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A GRAVITY MODEL ANALYSIS OF THE DETERMINANTS OF MYANMAR EXPORTS

Khin Myo Swe
School of Economics and Trade, Hunan University, China

Dilbar Khodjabaeva
Tashkent State University of Economics, Uzbekistan
d.xodjabaeva@tsue.uz

Abstract

This study seeks to identify the determinants of Myanmar's exports to its main trading partners. To find out the most relevant factors affecting them, we use panel data estimation technique and gravity model. Our sample covers the period from 2010 to 2018 for 28 main trading partners. The empirical results suggest that economic size and geographic variables can positively influence trade flows between these countries. In particular, the study showed that Myanmar's GDP, importer's GDP, trade openness ratio and the border between Myanmar and its main partners are the main factors. Transportation costs are found to have negative effect on exports.

Keywords: Gravity model, trade, exports, Myanmar, determinants

INTRODUCTION

Since the development of the trade model by Ricardo, it has been largely accepted that trade is good for the economic growth. Even before that, exports have been regarded as one of the cornerstones of economic growth of any country. Since then, the researchers have found the positive effect of exports on employment and balance of payments. It is also shown that exports will enable the local economies to be integrated into the global economy and expansion of know-how goes much faster.

Myanmar has been closed in terms of trade, especially because of the sanctions imposed by the western countries in 1997. When those sanctions become more severe in 2003 and 2007, the trade in Myanmar has suffered even more. Like many other developing countries, Myanmar have tried to improve the worsening balance of trade situation by promoting more of exports and limiting imports. This policy known as “export-first and import-second” might seem beneficial at first glance, however, it shows the fundamental problems the economy faces. The problem is, it is very difficult to imagine exports without the imports since modern products require very sophisticated manufacturing that requires many parts to be imported from abroad.

Myanmar is located in Southeast Asia, on the Indochina Peninsula, it borders on Bangladesh, India, China, Laos and Thailand, in the southwest it is washed by the Bay of Bengal, and in the south by the Andaman Sea.

Myanmar has rich natural resources: wood, mineral and ore minerals (copper, zinc, tin, tungsten, antimony, gold, silver, jade, rubies, sapphires), oil (proven reserves - 206.9 million barrels), gas - 350-400 billion cubic meters m), significant water resources, fish and seafood (the potential for their production is estimated at 1.1 million tons per year).

According to UN Comtrade statistics its GDP for 2017 was $66.7 billion, GDP per capita is about $ 1,250. GDP growth, according to Myanmar statistics for the 2016/2017 fiscal year, is about 7%, inflation is 6.2%, and the budget deficit is about 3 % Of GDP. Myanmar's main economic sector is agriculture, which employs about 70% of the working population and produces about 24% of GDP. Industry accounts for 24% of GDP.

The volume of foreign trade amounted almost 32 billion dollars, which of exports - 13.32 billion dollars and imports - 18.67 billion dollars. The main export items are gas, rice, legumes, seafood, valuable wood (primarily teak), clothing, precious and semiprecious stones; Import - consumer goods, machinery and equipment, metals, edible oils, cement, fertilizers, medicines. The main foreign trade partners are China, Thailand, Singapore, Japan and India.

Based on the role and importance of international trade that plays in the Myanmar’s economy, it is very important to identify the economic factors that influence Myanmar ’s exports in order to help the government take the necessary measures to improve the performance of the international trade sector. For this reason, as most researchers we also employ gravity model to find out the determinants of the country. Although extensive research has been carried out on gravity model, no single study was traced which analyzes trade relations and trade policies of Myanmar using this model in finding out the determinants of Myanmar total export trade. Therefore, we consider this study as an attempt to fill this research gap.

LITERATURE REVIEW

So far, gravity model has been used as a workhorse of applied literature in international trade. It was used in thousands of researches and publications including all the spheres of trade. It is interesting for researchers in different countries as it helps to measure influence of various trade-based impacts on total trade, starting from traditional tariffs to newly-imposed measures. As data availability becomes common for both developing countries and developed ones, the gravity model has become the starting point for a wide range of research issues with a political component. Although the gravity model was first proposed as an intuitive explanation of bilateral trade flows, it has recently acquired a number of micro based theoretical foundations. These approaches are important for policy researchers because they influence the data, specifications, and econometric methods used to evaluate the gravity model. Using a theoretically based gravity model can lead to excellent results and interpretations from the results obtained using the “naive” formulation, and high quality policy research and recommendations should increasingly be based on a strictly established methodology.

Gravity model was originally used by Tinbergen (1962) concluding that two-sided trade flows between trading countries can be estimated by using the gravity equation technique. Later Poyhonen (1963) employed the gravity model to describe commercial trade between two trading countries using this technique where the product of GDPs of the countries positively related, while the distance between partners was negatively related. Later on, researchers started to add more variables to the model to get more precise results.

Gonzalez et al (2018) found out the determinants of Nicaraguan agricultural exports formulating gravity model and then making an estimation with ordinary least squares. According to the study, Nicaragua’s GDP, partner’s GDP, trading partner’s population and real exchange rate were significant, but geographical adjacency showed insignificance being non-consistent with the model and many previous studies. Such findings may be viewed as a consequence of the lack of advantage in comparison to the international seaports that international land bridges had. Allayarov et al (2018) investigated the factors affecting Kyrgyzstan’s trade through gravity model with its main trading partners and predicted trade potential for the country. Panel data with Kyrgyzstan’s trade for 17 years with 35 main trading partners was estimated. The results proved that economic masses have a positive effect on trade, whereas partner’s population and distance had a negative effect. Moreover, Kyrgyzstan had a significant trade potential with neighboring countries. Bui et al (2017) analyzed the factors that influence rice export in Vietnam using gravity model. In their comprehensive survey, the authors presented that rice export are unstable, unsustainable and ineffective. Their study has used the gravity model with research time from 2004 to 2013 to describe the processes involved in factors influencing exports of rice

in Vietnam. Results have revealed, according to the hypothesis raised in the chapter, that gross domestic product (GDP), price, population and exchange rate are the biggest impacts on Vietnam rice exports. Irandu (2019) studied the factors that define horticultural exports of Kenya by means of a gravity model analysis. GDP and population of the two countries, geographical distance, colonial ties and common language were chosen as variables. The results revealed that Kenya exports more to European Union. Great Britain's share is also considerable. Rasoulinezhad and Kang (2016) used a gravity model to explain bilateral trade patterns between South Korea and 13 OPEC member countries over the period 1980 to 2014. Results of the estimation showed that the equation of gravity fits the data fairly well. They have confirmed the existence of long-term relationships between bilateral trade flows and major components of the gravity model – GDP, income (GDP per capita), income difference, exchange rate, level of openness, distance and membership of the WTO – through Fixed Effects (FE), Random Effects (RE) and FMO. They came to conclusion that South Korea – OPEC trade is well explained by the factors influencing South Korea's energy security, such as oil reserves, transport costs and political stability.

METHODOLOGY

This research tries to illuminate Myanmar's bilateral trade through the gravity model for the years 2010–2018. The research involves 28 countries over 9 years with one dependent and five independent variables. The data for GDP and trade openness come from the World Development Indicators database of the World Bank. Trade data comes from UN Comtrade database. Annual trade data is calculated at current US dollars. Data for distance and cultural similarities comes from CEPII database.

For the empirical analysis of the pattern of trade between the countries in the study, the use of the gravity model was chosen. This model has been widely used in studies of trade flows, due to its empirical robustness to describe the effects and the magnitude of the impediments and facilitators of them, and, therefore, it has proved to be a basic tool for economists looking to study the international economy.

$$X_{ij} = \mathrm{G}\frac{Y_i^{\alpha} Y_j^{\beta}}{D_{ij}^{\theta}} \qquad (1)$$

The term X_{ij} indicates the flows from source i to destination j. Alternatively, it can represent the total volume of interactions between i and j. The term Y measures the country's economic dimension (GDP or population). If it is measured as a cash flow (export values, for example), then Y is usually the Gross Domestic Product for each location. For people flow, it is

more natural to measure Y as the population. The variable D represents the distance between the locations, and, finally, the variables, α, β, θ represent the coefficients of the variables.

In empirical studies on international trade, the gravity equation for trade generally takes the log-linear form for estimation using ordinary least squares. Therefore, a linear relationship is obtained, as follows:

$$\ln X_{ij} = \alpha \ln Y_i + \beta \ln Y_j - \theta \ln D_{ij} + \delta \ln G_0 + \varepsilon_{ij} \quad (2)$$

where ε_{ij}represents a random error term that is inserted to explain the factors not observed by the previous equation, while δ represents the coefficient of the gravitational constant.

The functional specification proposed for the gravity equation of the present study is expressed in the following equation:

$$\ln X_{mp} = \alpha + \beta_1 \ln GDP_m + \beta_2 \ln GDP_p - \gamma \ln D_{mp} + \eta \ln OP_m + \theta \ln Bor_{mp} + \varepsilon_{ij} \quad (3)$$

where, lnX_{mp} indicates the value of exports made by country *p* from country *m* in chosen period; α is a constant; $\beta_1, \beta_2, \gamma, \eta, \theta$ are coefficients of the corresponding variables; $\ln GDP_m$ represents Myanmar's gross domestic product for the years of the sample; $\ln GDP_p$ represents trading partner's gross domestic product for the years of the sample; $\ln D_{mp}$ is the distance of country *m* in relation to country *p*; $\ln Op_m$ is a trade openness ratio of Myanmar; $\ln Bor_{mp}$ is a binary variable that receives a value of "1", if country *m* borders on country *p*, and zero, if not; ε_{ij} corresponds to the random error term. Table 1 shows details about the variables used, as well as the sign expected by them. Table 2 shows the descriptive statistics of the gravity equation.

Table 1. Summary of the variables in the model

Variable	Source	Expected sign	Description
GDP_m	WDI	+	Myanmar's gross domestic product
GDP_p	WDI	+	Trading partner's gross domestic product
D_{mp}	CEPII	-	Distance between Naypyidaw and trading partner's capital
OP_m	WDI	+	Myanmar's trade openness ratio
Bor_{mp}	CEPII	+	Dummy variable takes the value 1 if Myanmar shares common border with trading partners, and 0 if not

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln_exp	252	17.75534	2.157082	10.05406	22.43879
ln_gdpM	252	24.89635	.1768536	24.62606	25.15912
ln_gdppcP	252	9.34231	1.323995	6.660772	10.97246
ln_dist	252	8.349155	.8099575	6.35594	9.730552
ln_trop	252	4.343655	.6770778	3.112903	6.092711
Bor	252	.1428571	.3506235	0	1

Each of the independent variables from the gravity equation above has a definite effect on the level of Myanmar's exports with its trading partners. The coefficients of variables in the equation are expected to have signs as suggested by the economic theory and β_1, β_2 which stand for economic masses are expected to have a positive sign. Expected sign for γ which stands for distance is negative as a long distance between trading partners indicates higher costs and less profit margins for importing countries. Concerning trade openness, the more open the country is, the more exports would take place and therefore the expected sign of η is positive. In regard to borders, cultural similarities eliminate trade obstacles and make an increase in trade more likely, that's why we expect positive sign for θ.

RESULTS

There are several factors that influence a country's export capacity, ranging from institutional elements, improvements in the transportation system and qualification of the workforce, among others. In this sense, the identification of these aspects allows analyzing the extent to which it is possible to strengthen the trade flows of a given country.

The results obtained in the estimation of the econometric model proposed in equation 3 are presented below. As some variables were transformed by logarithms, their coefficients can be directly interpreted as elasticities. First, a model was chosen without trade openness and without geographic variables (equation 2), and, later, these variables were included (equation 3).

Empirical analyses suggest that the fixed effects estimation is the most suitable for the gravity model. Baldwin and Taglioni (2006) propose that the estimation by fixed effects should be used due to the presence of variables and characteristics not observable in the model, which are correlated with terms of trade costs. Thus, one cannot reject the hypothesis that the effects of countries' unobservable heterogeneities affect bilateral trade.

Table 3. Regression results of gravity equation

Independent variables	GLS coefficient	P-value
Constant	-18.349	.074
Myanmar's GDP	0.776	.035*
Trading partner's GDP	0.812	.000**
Trade openness	1.059	.001*
Distance	-1.197	.000**
Border	1.474	.037*

Note: *p‹0.05; **p‹0.01

According to our regression results, economic masses, trade openness, distance and contiguity are all significant which means that Myanmar's exports are well-explained by our chosen model. All the signs of coefficients gave the expected results as we predicted above.

In our results analysis, we assume that all other variables remain constant. A positive sign is as expected for the GDP of the two countries, β_1, β_2 and the estimated coefficient is significantly different from zero. Myanmar's estimated GDP coefficient is 0,776, suggesting that if Myanmar's GDP increases by 10 percent, Myanmar's total exports will increase by 7.7 points. In the same way, the estimated coefficient of GDP for trading partners is 0.812, which suggests that if the GDP of trading partners increases by 10 percent, cereal exports from Kazakhstan will increase by 8.1 points.

The distance γ is statistically significant, with a negative sign, as expected, proving that geographic distance is a significant resistance factor for Myanmar total exports. The value of -1.197 is consistent with many preceding studies. In our analysis, Myanmar's trade openness variable η has a positive sign (1.059) that if the openness ratio of Myanmar increases by 1%, total exports decrease by more than one point. Also statistically significant is the border variable θ with a positive sign which is consistent with many previous studies. Therefore, the idea that proximity between countries tends to positively influence trade flows is corroborated.

CONCLUSION

In 2012, Western countries' easing of economic sanctions against Myanmar increased the prospect of Myanmar expanding its exports. A steady increase in international trade flows, together with the liberalization efforts experienced in recent years generates the need to highlight, increasingly, the importance of factors that promote international trade. This effort pursued to find the determinants of Myanmar's total exports with its main trading partners. The analysis presented here highlights the relevance of this issue for a group of countries that has a

large representation in the country's economy. The results found pointed out that the economic size and the cultural and geographic variables could positively influence the trade flows between the two sides. In the case of the income variable, there was a great effect on the volume of exports meaning the higher the income, the more the volume of Myanmar's exports, which occur. In addition, the common border between Myanmar and its neighboring countries, together with trade openness variable encouraged the exports, where the results showed the significance and positive influence on the flows of Myanmar's exports. The distance variable between Myanmar and the importing countries proves to be a resistant factor for trade. Thus, we came to conclusion that all these results can help the government and policy makers to assume proper measures to develop the performance of Myanmar's exports.

LIMITATIONS AND FUTURE RESEARCH

Various scientists employ the different econometric techniques and research methods to achieve their purposes. The gravity model becomes a popular tool for economists with the properties of econometric estimations and methodologies. It is strongly recommended to do further research with new dimensions of the gravity model. Last but not least, the future of the gravity model will essentially depend on its ability to adapt to changing conditions and trade flows, as well as its new analytical approach to emerging datasets, as well as methodological modernizations. This study will help future scholars navigate the vast literature on the gravity trade of model.

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