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Does the Linder Hypothesis Hold? Recent Japanese Case

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ABSTRACT

The theory of comparative advantage has for a long time played one of the most important roles among the theories of international economics. The theory says that a country has to specialize in producing and exporting goods and services that the country can produce at lower opportunity cost than other goods and services. Achieving this, both countries can benefit. The Linder hypothesis focuses on internal demand in a country. It states that the pattern of export goods is determined by internal demand structure. This study empirically analyzes this Linder hypothesis for the recent case of Japan. The Gravity model can be used to obtain theory-consistent estimates of the Linder hypothesis. This model can estimate bilateral international trade on the basis of cross-section data. The results show that the Linder effect has been holding well. Also, FTA (Free Trade Agreement) has been having positive impacts on international trade.

Keywords: demand structure; income; Japan; Linder hypothesis.

INTRODUCTION

The theory of comparative advantage has for a long time played one of the most important roles among the theories of international economics. The theory says that an economy has to specialize in producing and exporting goods and services that the economy can produce at lower opportunity cost than other goods and services. Achieving this, both countries can benefit. The has been a lot of discussion for this theory both from both theoretical and empirical viewpoints, or both from academic and real-world fields.

Among them, [1] extended a [2]'s model, and indicated that companies with different productivity can coexist in one industry as each company faces concerns for their productivity level before deciding whether they should enter the industry or not.

While [1] emphasizes supply instead of demand, [3] focuses on demand. The Linder hypothesis focuses on internal demand in a country. It states that the pattern of export goods is determined by internal demand structure. Why can such a hypothesis be established? [3] states that companies tend to produce according to economic needs which usually come from internal demand. When the product activity starts, such companies face limited domestic demand, so companies would like to export their products. [3] then indicated that further exposures for companies to international trade led to reallocations toward much more productive ones taking into account some aspects such as demand structures. If two countries (such as US and Germany) have the same demand structure, exported and imported products of the countries would be the same. However, the products are in reality different in some aspects such as quality. So, the demand structures can be a deterministic element for international trade

pattern which are affected by a lot of factors. Empirical analysis would help provide more definitive answers. For this aspect, income per capita is mostly used for the representative factor that makes demand structures.

Comparative advantage still exists. However, among US, Germany, Japan and so on, cars from those countries that have comparative advantage are exported and imported. To explain this phenomena, other theories would be needed. This study focuses on this point and whether or not Linder hypothesis holds or not is empirically examined for a recent Japanese case.

This study is structured as follows. Following this section, existing studies are listed. Empirical methods are described, the analyses are conducted, and the results are examined. Finally, this study ends with a brief summary.

EXISTING STUDIES

Trade patterns have been disputed a lot since the 1800s. It would be impossible and unnecessary to summarize, however, new theories have been provided and discussed (for example, [1][2], [3], and see for example, [4]). However, this section's discussion is limited to Linder hypothesis or other related strong hypotheses.

The similarity of income is a key issue for the Linder hypothesis. Moreover, [5] found that trade could benefit by specialization in demand instead of production. Focusing on demand instead of supply is an important point for the Linder hypothesis. [6] suggested that the presence of both demand and supply perform roles for per capita income influencing intra-industry trade. [7} revealed that international trade diversification effects are larger for the European countries with per capita incomes which are close to the European average. [7] also indicated that non-EEC countries with per capita incomes near to the European average income have strong negative international trade diversification effects. [8] showed that developed countries in APEC (Asia Pacific Economic Cooperation) being near per capita incomes have inclined to trade more with each partner than developing countries in APEC. [9] found that while countries which have differences in incomes between countries increase international trade, countries which have differences in income dispersion decline international trade. There are some differences, however, most studies show that income per capita can be employed to check whether the Linder hypothesis fits or not. There seems to be a consensus about using income per capita when examining the Linder hypothesis.

Whether the Linder hypothesis holds well or not should be examined by empirical analyses. Sixty years have passed since the publication of [3], however, a lot of studies have been provided to examine the validity of the Linder hypothesis by now. It should be noted that most of them accept the hypothesis, not only the theoretical views but also empirical views.

[10] found that Linder hypothesis fits well. [11] showed that the Linder effect could be confirmed for both developed and less developed economies. [12] indicated the validity of the Linder hypothesis for 18 of 19 OECD (Organization for Economic and Cooperation and Development) countries. The empirical results to check whether the Linder hypothesis holds or not were robust. [13] found support for the Linder hypothesis. It was also found that the Linder hypothesis gained approval in the 1990s using panel data of international trade from 63

countries for 1970, 1980, 1990, and 1992. [14] also used panel data and found support for the Linder hypothesis. It used panel data of bilateral international trade between the triad (EU15, USA and Japan) countries and their 57 most related trading partners' countries for the period 1986–1997. [15] used the panel data of OECD economies and showed some grounds for the support of the Linder hypothesis. [16] found the validity of the Linder hypothesis using data which Germany performs international more intensively with trading partners with similar per capita incomes. However, [17] revealed that the support of the Linder hypothesis for Croatia could not be admitted. Instead, the structure of Croatia's international trade is in accordance with the gravity model of international trade. There are also studies which focus on sector levels of international trading. [18] used the data of Russia and five regional groups, and showed that Russia's manufacturing products and raw material integration employing the Heckcher-Ohlin's theory is not similar to that of other BRICs members from the view of the Linder hypothesis. [19] indicated that the Linder hypothesis was not in support of international trade of differentiated agri-food products. [20] found that the Linder hypothesis fit at the total level. Concretely, it showed that similar per capita incomes and the inequality of incomes in two countries increased international service trade. However, it also found that the precise impact was different among each service trading sector. [21] indicated that once controlling for the effect of commonality on the extensive margin was taken into account, the Linder hypothesis fit well at more aggregate levels. [22] suggested that the Linder hypothesis could be accepted but held only when the hypothesis is obeyed as a sector level prediction. Moreover, [23] showed that FDI (foreign direct investment) occurred between countries with similar per capita income levels which predicts a Linder hypothesis for FDI. However, this study does not address FDI. It examines whether the Linder hypothesis holds or not between Japan and its major trading partners.

EMPIRICAL ANALYSIS

The Gravity model can be used to obtain theory-consistent estimates of the Linder hypothesis. The gravity model seems to be a simple but robust analysis to estimate bilateral international trade on the basis of cross-section data. Economic size and distance between trading partners are usually used for theoretical and empirical analysis.

The typical equation is as follows (1)

$$Xij = \alpha \frac{YiYj}{Dij} \qquad (1)$$

X stands for international trade. Y denotes economic size (income per capita), D denotes distance, i, j denote countries, and α is a constant term.

The model has been said that it was introduced by [24] etc., and its theoretical foundation has been discussed in many studies. [25] showed that the unobservable trade costs are large, and that omitting them sometimes caused not only a bias of the observable trade costs but also a bias of country-specific variables that are either solved implicitly or estimated explicitly. [26] showed that the impact of distance on trade has fallen steadily over time. For the empirical methods, [27] found that heterogeneity problem is not taken into account adequately, and gravity models could overestimate the effects of international trade volume. [28] suggested that the variety of intra-regional trade costs have effects on relative bilateral trade costs and

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international trade volume except in a neutral case. Among these, distance is omitted for estimation because the effect of distance between trading partners on international trade has been decreasing (see, for example [29]).

The estimated equation is (2)

$$X_{ijt} = \exp(\alpha_0 + \alpha_1 LINDER_{ijt} + \alpha_2 FTA_{ijt}) + e_{ijt} \quad (2)$$

where X stands for exports from Japan (i) to country j at period t. LINDER is defined $|Y_i - Y_j|$. Y denotes income per capita as most empirical studies use. FTA represents a free trade agreement. This variable takes the value of 1 if both countries Japan and j are members of the same FTA un year t, and zero otherwise. e is the error term.

In the equation, the most important coefficient is α_1. If the coefficient is negative, the Linder hypothesis holds. The similarity of per capita income, therefore, is taken as an index of similarity of demand structures.

In the equation (2), the variable FTA is included. [30] showed that an FTA approximately *doubles* partner countries' bilateral international trade after 10 years. [29] showed that distance between capitals, along with the real GDP was included as an explanatory variable and shorter distances are associated with increases in international trade. On the other hand, it showed that the effect of distance on international trade has been decreasing gradually. Improvements in IT may have influenced this trend. The world has been shrinking via technologies and so on.

The empirical method is OLS (Ordinary Least Squares). Panel data is used for estimation. Along with the normal OLS method, robust estimation (RS) is employed for estimation. RS is unlike maximum likelihood estimation. OLS estimates for regression are usually sensitive to the variables that do not follow the pattern of the other ones. This is not a problem if the outlier is an extreme observation from the tail of a normal distribution. On the other hands, if the outlier is from non-normal measurement error or some other violation of normal OLS estimation, it compromises the suitability of the regression results if a non-robust regression method is employed.

Countries are as follows: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Columbia, Croatia, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jordan, Kazakhstan, Korea, Luxemburg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Spain Sweden, Switzerland, Thailand, Turkey, UAE, Ukraine, United Kingdom, USA, Venezuela.

Moreover, G7 (Group of seven) is also used for estimation.

Also, Japan signed FTA with Singapore (2002.11), Mexico (2005.4), Malaysia (2006.7), Chile (2007.9), Thailand (2007.11), Brunei (2008,7), Indonesia (2008.7), Philippine (2008.12), ASEAN (2008.12), Switzerland (2009.9), Vietnam (2009.10), India (2011.8), and Peru (2012.3).

Sample period is from 2001 to 2020. Yearly data is used. Data are from IFS (International Financial Statistics).

EMPIRICAL RESULTS

The empirical results of the equation (2) is in Table 2. The regression are all countries in the data, and G7 economies. The variable FTA is included in the equation for case of all of the data.

Table 1 LINDER Effect on International Trade

	All		G7	
	OLS	RS	OLS	RS
C	7.493*** (95.827)	7.551*** (92.076)	9.304*** (153.473)	9.287*** (146.370)
LINDER	-0.488*** (-8.827)	-0.578*** (-9.936)	-2.647*** (-8.831)	-2.623*** (-8.378)
FTA	2.292*** (12.299)	2.354*** (12.034)		
Adj.R2	0.149		0.392	
Adj.Rw2		0.198		0.438
F-statistic (probability)	99.544 (0.000)		77.990 (0.000)	
Rn-statistic (probability)		210.409 (0.000)		70.205 (0.000)

Note) Parentheses are t-value except for the cases of probability.

The results of the Table 1 are clear and robust. First of all, the Linder effect reduces trade volume for both cases. Also, it shows that FTA encourages international trade.

It can be said that the Linder hypothesis has been holding. According to this hypothesis, the pattern of export goods is determined by internal demand structure.

Moreover, recent trends in globalization may have strengthened the Linder hypothesis. FTA has been having positive impacts on international trade.

CONCLUSION

The theory of comparative advantage has for a long time played one of the most important roles among the theories of international economics. The theory says that a country has to specialize in producing and exporting goods and services that the country can produce at lower opportunity cost than other goods and services. Achieving this, both countries can benefit. The Linder hypothesis focuses on internal demand in a country. It states that the pattern of export goods is determined by internal demand structure. This study empirically analyzes this Linder hypothesis for the recent case of Japan. The results show that the Linder effect has been holding well.

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