFC, the EU's value chains were more global and acted primarily as downstream exporters of final products, which are highly sensitive to exchange rate fluctuations. Conversely, post-GFC, value chains were more regional and acted primarily as upstream suppliers of high-quality raw materials. Therefore, involvement in GVCs actually led to higher exports compared to before the GFC when the exchange rate appreciated. However, the involvement of EU countries in intra-

regional trade after the GFC actually led to a decline in EU exports when the exchange rate appreciated. This is due to the ease of movement of goods and capital between EU countries, which leads to production shifting elsewhere when production costs in that country increase due to exchange rate appreciation.

Meanwhile, GVCs and RVCs did not significantly influence the relationship between exchange rates and exports in ASEAN. This is due to differences in economic structures in each country, which causes the effects of GVCs to vary across ASEAN countries. Furthermore, the majority of ASEAN countries act as exporters of raw natural materials or intermediate raw materials with relatively low added value, so GVCs have not been able to moderate the relationship between exchange rates and exports. Furthermore, the low level of ASEAN regional integration and the differences in external tariffs among ASEAN member countries also mean that RVCs have not had a significant influence in moderating the relationship between exchange rates and exports.

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