

TRADE IN GOODS AND TRADE IN SERVICES LINKAGE: SOME EVIDENCE FROM CAUSALITY TEST

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ABSTRACT

The conventional view is that service sector is a collection of mainly non tradable activities with low productivity growth potential. The above view is fast changing. Trade in services provides same mutual economic gains made possible by trade in goods. Trade in services is essential and inseparable from trade in goods. The present paper is an attempt to understand whether trade in goods cause trade in services or vice-versa. The study is based on country level data collected over a 21 year period. Granger Causality Test is employed to determine the nature of causality between trade in goods and trade in services for countries in different income groups. Out of 20 countries selected for Causality Test, in 13 countries trade in goods is causing trade in services. The results also reveal that differences in income do not play a role in determining the direction of casual relationship. The study has certain conclusions such that liberalization of trade in goods at GATT/ WTO level has been an important factor for the growth of trade in service in recent years.

I. INTRODUCTION

Given the growing awareness of the role, services play in development, there is a new interest in trade in services. Until 80's, it was common to view the service sector as a collection of mainly non-tradable activities with low productivity growth potential. This conventional view of services is fast changing; the development of certain services is coming to be regarded not as a consequence of economic growth but as one of its preconditions. Trade in commercial services has grown faster than trade in merchandise over the past decade.

Many service industries also have become more international in scope as the economic advantages of specialization and greater economies of scale have become apparent at an international level. Trade in services provides the same mutual economic gains made possible by trade in goods. It permits international specialization on the basis of comparative advantage. It increases efficiency of domestic industries through increased competition and it enriches consumer choice by widening the range of available services (Brock, 1982).

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Lot of interest has been generated in trade in service since the formulation of General Agreement in Trade in Services (GATS) as a part of WTO. Since trade in goods and trade in services are somewhat interlinked an important question is whether the trade in goods causes trade in services or vice versa. The present paper is an attempt to find an answer to this question.

II. THEORETICAL BACKGROUND

International trade in services, like international trade in goods, is critical to economic growth. It creates significant new job opportunities, stimulates gains in productivity and provides consumer benefits. It is essential to and inseparable from international trade in goods. International trade in traditional services like shipping, aviation, communications, banking and insurance have always been important to trade in goods and in fact trade in goods could not take place without these services. Where the flow of services is hampered trade in goods is hampered too and where restrictions increase the cost of providing these services, trade in goods is reduced. International transactions in services are broadening the scope for employment for educated youth, thus reducing pressure on them to emigrate and trade in services also permits any country, whatever its location to make use of best available technology, talent or information available anywhere in the world.

International trade in services is also essential for the functioning of international business of multinational enterprises, which are important agencies of development in world economy. Many of economic linkages between a parent firm and its subsidiaries abroad entail transfers of service activities, ranging from managerial, accounting, insurance and legal advise to financing, marketing, advertising, research, engineering and data processing. The unhampered international movement of services is thus critical to the operation of multinational enterprises (Brock 1982).

The growing importance of service sector in most of the economies and its changing image as a tradable on the one hand and interlinkage of trade in service with trade in goods, on the other, make it imperative to know whether trade goods causes trade in services or vice versa. There are only very limited number of studies available on the relationship between trade in goods and trade in services. However, the following studies have provided us a framework for the analysis of causality between trade in goods and trade in services.

Some economists have argued that trade in services is not much different from trade in goods, while others claim that trade in service is something different. In this context Bagawati et al. (2004) agree that outsourcing is fundamentally just a trade phenomenon hence there is no need in applying a different approach from trade in goods when analyzing trade liberalization process in services. In the context of causality between trade in goods and trade in services, a study by Jansen and Piermartini (2004) of WTO's Economics and Statistics Division found a positive and significant effect of temporary movement of service providers (Mode-4 of Trade in services) on merchandise trade.

Study also found that temporary movement of natural persons has effect on trade in services in other modes also.

A study by Fieleke (1995) on US bilateral trade with its 17 major trade partners using simple regression log-log equation model showed that trade in services clearly rises with rise in trade in merchandise. The study did not find enough evidence to accept the hypothesis that trade in services is positively influenced by use of common language (English) between the trading nations.

A study by Deardorff (2000) assumes lot of significance in the context of trade in goods and trade in services linkage. The study examines the special role that trade liberalization in service industries can play in stimulating not only trade in services itself, but also in enhancing gains from trade in goods. International trade in goods requires inputs from several services industries such as transportation, insurance, and finance in order to complete and facilitate international transactions. Restrictions on the ability of national service providers to provide these services across borders and within foreign countries create additional costs and barriers to international trade above those that would arise in otherwise comparable intra-national exchange. As a result, trade liberalization in services can yield benefits, by facilitating trade in goods, which are larger than one might expect from analysis of the services trade alone. The study also shows that, trade liberalization in services can also stimulate fragmentation of production of both goods and services, thus increasing international trade and the gains from trade even further.

Chadha R. (2000) made an attempt to estimate the index of comparative advantage of export of major services by the developing country groups using Revealed Comparative Advantage (RCA) index. The value of RCA indicates whether the country/region has relative comparative advantage in such exports compared with the world average. The study showed that developing countries have revealed comparative advantage in 'freight and travel' while industrialised countries have RCA in 'passenger services, other transfers and other services.

The liberalization of trade in services could impact international trade in goods (Blyde and Sinyavskaya, 2007). International trade in goods requires inputs from several service industries. They admit that the liberalization of trade in goods could also impact the flow of trade in services. However, their study focused on the causality that trade in services could impact on trade in goods on the ground that trade in goods has been liberalized over the last several decades with only few restrictions remaining in place. Trade in services, on the other hand has been highly protected and the process of removing its barriers world wide has started only recently. The study by Blyde and Sinyavskaya (2007) empirically verified to what extend international trade in goods depends on international provision of services. The study found empirical evidence supporting the notion that a liberalization trade in services can be beneficial for international trade in goods.

Study by Carolina Lennon (2006) found that bilateral trade in goods explains bilateral trade in services, resulting estimated elasticity is close to 1. Reciprocally, bilateral trade in services also affects positively bilateral trade in goods.

The present study hypothesizes that trade in goods causes trade in services. The basis for this argument is that services are inputs for trade in goods and when trade in goods increases it is bound to increase trade in services. It is conjectured that the trade in goods would act as a pull factor to increase the trade in services. The study also hypothesizes that direction of causality varies across the different income groups.

III. METHODOLOGICAL FRAMEWORK

1. Data and Variables

In this paper with the help of Granger causality test, we will be able to know whether trade in goods and trade in services cause each other or whether there is bilateral causality between the two. For studying the same a sum of 82 countries were divided into four different income groups viz. high income countries, upper middle income countries, lower middle income countries and low income countries as per world bank classification. Out of 82 countries 20 countries are selected, which comprises of 25% of the total sample. To retain the uniformity among different income groups from each income group five countries have been selected at random individually. The data is collected for the period of 21 years that is from 1985 to 2005 from different issues of UNCTAD Statistical year book and WTO Annual Reports. The variables included in the study are trade in goods and trade in services. A necessary condition for causality test is that the variables should be stationary in nature. So if the series are non-stationary then they have to be made stationary. Therefore, it is necessary to conduct the stationarity test. The study has used Augmented Dickey Fuller test to conduct the stationarity test. One of the weaknesses of the test is that it sensitive to lag length. The optimum selection of lag length is determined by minimizing Akaike's Information Criterion.

2. Stationarity and Dickey Fuller Test

(i) Meaning of stationarity

A particular time series variable is called stationary if its mean, variance are constant over time and the value of the covariance between the two time periods depends only on the distance or lag between the two time periods and not the actual time at which the covariance is computed. A causality test demands stationarity of time series as a precondition.

(ii) Test of stationarity

The test of stationarity, which has become popular, is unit root test. We would consider the following model to study the above test.

$$Y_t = Y_{t-1} + e_t$$

Where e_t is stochastic error term that follows classical assumption of having zero mean and constant variance σ^2 and is nonautocorrelated. Now if in the above regression, if the coefficient of Y_{t-1} is in fact equal to one we will face unit root problem i.e. a non-stationarity situation.

Therefore if we run the regression $Y_t = \rho Y_{t-1} + e_t$

and find that $\rho = 1$ then we say that variable Y_t has unit root. In econometrics a time series that has a unit root is known as random walk. It is again a non-stationary time series, for example, stock prices are non-stationary and follow a random walk.

(iii) Dickey Fuller Unit Root Test

In Dickey Fuller test we test three regressions to test stationarity of the series at level. They are expressed as follows:

1. (No constant and trend) $Y_t = \rho Y_{t-1} + e_t$
2. (With Constant) $Y_t = \alpha + \rho Y_{t-1} + e_t$
3. (Constant and trend) $Y_t = \alpha + \beta T + \rho Y_{t-1} + e_t$

In each case the null hypothesis is $H_0: \rho = 1$ (unit root), if after running the regression we find that calculated t-statistics is statistically significant then it means the existing series is stationary, if not then we should take the first difference of the series and make it stationary before running any regression.

(iv) Augmented Dickey Fuller Test

$$Y_t = \alpha + \beta T + \rho Y_{t-1} + \sum \lambda_j \Delta Y_{t-1} + e_t$$

Null hypothesis is; $H_0: \rho = 0$

Alternate Hypothesis is $H_1: \rho < 0$

The null hypothesis is that there exist unit root, meaning the existing series is non-stationary. Since the critical values of t statistics for augmented Dickey Fuller test are negative values, reject the null hypothesis of unit root, if computed t^* is less than critical t value. As it would imply that existing series is stationary. The reason for negative critical values is that the test uses only the left tail of the t-distribution because the alternate hypothesis is $\rho < 0$ (Ramanathan, 2002).

3. Granger Causality Test

Regression analysis in economics helps us to study the dependence of one variable on other variables; it does not necessarily imply causation. But if we come across two variables in which both affect each other for e.g. if variable X and Y both affect each other with distributed lags then this is a problem which cannot be explained with the help

of regression analysis. This is what is exactly explained by Granger Causality test.

According to Granger test, if X causes Y then changes in X should precede changes in Y. In particular to say that "X causes Y", two conditions should be met, first X should help to predict Y and second Y should not help to predict X. This is because if X helps to predict Y and Y helps to predict X, it is likely that some other variables are in fact causing X and Y.

To evaluate whether each of these two conditions hold we have to test the null hypothesis that one variable does not help predict the other, for example, to test the null hypothesis that X does not cause Y we regress the lagged values of Y and lagged values of X (unrestricted regressions) and then regress Y only against lagged value of Y (restricted regressions).

Unrestricted regression: $Y = \sum \alpha_i Y_{t-i} + \sum \beta_i X_{t-i} + u_t$

Restricted Regression: $Y = \sum \alpha_i Y_{t-i} + u_t$

A F- test can be used to determine whether the lagged values of X contribute significantly to the explanatory power of 1st regression, if they do we can reject the null hypothesis and conclude that data are consistent with X causing Y. The null hypothesis that Y does not cause X is then tested in similar manner.

There is a need to test whether the group of coefficients $\beta_1, \beta_{ii} \dots \beta_m$ is significantly different from zero, and if they are we can reject the hypothesis that X does not cause Y.

To test the null hypothesis that Y does not cause X by running the same regression as above, but switching X and Y and testing whether the lagged values of Y are significantly different from zero. To conclude that X causes Y we must reject the hypothesis that X does not cause Y and accept the hypothesis that Y does not cause X.

Thus Granger test helps to find out if relationship between the two variables is unilateral or bilateral or whether the two variables are actually independent from each other and another variable causes both X and Y (Gujarati, 2003).

IV. RESULTS OF AUGMENTED DICKEY FULLER TEST

Table 1 represents the ADF test value of all the four income group at level and at first or second difference. In all these cases the ADF test statistics are given with intercept, intercept and trend and without intercept and trend variable. The values suggest that in most of the cases the values are non-stationary at level. However, the variables are stationary after first or second order differencing as seen by ADF values with constant, with constant and time trend and without constant and time trend. The values are significant either at 1 percent, 5 percent or at 10 percent level of significance.

Table1. Augmented Dickey Fuller Test Values for Trade in Goods

| Countries of different income categories | At Levels | | | OD | At first or Second order of Difference | | |
|--|------------------|----------------------|-------------------------|----|--|----------------------|-------------------------|
| | ADF value with C | ADF value with C & t | ADF value without C & t | | ADF value with C | ADF value with C & t | ADF value Without C & t |
| A.High Income | | | | | | | |
| Singapore | 0.57 | -3.26 | 2.34 | 1 | -5.05*** | -4.85*** | -3.88*** |
| Japan | -0.06 | -2.87 | 2.56 | 1 | -3.70** | -3.56* | -2.83** |
| Ireland | 2.37 | -1.11 | 7.39 | 2 | -6.75*** | -6.55*** | -6.87*** |
| Austria | 1.43 | -1.89 | 4.20 | 2 | -4.27*** | -3.46* | -4.38*** |
| US | 1.64 | -2.28 | 4.82 | 2 | -4.53*** | -4.18** | -1.60* |
| B.Upper Middle | | | | | | | |
| Korea | 1.21 | -2.00 | 3.22 | 1 | -3.25** | -3.56** | -2.40** |
| Venezuela | 1.14 | -4.18** | 2.23 | 1 | -4.30*** | -5.66*** | -3.35*** |
| Malaysia | 0.51 | -2.59 | 2.83 | 1 | -3.83*** | -3.83** | -2.71*** |
| Brazil | 0.59 | -2.73 | 1.74 | 2 | -4.86*** | -4.29** | -4.90*** |
| Mauritius | -1.02 | -2.10 | 3.08 | 2 | -6.94*** | -7.21*** | -7.16*** |
| C.Lower Middle | | | | | | | |
| Jordan | 4.64 | 3.36 | 2.08 | 2 | -5.36*** | -5.80*** | -5.30*** |
| Ecuador | 2.86 | -0.17 | 3.64 | 2 | -4.51*** | -4.60** | -4.29*** |
| Honduras | 1.94 | -1.53 | 3.95 | 2 | -6.18*** | -6.03*** | -6.19*** |
| Tunisia | 1.24 | -2.27 | 4.51 | 2 | -5.52*** | -5.58*** | -5.53*** |
| Philippines | 0.21 | -3.20 | 3.14 | 2 | -5.63*** | -5.43*** | -5.80*** |
| D.Low Income | | | | | | | |
| Bangladesh | 1.88 | -1.30 | 3.35 | 2 | -4.84*** | -4.81*** | -4.79*** |
| Cote de Ivoire | 1.45 | -0.43 | 2.41 | 1 | -2.82* | -4.79*** | -2.45** |
| Guinea | 1.56 | -2.96 | 1.23 | 1 | -5.50*** | -3.80** | -5.18*** |
| Kenya | 1.48 | -0.72 | 1.39 | 2 | -4.10*** | -4.42** | -3.99*** |
| India | 1.86 | 5.36 | 1.42 | 2 | -3.37** | -4.14** | -3.11*** |

Values in columns are t-values: ***, **, * imply statistical significance at 1%, 5% and 10% level respectively. OD=order of difference; C= constant, t= time trend

Table 2. Augmented Dickey Fuller Test Values for Trade in Services

| Countries of different income categories | At levels | | | OD | At first or Second order of Difference | | |
|--|------------------|----------------------|-------------------------|----|--|----------------------|-------------------------|
| | ADF value with C | ADF value with C & t | ADF value without C & t | | ADF value with C | ADF value with C & t | ADF value Without C & t |
| A.High Income | | | | | | | |
| Singapore | 0.68 | -3.20 | 2.63 | 1 | -3.71*** | -3.82** | -1.92* |
| Japan | -1.46 | -2.89 | 2.45 | 2 | -4.04*** | -4.20*** | -4.21* |
| Ireland | 3.42 | 2.01 | 4.03 | 2 | -5.84*** | -4.34** | -5.40*** |
| Austria | 0.72 | -3.55* | 4.18 | 2 | -4.25*** | -3.88** | -5.88*** |
| US | 1.75 | -1.79 | 7.52 | 2 | -5.27*** | -5.24*** | -5.34*** |
| B.Upper Middle | | | | | | | |
| Korea | 1.58 | -2.55 | 4.16 | 1 | -3.19** | -3.57** | -2.04** |
| Venezuela | -1.53 | -2.59 | 0.66 | 1 | -3.73*** | -3.76** | -3.54*** |
| Malaysia | -0.23 | -3.18 | 1.62 | 1 | -3.71*** | -3.59* | -2.76*** |
| Brazil | 0.57 | -2.89 | 2.38 | 2 | -2.74* | -4.60*** | -2.92*** |
| Mauritius | 0.94 | -2.31 | 4.64 | 1 | -3.38** | -3.47* | -1.65* |
| C.Lower Middle | | | | | | | |
| Jordan | 0.25 | -3.82** | 1.52 | 2 | -8.43*** | -8.64*** | -8.58*** |
| Ecuador | 1.42 | -1.81 | 4.42 | 1 | -3.82** | -4.37** | -2.24** |
| Honduras | 3.03 | -1.11 | 4.55 | 2 | -5.31*** | -5.37*** | -1.56* |
| Tunisia | -0.07 | -2.78 | 2.09 | 1 | -5.33*** | -5.26*** | -4.10*** |
| Philippines | -2.03 | -1.96 | -0.89 | 2 | -5.24*** | -5.07*** | -5.40*** |
| D.Low Income | | | | | | | |
| Bangladesh | 0.68 | -2.67 | 2.86 | 1 | -5.62*** | -5.75*** | -4.18*** |
| Cote de Ivoire | -0.90 | -1.70 | -0.89 | 2 | -3.97*** | -4.21** | -4.14*** |
| Guinea | -2.16 | -3.45* | 0.15 | 1 | -3.49** | -3.36* | -3.99*** |
| Kenya | 1.74 | -1.13 | 1.31 | 2 | -4.36*** | -4.94*** | -4.34*** |
| India | 4.88 | 4.96 | 0.33 | 2 | -2.78* | -3.30* | -2.28** |

Values in columns are t-values: ***, **, * imply statistical significance at 1%, 5% and 10% level respectively. OD=order of difference, C= constant, t= time trend

The ADF test values at levels for trade in services in the case of all the four income groups are given in table 2. The values suggest that in almost all the cases the values are non-stationary at level for trade in services also. ADF test reveals that the variable are stationary after first or second differencing.

V. RESULTS OF GRANGER CAUSALITY TEST

Granger causality test would help us to know if there exist a causal relationship between trade in goods and trade in services among the different groups of countries and also to know if there exist a relation then which direction does it follow, that is, which variable causes which or whether both variable causes each other. From each income group five countries are randomly selected.

Table 3. Granger Causality Test Results of High Income Countries

| Country | Direction of causality | F-value | Lags |
|---------------|------------------------|---------|------|
| Singapore | TG→TS | 0.52 | |
| | TS→TG | 4.77** | 1 |
| Japan | TG→TS | 6.86*** | |
| | TS→TG | 1.00 | 1 |
| Ireland | TG→TS | 3.60** | |
| | TS→TG | 1.00 | 3 |
| Austria | TG→TS | 3.80** | |
| | TS→TG | 0.83 | 3 |
| United States | TG→TS | 4.44** | |
| | TS→TG | 5.02** | 4 |

Table 3 shows the granger causality results of five countries randomly selected from high income group. In case of United states, there exist bi-directional causality. It means that both trade in goods and trade in services cause each other. While in case of remaining countries like, Japan, Ireland and Austria the direction of causality is from trade in goods to trade in services. It implies that trade in goods causes trade in services. Thus, growth in trade in goods will lead to increase in trade in services for high income countries. The direction of causality runs from trade in services to trade in goods only in case of Singapore.

Table 4. Granger Causality Test Results of Upper Middle Income Countries

| Country | Direction of causality | F-value | Lags |
|-----------|------------------------|---------|------|
| Korea | TG→TS | 4.75** | |
| | TS→TG | 0.00 | 1 |
| Venezuela | TG→TS | 2.90* | |
| | TS→TG | 1.25 | 4 |
| Malaysia | TG→TS | 3.46** | |
| | TS→TG | 2.66 | 1 |
| Brazil | TG→TS | 7.34*** | |
| | TS→TG | 9.76*** | 1 |
| Mauritius | TG→TS | 9.27*** | |
| | TS→TG | 1.12 | 3 |

In the table 4, we get to see the results of causality for upper middle-income countries. Out of the five countries randomly selected the bi-directional causality is evident in case of Brazil. In Brazil, both trade in goods and trade in services cause each other. In the remaining four upper middle income countries, which include Korea, Venezuela and Malaysia and Mauritius the causality runs from trade in goods to trade in services. Thus, trade in goods help trade in services to increase.

Table 5 Granger Causality Test Results of Lower Middle Income Countries

| Country | Direction of causality | F-value | Lags |
|-------------|------------------------|---------|------|
| Jordan | TG→TS | 4.48*** | |
| | TS →TG | 0.18 | 2 |
| Ecuador | TG →TS | 0.17 | |
| | TS →TG | 0.97 | 1 |
| Honduras | TG →TS | 1.52 | |
| | TS →TG | 2.69 | 3 |
| Tunisia | TG →TS | 0.35 | |
| | TS → TG | 0.40 | 1 |
| Philippines | TG →TS | 0.01 | |
| | TS →TG | 0.53 | 1 |

In the table 5, the results of causality test in lower middle-income group are presented. In this group the causality relation between the two variables is shown in case of only Jordan, wherein trade in goods is causing trade in services. While countries such as Honduras, Ecuador, Tunisia and Philippines do not show any causal relation with regard to these variables.

Table 6 Granger Causality Test Results of Low Income countries

| Country | Direction of causality | F-value | Lags |
|----------------|------------------------|---------|------|
| Bangladesh | TG→TS | 0.52 | |
| | TS→TG | 5.00** | 1 |
| Cote de Ivoire | TG→TS | 7.58*** | |
| | TS →TG | 0.58 | 1 |
| Kenya | TG→TS | 0.03 | |
| | TS→TG | 6.56** | 1 |
| Guinea | TG→TS | 3.69** | |
| | TS →TG | 1.41 | 3 |
| India | TG→TS | 5.36** | |
| | TS→TG | 3.36* | 1 |

The results of causality test in low income countries are shown in table 6. The study reveals that in case of India there exists a bi-directional causality between trade in services and trade in goods. Cote de Ivoire, and Guinea shows that the direction of causality runs from trade in goods to trade in services. While in case of Bangladesh and Kenya the results predict just the opposite revealing that in these two nations it is trade in services which is causing trade in goods.

VI. CONCLUSION

The results of the Granger Causality test do not show any clear pattern across the income groups. A positive outcome of the test is that the two variables do cause each other in most of the countries. We cannot conclude with unanimity whether trade in goods causes trade in services or vice versa in all selected countries, as this causal relation differs in different income groups and also between the countries in a particular income group. However, out of twenty countries selected for the causality test in thirteen countries trade in goods is causing trade in services. Therefore the emerging picture is that the trade in goods causes the trade in services. Interestingly, the causality result of high income and low income countries, more or less show similar pattern. The results, therefore, show that the difference in income do not play a role in determining the direction of causal relationship. The results support the view that any policy that improves the trade in goods will improve the trade in services. May be after a period of 25 years or so, the direction of causality may set changed if the rate of growth of trade in services become stronger than the rate of growth of trade in goods, as is seen today.

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