

## ANOTHER EMPIRICAL LOOK AT THE THEORY OF OVERLAPPING DEMANDS

### 1. INTRODUCTION<sup>1</sup>

Linder (1961) proposed that trade in manufactured goods was primarily determined by domestic demand conditions. This demand-oriented explanation was in sharp contrast to the supply-oriented factor-endowment theory which focuses on factor endowments and intensities as sources of comparative advantage and international trade patterns. Linder proposed that a country will export products for which there is a large and active domestic market. The simple reason is that the production for the domestic market must be large enough for firms to realize scale economies. The resulting lower costs would help to penetrate foreign markets. The most promising and open markets for exports will be found in countries whose income levels and tastes are generally comparable to those of the exporting country. Since consumer tastes depend on income levels, the types of products produced in a country are a function of the level of *per capita* income in the country. In other words, countries produce goods that respond primarily to the demands and tastes of their consumers but part of the output will be exported to other countries where receptive markets exist. Given these patterns of production, international trade will occur in products that have *overlapping demands*, implying that consumers in different countries with similar *per capita* incomes will consume similar types of manufactured goods. Linder's hypothesis is therefore referred to as the *preference similarity hypothesis* or the theory of overlapping demands.

Thus, an important implication of the Linder hypothesis is that international trade in manufactured goods will take place largely between countries with similar income levels and demand patterns. That is, trade will be stronger between countries with similar *per capita* income levels than between countries with dissimilar *per*

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<sup>1</sup> Parts of this discussion are based from Carbaugh (2009), pp. 86-87.

*capita* income levels. Standards of living are determined in part by the factor endowment of countries. It is commonly acknowledged that countries with large amounts of capital per worker tend to be more productive and richer than countries with lower amounts of capital per worker. Therefore, there should be a considerable volume of trade between countries with similar characteristics. Rich countries will tend to trade with other rich countries and poor countries with other poor countries. This implication of Linder's hypothesis presents a sharp contrast to the predictions of the Heckscher-Ohlin theory in which countries with dissimilar factor endowments would appear to have the greatest incentives to trade with one another because they would exhibit the greatest disparity in autarky prices. Further, a country's exports will differ from its imports because different factor proportions will be required for the production of the two categories of products. Linder's theory also implies that the products traded will be similar but differentiated in some ways. These implications seem to be supported by the observation that the great majority of international trade in manufactured products takes place among the relatively high-income countries such as the United States, Japan, Canada and members of the European Union. Furthermore, it is also true that the most rapid growth in international trade in manufactured goods in the post World War II period was between industrialized countries, particularly in Western Europe (Krugman and Obstfeld, 2006). After the major economies of continental Europe formed the European Economic Community (EEC) in 1957, trade within the EEC grew twice as fast as world trade as a whole during the 1960s. To be sure, Linder's theory does not imply that there will be no trade in manufactured goods between rich and poor countries. Since wealthy and poor people reside in rich and poor countries alike, there is bound to be some overlap in demand structures. However, the potential for trade in manufactured goods is small when the extent of demand overlap is small.

Linder suggested that his theory was applicable only to trade in differentiated manufactured goods in which consumer tastes and scale economies were deemed to be particularly important. He believed that trade in raw material or agricultural products can be adequately explained by the traditional theory with its emphasis on the supply of productive factors, including climate and natural resources. Linder's model also provides an explanation for *intra-industry trade*, an important phenomenon in international trade, which depends on economies of scale and implies imperfectly competitive markets. Such trade occurs when countries both export and import the same types

of products. Simple models of comparative advantage would seem to rule out this type of trade pattern. However, if trade takes place to satisfy the need for variety in consumption, as Linder suggests, intra-industry trade is not surprising.

In this paper we test the Linder hypothesis for five East Asian countries: Indonesia, Malaysia, the Philippines, South Korea and Thailand using panel data for 1997, 1999, 2001, 2003, and 2005. For this purpose, a modified gravity model is developed which is estimated using a fixed-effects estimator. The rest of the paper is organized as follows. The next section provides a brief review of the empirical literature. Section 3 presents the theoretical background and methodology. Section 4 reports the empirical results and analysis. Section 5 provides a summary and concludes.

## 2. BRIEF REVIEW OF LITERATURE

Linder's theory has been subjected to a variety of empirical tests. The overall results are generally inconclusive. On one hand, the Linder hypothesis has been supported by several studies. For instance, Sailors *et al.* (1973) found that the greater the difference in *per capita* incomes of countries, the less intensely the countries will trade with one another, supporting the Linder theory. However, it was argued that since countries with similar income levels have tended to be close geographically and culturally, this strong trade may reflect low transaction costs. Thursby and Thursby (1987) in their study of trade in manufactured products of 13 European industrialized countries, Canada, Japan, the United States and South Africa found strong support for Linder's theory, after allowing for distance between countries and other determinants of trade. Only Canada and South Africa failed to have a significantly negative regression coefficient for *per capita* income differences with a trading partner on the volume of trade with that trading partner. Several more recent studies also lend support to the Linder hypothesis. For example, Bergstrand (1990) finds that *per capita* income differentials tend to explain intra-industry trade. Chow *et al.* (1999) test the Linder hypothesis for trade between the four original tiger economies (Hong Kong, Singapore, South Korea and Taiwan) and their major OECD markets during the 1965-1990 period. They conclude that the Linder hypothesis may provide a relatively good explanation of trade for countries above some *per capita* income threshold and for trade in differentiated products. Fillat-Castejon and Serrano-Sanz (2004) in their study

of Spain using data for the 1959-1986 period find internal demand to be an important determinant of trade and suggest that foreign markets can be considered an extension of the domestic market. Fink *et al.* (2005) report support for Linder's hypothesis based on product quality for most consumer goods. Finally, Leitão and Faustino (2006) examine the features and determinants of Portuguese intra-industry trade from 1995 to 2003 and find that differences in income levels have a positive impact on intra-industry trade.

Other empirical studies, however, have failed to find support for Linder's proposition. For instance, Kennedy and McHugh (1980) test the Linder hypothesis for 14 industrialized countries using data for the 1960-1975 period. Their results do not support the Linder hypothesis. Qureshi *et al.* (1980) test Linder's theory for 10 regions in the United States with each region comprised of states with geographic and *per capita* income similarities. Kennedy and McHugh (1983) study U.S. trade with 57 countries using data for 1963, 1970 and 1976. They find no association between income differences and trade intensity. Hoftyzer (1984) using data for 58 countries for 1970 finds that international trade is affected by distance and membership in free trade areas but finds no support for the Linder trade thesis. In their study of 13 developed and 34 developing countries using data for 1980, Linnemann and van Beers (1988) conclude that similar levels of *per capita* incomes are not associated with a stronger trade in manufactures. They find that trade intensity tends to increase as *per capita* income of trading partners increases. For developed countries, however, the Linder hypothesis is not rejected when the absolute difference in *per capita* incomes is used as an explanatory variable.

### 3. THEORETICAL BACKGROUND AND METHODOLOGY

As discussed above, Linder's overlapping demands theory predicts that the bilateral trade pattern between two nations is determined by the similarity in their *per capita* incomes. Following Choi (2002), we develop the following model in order to test Linder's hypothesis:

$$\log (Xratio_{ijt}) = c_0 + c_1 \log(PCYdiff_{ijt}) + c_2 \log(PCYsum_{ijt}) + c_3 \log(DIST_{ij}) + c_4 ASEAN_{ij} + e_{ijt} \quad (1)$$

where

$i$  = exporting country

$j$  = importing country

$X$  = exports

$Y$  = Gross Domestic Product (GDP)

$PCY$  = *Per Capita* GDP

$\log(Xratio_{ijt}) = \log((X_{ijt}) / (Y_{it} + Y_{jt}))$

$\log(PCYdiff_{ijt}) = \log(|PCY_{it} - PCY_{jt}| / (PCY_{it} + PCY_{jt}))$

$\log(PCYsum_{ijt}) = \log(PCY_{it} + PCY_{jt})$

$DIST$  = distance between the two countries  $i$  and  $j$  (between the largest port city of each country)

$ASEAN_{ij}$  = dummy variable, 1 for ASEAN member, 0 otherwise.

$e_{ijt}$  = random error term

$t = 1997, 1999, 2001, 2003, 2005$

In order to normalize the dependent variable (exports) it was first divided by the sum of the GDP of both countries ( $i$  and  $j$ ) after which a logarithmic transformation was made. Likewise, we normalize the *per capita* income difference by dividing it by the sum of the *per capita* incomes of both countries and transforming it into logarithmic values.

Since we have used pooled data for 1997, 1999, 2001, 2003 and 2005, we have included dummy variables to represent these time periods. The final model that is to be estimated after including the dummy variables is as follows:

$$\begin{aligned} \log(Xratio_{ijt}) = & c_0 + c_1 \log(PCYdiff_{ijt}) + c_2 \log(PCYsum_{ijt}) + c_3 \log(DIST_{ij}) \\ & + c_4 ASEAN_{ij} + c_5 DUM97_{ij} + c_6 DUM99_{ij} + c_7 DUM01_{ij} + c_8 DUM03_{ij} \\ & + c_9 DUM05_{ij} + v_{ijt} \end{aligned} \quad (2)$$

where  $DUMs$  are the dummy variables for the various years and  $v_{ijt}$  is the random error term. The dummy variable,  $DUM$ , is defined as 1 for that particular year and 0 otherwise (e.g.,  $DUM97$  is defined as 1 for the year 1997 and 0 otherwise). In addition to estimating equation (2) we also estimate equation (1) for each year in our sample.

A negative and a statistically significant estimated value of  $c_1$  would lend empirical support to the Linder hypothesis. Alternatively, if the estimated value of  $c_1$  is positive or not statistically significant even with a negative sign, the hypothesis should be refuted. With respect to  $c_2$ , since increasing *per capita* incomes of both trading nation increases trade volume (both bilateral exports), this coefficient would be expected to carry a positive and statistically significant coefficient. The standard gravity model suggests that, all else constant, the distance between the two trading hubs reduces the level of trade among those two hubs. Based on this argument, it is

expected that  $c_3$  will carry a negative sign. Since ASEAN members are covered by a preferential trading system (AFTA or ASEAN Free Trade Area), it is expected that  $c_4$  will carry a positive sign. The coefficients of the dummy variables, *a priori*, are indeterminate.

As indicated earlier, we have selected Indonesia, Malaysia, the Philippines, South Korea and Thailand for our study. In addition to including the trade data for these countries with one another, we have also included their bilateral trade data with Japan, Singapore, Hong Kong, China, Australia, the United Kingdom and the United States. Using data for 1997, 1999, 2001, 2003 and 2005 for each country, a panel data set of 275 observations is created. All the data are obtained from the World Bank's World Development Indicators 2006 (CD-ROM), except for the data for distance which are derived from the timeanddate.com website.

#### 4. EMPIRICAL RESULTS

The estimation of equation 1 for each year in the sample is reported in Table 1. The estimation of equation 2 is reported in Table 2 which shows the results from three sets of equations. Column 1 reports the results from the full sample. In order to check the robustness of our results, we split the sample into two groups and re-estimate the model. The results of these estimations are reported in the second and third columns. As opposed to splitting the sample data in the middle we separate it between 165 observations and 110 observations to ensure that the data for a single country is not divided between the two samples. All three estimations are corrected for first-degree autocorrelation. The estimated results from all the estimations are consistent with one another in terms of their size, direction and level of significance which provide some indication of the robustness of our results.

The overall results of our estimations appear fine in terms of the goodness of fit, F-values and the direction of the coefficients of the variables. As expected, the coefficient of  $\log(PCYsum)$  in all the estimations is positive and statistically significant. This result suggests that an increase in *per capita* income in the trading nation is associated with an increase in the level of exports of the trading nation. Similarly, the coefficient of the variable *ASEAN* is also positive and statistically significant. This result is not surprising given that these countries enjoy a preferential trading arrangement among themselves. Following the gravity model, we have included the

TABLE 1 - *Estimation of Equation 1 for Different Years*  
*Dependent Variable  $\log(Xratio)$* 

Variable/Year	1997	1999	2001	2003	2005
Constant	-2.43 (3.19)***	-1.99 (2.46)**	-1.11 (1.49)	-0.54 (0.70)	-0.47 (0.58)
<i>Log(PCYdiff)</i>	0.06 (0.36)	-0.01 (0.02)	0.24 (1.34)	0.05 (0.28)	-0.07 (0.40)
<i>Log(PCYsum)</i>	0.57 (3.93)***	0.47 (3.12)***	0.33 (2.35)**	0.33 (2.17)**	0.36 (2.27)**
<i>Log(DIST)</i>	-0.33 (5.30)***	-0.32 (5.43)***	-0.35 (6.56)***	-0.43 (7.51)***	-0.46 (7.42)***
<i>ASEAN</i>	0.29 (2.32)**	0.37 (2.96)***	0.33 (2.90)***	0.24 (2.00)**	0.22 (1.67)*
<i>Adj R<sup>2</sup></i>	0.54	0.55	0.63	0.63	0.61
<i>F</i>	16.65***	17.44***	24.17***	24.36***	22.52***
<i>n</i>	55	55	55	55	55

Figures in parentheses are the t values for the corresponding coefficients.

\*\*\*, \*\*, and \* indicate significant at 1, 5, and 10 percent levels.

variable  $\log(DIST)$ . As predicted by theory, the estimated coefficient of this variable is found to be negative and significant.

The main focus of our study is the variable  $\log(PCYdiff)$ . As indicated above, the coefficient of this variable indicates whether the Linder hypothesis holds true or not. As seen in Table 1 the coefficient of this variable is positive but not statistically significant in all the estimations except for the year 2005. For the year 2005, although this variable carries a negative coefficient, it is very small and is not statistically significant. As indicated above, Table 2 reports the estimation of the model using panel data from all the years in our sample. As seen in Table 2, the coefficient of this variable is positive in the full sample estimation as well as in the estimation of one of the split samples, but the coefficients are not statistically significant. In the third estimation, the coefficient is negative as predicted by the Linder hypothesis, but the size of the coefficient is very small and statistically not different from zero. Based on these findings, it may be argued that our empirical findings do not support the theory of overlapping demands and thus refute Linder's preference similarity hypothesis.

How might these results be explained? Since our analysis uses data on total trade and not trade in manufactured goods as suggested

TABLE 2 - Estimation of Equation 2  
Dependent Variable  $\log(Xratio)$

Variable	Estimation 1 (Full Sample, n = 275)	Estimation 2 (Sample Size n = 165)	Estimation 3 (Sample Size n = 110)
<i>Log(PCYdiff)</i>	0.01 (0.46)	0.09 (0.86)	-0.06 (0.75)
<i>Log(PCYsum)</i>	0.41 (6.94)***	0.42 (5.42)***	0.30 (3.59)***
<i>Log(DIST)</i>	-0.33 (4.56)***	-0.40 (9.47)***	-0.25 (6.76)***
<i>ASEAN</i>	0.26 (4.56)***	0.20 (2.28)**	0.25 (3.37)***
<i>DUM97</i>	-1.69 (4.83)***	-1.30 (2.37)**	-1.86 (3.37)***
<i>DUM99</i>	-1.68 (4.88)***	-1.17 (2.33)**	-1.90 (4.27)***
<i>DUM01</i>	-1.67 (4.85)***	-1.14 (2.27)**	-1.80 (4.11)***
<i>DUM03</i>	-1.70 (4.90)***	-1.14 (2.24)**	-1.80 (4.08)***
<i>DUM05</i>	-1.69 (4.83)***	-1.15 (2.24)**	-1.86 (4.21)***
<i>AR (1)</i>	0.76 (18.76)***	0.79 (15.63)***	0.73 (10.47)***
<i>Adj R<sup>2</sup></i>	0.843	0.873	0.796
<i>DW</i>	1.993	1.900	2.200
<i>F</i>	164.4	126.8	47.99

Figures in parentheses are the *t*-values for the corresponding coefficients.  
\*\*\* and \*\* indicate significant at the 1 and 5 percent level.

by Linder, it does not provide a meticulous test of Linder's thesis which could still turn out to be true. This possibility seems unlikely, however. The data for the countries in our sample indicate that international trade is overwhelmingly important for these countries and they engage in a great deal of trade in manufactured goods, most of which is with high-income trading partners (and not among themselves). Therefore, the results of our study lead us to believe that domestic demand is less of a significant factor in explaining comparative advantage and trade patterns in our sample countries and that supply-side considerations such as factor endowments and factor intensities may play a much more pronounced role.



## 5. SUMMARY AND CONCLUSION

According to Linder's theory of overlapping demands, international trade in manufactured goods is determined primarily by domestic demand conditions. This theory implies that such trade will be stronger between countries with similar *per capita* income levels than between countries with dissimilar *per capita* incomes. In this paper, we test the Linder hypothesis for five East Asian countries: Indonesia, Malaysia, the Philippines, South Korea and Thailand using cross-sectional as well as panel data for 1997, 1999, 2001, 2003 and 2005.

In addition to bilateral trade data for these countries with one another, we also include their bilateral trade data with their other major trading partners. First, we develop and estimate a modified gravity model for each year in the sample. Next, we construct panel data using data from all the sample years and estimate the models in three forms using a fixed-effects estimator. The overall results of our estimations are quite robust and do not support Linder's hypothesis. Given the overwhelming importance of international trade to the economies of our sample countries and that these countries conduct most of their manufactured goods trade with high-income countries, our results are not entirely surprising. However, it should be noted that our study uses total trade (exports) rather than trade in manufactured goods and uses *per capita* income to measure preference similarity. Although Linder himself employed these variables, they are still proxies for the variables discussed by Linder in his theory.

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## ABSTRACT

Linder's theory of overlapping demands suggests that international trade in manufactured goods will be stronger between countries with similar *per capita* income levels. In this paper, we test the Linder hypothesis for five East Asian countries using panel data for five years. In addition to including bilateral trade data for these countries, we include their bilateral trade data with their other major trading partners. A modified gravity model is developed for this purpose. The model is first estimated for each year in the sample. In addition, a panel data set is constructed and estimated using a fixed-effects estimator. The overall results of our estimations are quite robust and do not provide support for Linder's hypothesis.

Keywords: Linder Hypothesis, East Asian Countries, Panel Data  
JEL Classification: F1

## RIASSUNTO

### *Un altro sguardo empirico alla teoria delle overlapping demands*

Secondo la teoria delle *overlapping demands* di Linder, il commercio internazionale di beni manufatti risulterebbe essere maggiore tra i paesi che presentano livelli di reddito procapite simili. In questo studio tale teoria viene applicata a cinque paesi dell'est asiatico utilizzando dati *panel* per un periodo di cinque anni. Oltre a considerare i dati del commercio bilaterale tra questi paesi, sono stati inclusi anche i dati del commercio bilaterale con gli altri principali partner commerciali. A questo proposito è stato sviluppato un modello gravitazionale modificato, stimato prima per ogni anno del campione. È stato realizzato un *panel data set* attraverso un *fixed effect estimator*. Le stime ottenute risultano nel complesso robuste e non forniscono evidenze a sostegno dell'ipotesi di Linder.