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Trade Openness and GDP Growth in Nepal: A Granger Causality Test

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Abstract

Integrating to the global economy and harnessing the benefits of specialization, and greater economies of scale, Nepal attempted to open its trade sector from the mid-1980s with a conviction that opening to trade fosters GDP growth and long-term economic development. In its attempt towards opening the trade, several existing policies were amended, new policies were introduced, compatible to the outward-oriented regime, including the 1992 Industrial policy, the 1992 Trade Policy, and the 1994 Privatization Policy. Together with these reforms, it has become one of the most liberalized economies in the south Asia. Further, the reform has a positive effect on GDP growth. Thts paper is an attempt to show a causal relationship between trade openness, measured as total real trade as percentage of real GDP and real GDP in Nepal. For the purpose, a Granger causality test was employed.

Introduction

International trade has long been regarded as an engine of economic growth and a strong positive force for economic development. It has been a driving force of world economic growth in the last 50 years. Over the last 50 years, world trade flows increased rapidly, faster than world population, and even faster than overall world economic growth although the trade and the world economy had risen exponentially (BBC, 1999; WTO, 2008). During the first 25 years after the Second World War, the world economy grew about 5 percent on an annual average, a high rate that was partly a result of increased volume of international trade (WTO, 2008). Its volumes continued to advance with an average increase of 6.7 percent over last seven years from 2001 to 2007, registering a robust 8.7 percent growth in 2007 and has been expected to grow by 7.4 percent and 9.3 percent in 2008 and 2009 respectively (World Bank, 2007a). Such a robust growth in world trade has been a major factor to raise world economic growth (BBC, 1999; WTO, 2008).

Trade barriers have been declining over the last 25 years, which is the major contributor

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for the rapid expansion of the volume of trade (Dadush and Nielson, 2007). During the last 25 years, average applied tariffs on manufacturing dropped from approximately 30 percent to about 9 percent in developing countries (World Bank, 2007b). Similarly, tariffs on industrial product have fallen steeply and now average less than 5 percent in the industrial countries (WTO, 2008). The decline in the average tariffs has made the global economy more open and integrated. It is argued that openness is an important element of sound economic policy and opening to the trade is a necessary step for achieving it (Mcculloch *et al.*, 2001). Trade openness spurs competition, which is a prerequisite for a well functioning market. Healthy competition integrates the domestic economy to the rest of world, which is the best way for a country to grow in longrun (World Bank, 1987). Evidence shows that countries with more open and outward-oriented trade policy consistently outperform countries with restrictive trade and foreign investment regimes (OECD, 1998). Over the last 25 years, countries which are relatively open to trade have achieved double the annual average growth as those that are relatively closed (OECD, 1998). Further, increased trade is associated with higher income per-capita. Each percentage-point increase in openness (measured as the sum of imports and exports, expressed as percentage of GDP) during the 1960-85 period was associated with a 0.34 percent increase in real income per-capita in the world (USG, 1998).

Opening to trade leads to higher income and output and hence growth through static and dynamic gains. The static gains, a short-run increase in income and output arises from greater specialization, division of labour, and competition. Free trade brings greater specialization according to a comparative advantage, lowers prices and allows a wider selection of products and services for both consumers and firms. It allows exporters to sell their output in a larger market; workers in export-oriented industries benefit as the resulting higher prices for the goods they made. Specialization also improves returns on investments, and stimulates the growth. In addition, competition encourages efficient allocation of resources, lowers prices, enhances varieties, and improves product quality. Further, free trade fosters productivity growth within industries, forcing inefficient firms to exit and allowing efficient firms to expand (Bolaky and Freund, 2004). Freund On the other hand, dynamic gains arises from greater economies of scale, productivity gains, learning by doing and access to improved technologies that trade openness can be expected to bring in the long-run. Consequently, a causal relationship may be expected from trade openness to GDP.

Nepal attempted to open its trade sector from the mid-1980s with a conviction that economic reforms and trade liberalization would attract investment, promote development and contribute to generate productive employment and alleviate poverty, in a general framework of equity, participation and market based efficiency (MOICS, 2004), which accelerated further after 1990 with a change in political regime from a party-less system to a multi-party system. In its attempt towards the outward-oriented trade policy, several existing policies were amended; new policies were introduced, compatible to the outward-oriented regime including the 1992 Industrial Policy; the 1992 Trade Policy; the 1992 Commercial Policy and the 1994 Privatization Policy. In its attempt to enter into the multilateral trading agreement, it became a member of the WTO in 2004. Together with

the policy reforms, Nepal has become one of the most liberalized economies in the south Asia and is comparable to the most-liberalized developing countries in the world (World Bank, 2008).

After trade policy reforms, total trade as percentage of GDP increased from 30 percent in 1984 to 64 percent in 1997. Similarly, total export as percentage of GDP rose from 11 percent in 1984 to 24 percent in 1995. Likewise, total import as percentage of GDP furthered from 19 percent in 1984 to 38 percent in 1997 (MOF, 1999). In addition, the growth in trade has been a positive factor to drive economic growth in Nepal. Following trade liberalization in the early 1990s, Nepal's exports grew at an annual average of 15 percent throughout the decade, contributing to overall economic growth from the demand side. Similarly, imports of machinery and transport equipment grew at about 10 percent annual average during the 1990s, enabling the overall economic growth from the supply side (MOICS, 2004). This all clearly shows that opening to trade is fostering GDP growth in Nepal.

Given the above theoretical and empirical background, this paper is an attempt to find a causal relationship between trade openness and GDP growth in Nepal. A Granger causality test has been used to find a causal relationship between trade openness and GDP in Nepal. For the purpose of the analysis, total real trade as percentage of real GDP has been used as a proxy measure of trade openness under an assumption that as the country opens and deregulates its trade, it is expected to have higher total real trade as percentage of real GDP.

Theory and Literature Review

Meaning of Trade Openness

Generally, openness to trade involves greater reliance on markets to channel investment and other resources into tradable sector. It may involve deregulation or decontrol of trade sector, which involves removal of or reduction in the trade practices that thwart free flow of goods and services between countries. It could also mean re-regulating in a manner that is consistent with international norms, i.e., non-discrimination. It includes dismantling of tariff such as duties, surcharges, and export subsidies as well as non-tariff barriers such as licensing regulations, quotas, and arbitrary standards. There are various modalities of trade openness, which may vary from country to country. However, they generally involve neutralizing incentives for exports and imports at low tariff levels through:

- removal of import quotas and other quantitative restriction or their conversion into tariffs;
- subsequent reduction of the level and the dispersion of import tariff rates;
- compensatory devaluation of the national currency;
- removal or reduction of export taxes (Shafaeddin, 1995).

The concept of openness applied to trade policy could be synonymous with the idea of neutrality. Neutrality means that incentives do not distort between saving a unit of foreign

exchange through import substitution and earning a unit of foreign exchange through exports (Harrison, 1996). Such neutrality could be maintained, lowering or avoiding trade restrictive barriers such as a tariff, quota, and subsidy. The discriminatory use of tariffs, quotas, investment licensing tax and credit subsidies are incompatible with the purest sort of outward oriented strategy (World Bank, 1987).

Theoretical Link between Trade Openness and Economic Growth

The idea that trade policy has an impact on economic growth is not new and goes back to the economists dating back to David Hume (1752), Adam Smith (1776), and David Ricardo (1817). For Hume (1752), international trade is a source of bullion. In the *Wealth of Nations* (1776), Smith highlighted the static gains of international trade. Following the Smith's tradition, Ricardo developed a theory of comparative advantage as the basis of international trade. Heckscher-Ohlin (H-O) extended the Ricardian theory by predicting the pattern of trade and production based on the factor endowment of a trading region. Later, the neoclassical growth model developed by Solow (1956) and Swan (1956) established a formal link between trade and economic growth though it happens to be a static gain. Finally the endogenous growth model and institutional approach to economic growth have explained static as well as dynamic gains of international trade and its relationship with economic growth. Hence, there are three different approaches to think about the relationship between the trade and economic growth: neoclassical, endogenous growth and the institutional approaches (Duncan *and* Quang, 2008).

In the neoclassical approach, trade patterns among countries are determined by comparative advantage either in a form of technology differences as in the Ricardian model or of resource endowments differences as in the H-O model. It predicts that a country will have an allocative efficiency through static gains from lowering its trade barriers. As for example, presence of an import duty or restriction creates an anti-export bias by raising the price of importables relative to exportables. Removing such a bias through trade liberalization encourages a shift of resource from production of the import substitutes towards production of the exports, which is a source of growth as the country adjusts to a new allocation of resources in keeping with its comparative advantage (Mcculloch *et al.*, 2001).

In the endogenous growth model, openness should be positively associated with growth (Grossman *et al.*, 1994; Romer, 1994; Barro *et al.*, 1997). Such models suggest that openness spurs growth through numerous channels, including: scale, allocation, spillover, and redundancy effects (Duncan *and* Quang, 2008). Scale effects are derived from production of a bulky amount of goods and services, which is possible from a closer integration with the world market, while allocative effects arise from the resource reallocation leading to the accumulation of factors of production such as human or physical capital or research and development (R&D). Likewise, integration to the world market diffuses technical knowledge (spillover effect) through greater availability of imports because it enables domestic producers to access and benefit from the technology embodied in imports. Finally,

integration to the world market reduces the unnecessary waste of resources devoted to R&D because open trade leads to the reduction of unnecessary duplication of research, eliminating redundancy in R&D. Consequently, the global resources devoted to R&D will be used more effectively and the larger global stock of knowledge provides an extra boost to growth (Ben-David *et al.*, 2002; Duncan and Quang, 2008; Syal, 2008).

Finally, the institutional approach assumes that institutions play an important role to promote trade and to boost economic growth. Countries with better institutions and countries that trade more grow faster. Countries with better institutions also trade more (Duncan and Quang, 2008). Hence, better institutions, which includes proper law and order, well-defined property right, enforcement contract, clean/non-corrupt government, effective bureaucracy and administrative procedures are a prerequisite for trade to contribute economic growth (Dollar *et al.*, 2002).

Like in the theory, trade openness may be expected to have static and dynamic gains in the sectors having comparative advantages in Nepal. Because of abundance of labour, it has a comparative advantage in production of the labour-intensive sectors. As accordance to the prediction of the theory, over the last two decades, a change in a pattern of its export has been witnessed from the traditional agro-based such as cereals, log, jute towards the labour-intensive manufacturing such as readymade garments, woolen carpets, and pashmina. With opening the trade, more specialization, division of labour, and competition may be expected in the labour-intensive manufacturing sectors in the short-run. Likewise, because of the long-run dynamics of trade openness from diffusion of technology and learning by doing, further more production of the labour-intensive manufacturing may be expected in the long-run. Consequently, the labour-intensive manufacturing may be expected to grow as a leading sector in the economy and to contribute to the growth in both short-run and long-run.

Review of the Literature

There are bulks of literatures showing that trade openness do Granger cause GDP, i.e., opening to trade is a positive force for GDP growth (Zestos *et al.*, 2002; Utkula *et al.*, 2004; Chaudhary *et al.*, 2007; Awokuse, 2006). They opined that opening to trade offers static gains from greater division of labor, and specialization according to comparative advantage in short-run and dynamic gains from diffusion of technology and learning by doing in long-run through which the economy adjusts with higher income and output in both short-run and long-run. Hence trade openness does granger cause GDP growth.

Zestos *et al.* (2002) tested a causal relationship between growth rates of exports, imports, and the GDP in Canada and the United States, using a vector error correction (VEC) model. Using time-series annual data over the 1948-96 period, Granger causality tests were also performed. Their finding has supported a bi-directional causality for Canada from the foreign sector to GDP and vice-versa. A weaker relationship between the foreign sector and GDP was statistically supported for the United States. That is, there was a strong Granger causality from exports to GDP. However, there was no evidence of Granger

causality from imports to GDP. These results were also supported by comparing the total trade (exports plus imports values) shares to GDP of the two neighboring economies. The Granger causality tests suggested that Canada is a more open economy than the United States and more trade dependent.

Utkulu *et al.* (2004), employing a framework of 'endogenous' growth theory, examined the effect of trade liberalization on long-run income per-capita and economic growth in Turkey. They examined the multivariate co-integration and causality issues among the variables considered by taking the 'new' growth theory. Their causality evidence between the long-run growth and a number of indicators of trade liberalizations has confirmed the predictions of the 'new growth theory'. In addition, they found that openness Granger causes real GDP per-capita in Turkey.

Using an augmented VAR model proposed by Toda and Yamamoto (1995), Chaudhary *et al.* (2007) employed a co-integration and multivariate Granger causality test to examine the long-run and the short-run dynamics from export growth, import growth and real output growth over the 1973-2002 period for Bangladesh. Their findings have revealed that there is Granger causality from the export to the growth at 5% level of significance and from growth to export as well. In addition, they have found that there is Granger causality from import to growth at 1 percent level of significance and from growth to import as well.

Using a quarterly time-series data over the 1994-2004 period, Awokuse (2006), employed an augmented production function approach and examined a causal relationship between trade and economic growth in three transition economies-Bulgaria, Czech Republic, and Poland within an integrated framework and explicitly tested for the effect of both exports and imports on economic growth. Following Toda and Phillips (1993), he adopted recent advances in time-series modeling by specifying causal models based on vector error correction models. The empirical results indicated a bi-directional causal relationship between exports and growth in Bulgaria and causality from imports to economic growth in the Czech Republic and Poland. Further, the empirical results suggested that trade stimulates economic growth. Finally, overall Granger causality test results suggested that imports played as much of a role as exports in stimulating economic growth in these countries.

To sum, the various empirical studies based on cross-country panel date model suggest that opening to the trade spurs economic growth and hence a Granger causality from trade openness to GDP. In the context of the present study, trade openness can be expected to foster GDP growth as well on account of greater specialization and division of labour in the sectors having a comparative advantage such as labour intensive manufacturing in short-run and diffusion of technology and learning by doing in the same sector in long-run. Hence a Granger causality can be expected from trade openness to GDP growth in Nepal.

Research Methodology

Nature and Sources of the Data

The model developed for this study uses 37 years annual time-series data from 1970 to 2006, collected from secondary sources such as.Ministry of Finance of the Government of Nepal, Central Bureau of Statistics of the Government of Nepal and the World Bank. Developing a deflator considering the price of 1970 as the base and adding annual inflation rate for the subsequent periods, the nominal values of the GDP and trade were adjusted and converted into real terms. Hence, the variables used in the model are in real terms.

Stationarity of the Time Series and First Difference Model

The conventional Granger-causality test based on standard VAR is conditional on the assumption of stationarity of the variables constituting the VAR. If the time series are non-stationary, the stability condition of the VAR is not met, implying that the Wald ÷2 test statistic for Granger-causality is invalid (Gujarati, 2003). Therefore, before proceeding the test, it is imperative to ensure that the underlying data are stationary. A time series is said to be stationary if its mean and variance are constant over time and value of covariance between two time periods depends only on the distance or lag between the two time periods and not on the actual time at which covariance is computed (Gujarati, 2003). The Augmented Dickey-Fuller (ADF) test can be used to check unit roots/ non-stationarity of the time series. The ADF statistic is obtained by

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-1} + \varepsilon_t \qquad (3.1)$$

where e_t is a pure white noise error term and where $DY_{t-1} = (Y_{t-1}-Y_{t-2})$, $DY_{t-2}=(Y_{t-2}-Y_{t-3})$, etc. In the ADF, we test whether $d = 0$. The ADF statistic, used in the test, is a negative number. The more negative it is, the stronger the rejection of the null hypothesis that there is a unit root at some level of confidence. Alternatively, the corresponding p-value of the test statistic can also be used to find the significance of the null hypothesis. Table 1 summarizes the ADF test result of the time series used in the model.

Table 1: Augmented Dickey Fuller Test Result

Variables	Without Trend				With Trend			
	Interpolated Dickey-Fuller				Interpolated Dickey-Fuller			
	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
GDP	NA (1.000)	-3.675	-2.969	-2.617	NA (1.000)	-4.279	-3.556	-3.214
TGDP	-1.089 (0.719)	-3.675	-2.969	-2.617	-1.756 (0.725)	-4.279	-3.556	-3.214

(Value in the parentheses is the p-value of the respective test statistic)

Table 1 reveals that the test statistic for TGDP is higher than the critical values at the 1 percent, 5 percent and 10 percent significance level for both interpolated Dickey-Fuller without trend and interpolated Dickey-Fuller with trend, indicating that the null hypothesis that the variables do have a unit-root or non-stationarity can not be rejected. In addition, the p-value of the TGDP is more-than 0.05 or 0.10, i.e., the null hypothesis is failed to be rejected at the same level of significance. As far as the *GDP* is concerned, although the STATA 10.1 did not compute its corresponding test statistic for both interpolated Dickey-Fuller without trend and interpolated Dickey-Fuller with trend, the p-value, which is as higher as 1.00, clearly indicates that the null hypothesis is failed to be rejected. As the test detected a unit root, the first difference of the variables can be used as a remedy of the unit root. Once first difference of the variables has been used, it exhibits stationarity property and the OLS can be used for statistical analysis and inference (Gujarati, 2003)

The Model

Granger causality analysis is an empirically applied method to investigate a causal relationship between variables. Causality in the sense Granger (1969) is inferred when values of a variable, say, x_t, have explanatory power in a regression of y_t on lagged values of y_t and x_t. If lagged values of x_t have no explanatory power for any of the variables in the system, then x is viewed as weakly exogenous to the system. The present study will test for Granger-causality relationship between trade openness and GDP growth. To perform a Granger causality test between trade openness, measured as total real trade as percentage of real GDP (dTGDP) and real GDP (dGDP), the following models have been used:

$$dGDP_t = \alpha_0 + \sum_{i=1}^{n} \beta_i dGDP_{t-i} + \sum_{i=1}^{n} \phi_i dTGDP_{t-i} + \varepsilon_t \qquad (3.2)$$

$$dTGDP_t = \gamma_0 + \sum_{i=1}^{n} \delta_i dTGDP_{t-i} + \sum_{i=1}^{n} \mu_i dGDP_{t-i} + \vartheta_t \qquad (3.3)$$

where d is first difference, ε_t and ϑ_t are zero-mean, serially uncorrelated random error terms. In equation (3.2), causality implies *dGDP* is 'Granger-causing' dTGDP, provided that some ϕ_i is not zero. Similarly, in equation (3.3), dTGDP is 'Granger-causing' *dGDP* if some μ_i is not zero. To implement the Granger-causality test, the F and chi-square statistics are calculated under the null hypothesis that in equation (3.2) and (3.3) all the coefficients of ϕ_i and $\mu_i = 0$.

The results from Granger-causality tests are sensitive to the selection of the lag length. For an issue concerning selection of an appropriate lag length for the lag variables of *dGDP* and dTGDP, the criterion of minimizing the mean square of error of prediction given by Akaike (1974) has been used in this study. Statistical software, STATA (version 10.1) has been used to analyze the data and to perform the statistical tests and inferences.

Trade Openness and GDP: A Granger Cauusality Test

Granger Causality Test: Does Trade Openness Granger Cause GDP?

A Granger causality test was carried out to find whether the trade openness (dTGDP) does Granger cause the GDP (dGDP). Table 2 summarizes the test result.

Table 2: Trade Openness Granger Causes GDP

Granger Causality Test (asymptotic)
H_0: *dTGDP* does not Granger-cause *dGDP*
F(4,28) = 2.428046
Prob > F = 0.071
Granger Causality Test (Small sample)
H_0: *dTGDP* does not Granger-cause *dGDP*
chi2 (4) = 9.6254682
Prob > chi2 = 0.0472

Table 2 summarizes outcomes of Granger causality test for both asymptotic and small sample cases. For the asymptotic case, since the F(4,28) is 2.4 with corresponding p-value 0.07, the null hypothesis that the dTGDP does not granger cause the dGDP is failed to accept at the 10 percent level of significance. Similarly, in the small sample case, as witnessed by chi2(4) = 9.7 with corresponding p-value 0.04, the null hypothesis that the dTGDP does not Granger-cause the dGDP is also failed to accept at the 5 percent level of significance.

Granger Causality: Does GDP Granger Cause Trade Openness?

To find whether GDP (dGDP) does Granger cause trade openness (dTGDP), a Granger causality test was done and Table 3 summarizes the test result.

Table 3: GDP Granger Causes Trade Openness

H_0: *dGDP* does not Granger-cause *dTGDP*
F (4, 28) = 1.0056028
Prob > F = 0.421
Granger Causality Test (Small sample)
H_0: *dGDP* does not Granger-cause *dTGDP*
chi2 (4) = 3.9864967
Prob > chi2 = 0.4078

Table 3 is a summary of the Granger causality that tests whether the *dGDP* does a Granger cause the *dTGDP* for both asymptotic and small sample cases. The table shows that for the asymptotic case, where F(4,28) = 1.00 with the corresponding p-value 0.42, implies that *dGDP* does not show a significant relationship with *dTGDP* and hence no evidence of a Granger casuality from *dGDP* to *dTGDP*. Likewise, the small sample case, where chi2(4) = 3.98 with the corresponding p-value 0.40, reveals that *dGDP* does not show a significant relationship with *dTGDP* and hence no Granger causality from *dGDP* to *dTGDP*.

As in the previous studies done in this field such as Zestos *et al.* (2002), Utkula *et al.* (2004) and Awokuse (2006), one way causality has been revealed from the trade openness to the real GDP. However, no statistical evidence has been found to have causality from the real GDP to trade openness. That is, there exists causality from trade openness to real GDP, not from the side of real GDP to trade openness. With this, trade openness, measured as total real trade as percentage of real GDP can be used as an explanatory variable of real GDP to predict the quantitative relationship between trade openness and real GDP in Nepal.

Since openness to trade is a positive force to increase real GDP in Nepal, a further opening to trade can be expected to have a positive effect on her real GDP. Integrating the domestic economy with rest of the world offers the static gains such as an increase in income/output over the short-run because of cheaper import of raw materials and consumption goods, expansion of the market, predicted by the classical and the neo-classical theories and the dynamic gains such as a rise in income/output over the long-run due to the spillover effects from learning by doing and diffusion of technology, predicted by the endogenous growth model and institutional approach to economic growth. The static and the dynamic gains are sources of a high GDP growth. A high GDP growth over the long-run expands economic opportunities and improves allocative efficiency reduces distortion in relative prices, exchange rate and hence correct market failure. In this way, opening to trade leads to long-term economic growth and development in Nepal.

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