

5 **EU enlargement: the impact on agricultural and food exports from selected Asian Countries to the EU market - a gravity approach**

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Abstract

The process of EU economic integration took place gradually. The 5th enlargement in 2004 was the largest expansion of the EU. It affected the agricultural sector notably due to the economic structure of the new members from Central and Eastern Europe. This chapter aims to examine the effect of the 5th enlargement on exports of agricultural and food products from 8 major Asian countries toward the EU market. The refined gravity model is employed, using annual data during 1999 to 2015 with 12 product groups. The empirical findings reveal that the total exports of agricultural and food products from Hong Kong and Korea reduce, whereas exports from Indonesia increase. There was no significant change in exports of total agricultural products and food from China, India, Japan, Malaysia and Thailand. However, changes in exports of certain products in various countries are found.

Key words: European Union, Economic integration, EU enlargement, Agricultural and food exports, Asia

1. Introduction

The European Economic Community (EEC) was set up with the Treaty of Rome in 1957. Its underlying objective, namely the creation of conditions for the stability and prosperity of EU citizens, was ambitious and affected by the consequences of WWII. The Common Agricultural Policy (CAP), introduced in 1962, is one of the oldest policies adopted by the EU and is heavily anchored in the European integration project. Even if the CAP has been amended several times, the most important reforms were those in 1992 and 2003. In 1992, support prices were cut and in 2003, the majority of all direct payments from production were decoupled. .

The current EU comprises 28 members. The 2004 enlargement (the fifth enlargement) was the biggest expansion of the EU. It incorporated 12 countries, ten of them, from Central and Eastern Europe. Agriculture represented heated issue at the negotiation phase, due to its extent and to the profound differences existing in the agricultural sector of the new and old member states (Bach et al, 2000). As a consequence, the CAP was dramatically reformed.

The process of economic integration took place gradually. In 1986, the Single European Act, signed by 12 European countries, provided the basis for a vast six-year Programme aimed at sorting out the problems with the free flow of trade across EU borders and thus creating the ‘Single Market. Over the years, the EU has sought to strengthen its role in the international context, not only in economic terms but also with regard to the different geopolitical areas (Josling et al, 1988). Starting with these premises, the article aims to examine the effect of the enlargement on exports of agricultural and food products from some selected Asian countries towards the EU market. In this study, EU countries with a

population of less than 5 million have not been considered¹. The selected Asian countries are China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia and Thailand. We could not include Vietnam, because the data series needed to feed the model was not available. Our research redefines the gravity model of Yang and Martinez-Zarzoso (2014). Data from about 38 countries (20 EU member states, 8 Asian countries and 10 of the EU's main trade partners such as the U.S., Brazil, Russia, Switzerland, Norway, Turkey, Canada, Argentina, Australia and South Africa), cover the period 1999-2015.

2. Literature review

Trade creation and trade diversion emanating from economic integration induce changes in trade patterns among the member states and between member and non-member countries (Viner, 1950). The existing literature on the subject can be grouped into two categories: *ex-ante* and *ex-post* analysis. Herok and Lotze (2000) analyzed the impact of the fifth enlargement by focusing on agriculture under the Computable General Equilibrium (CGE) model. They predicted that imports of food products from the EU15 to CEE (Central Eastern Europe) countries would have increased drastically in 2005, while imports of agricultural and food products from third world countries into the new member states would have reduced. Similarly, Frandsen et al. (2003) demonstrated that the domestic price supported payments and production, which in turn distorted international trade leading to adverse effects on the developing countries' export capacity. In addition, Bartošová *et al.* (2007), using data available for the period 1996 to 2005, asserted that accession to the EU would increase exports of agricultural products from CEE countries towards the EU15 by between 60% and 200%. Moving on to *ex-post* analyses, the effects of EU enlargement from 1985 to 2000 on agricultural trade creation and diversion for 6 major agri-food products were analyzed by Sarker and Jayasinghe (2007), using a gravity model. The results suggested that the EU members traded more with each other than they did with nonmembers as far as the following products were concerned: red meats, vegetables, grains, fruits, and sugar. In addition, the results also showed that for five of the six commodities mentioned, the EU had reduced its openness to trade with the rest of the world. However, in their study the dependent variable in the equation is total bilateral trade. This imposes an equality constraint on the coefficients of exports and imports, which may not be reasonable. Sun and Reed (2010) employed the export of agricultural products as a dependent variable in their research. Using data available between 1993 and 2007, the findings indicated that significant trade creation existed. The EU15 and EU25 increased intra-trade between member states by 71.6% and 56.8%, respectively. With regard to trade diversion, exports to external, nonmembers EU15 countries lowered by 6.8%, while the imports from the non-EU15 countries reduced by 8.6%. The limitation is that the time span is not long enough to scrutinize trade creation and trade diversion in the EU25. Romania and Bulgaria were excluded from the study.

3. Methodology

¹ The EU countries analysed are Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Poland, Portugal, Romania, the Slovak Republic, Spain, Sweden and the United Kingdom. We included Ireland as a whole considering North Ireland and the Republic of Ireland together.

3.1. The model

The gravity model is a widely used approach when analyzing the trade effects of economic integration. By transposing Newton's Law of Gravitation to the area of international economics, the first gravity model was developed by Tinbergen in 1962 (Tinbergen, 1962). Anderson (1979) was the first to develop a theoretical foundation of the gravity model. . More recently, a theoretically based log-linear gravity equation had been derived (Anderson and van Wincoop, 2003). The gravity model of Yang and Martinez-Zarzoso (2014) has been adopted in our study. Nonetheless, we have refined their research firstly by considering the effects of changes in the exchange rate on country exports, given that the theory of international trade establishes the relationship between exports and currency values. The depreciation of domestic currency generally boosts exports and vice versa resulting in currency appreciation. In addition, it has been argued that one of the reasons why a certain country, such as China, shows high export values is because of its artificially low currency values (Auboin and Ruta, 2011). Since China is one of the EU's major trade partners, omitting exchange rates from the model is likely to render a misleading interpretation of the majority of the changes in exports. Secondly, while they have used aggregate trade data, we have focused on the sectoral level of agricultural products and food. The model examines the trade effect on selected 8 Asian countries from total 38 studied countries by augmenting with relevant dummy variables.

Since data at the sectoral level usually contain multiple zero values of trade flows, we tackle this problem by adopting the fixed effects of the Poisson Pseudo Maximum Likelihood approach (FE-PPML)² as the main estimation method in our study (Santos Silva and Tenreyo, 2006), provided that there is no consensus on a standard method for solving the problem of zero trade flows (Santos Silva and Tenreyo, 2009). Our equation is reported in the appendix. The equation illustrates that exports are determined by using the standard variables of the gravity equation such as GDP, population, distance and the exchange rate. To capture the effects of EU enlargement on exports, the binary dummy variables are included in the equation.

Accordingly, the expected sign of the resulting coefficient estimates can be described as follows. The coefficient of the multiplication of the GDP is expected to be positive, as the GDP variable is a proxy for country size. The anticipated sign of the coefficient from the multiplicative population term is negative since it implies the self-sufficiency of the respective country pairs. According to Frankel (1997), According to Frankel (1997), a country with a sizeable population can count on larger natural resources and wider domestic market.

Therefore, it is less dependent on imports. On the other hand, high consumption reduces the quantity of products available for export. Consequently, a country with a large population is less dependent on international trade. Geographical distance remains intrinsic to transport costs. Hence, it is expected to give a negative coefficient estimate. The exchange rate in our equation is quoted as exporter currency per currency of trade partner. A depreciation of the exporter's currency against the currency of the importer is associated with an increase in exporter exports. Therefore, the real exchange rate and exports are presumed to have a positive relationship. As for the coefficients of the binary dummy variables, having the same language and sharing a common border generally facilitates trade between countries. Consequently, they are also presumed to give positive coefficient estimates. The predicted signs of the three dummy variables which indicate the changes in exports within the EU and between the EU and the non-EU countries ($d_{eu_exp_eu_{eit}}$, $d_{eu_exp_non_{eit}}$ and $d_{non_exp_eu_{eit}}$) are uncertain. The expected signs of coefficients that indicate the impact of the fifth EU enlargement on exports from eight Asian countries to the EU are uncertain. This is because the reduction of trade barriers between the EU member states may induce the level of intra-bloc trade and therefore reduce the trade volume *vis-à-vis*

² The reason is that it still gives a robust result although heteroscedasticity is present in the estimation. In addition, the fixed effects method is employed to check for the multilateral resistance terms (Anderson and van Wincoop, 2003).

the Asian countries. Conversely, EU enlargement expands the export market for Asian nations. Hence, the net effect on Asia depends on these two factors.

3.2. Data

The panel dataset, based on a 12-month period, covers agricultural products, using the EU definition and the SITC (Standard International Trade Classification) Rev.3 categories. The analysis involves 12 groups of agricultural products and food (table 5.1). For simplicity, the new name of each product group is defined in the last column of table 5.1.

Table 5.1 here

The data for exports (in 1,000 USD) were obtained from the UN's Comtrade databases. The statistics concerning gross domestic product (GDP at 2010 constant price, USD) and population size were compiled by the World Bank World Development Indicators. The real exchange rate series were constructed using the nominal exchange rate values from the Penn World Table (PWT) and data on countries' consumer price indices (CPI), obtained from the International Monetary Fund's International Financial Statistics (IFS). Distance in kilometers is the weighted distance measure, which was acquired from the French Institute for Research on the International Economy (CEPII). The dummy variables for language similarity and common borders were also extracted from the CEPII databases.

4. Empirical results

4.1 Standard variables of gravity equation

The empirical results reveal that most of the fundamental variables produce the sign predicted by the gravity model with the value of R^2 ranges from 0.50 to 0.80 across industries. The multiplication of GDP of exporters and importers has a positive effect on the exports of total agricultural products and all 12 of the studied product groups. A 1 per cent increase in the multiplication of GDP raises exports of total agricultural products by 1.06 per cent. The coefficients from 12 product groups lie between 0.70 to 1.43 per cent. The coefficient estimate of the population variable is -0.95 for total agricultural exports. They are negatively significant in 7 product groups.

Turning to the impacts of the real exchange rate, only 2 of the product groups studied show a significant effect on exports bearing the expected signs. Generally, a 1 per cent increase in real exchange rate increases the exports of aggregated agricultural products by 0.09 per cent. The estimated coefficients from our model indicate that trade costs, proxied by distance, are completely in line with the prediction of the model. All 12-product groups together with the total agricultural exports show the significant negative signs. Findings assert that increases in trade costs reduce exports in general. The coefficients of dummy variables of language similarity and common borders also give the sign expected. While the exports of 10 product groups give significant positive coefficients for language similarity, all 12-product groups show the significant positive effects from the common border variable. The same effect is also found in total agricultural exports. The coefficients of three dummy variables indicate that the process

of European economic integration has expanded trade among member states but has had no significant effect on trade with non-EU countries. The further estimation details can be obtained from the authors upon request.

4.2 The impact on exports of the selected Asian countries

Asia has become the world's most dynamic region in international trade and the European Union is one of the most important partners for Asian countries (Abler et al, 2009).

Figure 5.1. Here

Besides Japan (Figure 1), the total trade between the EU and Asian countries has increased over time, especially in the case of China. The eight selected Asian countries hold approximately 17 per cent of extra-EU total trade in agricultural and food products.

The effects of the enlargement on exports can be examined through the coefficients of dummy variables of eight Asian countries (γ_1 to γ_8 in the gravity equation). The percentage change in exports is calculated and presented in table 5.2.

Table 5.2 here

The empirical results indicate that only 3 out of 8 countries receive a significant impact on the exports of total agricultural products to the EU market. Hong Kong and Korea exports of total agricultural products reduced by -0.49 and -0.30 per cent, respectively. Conversely, the total exports of agricultural products from Indonesia to the EU increased by 0.26 per cent after the EU enlargement. There was no significant change in exports of total agricultural products from China, India, Japan, Malaysia and Thailand. However, the analysis at a product group level reveals that EU integration generated changes in exports of certain products in various countries, as follows.

China: while the enlargement decreased the exports of animal and vegetable oils by -0.56 per cent, it boosted the exports of feedstuffs by 0.43 per cent. In addition, the exports of woody plants increased by 1.39 per cent. Since the three product groups affected accounted for only 12.54 per cent of total exports of agricultural products to the EU market, the impact of the enlargement on aggregate agricultural exports is not significant.

Hong Kong: most exports from Hong Kong to the EU decreased. The findings reveal that exports of 9 product groups declined after the fifth EU integration, namely seafood, cereals, vegetables and fruits, sugars, colonial products, feedstuffs, beverages and tobacco, textile fibres and woody plants. These 9 product groups constitute 92 per cent of total exports of agricultural products to the EU. Feedstuffs, which alone accounts for 73.53 per cent of agricultural products, reduced by -0.54 per cent.

India: in contrast to Hong Kong, EU enlargement did not affect the majority of exports of agricultural products from India to the EU market. Empirical findings show that no significant impact was detected in 8 of the studied groups (live animals, seafood, cereals, sugars, feedstuffs, beverages and tobacco, animal and vegetable oils and animal and vegetable materials), which represented 62.22 per cent of total

agricultural exports from India to the EU. Nonetheless, the exports of two important product groups, vegetables and fruits and colonial products, reduced by -0.25 and -0.42 per cent, respectively. In contrast, two product groups saw exports rise: textile fibres and woody plants. However, neither of them are India's key exports to EU countries.

Indonesia: the exports of 3 product groups (live animals, cereals and colonial products) decreased whereas 4 product groups (feedstuffs, textile fibres, animal and vegetable oils, woody plants) increased exports from Indonesia to the EU market. Animal and vegetable oils, which is the largest exporting product group (representing 52.33 per cent of total exports in agricultural products), grew by 1.14 per cent after EU integration.

Japan: empirical results reveal that the exports of just 3 product groups, which constitute 14.63 per cent of agricultural exports, were affected by EU integration. While exports of beverages and tobacco improved by 1.44 per cent, exports of cereals and woody plants shrank by -0.44 and -0.80 per cent, respectively.

Korea: the reduction in exports of total agricultural products from Korea to the EU following the fifth enlargement was mainly due to declines in seafood exports (-0.45 per cent) since it alone accounted for 52.89 per cent of total agricultural exports. A decrease in exports is also registered in sugars, while there is a rise in exports of cereals, vegetables and fruits, feedstuffs and woody plants. Nonetheless, the export share of these 4-product groups is only 23.12 per cent of total agricultural exports.

Malaysia: the findings indicate that exports of 2 product groups, animal and vegetable oils and textile fibres increased whereas the exports of vegetables and fruit declined. Exports of animal and vegetable oils, which represented the majority share (56.76 per cent) of agricultural exports, expanded by 0.57 per cent. There were also reductions in exports of the other 3 product groups: seafood, colonial products and woody plants (-0.73, -0.35 and -0.24 per cent, respectively).

Thailand: the exports of 6 product groups, representing 57.03 per cent of total agricultural exports to the EU, were not affected by EU enlargement. However, exports of vegetables and fruits, and woody plants declined by -0.51 and -0.37 per cent, respectively. On the other hand, exports of the other 4 product groups increased after the enlargement of the EU, namely sugars, feedstuffs, textile fibres and animal and vegetable oils.

5. Concluding remarks

Our research findings are presented as follows. Significant effects of enlargement on exports of total agricultural products exports from Asian countries to the EU market are found in 3 out of 8 countries. While both Hong Kong and Korea experienced a reduction in exports, Indonesia's exports of total agricultural products increased. A product group analysis reveals that China was more or less unaffected, with the exception of higher exports of woody plants. The EU's fifth enlargement did not significantly impact India and Japan with 8 out of 12 groups unaffected. The decline in Hong Kong's exports is present in 9 product groups, while Korea's decline was mostly due to reductions in seafood exports. By contrast, the rise in exports of animal and vegetable oils, which constitute 52.33 per cent of the country's total agricultural product exports were the major contributing factor of increased total agricultural exports from Indonesia to the EU. Malaysia is in a similar position. Exports of animal and vegetable oils, which represent the largest share (56.76 per cent) of total agricultural exports to the EU, increased significantly after enlargement. Although there was no major impact of the enlargement on Thailand's

total agricultural exports, the country was still affected by the reduction of exports of vegetables and fruit. In general, this analysis shows that the process of European economic integration has expanded trade among member states but has had no significant effect on trade with Asian countries with regard to agricultural and food products.

It should be added that the chapter does not take into account the effects that the signing of any free trade agreement has produced in trade between the EU and the selected Asian countries. This is the case of Korea, which in 2011 signed an agreement with the EU. The issue requires further in-depth research.

References

Abler D., Banse M., Kulper M., Roza P., Santuccio F. (2009) EU Agricultural Trade Relations with Asian Countries, JRC Scientific and Technical Reports, European Commission

Anderson, J. E. (1979). "A Theoretical Foundation for the Gravity Equation." *American Economic Review*, 69 (1), pp. 106-116.

Anderson, J. E. and Wincoop, E. V. (2003). "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review*, 93 (1), pp. 170-192.

Auboin, M. and Ruta, M. (2011). "The relationship between Exchange rates and International Trade: A review of economic literature." *Staff Working Paper ERSD-2011-17*, World Trade Organization.

Bach, C. F., Frandsen, S. E. and Jensen, H. G. (2000), Agricultural and Economy-Wide Effects of European Enlargement: Modelling the Common Agricultural Policy. *Journal of Agricultural Economics*, 51: 162–180

Bartošová, D., Bartová, L. and Fidrmuc, J. (2007). "Implications of EU Enlargement for the New Member States' Agri-food Trade." *Working Paper No. 07/10*, TRADEAG.

Frandsen, S. E., Gersfelt, B. and Jensen, H. G. (2003), The Impacts of Redesigning European Agricultural Support. *Review of Urban & Regional Development Studies*, 15: 106–131.

Frankel, J. A. (1997). *Regional Trading Blocs in the World Economic System*. Institute for International Economics, Washington, DC.

Herok, A. A and Lotze, H. (2000). "Implications of an EU Eastern Enlargement under a New Common Agricultural Policy." *Journal of Policy Modeling*, 22 (6), pp. 661-690.

Josling T., Kelch D., Liapis P., Tangermann S., (1998) Agriculture and European Union Enlargement, Economics Division, Economic Research Service, Technical Bulletin no 1865, Washington DC, US Department of Agriculture

Santos Silva, J. M. C. and Tenreiro, S. (2009). "Comments on The Log of Gravity Revisited." Manuscript, London School of Economics.

Santos Silva, J. M. C. and Tenreiro, S. (2006). "The log of gravity." *The Review of Economics and Statistics*, 88, pp. 641-658.

Sarker, R and Jayasinghe, S. (2007). "Regional trade agreements and trade in agri-food products: evidence for the European Union from gravity modeling using disaggregated data." *Agricultural Economics*, 37, pp. 93-104.

Sun, L. and Reed, M. R. (2010). "Impacts of Free Trade Agreements on Agricultural Trade Creation And Trade Diversion." *American Journal of Agricultural Economics*, 14, pp. 1-13.

Tinbergen, J. (1962). *Shaping the World Economy: Suggestions for an International Economic Policy*, Appendix VI, New York: The Twentieth Century Fund.

Viner, J. (1950). *Customs union theory*. New York: Carnegie Endowment for International Peace.

Yang, S. and Martinez-Zarzoso, I. (2014). "A panel data analysis of trade creation and trade diversion effects: The case of ASEAN–China Free Trade Area." *China Economic Review*, 29, pp. 138-151.

Appendix

The gravity equation:

$$\begin{aligned} \ln(x_{eit}) = & \beta_0 + \beta_1 \ln(gdp_{et} * gdp_{it}) + \beta_2 \ln(pop_{et} * pop_{it}) + \beta_3 \ln dist_{ei} + \beta_4 \ln exc_{eit} \\ & + \beta_5 d lang_{ei} + \beta_6 d border_{ei} + \delta_1 d eu_exp_eu_{eit} + \delta_2 d eu_exp_non_{eit} \\ & + \delta_3 d non_exp_eu_{eit} + \gamma_1 d cn_{eit} + \gamma_2 d hk_{eit} + \gamma_3 d ind_{eit} + \gamma_4 d ido_{eit} \\ & + \gamma_5 d jp_{eit} + \gamma_6 d kr_{eit} + \gamma_7 d my_{eit} + \gamma_8 d th_{eit} + \varepsilon_{eit} \end{aligned}$$

Where:

x_{iet} = exports from country e (exporter) to i (importer) in period t

$gdp_{et} * gdp_{it}$ = product of the countries' GDPs in period t

$pop_{et} * pop_{it}$ = product of the countries' populations in period t

$dist_{ei}$ = distance between country e and i

exc_{eit} = real exchange rate between country r and i in period t

$d lang_{ei}$ = dummy variable of language similarity, it equals to 1 if country e and country i use the same official language, otherwise 0

$d border_{ei}$ = dummy variable of common border, it equals to 1 if country e and country i share a common border, otherwise 0

$d eu_exp_eu_{eit}$ = dummy variable of trade effects, it equals to 1 if both countries e and i belong to the EU since 2004, otherwise 0

$d eu_exp_non_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e belongs to the EU and importer i does not since 2004, otherwise 0

$d non_exp_eu_{eit}$ = dummy variable of trade effects, it equals to 1 if importer i belongs to the EU and exporter e does not since 2004, otherwise 0

$d cn_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is China and importer i belongs to the EU since 2004, otherwise 0

$d hk_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is Hong Kong and importer i belongs to the EU since 2004, otherwise 0

$d ind_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is India and importer i belongs to the EU since 2004, otherwise 0

$d ido_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is Indonesia and importer i belongs to the EU since 2004, otherwise 0

$d jp_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is Japan and importer i belongs to the EU since 2004, otherwise 0

$d kr_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is Korea and importer i belongs to the EU since 2004, otherwise 0

$d my_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is Malaysia and importer i belongs to the EU since 2004, otherwise 0

$d th_{eit}$ = dummy variable of trade effects, it equals to 1 if exporter e is Thailand and importer i belongs to the EU since 2004, otherwise 0

ε_{eit} = error term