TRADE FACILITATION AND POVERTY IN DEVELOPING COUNTRIES

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ABSTRACT

This paper evaluates the effect of non-tariff trade barriers, particularly the quality of trade facilitation on poverty in developing countries. This is on the back of various theoretical and empirical evidence pointing to trade liberalization as a potent force which allowed for higher economic growth across countries in the past. With the flatter tariff rates across nations and over the years, trade facilitation (e.g., transportation, customs quality, shipments reliability, etc.) is seen to have grown in importance in explaining the quality of trade. The paper employs the World Bank's report on Logistics Performance Index as the main measure of trade facilitation and with the use of two comparative estimation methods, namely the Ordinary Least Squares and Two Stage Least Squares — the marginal effects of the various trade facilitation indicators on poverty were ascertained. Results provide ample evidence that trade facilitation quality in developing countries have strong negative relationship to poverty. Moreover, via beta coefficient analyses, it was noted when compared to other government policies, (i.e., increased education spending and higher spending on the health sector), improving trade facilitation fares well in terms of impact as a possible policy direction that a country could pursue to alleviate poverty.

1 INTRODUCTION

The twentieth century saw the aggressive move of many countries towards trade liberalization, marking the height of international trade. Along with the rapidly increasing trade volumes, the countries also saw rapid economic expansion. The said co-movements of trade liberalization and economic growth across nations has generated a sizable amount of literature explaining the mechanisms of the trade-growth nexus. Most of them affirming that there is in fact a structural and significant relationship between trade and growth. Dollar and Kraay (1999), for example, concluded that the positive trend in trade volumes exhibits a strong positive relationship to growth rates, accounting for within-country variations.

Advocates of trade liberalization have thus recommended gradual reductions in tariff rates to encourage growth among nations and to raise national incomes[1]. The reduction or the complete removal of tariffs as trade barriers improved the access to markets in developed countries, which consequently contributed to their economy's growth (Romalis, 2006). Learning from high income countries, many developing countries followed suit in opening their borders. David and Kraay (2000) noted that the average tariff rates among the post-1980 globalizing developing countries[2] declined from 41.7 percent in 1985 to 18.2 percent in 1995. Moreover, during that period a significant increase in growth rates took place for these globalizing economies relative to countries who were more restrictive.

Empirical Debate

While the link between income growth and trade liberalization became obvious, the effect of trade on poverty, however, is a different story. At least for some, there still exist a disconnect

[1] The Ricardian Theory explains that national income tends to increase because trade allows countries to specialize in what it produces most efficiently.

[2] Countries that are characterized by increased trade volumes and reduced tariff rates during the 1980s and 1990s

between the improvements in economic growth owing to trade and its impact on reducing poverty.

The conclusion made by Dollar and Kraay, wherein they pointed to a link between trade and poverty through augmentation in income, has ignited critical comments from various scholars. Most notably, Dani Rodrik[3], along with Howard Nye and Sanjay Reddy[4]— they criticized the methods used by Dollar and Kraay in arriving at their conclusions. Nevertheless, the main focus of the criticisms are on the Econometrics used by authors, particularly the methods use in addressing the possible endogeniety of the explanatory variables.

The critiques primarily aimed to invalidate the results presented by Dollar and Kraay. And as a riposte from the authors, Dollar and Kraay (2000) estimated the impact of trade liberalization to inequality in the globalizer economies, by using the income share of the lowest quintile of the population. Wherein, by used of instrumental variable regressions they presented that trade in fact contributes to income growth, while being able to show that the welfare of the poorest segments of the populations were not jeopardized.

Nonetheless the debate on the Trade, Growth and Poverty connections, stem mainly on the methods used by the researchers. That is, despite the criticism on the claims made by Dollar and Kraay, they, in fact do not dispute that a connection between trade liberalization and poverty reduction is actually present. What this debate created was to place a certain level of ambiguity on how trade liberalization and poverty reduction are truly linked. For the majority of countries who opened their borders to the world, although there is little dispute that trade did in fact aid in increasing their national income level, casting doubts on the distributional benefits from trade is easy, particularly on the ambiguous impacts of trade on inequality.

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[3] Rodrik D. “Comments on “Trade, Growth, and Poverty,” by D. Dollar and A. Kraay” Harvard University (2000)

[4] Nye, H.M, and Reddy, S.G. “Dollar and Kraay on “Trade, Growth, and Poverty”: A Critique”

From this, it is desirable to look at trade from another lens. Most literature on this subject widely use trade volume and tariff levels as the main instrument in establishing the connection between trade and poverty, thereby leaving a gap in analyzing the role played by the quality of trade facilitation across countries on poverty. Hence, this opens the possibility that when trade facilitation's impact on poverty is scrutinized, one may find important relationships on how better trade facilitation through upgrading the transport channels within the country and beefing up logistics quality of goods mobility (particularly a country's physical connectivity to trade) will aid in diffusing the gains from trade into marginalized sections of the society, thus contributing to poverty alleviation.

Working Hypothesis

The growing importance of trade facilitation is seen as a link that bridges the gap between trade and poverty. Specifically, improvements in the components of the World Bank's Logistics Performance Index are seen as good indicators of trade facilitation performance. And these indicators, namely: the efficiency of the clearance process by customs and other border agencies; quality of transport and information technology infrastructure for logistics; ease and affordability of arranging international shipments; competence of the local logistics industry; ability to track and trace international shipments; and timeliness of shipments in reaching destinations are suspected to be positively related with the reduction of poverty incidence across counties. Hence, there is reason to believe that poverty incidence will be lower if the quality of the trade facilitation and trade logistics in countries are high.

Moreover, there is reason to believe that when each component of trade logistics is paired to national poverty incidence, their respective importance in explaining poverty varies, as each component of trade logistics affects the quality of trade facilitation in various channels.

This study also seeks to determine if tariff barriers may have waned in importance in explaining trade openness relative to trade facilitation. Moreover, there is reason to believe that trade

facilitation when compared to other government policies such as health and education spending, trade facilitation remains as an important government strategy based on its relative impact on reducing poverty. Thus policy makers might need to shift their attention to improving trade facilitation and trade logistics to keep their economies competitive in the global stage. The factors dictating trade efficiency in generating growth and opportunities to solve the poverty problem can be closely linked to countries' abilities to better transport and enhance mobility of tradable goods. The importance of trade today lies solely neither on the volume of trade nor on the relative share of international trade on a country's economy. It is instead determined by how the gains are realized and how these benefits are relayed to the rest of the economy.

Significance and the Objectives of the Study

As the world becomes borderless through globalization, the importance of international trade is unquestionable. Nations who engaged in goods, services and capital exchanges with trading partners must clearly understand the mechanisms and nature of the trading process to maximize the their gains. Nowadays, how economies developed are greatly affected by the relationships they countries forge with neighboring countries and trading partners.

One can also look at the relevance of improving trade to reducing poverty as one of the prime commitments of nations in reaching the Millennium Development Goals. Gaining a better understanding of the complexities of poverty is an opportunity to help achieve Goal 1, which highlights the aspiration of the world to eliminate poverty and alleviate the many faces of suffering that exists with it. Meanwhile, Goal 8 which contends for the intensification of global formation to achieve development, is also being addressed by delving on the questions pertaining to international trade. Recall that MDG Goal 8 aims to extend further an "open, rule-based, predictable, non-discriminatory trading and financial system (includes a commitment to good governance, development, and poverty reduction; both nationally and internationally)". Looking

at how trade as a process can be improved may provide answers as to how it can be improved and be able to contribute in answering this development puzzle—poverty.

2 REVIEW OF RELATED LITERATURE

Trade liberalization is accounted mostly for by the significant reduction or complete removal of tariff rates when trading hence a reduction in the direct cost of trading . However, other barriers to trade also exist, these are characterized mostly by the indirect costs incurred during the process. These barriers pertain to poor trade facilitation which include trade and business logistics measures and also infrastructure barriers that deal with transport facilitation measures.

Sousa and Findley (2008) defines trade logistics as the "range of activities required for the transportation, storage and handling of production inputs as well as finished products from producer to consumer". The literature offers considerable evidence linking advancement in transport and logistics directly to improvements in the trading process, especially on export performance.

Hausman, Lee and Subramanian (2005) noted that better trade logistics performance positively affects the level of bilateral trade between countries. The quality of trade of logistics services varies greatly across countries. This was observed by Wilson et. al (2005) when they examined logistics characteristics of Asia Pacific Economic Cooperation (APEC) member countries, wherein they concluded the differences in the quality of their trade logistics and facilitation is due to a broad range of measures, including ports infrastructure, customs clearance, regulatory administration, and e-business use. Wilson also surmised that these differences in the quality of trade facilitation may explain the significant variation of these countries trade performances.

Carruthers (2002) found out that the effects of improved trade logistics are especially strong when trade mechanisms connect importers to multiple suppliers of highly substitutable commodities. Hummels (1999) compared the sales by manufacturers of similar products, and estimated that if exporters can lower the shipping costs with the aid of good trade logistics by 1 percent, they can enjoy a 5-8 percent higher market share. Fink (2001) estimated that liberalizing the provision of port services and regulating the exercise of market power in shipping could reduce shipping costs by nearly one-third.

From above, there are a handful of evidences suggesting that higher trade costs form a significant obstacle to trade and higher non-tariff barriers impede the realization of gains from trade liberalization. Improved infrastructural and logistics services play an important role in the flow of international trade. On one hand, they generate wealth by reducing the costs of trade because of their non-discriminatory and non-rivalrous characteristics; on the other hand, they integrate production and trade across countries.

Good internal logistics facilitate surplus commodity shipments from surplus to shortfall regions; this reduces the variability of prices between the two regions. Good internal logistics then provide producing nations protection from scarcity and glut. Better market access appears to dampen price volatility for a broad range of products. Engel and Rogers (1996) show that the volatility in goods prices between city pairs rises with the distance between the cities, and is especially large for city pairs across national borders. Essentially, arbitrage is necessary to narrow price differentials across locations, and this is much harder to achieve when logistics are poor.

Better transport and logistics systems make the timing of delivery more reliable. Producers cannot manufacture goods without the inputs they need, and retailers cannot sell goods they do not have in stock, if delivery times are uncertain, firms must hold large inventories of goods. Gausch and Kogan (2001) find that inventory holdings in manufacturing are two to five times

higher in developing countries than in the United States, and estimate that halving inventories could reduce unit production costs by 20 percent.

In relation to the geographic contributions on trade performance disparity, Redding and Venables (2002) estimated that more than 70 percent of the variation in per capita income across countries can be explained by the geography of market and supplier access. If countries gain better access to coasts alone the incomes of people can increase by 20 percent.

Other studies have found that differences in logistics performance are driven only in part by poor quality of physical infrastructure services such as road, rail, waterways, port services, and interfaces (Subramanian and Arnold 2001). Instead, 'the inadequacies are often caused by [non-tariff] policy and institutional constraints—such as procedural red tape, inadequate enforcement of contracts, poor definition and enforcement of rules of engagement, delays in customs, delays at ports and border crossings, pilferage in transit, and highly restrictive protocols on the movement of cargo'. (Hausmann, Lee and Subramanian 2005)

The importance of transport and logistics is illustrated by a study on their impact on Intra trade among the economies of the Asia Pacific Economic Cooperation (APEC). It shows that intra-APEC trade would increase by an estimated $280 billion through an improvement of various trade facilitation measures, half of which derived from improvements in port logistics. This represents about a 10% increase from the current level of intra-APEC trade. The increase would be sustained over time. The study suggests that well-conceived investment in trade facilitation could have high economic payoffs. That is the importance of governments' role in trade facilitation, and effort in this should be an integral part of the country development strategy.

Reducing the cost and improving the quality of logistics and transport systems improves international market access and leads directly to increased trade and reduces the prices paid by consumers and increases the prices received by producers, that eventually results to higher

incomes and the scope for significant reductions in poverty (Carruthers, Bajpai and Hummels 2002).

Most literature however has yet to point concrete evidences on the relationship of trade facilitation and poverty, except for the recent study made by Coung Nguyen (2013) wherein he conducted an empirical investigation on the association between trade facilitation with inequality and poverty and inequality. The primary measure he used was the relative time needed to complete export and import transactions in a country, by using the number of documents needed for trade. He used a GMM-type instruments for trade facilitation and derived strong correlations between poverty, inequality and GDP per capita when coupled with the number of documents and the length of time for the whole trading process to occur per country.

Over-all, the present literature has yet to examine trade logistics as a separate variable to determine poverty incidence across countries. Given that trade logistics is composed of various components such as the quality of infrastructure, customs performance, etc., it can be possible marker for poverty. Trade logistics is considered as a means of improving trade and as trade improves, scholars of trade and poverty assume that the problem of poverty will be abated.

Several studies concerning trade logistics have shown the possible causality of good trade logistics to poverty alleviation. But one could also view poverty as a contributing factor to trade logistics performance or vice versa. If demonstrated that components of trade logistics can determine the magnitude of occurrence of poverty, nations, especially developing ones, will be able to target the improvement of that identified component and prioritize its development in consideration of the limited capacity of developing countries in reforming infrastructure and institutions. From this, one could open up the perspective of improving trade logistics not only to make countries connect to the globalized economy but also be able to significantly abate poverty.

3 THEORETICAL FRAMEWORK

Trade and Poverty

According to the Stolper-Samuelson theory of International Economics, freer trade should help alleviate poverty in poor countries, as they are expected to utilize their comparative advantage to export labor-intensive goods. This is on the back of the assumption that wages in these countries are relatively lower than the developed economies. The Stolper-Salmuelson's theory was empirically verified by the research done by Anne Krueger's (1983) from a multi-country project on the subject of the effects of trade on wages and employment in developing countries. Meanwhile a more dynamic view of the connection between trade and poverty is put simple in two steps: trade promotes growth; and growth reduces poverty.[5]

The query on what causes poverty remains a central problem of the field of Economics to date. Poverty is linked to trade since the trading process can fuel the economic growth as trade across countries expands. The expansion of trade could then open opportunities to abate the poverty burden in both the developing and the developed worlds, as trade fuels job creation and directly improves wage earning and affordability of goods and services to the poor. Moreover, trade can enhance economic growth by encouraging competition and more efficient utilization of resources. Trade contributes to higher productivity through conception and innovation derived from increased specialization and division-of-labor. (ADB 2002)

Trade Facilitation and Poverty

Since 1994, trade facilitation was considered by the World Trade Organization as an important agenda to be tackled by its member governments, and in 2004 the negotiations concerning trade facilitation commenced in the WTO (Duval, 2007). Over the years, the number of bilateral and

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[5] As described in Bhagwati J. and Srinivasan T.(2002), "***Trade and Poverty in the Poor Countries***," American Economic Review, American Economic Association, vol. 92(2), pages 180-183, May

multilateral agreements between countries increased and has weighed down tariff rates. Due to significant reduction in tariffs, the view has shifted to non-tariff regulations as main cause of frictions in the flow goods from country to country. With this, trade facilitation aims to reduce transaction costs of international trade by simplifying customary and technical regulations (United Nations, 2002). It is also deemed as a means to simplify and improve the efficiency of international trade procedures (United Nations, 2002; Wilson et al., 2003, 2005; Engman, 2005; Iwanow and Kirkpatrick; 2007). Trade facilitation involves better trade logistics at ports to improving the environment of transaction costs such as simplification and harmonization of procedures on international movements of goods and services (Wilson et al., 2003, 2005; Iwanow and Kirkpatrick; 2007).

Since, better trade facilitation reduces the cost of trading, its direct impact is to increase the international trade. Wilson et. al (2005) found that improving port efficiency, customs and e-business yielded positive effect on trade flows. As opposed to the evidences, which showed that heavy regulatory environments does harm the trade flows. In a study conducted by Clark et al. (2004), they showed that a reduction in inefficiencies in transport costs results in an increase in bilateral trades of countries to the US. Meanwhile, Dollar et al. (2006) noted that the number of days to clear goods through customs has a negative effect on exports in developing countries. Further, Iwanow and Kirkpatrick (2007) find that a 10 percent improvement in trade facilitation can increase the export volume by around 5 percent. Djankov et al. (2010) examine how the time delays of shipment of products on international trade. They find that an additional day that a product is delayed can decrease the international trade volume by around one percent. Recently, Dennis and Shepherd (2011) show that trade facilitation improvement can promote export diversification in developing countries. A 10 percent reduction in the export cost can lead to a three percent increase in export diversification[6].

[6] As summarized in "Poverty, Inequality and Trade Facilitation in Low and Middle Income Countries" (Nguyen Coung, 2013)

Following the evidence that trade facilitation is beneficial in improving a country's position in international trade, various literature also looked at trade facilitation, as a variable that promotes economic growth and affect poverty and income distribution of the country. As Dollar and Kraay (2000) pointed out, economic growth is among the prerequisite to reduce poverty. There are also a considerable amount of literature which documented the positive effect of trade facilitation on employment and then linked employment generated through trade as a means for poverty reduction (e.g., McCulloch, 2001; Harrison, 2005; Winters, et. al., 2004; Hoekman and Winters, 2005). In line with this, Hoekman and Winters (2005) noted that trade contributes to increased rate of employment generation. They noted that the expansion of export-oriented sectors were able to create opportunities for low skilled workers to gain employment. This is backed by several studies that found positive correlation between trade facilitation and employment (Dennis, 2006; ESCAP, 2009; Zaki, C., 2011). Most recently, the paper by Nguyen (2013) noted that trade facilitation as measured by the length of process to trade and the relative administrative requirements to trade can affect per capita GDP, poverty and inequality. More specifically, deterioration in trade facilitation which is measured by an increase in the number of documents and days for exports and import can reduce per capita GDP. Moreover, in Nguyen's study noted that countries with a larger number of documents and more time for imports and exports tend to have higher poverty (measured by the headcount and poverty gap index) and higher inequality (measured by the Gini index) than other countries. He also noted that the Logistics Performance Index can be as a measure of trade facilitation, which is the main dependent variable of this paper.

Abiding with the contention that improving trade will significantly impacts poverty reduction, thus, enhancing trade facilitation and logistics reduces transactions costs, eventually increasing gains from trade. Trade logistics performance, which dictates the facilitation of trade, is therefore a critical determinant for developing countries to harness global trade and reap the benefits of globalization.

Economic liberalization and technological advancements fuel the decentralization of production, marketing, and distribution activities worldwide. This offers developing economies a wide array of opportunities for the provision of value added services. Participating in global supply chains can improve countries' access to markets and encourage investment so as the increase of employment opportunities.

Although this might be true, it is also suggested that the escalating decentralization presents a tough challenge for developing economies. This is due to intense competition in the global market, and there is pressure for less developed nations to be highly efficient, prolific, and competent of providing just-in-time services. Efficient logistics services play a vital role in the global relay of goods and services. Moreover, efficient logistics dictates the ability of countries to draw foreign investments and maintain them. (ADB 2002) Earlier studies on investment environment and trade facilitation emphasize that inefficiencies in logistics is an important limitation on productivity and competitiveness of firms in developing countries. Dollar, Hallward-Driemeier, and Mengistae (2004) found that firms in countries with a better investment climate, including better logistics, have a higher probability of exporting to international markets and attracting foreign direct investments. Similarly, the study of Subramanian et al. (2005) concluded that the intensity of customs red-tape can adversely affect a firms' productivity.

Trade Logistics

Logistics inefficiencies harm the competitiveness of private firms through their effects on cost and time. The costs relate not only to the direct costs of transporting products; goods in transit incur indirect costs such as inventory holding costs. The longer the transit time, the higher the costs. Hummels (2001) finds that shippers are willing to pay a premium for faster delivery.

Logistic management is "the science of balancing the storage [stocks] and movement [flows] of inputs and outputs to meet demand, and minimize total cost while delivering increased

efficiencies."[7] Today's internationally competitive businesses work through strategic, integrated global networks that are designed to deliver efficient and high-quality response to demands from anywhere in the world. This trend has given rise to the terms "global logistics" and "supply chain management." In addition, growing environmental concerns require that logistics should not only be efficient; they should also contribute to sustainable development.[8] Logistics and value added facilities along with improved intermodal transportation systems can also facilitate increased trade and economic growth within a given urban region.[9]

Other indirect costs are incurred when delivery times and reliability are uncompetitive, severely affecting a country's position in highly competitive international markets demanding just-in-time delivery. Product value often declines while in transit. For perishable products, spoilage or wastage may increase with transit time. Products with time-sensitive information, such as newspapers, decline sharply in value as that information becomes obsolete. Seasonal and fashion apparel has similar time sensitivity. These costs also reflect lost opportunities, as when critical inputs cannot reach manufacturing plants in time or perishable commodities cannot reach markets in time—or when production plants must hold higher-than-optimal levels of raw material inventories to cover for logistics delays.

Trade Performance Index

The World Bank started publishing the information of countries' Logistics quality measurement known as the Trade Logistics Performance Index on 2007 and subsequently released the results of the same surveys for the years 2010, 2012 and 2014.

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[7] DOTARS, "Freight Logistics in Australia: an agenda for action," June 2002, p5.

[8] OECD Organization for Economic Co-operation and Development, Abstract: Source Industry, Services & Trade, August 2002.

[9] Browning, Jess, "Development of Logistics and Transportation Systems in Promoting Trade & Economic Growth: Comparing Incheon and Seattle Areas," Korean Observer, Forthcoming Autumn 2003.

The Logistics Performance Index (LPI) and its indicators provide the first in-depth cross-country assessment of the logistics gap among countries. Drawing on the first-hand knowledge of logistics professionals worldwide, it provides a comprehensive picture of supply chain performance—from customs procedures, logistics costs and infrastructure quality to the ability to track and trace shipments, timeliness in reaching destination and the competence of the domestic logistics industry.[10]

Trade competitiveness is central to whether countries can harness globalization's new opportunities for development. The performance of customs, trade-related infrastructure, inland transit, logistics services, information systems, and port efficiency are all critical to whether countries can trade goods and services on time and at low cost.

4 METHODOLOGY

Data

The National Poverty Data from the World Development Indicators of the World Bank was used in this paper, primarily the Poverty headcount ratio at the national poverty line. The sample countries' national poverty incidence varies on the survey years for each country. Hence, the medium term averages of the poverty rates where used. That is data from 2004 to 2009 are averaged and labeled as period 1 while, the medium term average from 2010 to 2014 was labeled period 2.

Logistics Performance Index[11]

The Logistics Performance Index (LPI) is the result of the World Bank's intention to quantify the trading facilitation performance of countries across the globe. The LPI was built on information

[10] Arvis, Jean-François et. al. The Logistics Performance Index and Its Indicators. The International Bank for Reconstruction and Development. The World Bank. Washington DC, USA.2010, 2014

[11] Connect to Compete. World Bank's Logistics Performance Index Methodology, 2007, 2010, 2012, 2014

from a web-based questionnaire completed by more than 800 logistics professionals worldwide —the operators or agents of the world's largest logistics service providers[12]. Performance was evaluated using a 5-point scale (1 for the lowest score, 5 for the highest). The LPI was aggregated as a weighted average of the six areas of logistics performance. The index was constructed using the Principal Component Analysis method to improve the confidence intervals.

The LPI uses a broader and comprehensive approach to supply chain performance to measure some of the critical factors of trade logistics performance, which include the quality of infrastructure and logistics services, the security of property from theft and looting, the transparency of government procedures, macroeconomic conditions, and the underlying strength of institutions.

Quantitative Analyses

In the preceding sections, it was surmised that improved realization of trade facilitation gains (e.g. the rise in real incomes) may eventually lead to the decline in the number of poor. Moreover, it was highlighted that a possible correlation exists between poverty incidence and the six trade logistics components.

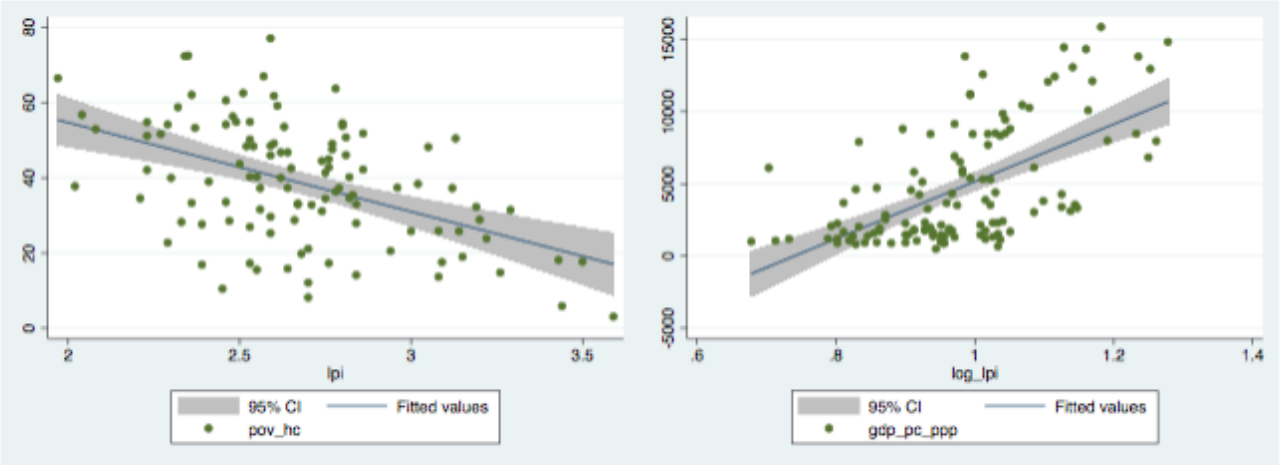
First, the establishment of the relationship between trade logistics performance and poverty reduction must be presented to see the basis of connecting trade and poverty through the trade logistics performance.

An OLS estimate for three data series was implemented. The variable POV indicates the national poverty incidence data among 69 developing countries, measured by poverty headcount ratio at national poverty line (percent of population)[13], the LPISCORE represents the score of each

[12] Description of the LPI Methodology by the World Bank

[13] National poverty rate is the percentage of the population living below the national poverty line. National estimates are based on population-weighted subgroup estimates from household surveys. World Development Indicators

Figure 1:
Negative Relationship between LPI and Poverty (A) and Positive Relationship between LPI and Income (B)



(A) (B)

country on the Logistics Performance Index and GDP which is the GDP per capita of each country[14], hence the basic equation as follows:

$$\log(POV) = \alpha_0 + \alpha_1 \log(LPISCORE) + \alpha_2 \log(GDP) + \alpha \quad \text{(Equation 1)}$$

In support of the contention that trade is expanding and tariff trade barriers are decreasing in today's international environment, there is a need to show that trade liberalization can explain poverty incidence among countries. Average tariff data of countries was employed as an indicator of liberalized trade. The equation specified below is employed to examine if trade liberalization is at work, higher tariff rates means more restrictive trade, and how this is affect the poverty incidence in a country.

$$\log(POV) = \rho_0 + \rho 1 \log(TAVE) + \rho \quad \text{(Equation 2)}$$

To measure and compare the influence of tariffs and logistics performance on poverty incidence, the following equation is specified through OLS:

[14] World Bank. World Development Indicators

$$\log(POV) = \beta_0 + \beta_1 \log(LPISCORE) + \beta_2 \log(TAVE) + \beta_3 \log(GDP) + \beta \quad \text{(Equation 3)}$$

The variable TAVE represents the average tariff rate, which is generated with the use of simple averaging of tariff rates imposed on agricultural and non-agricultural products. Each tariff line has exactly the same weight irrespective of its economic importance[15].

To address the possible problem of endogeniety of trade facilitation quality, a Two-Stage Least Squares Regression is specified. Firstly, it is needed to determine which among the components of the LPI is a suitable instrument for the 2SLS regression. By employing a simple OLS, the partial effects of each trade logistics components on the incidence of poverty will be examined.

$$\log(POV) = a_0 + a_1 \log(INSCORE) + a_2 \log(GDP) + a$$
$$\log(POV) = b_0 + b_1 \log(CSCORE) + b_2 \log(GDP) + b$$
$$\log(POV) = c_0 + c_1 \log(SHSCORE) + c_2 \log(GDP) + c$$
$$\log(POV) = d_0 + d_1 \log(LSCORE) + d_2 \log(GDP) + d$$
$$\log(POV) = f_0 + f_1 \log(TTSCORE) + f_2 \log(GDP) + f$$
$$\log(POV) = g_0 + g_1 \log(TISCORE) + g_2 \log(GDP) + g$$

The variable *INSCORE* indicates the countries' infrastructure score; this is the rating of the quality of trade and transport infrastructure (e.g., ports, railroads, information technology) in different countries.

The variable *CSCORE* indicates the customs score of countries, which is based on the efficiency of customs and border management clearance. *SHSCORE* signifies the capacity of countries to easily arrange shipments, this involves the ease and affordability associated with shipping products to or from the stated country.

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[15] Simple mean applied tariff is the unweighted average of effectively applied rates for all products subject to tariffs calculated for all traded goods. Data are classified using the Harmonized System of trade at the six- or eight-digit level. Tariff line data were matched to Standard International Trade Classification (SITC) revision 3 codes to define commodity groups. Effectively applied tariff rates at the six- and eight-digit product level are averaged for products in each commodity group. When the effectively applied rate is unavailable, the most favored nation rate is used instead. To the extent possible, specific rates have been converted to their ad valorem equivalent rates and have been included in the calculation of simple mean tariffs. World Bank Indicators

The *LSCORE* variable represents the logistics competence of the nations; this comprises the evaluation of the level of competence of the logistics industry (e.g., transport operators, customs brokers). The last two variables in the simple linear regression analyses are that indicates the timeliness of shipment and *TTSCORE* that signifies the ability to track and trace your consignments when shipping to or from a certain country. Finally, *TISCORE* pertains to the frequency with which shipments reach consignees within scheduled or expected delivery times.

Variables such as Infrastructure Score and Customs Score which explains the Infrastructure quality of the country and institutional quality, respectively are suspected to have independent impact on growth and that of poverty, which poses a endogeniety bias. Hence we will try to analyze whether trade facilitation remain a significant explanatory variable for poverty reduction once these components are netted out. The results of the regression of poverty incidence on the individual components of the Logistics Performance Index will serve as the basis of choosing the Instruments. The variables that are not related to poverty — i.e., Tracking and Tracing Score and Timeliness Scores are deemed as acceptable variables for the Instrumental Variable regression. Moreover, we aim to estimate the elasticity of trade logistics by controlling the level of per capita income in the economy (and the income share of the poorest population in the countries (Income Share of the 10 percent bottom quintile[16]). Hence finally, the Two-Stage Least Square regression is specified as follows:

(Equation 4.1)

$$\log(POV) = Y_0 + Y_1\log(LPISCORE) + Y_2\log(TAVE) + Y_3\log(GDP) + Y_3\log(B10INSHARE) + v$$

(Equation 4.2)

$$\log(LPISCORE) = P_0 + P_1\log(TTSCORE) + P_2\log(TICORE) + P_3\log(GDP) + P_3\log(B10INSHARE) + u$$

[16] Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles. World Development Indicators

LIMITATIONS

This study utilized data from the developing countries, since the authors of the Logistics Performance Index concede that industrialized countries score higher on the LPI. Industrialized countries therefore have the resources needed to augment their infrastructure unlike the constrained less developing economies that cannot directly address the problems of the trading facilitation processes. Furthermore, industrialized countries tend to have stronger institutional advantage when it comes to their customs' performance as these well-off countries register low corruption rates and much lesser red-tape problems. Including developed countries in the study would not be useful since their relative wealth greatly affects their LPI score. Some developing countries also deviate from the pattern that low income countries are at the bottom of the LPI (i.e., China and India). These exceptions occur since these countries house important ports in their respective regions where the logistics industries are already developed despite the prevalence of poverty or the meager income per capita.

Moreover, this study includes only 69 developing countries from the continents of Africa, Asia, South America and some from Europe. This study cannot cover those economies from the pacific, especially island nations, given the insufficiency of data. This is also true for other developing countries.

5 RESULTS

Table 1. Verifying Correlations between LPI components and Poverty

Dependent: Poverty	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII
log Infrastructure	-0.800** (0.332)						-1.21* (0.057)
log Customs		-0.610* (0.344)					0.30 (0.057)
log Shipping			-0.795* (0.350)				-0.87** (0.438)
log Logistics Competence				-0.765* (0.364)			-0.18 (0.754)
log Tracing and Tracking					-0.547 (0.341)		-0.39 (0.582)
log Timeliness						-0.271 (0.376)	0.29 (0.527)
log GDP	-0.231*** (0.057)	-0.272*** (0.052)	-0.263*** (0.051)	-0.245*** (0.056)	-0.274*** (0.052)	-0.292*** (0.055)	
R^2	0.234	0.3155	0.3280	0.3233	0.3118	0.2984	0.3513

Table 2. Regression Results Summary

Dependent Variable: Poverty					
	Model 1 (OLS)	Model 1.1 (OLS)	Model 2 (OLS)	Model 3 (IV Reg)	Model 4 (IV Reg)
log LPI Score	-2.15*** (0.39)		-2.25*** (0.397)	-2.11*** (0.397)	-2.039*** (0.422)
log GDP per capita	-0.08* (0.05)		-0.042 (0.053)	-0.048 (.052)	-0.043 (0.0525)
log Average Tarrif		0.15* (0.080)	0.094 (0.080)		0.105 (0.079)
log Income Share Bottom 10 percent			-0.285*** (0.080)	-0.248*** (0.077)	-0.281*** (0.079)
				Instruments:	Instruments:
				Tracking and Tracing Quality	Tracking and Tracing Quality
				Timeliness of Shipment	Timeliness of Shipment
R^2	0.24	0.026	0.330	0.320	0.330
Adjusted R^2			0.302		
Sargan Test of overidentifying restrictions				ok	ok
Wu-Hausman Tests of endogeneity				ok	ok

Test Results Interpretation:

From the above regression results, we can observe that logistics performance both have practical and statistical significance as explanatory variable of poverty. This result is the same for both the Ordinary Least Squares estimation and the 2 Stage-Least Squares estimation.

Meanwhile, in the implementation of the 2 Stage Least Squares, two instrumental variables were used, hence it is needed to check over-identification via the Sargan Test. Based on the computation done in STATA, the specified regression equation yielded valid instruments as it rejected the Sargan test's null hypothesis of invalid instruments. Moreover, we employ the Wu-Hausman Test for endogeneity. However, it can be noted that we are unable to reject the null hypothesis that the variables used in the regressions are exogenous. Suggesting that the simple

OLS is already sufficient. But given the theory pointing on to the possible endogeniety problem and the p-value of the test, wherein the probability of being exogenous are not entirely zero, thus a certain degree of endogeniety may still exist. Hence there is still reason to estimate both OLS and 2SLS. Nonetheless, the results based from the OLS and the 2SLS are not that significantly different (as suggested by the Hausman test). This is an evidence that the coefficients in both estimates are consistent and robust.

Table 3. Comparative Impact of Selected Policy Variables to Poverty

Beta Coefficient Analyses of Comparative Policies

Dependent: Poverty (log)	Coefficient	P-value	Beta values
Explanatory variables			
Logistics Performance (log)	-2.25	0.000	-0.494
Education (log)	-0.212	0.204	-0.148
Health (log)	-0.069	0.537	-0.069
Human Development Index (log)	-1.37	0.000	-0.699

Using the beta coefficient analyses, we compare the relative impact of various policies to poverty. In this section, all the policy variables were used as regressors of poverty and the beta coefficients are estimated using the OLS.

Each policy variables namely, logistics performance, education spending per GDP[17], health spending per GDP[18] and the human development index[19] were transformed into log and the following equation was estimated:

(Equation 5)

$$\log(POV) = P_0 + P_1\log(POLICY) + P_2\log(TAVE) + P_3\log(GDP) + P$$

For each regression results, the beta coefficients were obtained. From here we can see that the log of HDI resulted to the highest effect on poverty, wherein an increase of 1 standard deviation in the HDI corresponds to a reduction in the standard deviation of poverty by 0.7; this is followed by logistics performance (0.5 reduction in standard deviation of poverty); then education (a reduction of 0.15 of the poverty's standard deviation); and lastly health spending (0.07 decline poverty's standard deviation)

The results however, are deemed indicative only of the relative effects of the policy variables to poverty. It does not reflect the true impact propensity of each policy variables. This is because HDI, specifically includes income poverty as part of its measure variable, hence it is expected to have a strong impact. Meanwhile, education and health spending are statistically insignificant in explaining poverty per equation 5 (also reflected in the p-values of Table 3). This result can be attributed to the lag effects of these policy variables, wherein, the expected impact to welfare and eventually to poverty are observed in the long run and is almost negligible at the moment of implementation. Nonetheless, the exercise provides an evidence that improving trade facilitation performance of a nation does affect poverty alleviation in comparison to other policies that may be implemented or pursued by a country in order to make a dent on poverty.

[17] Public Expenditure on Education as reported in the Human Development Index

[18] Public Expenditure on Health as reported in the Human Development Index

[19] Human Development Report 2010-2013

6 CONCLUSION

With the world turning its back from anarchy and countries embraced global trade, it becomes an imperative for governments to reduced the trade barriers that separates their economy to the world for them to reap the benefits of trade. The freer movements of goods across borders, as well as mobile factors of production, effectively balance the world economy as it facilitates shifts of resources from regions of surpluses and efficient production to countries with excessive demand for particular goods that require costly production. In the latter half of the 21st reduction as a viable policy for trade liberalization. Numerous studies verify the positive relation between tariff reduction to economic growth and to lessening the number of the poor.

From the results of this study, however, it can be noted that tariff costs is not the main force that obstructs trade. It is in fact trade facilitation that plays a critical role in the goods exchange process. A below-par logistics system raises transportation and transactions costs that could bring prices up or merely discourage the facilitation of trade. Like a high tariff rate, poor logistics stifles the potential gains from trade that could have benefited the economy.

Using OLS estimation, the study confirms the negative correlation between LPI score and poverty incidence, that is, a competitive logistics system reflects lower poverty incidence. Moreover, by means of a Two-Staged Least Squares Estimation, the factors of Trade Facilitation that directly impacts economic growth was netted out before employing trade facilitation as an explanatory variable for poverty. From the estimation described in the previous section, the results points that trade facilitation significantly explain poverty across countries, controlling income levels and the income share of the bottom quintile and that of average tariff rates.

The logistics performance index covers six components, and these are further divided into the policy variables wherein the government and the private sector have handle and the outcome

variables from better trade facilitation. Various studies confirmed that infrastructure[20] and institutions[21],[22] not only improve trade facilitation, but also contributes to economic growth and possibly the alleviation of poverty.

The main contribution of this paper was to be able to provide evidence that trade facilitation can explain poverty even after netting out the components of trade facilitations that have direct impact to poverty. Hence addressing Dani Rodrik's critique to the Dollar and Kraay paper which disputes the validity of the methods used to present that trade liberalization does reduce poverty. Moreover, the connection was established using non-tariff barriers to trade.

POLICY IMPLICATIONS

The logistics performance index is primarily driven by the "inputs" components, i.e. infrastructure quality, customs quality and domestic services quality. Hence the government and their private sector partners through policy regulations, can improve trade facilitation quality. Wherein there is considerable reason to direct public policy towards the improvement of internal transportation and communication infrastructure and pushing for an efficient customs procedure.

Moreover, if the government likewise pass policies to encourage competition in the logistics industry, it can facilitate the significant reduction in the cost of services imposed by private carriers and port operators while pushes them to beef up the quality of their services to remain competitive.

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[20] Ifzal Ali and Ernesto Pernia (2003). "Infrastructure and Poverty Reduction —What's the Connection?". Asian Development Bank

[21] Qualified as Political, Social, Cultural and Administrative Institutions

[22] Deolalikar, A.B., Brillantes, A.B., Gaiha, R., Pernia, E.M., and Racelis, M (2002). "Poverty Reduction and the Role of Institutions in Developing Asia". Asian Development Bank

From the above policy actions, a country's trade facilitation capacity will be greatly improved, recalling the results presented above, this can provide opportunities for synergistic effect towards the poverty alleviation.

REFERENCES:

Ali, Ifzal and Ernesto Pernia (2003). "Infrastructure and Poverty Reduction —What's the Connection?". Asian Development Bank

Arvis, J.F., Mustra A., Panzer, J., Lauri, D. and N. Tapio (2007), "Connecting to Compete: Trade Logistics in the Global Economy" The Logistics Performance Index and Its Indicators, The International Bank for Reconstruction and Development, The World Bank. Washington DC, USA.

Banerjee, V.A., Benabou, R. and Mookherjee, D (2006), "Introduction and Overwiew". Understanding Poverty. Oxford University Press, Inc. New York, USA.

Bhagwati J. and Srinivasan T.(2002), "Trade and Poverty in the Poor Countries," American Economic Review, American Economic Association, vol. 92(2), pages 180-183, May

Carruthers, Robin, and Jitendra N. Bajpai. (2002). "Trends in Trade and Logistics: An East Asian Perspective." Working Paper No. 2, Transport Sector Unit. Washington, D.C.: World Bank.

Dennis, A. and B. Shepherd. 2011. "Trade Facilitation and Export Diversification." World Economy, vol. 34, no. 1, pp. 101-122.

Deolalikar, A.B., Brillantes, A.B., Gaiha, R., Pernia, E.M., and Racelis, M (2002). "Poverty Reduction and the Role of Institutions in Developing Asia". Asian Development Bank

Djankov S, Freund C, and Pham CS (2010), "Trading on time", Review of Economics and Statistics 92: 166-173

Dollar, D. and A. Kraay (2001), "Trade Growth, and Poverty", mimeo, The World Bank.

Dollar, D., M. Hallward-Driemeier and T. Mengistae (2006), "Investment Climate and International Integration", World Development 34(9), 1498–1516.

DOTARS, "Freight Logistics in Australia: an agenda for action," June 2002, p5.

Duval, Y. (2007), "Trade facilitation beyond the Doha Round of negotiations", Chapter I in ESCAP (2007), Trade facilitation beyond the multilateral trade negotiations: Regional practices, customs valuation and other emerging issues – A study by the Asia-Pacific Research and Training Network on Trade, (United Nations, New York).

Engel, Charles, and John. H. Rogers. (1996). "How Wide is the Border?" *American Economic Review* 86(5):1112–25.

Engman, M. (2005), "The Economic Impact of Trade Facilitation", OECD Trade Policy Working Papers, No. 21,OECD Publishing.

Fair, M.L. and Williams, E.W.(1975), "Economics of Transportation and Logistics", Business Publication, Inc. Dallas, Texas, USA.

Fink, Carsten, Aaditya Mattoo, and Ileana Cristina Neagu.(2002). "Trade in International Maritime Services: How Much Does Policy Matter?" *World Bank Economic Review* 16:81–108.

Frankel, J. and D. Romer (1999), "Does Trade Cause Growth?", *American Economic Review*, Volume 89 (3), pp. 379-399.

Gausch, Luis J., and J. Kogan. (2001). "Inventory in Developing Countries: Level and Determinants, a Red Flag on Competitiveness and Growth." Washington, D.C.: The World Bank.

Hallward-Driemeier, Mary, Giuseppe Iarossi, and Kenneth L. Sokoloff. (2002). "Export and Manufacturing Productivity in East Asia: A Comparative Analysis with Firm-Level Data." National Bureau of Economic Research Working Paper No. W8894.

Hausmann, Warren, Hua L. Lee and Uma Subramanian (2005). "Global Logistics Indicators, Supply Chain Metrics and Bilateral Trade Patterns", World Bank Policy Research Working Paper 3773 (Washington D.C., World Bank), November 2005

Hoekman, Bernard, and L. Alan Winters. 2005. "Trade and Employment: Stylized Facts and Research Findings." World Bank Policy Research Working Paper no. 3676. Washington, D.C.: World Bank.

Hummels, David. (1999). "Towards a Geography of Trade Costs." Processed. Graduate School of Business, University of Chicago.

Hummels, David, and Peter Klenow.(2001). "The Variety and Quality of a Nations' Trade." NBER Working Paper No. w8712. Cambridge, MA.

Iwanow, Tomasz and Colin Kirkpatrick (2007), "Trade Facilitation, Regulatory Quality and Export Performance", Journal of International Development, 19, 735–753

Limao, Nuno and Anthony Venables (2001). "Infrastructure, geographical disadvantage, transport costs and trade", *World Bank Economic Review*, vol. 15, pp. 451-479.

Nguyen, Cuong (2013): Poverty, Inequality and Trade Facilitation in Low and Middle Income Countries.

OECD Organization for Economic Co-operation and Development, Abstract: Source Industry, Services & Trade, August 2002.

Rodriguez, F. and D. Rodrik (2000), "Trade Policy and Economic Growth: A Skeptics Guide to the Cross-National Evidence", mimeo, University of Maryland and John F. Kennedy School of Government.

Romalis, J. (2006), "Market access, Openness, and Growth," NBER Working Paper.

Redding, Stephen, and Anthony, J. Venables. (2002). "Economic Geography and International Inequality." Centre for Economic and Policy Research (CEPR) Discussion Paper No. 2568. London.

Wilson, John S., Tsunehiro Otsuki, and Mirvat Sewadeh.(2002). "Dirty Exports and Environmental Regulation: Do Standards Matter to Trade?" Processed. Development Research Group. Washington, D.C.: World Bank.

Wilson, John, Catherine Mann, Yuen Pau Woo, Nizar Assanie, and Inbom Choi.(2002). "Trade Facilitation: A Development Perspective in the Asia Pacific Region." World Bank working paper presented to APEC. Processed. Washington, D.C.: World Bank.

Zaki, C. (2011), "Assessing the Global Effect Of Trade Facilitation: Evidence From The Mirage Model", Working Paper 659, The Economic Research Forum.

Appendix: Countries

Argentina	Central African Republic	Gambia, The	Kyrgyz Republic	Nepal	Sri Lanka	Vietnam
Armenia	Chad	Ghana	Lao PDR	Nicaragua	Tajikistan	Zambia
Azerbaijan	Chile	Guatemala	Lesotho	Nigeria	Tanzania	Zimbabwe
Bangladesh	China	Guinea	Malawi	Pakistan	Thailand	
Benin	Colombia	Haiti	Malaysia	Panama	Togo	
Bolivia	Costa Rica	Honduras	Mali	Paraguay	Tunisia	
Brazil	Cote d'Ivoire	India	Mauritania	Peru	Turkey	
Burkina Faso	Dominican Republic	Indonesia	Mexico	Philippines	Turkmenistan	
Burundi	Ecuador	Jamaica	Mongolia	Rwanda	Uganda	
Cambodia	El Salvador	Kazakhstan	Mozambique	Senegal	Uruguay	
Cameroon	Ethiopia	Kenya	Namibia	Sierra Leone	Uzbekistan	