

## CHAPTER V

### EMPIRICAL ESTIMATION

#### 5.1. Estimates of Gravity Equations, Model Selection and Discussion of results

##### 5.1.1. Estimation and Model Selection

The gravity models introduced in the previous section are estimated to find the determinants of trade flow of Bhutan and to calculate trade potential of Bhutan. The pooled regression model or constant coefficients model is found to be more appropriate strategy to be adopted and gravity models fits well. So this estimation method is applied and different equations are estimated, in order to test consistency of variables as well as to improve model fitness in framing Bhutan's overall trade flow, imports and difficult export phenomenon.

In these models, both intercept and slope are considered identical for all pool members and have applied cross section weight (GLS) using estimated cross section residual variances assuming the presence of cross section heteroskedasticity. To correct autocorrelation problem Auto Regression (AR) is added to the model. Our estimations are based on unbalanced panel data and results are interpreted.

First equation (5) above is estimated for 338 number of observations (17 cross section data and 23 time series data) covering all countries of our sample, however there exists a perfect multicollinearity problem between dummy variable border and bilateral trade agreement with India and arise near singular matrix problem. This is because Bhutan do not share border with any other trading partners except with India. Therefore, either one of the dummy variables could be taken into account, so we have considered bilateral trade agreement and dropped border variable from our estimation of all three models (any one taken into account results in same significance).

Then model is estimated taking all variables (Appendix A, table 10a.), however some variables poses wrong signs and are found insignificant. The variables like change in GDP and change in PCGDP over time are found insignificant and even the magnitude of coefficient are very small (0.002). Dropping these variables improves the significance of other variables and another estimate has been taken after dropping these variables from

the model. The preferential trade agreement with Bangladesh and SAPTA (even poses wrong sign), both are still found to be insignificant. Thus dropping these variables trade model has been regressed on GDP, distance, trade to GDP ratio (openness) and bilateral FTA with India (dummy variable). This time all explanatory variables are found to be significant with expected signs. So our selected estimated gravity model with GLS and AR for Bhutan trade is:

$$\log TR_{ijt} = \alpha_0 + \alpha_1 \log(GDP_{it} * GDP_{jt}) + \alpha_4 \log(Dis\ tan\ ce_{ij}) + \alpha_5 \log(TR / GDP_{it}) + \alpha_6 \log(TR / GDP_{jt}) + \alpha_8 (TA_{ij}) + (U_{ij}) \quad 5(a)$$

It should be noted that the GDP per capita data used in this study are obtained from UN statistic division; however, this data lacks consistency with ADB data. The per capita GDP figure as per ADB data source is higher by two to three folds compared to UN data due to difference in population figures. However, to maintain consistency in our study we have used UN data set since all other data's are obtained from the same source. We have estimated separate equation including PCGDP and PCGDP differential to avoid distortion of efficiency of the model.

Despite the difficulties on data issues and especially on data consistency, the gravity trade equation explains more than 89% (adjusted R<sup>2</sup>) of the variation in Bhutan's trade in consistent with the empirical evidence of the gravity trade model. The empirical evidence shows that independent variables explain above 65% to 95% of the variation in the dependent variables in the gravity equation.

The gravity model of Bhutan's exports-equation (6) has been estimated taking all explanatory variables for 175 observations of 16 countries (Appendix A, table 11a). Many variables are found either insignificant or poses wrong signs. In the process of model selection, we have found only GDP of trading partner, openness, distance, bilateral trade agreement with India and Bangladesh significant, thus the preferred gravity model of Bhutan's export (with GLS and AR) is as follows:

$$\log X_{ijt} = \beta_0 + \beta_2 \log(GDP_{jt}) + \beta_6 \log(Dis\ tan\ ce_{ij}) + \beta_7 \log(TR / GDP_{it}) + \beta_8 \log(TR / GDP_{jt}) + \beta_{10} (TA_{ij}) + \beta_{11} (TB) + U_{ij} \quad 6(b)$$

Similarly the gravity model of Bhutan's import-equation (7) is estimated for 264 observations covering all countries in the sample (Appendix A, table 12a) and same

variables of export model are found significant with expected signs except bilateral trade agreement with Bangladesh is found to be insignificant. Thus, the preferred estimated gravity model of Bhutan's imports (with GLS and AR) is:

$$\log M_{ijt} = \delta_0 + \delta_2 \log(GDP_{jt}) + \delta_6 \log(Distance_{ij}) + \delta_7 \log(TR / GDP_{it}) + \delta_8 \log(TR / GDP_{jt}) + \delta_{10}(TA_{ij}) + U_{ij} \quad 7(b)$$

### 5.1.2. Empirical Estimation Results of Gravity Trade Model

As per our estimation results the determining factors of Bhutan's total trade (export + import) are the product of GDP of Bhutan and its trading partners, openness of the economy of both the countries, FTA with India and negatively influenced by distance.

**Table 5 Empirical Results of Trade Gravity Model (1<sup>st</sup> order AR model)**

Variables	Coefficient ( $\alpha$ )	t-value	Probability
Constant Term	-7.8680	-4.4296	0.0000
LOG (GDPi?*GDPj?)	0.4701	6.3188	0.0000
LOG(OPENi?)	0.4707	2.9586	0.0033
LOG(OPENj?)	0.2836	2.0539	0.0408
LOG(DIST?)	-1.0462	-4.8679	0.0000
TA?	3.8857	10.1334	0.0000
R square =	0.8951		
Adjusted R square =	0.8932		
Durbin Watson =	2.3487		
F =	470.6582	Signif F = 0.000	Panel observation = 338

Note: All variables are significant at 1% level except openness of country j significant at 5% level.

Dependent Variable: logarithm of Total Trade (exports + imports) between country i and j.

In consistent with other empirical evidences, Gravity model of Bhutan's trade equation explained 89% (adjusted R<sup>2</sup>) of the variation of total trade though five out of 11 variables involved in the model are found to be significantly related to the dependent variable. F-statistic=470.65 (Prob=0). Durbin-Watson stat = 2.3 which is obtained after correcting autocorrelation problem by adding AR (1).

In our trade model the coefficient of product of GDP of country i and j is positive and highly significant as expected. This implies that Bhutan tends to trade more with larger economies that is Bhutan's bilateral trade with country j increases by 0.47% as the product of Bhutan's GDP and country j's GDP increases by 1%.

The distance has a large and overwhelmingly significant negative impact on bilateral trade and distance cost is also found very significant factor in modeling Bhutan's

trade. The distance variable is found significant at 1 % level with anticipated negative sign which indicates that Bhutan tends to trade more with its immediate neighboring countries and higher the distance between Bhutan and country  $j$ , lower the volume of trade. The estimated elasticity of trade with respect to distance is 1.04% (in absolute value proportional) which indicates that when distance between Bhutan and country  $j$  increases by 1%, the bilateral trade between the two countries decreases by 1.04%. It is generally more convenient and cheaper to have trade relations with nearby countries as the mutual distance causes a resistance to trade due to factors such as transport cost and time.

The trade-GDP ratio is the proxy of openness of countries. The coefficient of trade openness variable of Bhutan and its trading partners are found significant at 5% and 1% level respectively with expected positive sign. Our estimate suggests that a 1% increase in the openness in Bhutan and the trading partner's openness could increase Bhutan's total trade by 0.47% and 0.28% respectively. This implies that Bhutan's trade with all countries under consideration is likely to improve with further liberalization of its own trade barriers and trade barriers in these countries. However, trading partners' openness displays weak negative correlation with trade on coefficient magnitude.

The bilateral trade agreement with India has the strongest effect on the trade flow with coefficient value of 3.8% and significance of t-statistics at 1% level. This could be one of the factors attributable for the lopsided nature of Bhutan's trade (80% of the total trade) with India. However, we cannot ignore other factors like common currency, sharing of common border and historical relationship (not included in the model due to multicollinearity problem) which would actually have contributed for trade flow between the two countries.

Further, alternative estimation of trade equations are presented in (appendix A table 10a), and are interpreted in the following section. The equation 2 and 3, estimated including product of per capita GDP of Bhutan and its trading partners and per capita GDP differential variables. The per capita GDP differential is found significant at 1% level with coefficient value of 0.45% which implies bilateral trade with country  $j$  increases as the per capita GDP differential $_{ij}$  increases but less than proportionately. The positive sign of this coefficient indicate that the H-O effect (difference in factor endowments) dominates the Linder effect in case of Bhutan's trade.

On the other hand if the model is estimated with only basic gravity variables and preferential trade agreements (table 10a, eq.5) that are, the product of GDP, distance, and trade agreement with India, Bangladesh and SAPTA. All these variables are found significant at 1% level except preferential trade agreement with Bangladesh and SAPTA (both are insignificant and possess wrong sign) with adjusted  $R^2=87\%$ .

With regard to SAPTA we tested for its significance considering three different periods, first we estimated assuming its existence since 1991 (member countries decided to enforce SAPTA by 1997), it was found significant at 5% level with very weak coefficient value of 0.17% indicating that prior to the formal enforcement, the SAPTA was effective. Secondly, we estimated considering existence of SAPTA since 1996 (it actually came to force by December 1995) it was found insignificant indicating that SAPTA has not played a very significant role since its actual enforcement. Thirdly, taking dummy as unity since 1985 that is initial formation of regional cooperation SAARC (prior to the formation of SAPTA) the coefficient was found insignificant, indicating such membership has not enhanced any trade within the member countries.

In all different equations estimation, the product of GDP, distance, openness of Bhutan and bilateral trade agreement with India are found statistically significant at 1% level with reasonable coefficient value. Thus these four variables can be considered as major determinants of Bhutan's total trade flow.

Furthermore, the gravity equation fits the data and delivers fairly precise and plausible income and distance elasticities and also estimates for other macroeconomic variables and geographical characteristics with statistically significant t-statistics despite of all the limitations. The overall fit of regression is quite good and as it is predicted by the theory bilateral trade flows between Bhutan and its trading partners comply with the gravitational force.

### **5.1.3. Regional Differences**

In this section we concentrate on differences in the significance of variables of Bhutan's trade equation estimated separately for two trading blocs that is Asian countries and other industrialized countries, to find factors that determine trade flow between Bhutan and Asian trading partners (within the region) and between Bhutan and other industrialized countries (outside the region).

Our result does present an interesting situation separating trade partners into two groups. The estimation results indicate the product of GDP of Bhutan and its trading partners, openness of economy of Bhutan and bilateral free trade agreement with India as a determining factor for Asian countries. However, for industrialized countries only the product of GDP is found to be significant.

**Table 6 Empirical Results for Asian Countries (2<sup>nd</sup> order AR model)**

Variables	Coefficient ( $\alpha$ )	t-value	Probability
Constant term	-7.3926	-2.8374	0.0053
LOG(GDPI? <sup>*</sup> GDPI?)	0.3275	3.2982	0.0012
LOG(OPENI?)	0.5036	3.5407	0.0006
LOG(OPENJ?)	0.2692	1.5872	0.1148
LOG(DIST?)	-0.6585	-2.0196	0.0454
TA?	3.4860	7.9385	0.0000
R square =	0.9544		
Adjusted R square =	0.9520		
Durbin Watson =	2.1061		
F =	397.8185	Signif F = 0.000	Panel observation = 141

Note: All variables are significant at 1% level except distance is significant at 5% level and the openness of country j is insignificant.

Dependent Variable: logarithm of Total Trade (exports + imports) between i and j.

The empirical result of Bhutan's total trade with Asian Countries shows that the product of GDP, openness of Bhutan, FTA with India are all significant at 1% level and the distance is significant at 5% level with much lower coefficient value compared to the trade model (for all the countries in the sample) and also openness of trading partner is found to be insignificant.

It should be noted that including dummy variables SAPTA and preferential trade agreement with Bangladesh weakens the significance of distance and even leads to wrong sign but increases the significance of openness variable. Alternatively, (eq. 2 & 3, table 11a) if model is estimated including PCGDP and per capita GDP differential we get positive and significant per capita GDP differential indicating that the H-O effects dominates the Linder hypothesis.

**Table 7 Empirical Results of Other Developed Countries (1<sup>st</sup> order AR model)**

Variables	Coefficient ( $\alpha$ )	t-value	Probability
Constant Term	-15.1797	-3.0172	0.0029
LOG(GDPI? <sup>i</sup> *GDPJ?)	0.3369	2.3239	0.0212
LOG(DIST?)	0.3957	0.4757	0.6349
R square =	0.8441		
Adjusted R square =	0.8415		
Durbin Watson =	2.1342		
F =	236.6847	Signif F = 0.000	Number of observation = 185

Note: Dependent Variable: logarithm of Total Trade (exports + imports) between i and j.

With regard to the developed countries only the product of GDP, variable is found significant at 5% level with coefficient value of 0.33% but the distance is found insignificant and even poses wrong sign. All other variables are either insignificant or poses wrong sign. Thus the gravity equation estimation of the Bhutan's trade for industrialized trading partners does not fit well. The reasons could be because of high difference in GDP of Bhutan and its trading partners which distorts the estimation result. Moreover trade with these industrialized countries is not on a regular basis but as an when there is a demand. So basically Bhutan's trade with these countries does not depend on the factors considered in the study.

The difference in significance of variables between the two trading blocs are; for the Asian trading partners the determining factors are almost same as determining factors of overall trade model estimated for all the countries in the sample except openness of trading partner is found insignificant. However, in case of developed countries only the product of GDP is found significant with positive sign and all other variables are found insignificant and some even poses wrong signs. This indicates that Bhutan trade pattern is basically determined by trade within the region, especially the factors that enhance trade with India due to lopsided nature of Bhutan's trade.

#### 5.1.4. Empirical Estimation Results of Export and Import Models

Following export and import equations are estimated for simulation exercises to determine natural bilateral trade between any of the two countries. Such simulated bilateral exports and imports are compared with the actual exports and imports to assess the bilateral trade potential. Thus measuring the impact of factors considered in the export and import model and then by simulating bilateral trade between the countries involved and comparing this with the actual bilateral trade, help to find whether countries overtrade or under trade.

a) In the export model GDP of country j, distance, trade openness, bilateral trade agreement with India and Bangladesh are found highly significant as determining factor of Bhutan's exports and this model is used for estimation of export potential.

**Table 8 Empirical Results of Export Model (1<sup>st</sup> order AR model)**

Variables	Coefficient ( $\alpha$ )	t-value	Probability
Constant Term	-8.4063	-2.9350	0.0038
LOG(GDPJ?)	0.6843	3.0905	0.0023
LOG(OPENI?)	0.6754	2.6010	0.0101
LOG(OPENJ?)	0.4474	1.7544	0.0812
LOG(DIST?)	-1.5506	-2.9984	0.0031
TA?	5.6002	6.6779	0.0000
TB?	3.3180	3.0937	0.0023
R square =	0.8653		
Adjusted R square =	0.8597		
Durbin Watson =	2.1844		
F =	153.2755	Signif F = 0.000	Panel observation = 175

Note: Dependent Variable: logarithm of Exports from i to j.

Bhutan's export manifest high geographic concentration among factors that may have led toward this concentration, distance has played an important role. Distance is found highly significant and 1% increase in distance would reduce trade by 1.5% (more than proportion). The regional integration process would highly contribute reducing the perceived "distance cost", thus inducing structural improvement in exports.

GDP of importing country j indicate absorption capacity and our estimation indicate that 1% increase in demand will increase export volume by 0.68% (less than proportional) and the GDP of country i(Bhutan) which indicate supply side is found insignificant but poses expected positive sign.

The openness variables are found to be significant at 5% and 10% with coefficient value of 0.67% and 0.44% for Bhutan and its trading partners respectively. Thus liberalization of trade policies in both the importing and exporting countries would lead to increase in the export of Bhutan. The weak correlation of coefficient of openness of trading partners implies that Bhutan's export depends more on its own production capacity rather than on the import demand.

Interestingly not only free trade agreement with India but also preferential trade agreement with Bangladesh is found statistically significant with very high magnitude of coefficient value of 5.6% and 3.3% respectively. But SAPTA (eq. 2, table 13a) is found to be insignificant and even poses wrong sign indicating belonging to the same regional



membership has not enhanced the level of exports, therefore it is dropped from the final model.

Theoretically, movements in the RER are negatively correlated with the growth in real exports. This implies that an appreciation of the RER will be a higher cost of exports, all other factors held constant. This could lead to a decrease in real exports demanded. Conversely a fall or depreciation of the RER will be reflected in a lower cost for exports leading to an increase in the volume exported. Movements in the RER affect resource allocation by changing the country's competitiveness in the international arena. A declining RER effectively increases our competitiveness and supports our exports but is reflected in higher import costs. Given that an increase in the RER effectively increases the cost of exports, this result implies a fall in volumes exported. However, in our model RER is found to be insignificant and even poses wrong sign. If RER variable is dropped from the model the significance of the other variables improves, thus it is dropped from the final model. This is because Bhutan has informal currency union with India and 96% of the total export is made to India and very small amount is exported to rest of the countries. Further per capita GDP and per capita GDP differential are found to be insignificant (eq.1, table 13a) and are dropped from the model since effect of other variables on export weakens by inserting these variables.

b) The estimation result of import model indicates that the main determining factors for Bhutan's imports are GDP of the trading partners (production capacity), openness, distance and the free trade agreement with India and this model is used for estimation of import potential.

**Table 9 Empirical Results of Import Model (4<sup>th</sup> order AR model)**

Variables	Coefficient ( $\alpha$ )	t-value	Probability
Constant Term	-9.5065	-6.1282	0.0000
LOG(GDPJ?)	0.6178	4.2386	0.0000
LOG(OPENI?)	0.4015	2.1660	0.0312
LOG(OPENJ?)	0.5307	2.9567	0.0034
LOG(DIST?)	-0.8579	-3.0739	0.0023
TA?	4.1821	10.4591	0.0000
R square =	0.9286		
Adjusted R square =	0.9261		
Durbin Watson =	1.9658		
F-Stat.=	367.0450	Signif F = 0.000	Panel observation = 264

Note: Dependent Variable: logarithm of Imports from j to i.

In consistent with all empirical results the linkages of economic mass with import level is found significant and the result indicates that improvement conditions on foreign supply will bring about increment of imports by 0.61% but the domestic demand though it has a positive impact, is found insignificant which could be because of small size of domestic market.

The distance factor is found to be statistically significant factor in modeling imports with negative effect, so higher the distance between Bhutan and country j, lower the imports are. The estimation result indicates that 1% increase in distance would lead to reduction in imports by 0.85% (less than proportion). The openness variables are found significant indicating higher imports with reduction of trade barriers in both the countries.

The free trade agreement with India has a highest magnitude of coefficient and is statistically significant at 1% level. However, other preferential trade agreements (TB and SAPTA), (eq.1, table 14a) are found to be insignificant and even pose wrong signs. Both these agreements are based on a commodity-to-commodity approach. Moreover, in order to qualify for SAPTA tariff preferences, rules of origin stipulate certain percentage of domestic content in exportable products. This has been viewed by some as a possible obstruction to trade flows among South Asian countries, since South Asian exports are highly import-dependent and such a qualification for domestic content requirements would be a hurdle in trade.

The exchange rate is also found to be insignificant since Bhutan currency is pegged one to one basis with its major trading partner India (constituting more than 70% of Bhutan's total import) and no exchange rate is involved between the two countries. Moreover, due to lack of domestic production and lack of availability of goods within the country, Bhutan has to depend on external trade irrespective of change in exchange rate.

The per capita GDP differential though insignificant poses positive (eq.3, table14a) sign indicating that H-O effect dominates the Linder effect. The per capita GDP of country j is significant with positive sign indicating that with economies of scale effect more goods are produced and exported by country j.

### 5.1.5. Bhutan's Trade Potential

The abovementioned models are explored to predict exports and imports of Bhutan. Therefore this section is devoted to the analysis of difference between predicted and actual trade flows between Bhutan and its trading partners. If the difference between predicted and actual trade flow is negative then the correspondent country is overtraded in exports (imports) and if it is positive then under traded in exports (imports), so there is more room to trade. The estimated coefficients from gravity exports and imports model presented above in Table 8 and 9 serves as the basis for the calculation of export and import expansion respectively. The coefficients obtained from the above export and import gravity equations are employed to simulate potential exports and imports adopting static deterministic simulation method (Gauss-Seidel). This helps to identify countries with more room for trade (under trade) and the countries characterized by an overtrade situation. Secondly, reflecting potentials to develop trade provides implications on our trade policies and role of trade as our source of economic growth.

Intuitively the success of the gravity equation is based on the facts that countries that are closer will trade much more with each other. Moreover trade also depends on the income level of both countries as measured by GDP. Increase in the importing country's income represents demand increase for the products as in the estimation of the export equation. On the other hand, the increase in the home country GDP (usually not present in the export estimation) captures the change in supply side: greater GDP indicating greater production capacities and greater product varieties to trade with other countries. Normally we would expect countries to trade more with the bigger countries than with smaller countries, since the larger countries has much more income to spend on our products, but it also depend on the capacity of our production and products available for exports.

Comparing Bhutan's actual exports to potentials does enforce the important influence that the fact "being neighbors" has on the pattern of exports flows for Bhutan. Imports with neighbor countries are on "overtrade" situation, showing that geographical proximity and cultural closeness is very important indicators of trade patterns, besides other economic incentives but model indicate some potential to exports. Bhutan's trade is highly concentrated within the region that too directed towards India and these countries are not only high performing pairs but still exist more room to trade. The results also

indicate trade potential with countries outside the region but trade remains marginal with these countries.

### 5.1.6.1 Trade Potential with India

The figure (10) below illustrates export and import potential of Bhutan with its major trading partner (India). The model has tracked the actual level of the imports from India to Bhutan and exports from Bhutan to India quite well. It indicates that India has been performing well in exporting to Bhutan and importing from Bhutan. Bhutan and India are the high performing pairs, but the rising trend of the graph indicates future trade potential for both exports and imports with India.

Based on the gravity equation, there is still “gap” or more room for Bhutan to increase her exports to India, however there is no room to increase her imports from India since in recent years significant rise in imports is noted. The figure indicates that exports have been overtraded since 1987 to 2001 (with commission of hydro power) which could be mainly attributed to export of electricity to India and spill over effect of power sector on other industrial sectors which increased the export base. But after 2001 exports to India is under-traded and show some room for exports in the future. The increase in exports in the future are certain, since with commissioning of Tala hydro power in 2006 export of electricity to India is projected to increase significantly. Thus potential to export to India is attributable mainly to electricity exports followed by mineral products.

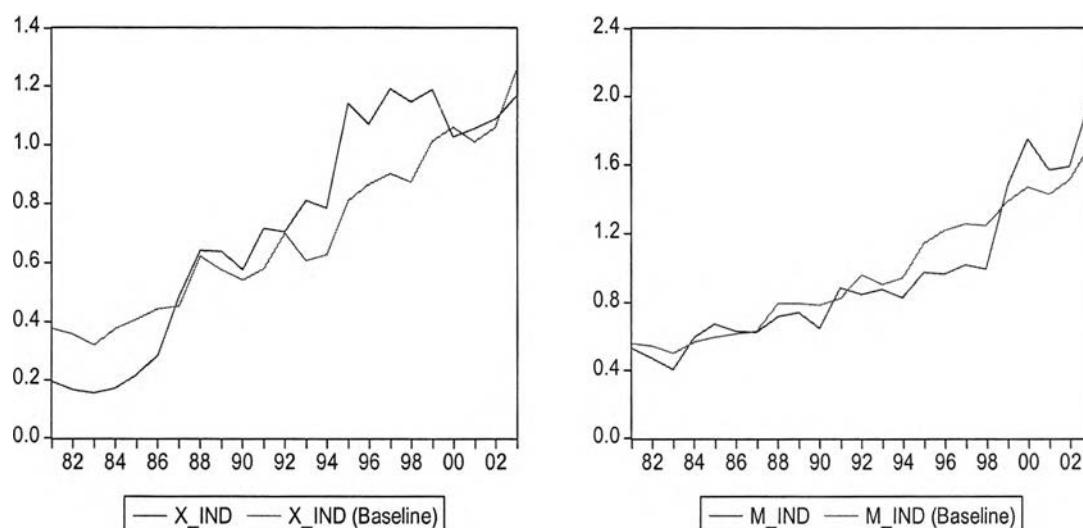


Figure 22 Predicted and Actual Exports (X) and Imports (M) between Bhutan and India

On the other hand the import figure illustrates almost balanced trade for certain years and under traded for most of the years but the gap is not very large, but by end of 1990s shows overtrade situation with significant increase in imports particularly due to establishment of power plants and other developmental activities. Thus though in the prior years there existed room to enhance imports from India but in recent years with huge increase in imports there is no potential to imports from India and is high performing pair.

Bhutan's trade with other countries fluctuate a great deal and also since more than 90% of Bhutan's exports and 70% of imports takes place with India and the trade pattern is highly determined by the factors that determine Bhutan's trade with India, so the model fails to depict precise trade potentiality with other countries and it is difficult to make judgment of overtrade or under trade situation (presented in Appendix B). With these limitations the actual and potential exports and imports are compared for the year 2000 to 2003 and results are interpreted in the flowing section. To note, prior to these year countries might have either over or under traded. Thus lot of model improvement is required to make precise estimation.

#### **5.1.6.2 Trade Potential within the sub-region**

The figure (23) shows that actual export and import are much higher compared to the potential export and import value estimated by the model. The difference between actual and potential value of both exports and imports are positive indicating that Bhutan is under trading with these countries, except with regard to import from India. The magnitude of export potential is much higher with Bangladesh compared to Nepal. Nepal has very negligible potential of both export to and import from Bhutan. To be noted Bhutan's export potential with Bangladesh is much higher compared to import potential even though at present Bhutan's export to Bangladesh is much higher compared to imports. This implies Bangladesh is a potential market for Bhutan next to India, thus improvement of preferential trade agreement with Bangladesh could help boost Bhutan's exports.

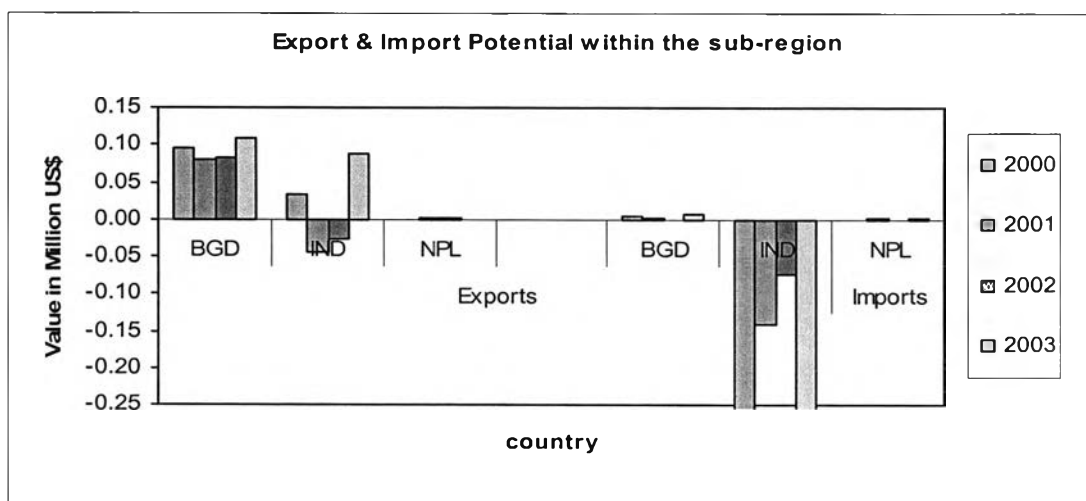


Figure 23 Exports & Imports Potential within the sub-region

### 5.1.6.3 Trade Potential with Other Asian Countries

Bhutan over traded imports but under-traded exports with other Asian countries in the sample, so these countries are high performing pairs with regard to Bhutan's imports but have potential for Bhutan's exports to these countries.

The figure illustrates, Bhutan under traded exports to all the countries within the region. Therefore there exist high potential to export within the regions, highest being Thailand followed by Japan, Malaysia and Singapore which are expected to contribute to trade diversification. To note South Korea is excluded from the export model since not a single export is made except in 2001 where very negligible export worth of about 106 US \$ is made to S. Korea but huge imports mostly of passenger cars are made from South – Korea.

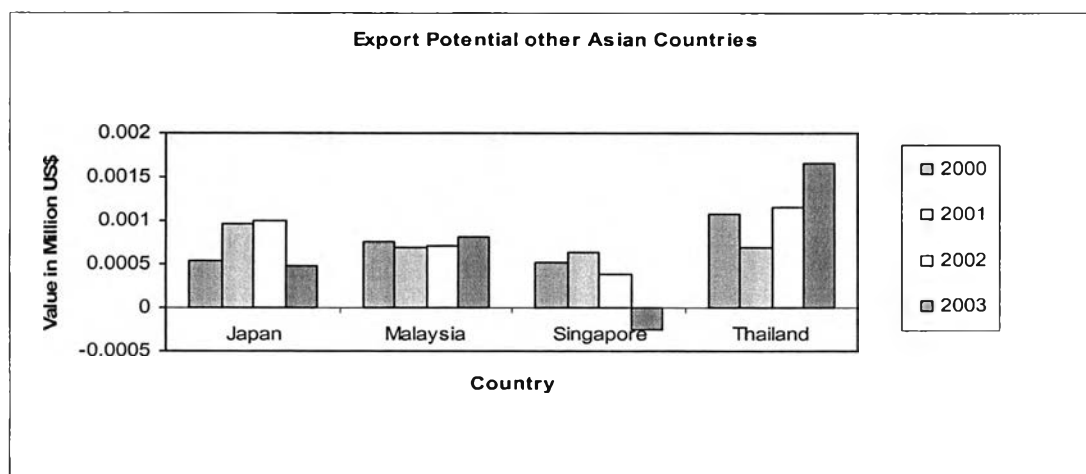


Figure 24 Export Potential within the Region

On the other hand with regard to imports Bhutan seems to overtrade with all these countries except Malaysia since at present imports from Malaysia is much lower compared to imports from other countries. Thus with regard to Malaysia there is some room to increase her exports to Bhutan but there is no gap for rest of the countries to increase their exports to Bhutan indicating these are high performing pairs. The diagram illustrates Japan as highest performing pairs on average followed by Singapore, Thailand and South Korea.

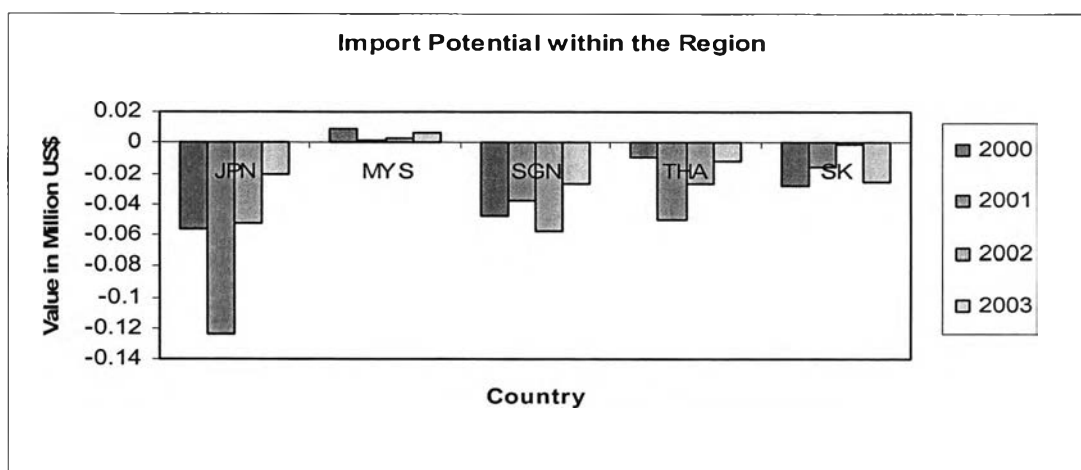


Figure 25 Import Potential within the Region

#### 5.1.6.4 Trade with Industrialized Countries

As mentioned before it is quite difficult to make precise estimation of export and import potential using the same export and import models for industrialized countries. Because of unique trade structure and lopsided trade pattern of Bhutan towards India, factors are basically determined by trade pattern within the region. Further, trades with these countries are not on regular basis and there exist great fluctuation in both exports and imports with these countries. Imports from these countries are much higher compared to exports since mostly high value machineries and electrical appliances are imported and exported mostly handicrafts and personnel effects of very negligible values.

It is interesting to note from the figure, that even though Bhutan's export to industrialized countries are very negligible the result indicate overtrade with UK, USA and overtrade in certain years with NDL, DNK and AUT and under traded with rest of developed countries in the sample. However, the magnitude of export potential is not very high for most countries and we should also bear in mind that to have high to potential to

exports depends not only on the market demand but also on production capacity and competitiveness of our products in the world market.

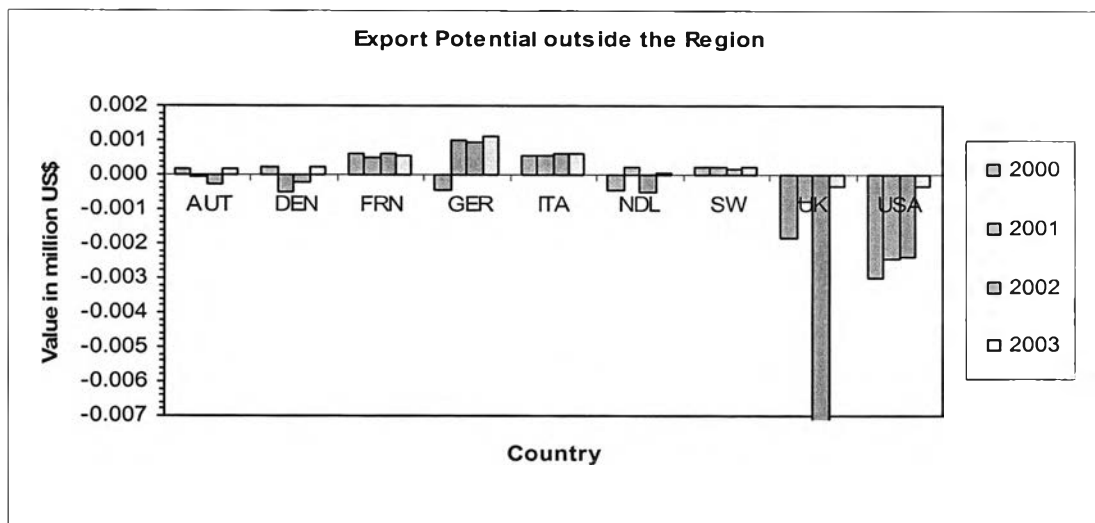


Figure 26 Export Potential outside the Region

With regard to import from these countries, model indicates under trade with most of these countries except UK, Austria, Italy and Denmark. The very high overtrade with UK could be mainly due to purchase of new air bus.

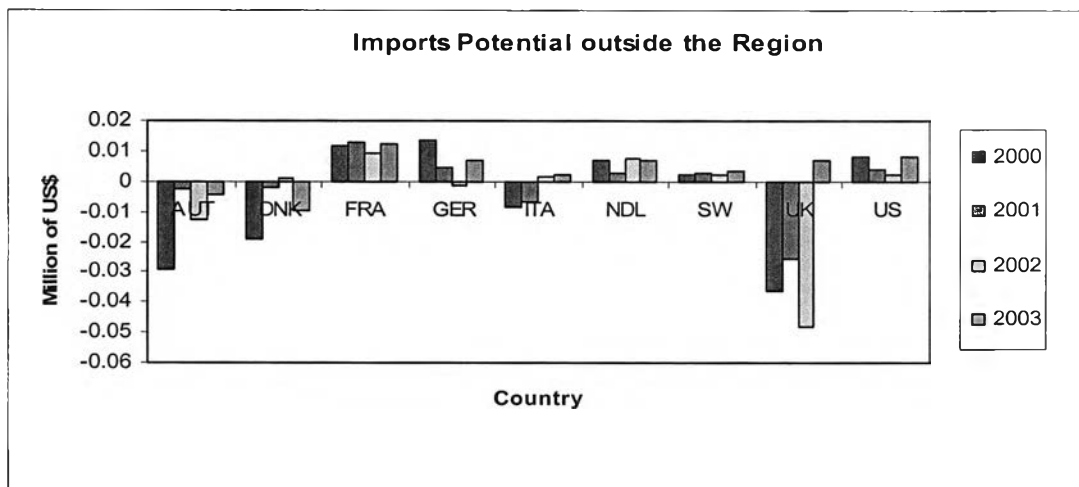


Figure 27 Import Potential outside the Region

In general trade (especially exports) with developed countries remains marginal. The establishment of the Free Trade Area through the network of the bilateral free trade agreements might offer new incentives to fostering regional integration. Integration process of both within the region will clearly affect the future path of trade patterns. Both processes will impact future trade flows. FTA will potentially induce more trade creation



while the presence of “overtrade” with neighboring countries may also lead to some trade diversion both forces may contribute to enlarging the geography of foreign trade.

Thus from the estimated results it is observed that Bhutan’s magnitude of import potential is the highest from Bangladesh, Malaysia, Nepal within the region and France, Germany, USA, Netherlands, Switzerland and Italy outside the region. Bhutan’s magnitude of export potential is highest to Bangladesh followed by India, Nepal, Thailand, Japan, Malaysia and Singapore within the region and Germany, France, Netherlands, US, Switzerland and Italy.

With the high performing pairs of Bhutan’s trade, government should put an effort to maintain this optimal level of export and import with these two countries. On the other hand with countries with more room to trade Bhutan should adopt policies that aid to obtain the trade potential. However lot of model improvement is needed to draw up precise estimation and to draw accurate conclusion.

#### **5.1.6. Comparison among the models**

From the empirical evidences of the three models, it is observed that economic mass, FTA with India, openness and distance between Bhutan and its trading partners are the crucial factors playing central role for enhancing Bhutan’s trade. These variables are found largely significant in all three models, indicating more liberalization and reduction of transportation cost with better infrastructure development are of utmost importance.

The difference between export and import model is that coefficients of all variables are slightly bigger in the exports equation than in the imports one. The magnitude of effect of distance and openness of Bhutan is higher for exports compared to imports. The preferential trade agreement with Bangladesh is found as a determining factor of Bhutan’s exports but not for imports. So the existence of bilateral trade agreement with Bangladesh could be one of the factors attributable to trade surplus that Bhutan enjoys with Bangladesh. Also the coefficient of dummy variables of bilateral free trade agreement with India is found larger in export than in import model. Furthermore coefficient of distance between Bhutan and its trading partner is more significant in the exports model. The magnitude of effect of distance on exports is higher (more than proportional,  $>-1$ ) compared to import, on which the distance effect is less than proportional. These indicate that Bhutan’s export flows are more heavily dominated by

regional trade than imports flows (approx. 99% of exports within the region and electricity the major exports is exported only to India).

The GDP of country i(Bhutan) which represents absorption (import model) and production (export model) capacity of Bhutan is found insignificant in both import and export model but with expected positive signs. However, in many studies this variable is found significant and has been argued that for small economies benefits from a liberalized trade regime would depend upon its own domestic production capabilities, industrial diversification and private sector initiatives. Thus the insignificance of this variable in our model could be because of limitations of data and methodology. So with change in methodology and better data set could lead to different results.

The real exchange rate is also found insignificant in both the model as Bhutan shares informal currency union with India (Bhutan currency pegged one to one basis with Indian currency) and more than 90% of total exports and 70% of total imports takes place with India. On the other hand, imports from other countries are mostly sophisticated machinery and electrical appliances which depend on the need and demand at the national level which is imported irrespective of appreciation or depreciation of exchange rate.

Further the regional agreement SAPTA is found insignificant in all three models probably because it is based on a commodity-to-commodity approach and in order to qualify for SAPTA tariff preferences, rules of origin stipulate certain percentage of domestic content in exportable products. This has been viewed by some as a possible obstruction to trade flows among South Asian countries. Since South Asian exports are highly import-dependent, such a qualification for domestic content requirements is hurdle in trade.

When we estimated the models taking only the gravity variables, all variables are found highly significant for all three models and the goodness of fit is reasonably high. So despite of all the limitations the variables are found statistically significant accordance to the theory and could conclude that gravity model fits well for the Bhutan's trade.



## 5.2. Natural Trading Partners

In the literature, there are competing definitions of what makes two countries natural partners. Geographically close countries, or those that have high initial trade volumes, or those that are complement of each other can be called natural partners.

Initially studies have based the “natural trading partner” hypothesis on two versions referring either to countries with high initial volume of trade among the partners and the distance between them is low. The central statement of the theory suggests that liberalization of trade with natural trading partners is more likely to be trade creating among partners and less likely to divert trade from non-partners.

Adherent to the first hypothesis some author argue that integration with “natural trading partners” is likely to raise welfare because the likelihood and extent of trade diversion is minimized when the volume of trade between prospective partners is large, since if the two trading partners already trade disproportionately, the risk of large amounts of trade diversion is reduced. In accordance with Kandogan 2005, Wonnacott and Lutz (1989) and Summers (1991) define natural partners as countries with high initial trade volume.

Second hypothesis associated with location and transport costs, in accordance with Schiff (1999); Wonnacott and Lutz (1989) supported this hypothesis stating that, *ceteris paribus*, since proximity between PTA members increases trade between them (due to lower transport costs), it reduces the extent of trade diversion and increases the benefits of PTAs, a point also made by Deardorff and Stern (1994). Krugman (1993, pp. 63, 64) argues that due to transportation and communication costs, there is a strong tendency for countries to trade with their neighbors. And if free trade agreements (FTAs) are formed with neighbors, the gains from freeing intra-regional trade will be larger and the losses of reducing interregional trade will be smaller than if these costs are ignored.

However, Bhagwati and Panagariya (1996) find both definitions untenable citing the loss of tariff revenue as the reason for the former definition, and significant similarity for the latter. In contrast to the Natural Trade Partners Theory’s predictions, Panagariya (1997) suggests that the larger the initial level of trade between the partners or the closer they are geographically, the more they will lose from a preferential trading agreement.

Similarly, Schiff (1999) showed that neither analysis is correct. He criticized that the volume of trade does not necessarily provide an objective measure of the extent to which trading partners are “natural”, because the volume of trade itself is affected by trade policy. According to him the ideal criterion for “natural trading partner” is supposed to be independent of trade policy. Therefore, Schiff (1997) have proposed to define “natural trading partners” in terms of complementarity or substitutability in the trade relations of member countries rather than in terms of their volume of trade. In other words, countries are defined as “*natural trading partners*” if they tend to import what the prospective partner exports. Under that definition, the “natural trading partner” hypothesis is likely to hold.

Therefore, based on the above three versions of definitions of “natural trading partners” theory, referring to trade volume, distance and complementarity in the trade relations of member countries. The trade relation between Bhutan and India seems to depict above characteristics of ‘natural trading partners’ hypothesis and the ‘natural trading partners’ theory and hypotheses seems to hold for these two countries.

Firstly, India is only trading partner with whom Bhutan shares common border and has lowest distance and Bhutan trades disproportionately (on average more than 90% of total exports and more than 70% of total imports) with India and has shown a rising trend in the trade flows and also our model indicates some future trade potentials between the countries. India has been a major trading partner of Bhutan since the country opened up its economy to the rest of the world (1960s) and these two countries share a special cultural and historical relationship and the free trade agreement dates back to 1949. Krugman (1991), argued “If a disproportionate share of world trade would take place within trading blocs even in the absence of any preferential trading arrangement, then the gains from trade creation within blocs are likely to outweigh any possible losses from external trade diversion” (Schiff, 1999).

Similarly, Kandogan (2005) has tested for the natural trading partner theory through regression analysis (triple indexed gravity model) by assessing the trade creation and trade diversion effect after formation of the FTA. He has applied the model to inter-industry, and horizontal and vertical intra-industry imports components separately, given the expectation that the amount created and diverted of each component depends differently on variables measuring naturalness. However in case of Bhutan and India

there hardly existed trade prior to the formation of FTA as Bhutan remained closed economy and to analyze trade diversion or creation effect before and after formation of FTA is not feasible. However further liberalization of trade with India; the trade diversion from other countries would be minimal since trade with other countries account for only about 10 to 20% of total trade.

Over the decade though Bhutan's trade link has increased with over 50 countries however India still remains major import source and major export market of Bhutan. Bhutan imports range of products from intermediate to consumer goods to capital goods from India most of the country's basic needs are met through imports made from India. On the other hand Bhutan's major export electricity which is the main source of revenue of the country is exported only to India and depends only on Indian market and Bhutan also exports range of mineral products to India. This implies existence of complementarity in trade relation between these two countries as one seems to import what other exports. Further, apart from Bhutan's official trade with India, the volume of unofficial or informal border trade has been estimated quite large. This is also an indication of the strong complementarities that exist between India and Bhutan.

Some studies have stated that small country will benefit from having large trading partner since it will continue to import from the world market to which it charges a tariff, so the member country (Bhutan) is more likely to obtain an improvement in its terms of trade by selling to the partner at the higher tariff-inclusive price. Also large country (India) is able to provide goods at world price and Bhutan being a small country is a price taker with limited production capacity and also with limited domestic market takes price as given and it would benefit or welfare of home country would be raised from further enhancement in trade relation with India. But to achieve this Bhutan need to diversify its production.

Thus we find some evidence and support of the "natural trading partners" theory and the natural trading partner hypotheses based on trade volume, distance and complementarity in trade relation and these hypotheses seems to hold for India and Bhutan. Since, it is quite certain that home country will benefit from further integration of its economy with Indian economy and would suffer huge losses from disintegration. Thus can conclude that further integration (formation of FTA or customs union) would not only increase home country welfare but also world at large. However, further in depth study

might be required to prove the existence of “natural trading partner” and look into the possibilities of further integration or formation of customs union between India and Bhutan and carry out cost and benefit analysis.