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Abstract

With inception of a comprehensive WTO framework in 1995, while the tariff barriers across Member countries have declined, several procedural and policy-related hassles still continue to obstruct trade flows. To reduce the procedural hassles to export and import flows, from the Cancun Ministerial (2003) onwards, negotiations to reach an agreement on Trade Facilitation (TF) started, which was finally concluded at the Bali Ministerial (2013) meeting of the WTO. The current analysis explores the relationship between TF measures, as reflected from the World Bank Logistics Performance Index (LPI), and export orientation (export as percentage of GDP) during four years, namely 2007, 2010, 2012 and 2014. The empirical results underline the difference in the influence of TF on export orientation in higher-income and lower-income countries. It is concluded that there is need to continue the 'Aid-for-Trade' support measures to lower-income economies, for improving their TF scenario.

Keywords: Trade Policy, Trade Facilitation, Exports, LPI, Empirical Estimate, Aid-for-Trade
JEL Classification: F13, F14

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Introduction

With inception of a comprehensive WTO framework in 1995, while the tariff barriers across Member countries have declined, several market access related, procedural and policy-related hassles still continue to obstruct trade flows. In order to reduce such impediments, in 1996 at the Singapore Ministerial Meeting of the WTO, four new agreements (trade and investment issues, competition policy, transparency in government procurement, trade facilitation) were proposed for inclusion within the WTO framework. However, the proposal was intensely debated among the Member countries in the subsequent Seattle Ministerial (1999) and the Doha Ministerial (2001) Meetings, where the developing countries and less developed countries (LDCs) felt that these newer issues may be included among the WTO commitments only after fulfilment of all the major Doha Work Programme promises (Chakraborty and Khan, 2008). As a result, the negotiations on the four 'Singapore Issues' came to a standstill.

The scenario changed from the Cancun Ministerial (2003) onwards, when the countries gradually realized that delaying an agreement on Trade Facilitation (TF) hurts their long-term trade interests. The realization dawned with deepening of the international production networks (IPNs), with exports from the countries becoming crucially dependent on key imports, including raw materials, parts and components. Therefore, negotiation on TF gained pace with discussions on reform commitments and operational modalities. The TF process has been defined by the WTO and UNCTAD as:

> ".. simplification and harmonization of international trade procedures, including activities, practices, and formalities involved in collecting, presenting, communicating, and processing data required for the movement of goods in international trade." (Wilson *et al*., 2002).

In other words, the TF negotiations intend to ease the import flows in a country further, by focusing on several core principles, namely, imposition of minimum service charges, transparency in sharing all the relevant laws, regulations and decisions with the stakeholders, non-discrimination on import consignments entering the country etc. Looking from a functional perspective, the focus is on simplifying and improving both *gateway* (e.g., border formalities, transparency of regulations, efficiency of regulatory agencies, logistical capability of ports) as well as *behind-the-border* (e.g., quality and costs of transport infrastructure, availability of multimodal transport) measures (Roy and Banerjee, 2010). Therefore, in addition to 'soft' measures (e.g., simplifying documents, policies and regulations), TF also requires a country to implement the 'hard' reforms (e.g., improvements in port infrastructure, quality of logistic services). It was soon understood that a major concern of the developing countries and LDCs revolves around the fear that they might be, 'forced to undertake investments in infrastructure projects beyond their means' (WTO, undated a). Keeping this concern in mind the Hong Kong Ministerial (2005) deliberated on the technical assistance and capacity building required in developing counties and LDCs (WTO, undated b). The negotiations were finally concluded in the Bali Ministerial (2013), with Members arriving at a TF agreement. The Agreement is pioneering in WTO framework, as for the first time developing countries and LDCs, based on their capacity, committed to implement the agreement provisions (WTO, undated c).

The TF scenario prevailing across countries can be compared by reviewing the Logistics Performance Index (LPI), prepared by the World Bank in periodic intervals. The composite LPI is constructed on the basis of six broad criteria, namely - customs efficiency, trade and transport infrastructure, ease and cost-efficient of shipments, logistics services quality, tracking and tracing of shipments and timeliness of consignments, for which cross-country comparison is conducted. Each of these components crucially influence the ease of trading in raw materials and semi-processed intermediate goods, and therefore determines the ability of a country to participate in global supply and value chains. Countries receiving high LPI scores in the components are characterized by lower trade costs, thereby enabling them to enjoy an edge in export markets. The index is constructed by the World Bank through a structured survey conducted among logistics professionals from across the globe, who evaluates, 'upto eight of their main overseas partner countries' (World Bank, 2016).

In this background the current paper intends to analyse how the TF measures may influence the export orientation (export expressed as percentage of GDP) of an economy. The relationship has been analysed for the cross-section of countries during four periods, namely 2007, 2010, 2012 and 2014 for which both LPI and exports data are available. While the first two years represents moderate TF measures in a number of developing countries and LDCs, the last two periods are characterized by relatively deeper implementation of the same across countries. The paper is organized as follows. A brief discussion on the literature is followed by description of the empirical model and data. The empirical results and the policy observations are noted in subsequent sections.

Literature Review

Trade Facilitation and Exports

The literature on TF and exports is rich and evolving. With deepening of the IPNs and tariff and TF reforms through regional trade agreements (RTAs), the cross-border movements of consignments are increasing (Menon, 2013). Moreover, due to the delays in arriving at a multilateral TF agreement, a number of RTAs have emerged. Many of these newly formed RTAs have incorporated detailed TF provisions, such as, customs clearance and facilitation, cooperation and exchange of information, publication and enquiry points, advance ruling, single window and automation, with significant positive impact on trade (UNCTAD, 2011). While only 50 percent of the RTAs signed during 1980s incorporated TF provisions, the corresponding number has increased to 92 percent during 1990s and further to 95 percent for the RTAs coming into force from 2000 onwards (Neufeld, 2014). The gradual deepening in TF framework has in turn significantly contributed in expansion of the IPNs in East Asia and the Pacific (ADB and UNESCAP, 2013). TF measures are expected to improve intra-bloc trade flows, once incorporated, in MENA (Dennis, 2006) and South Asian regions (Roy and Banerjee, 2010).

One branch of existing literature includes policy studies that underline the importance of TF measures in promotion of exports. Influence of enhanced efficiency of customs and border handling procedure through modernization with information and communication technology (ICT) tools and other technologies on competitive advantages of local exporters in China has been highlighted (Shujie and Shilu, 2009). The need for expansion and upgradation of infrastructure (e.g., ports) for export promotion is also noted (Roy and Banerjee, 2010).

A number of studies have used surveyed data, and other databases to empirically estimate the effects of TF measures on trade. The cross-country empirical model of Portugal-Perez and Wilson (2010) indicate that improvement in infrastructure quality as well as border efficiency and transparency significantly influence export performance. The analysis of Fontagné *et al*. (2016) with OECD TF data reveals that while measures such as information availability, advance rulings and appeal procedures particularly enhance exports from small and medium firms, simplification of documents and border handling procedures enable exports by large firms only. The gravity analysis of Djankov *et al*. (2010) observed that each additional day's delay lowers trade in the concerned product category by more than 1 percent. Nordås *et al*. (2006) noted that both time delays and lengthy exports and imports related procedural requirements reduce trade volumes as well as the probability of firms entering export markets for time-sensitive segments. The gravity model estimates of Wilson *et al*. (2003, 2005) also underline the importance of TF improvements in a country towards export promotion.

Several empirical studies in recent period have used the World Bank LPI database for analysing export competitiveness. Through a gravity model, Puertas *et al*. (2013) explored the relationship between LPI and export competitiveness for EU-26 countries, and observed logistics to be more important for exporting countries vis-à-vis their importing counterparts. Among the six components of the LPI, competence and tracking were found to have significant bearing on trade. Felipe and Kumar (2010) noted that the rise in bilateral trade in Central Asia as well as the export basket sophistication can be explained by the improvement in the exporting country's LPI performance. De and Saha (2013) observed improvements in logistics services to enhance trade volumes by deepening cross-border IPNs. In the present context, the analysis attempts to check whether there is systemic difference in influence of LPI indices on export orientation of economies across time periods.

Control Variables

A few control variables, namely, the per capita income of the countries (PCGDP), the share of industrial sector in their GDP (GDPIND), merchandise imports as percentage of GDP (MERIMP) and inward foreign direct investment stock as percentage of GDP (FDIINSTK), are included in the current analysis in line with existing literature. With rise in the size of the economy, while export basket can move towards more sophisticated products, the relative importance of trade in GDP may diminish (Mukherjee *et al*., 2014). In addition, growing contribution of industrial sector may influence the export orientation of the economies (Mukherjee *et al*., 2014). Inward FDI stock in recipient countries, particularly the developing ones, enhance the quality of their exports (Harding and Javorcik, 2012), which may in turn increase share of exports in GDP. Finally, the deepening of the IPNs indicates that the merchandise exports from a country are becoming crucially dependent on the imports (both raw materials and semi-processed products) from partner countries (UNESCAP, 2011; WTO, 2011). Rising value of intra-industry trade (IIT) index also support this contention (Brulhart, 2008). The relationship between imports and exports holds good at country level as well (Çelik, 2011; Nag and Mukherjee, 2012).

Empirical Model

In line with the theoretical and empirical literature, the following cross-section regression model for 2007, 2010, 2012 and 2014 are estimated for analysing the influence of LPI on export orientation (export as percentage of GDP). The following log-linear model is adopted so that

the estimated coefficient can be interpreted as the elasticity between control variables and export orientation:

$$LMEREXP_i = \alpha + \beta_1 LPCGDP_i + \beta_2 LPCGDP_i^2 + \beta_3 LMERIMP_i + \beta_4 LGDPIND_i + \beta_5 LLPI_i + LOW_i + D_i + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where,

α	represents the *constant* term
βs	are *coefficients*
$LMEREXP_i$	represents log of Exports as percent of GDP of country *i*
$LPCGDP_i$	represents log of Per Capita Gross Domestic Product (GDP) (US Dollars at constant prices (2005) of country *i*
$LMERIMP_i$	represents log of Imports as percent of GDP of country *i*
$LGDPIND_i$	represents log of share of industrial sector as percent of GDP of country *i*
$LFDIINSTK_i$	represents log of FDI inward stock as percent of GDP of country *i*
$LLPI_i$	represents log of Logistics Performance Index (LPI) related variable of country *i*
$LCUST_i$	represents log of efficiency of Customs and Border management clearance of country *i*
$LEOS_i$	represents log of Ease of arranging competitively priced Shipments of country *i*
$LLOGSER_i$	represents log of Competence and Quality of Logistics Services of country *i*
$LINFRA_i$	represents log of Quality of Trade and Transport Infrastructure of country *i*
LOW_i	represents Low Income Group Dummy of country *i*
D_i	represents the multiplicative dummies
ε_i	represents the error term

The LOW_i dummy is constructed in the following manner. As per World Bank classifications (World Bank, undated a), countries with Per Capita Gross National Income (PCGNI) lower than US$ 1,005 are defined as low income countries (LICs). Countries having PCGNI between US$ 1,006 - 3,975, US$ 3,976-12,275 and US$ 12,276 or more are defined as lower-middle income countries (LMICs), upper-middle income country (UMICs) and high income countries (HICs) respectively. The LOW dummy takes a value of 1 for LICs and LMICs, and 0 for UMICs and HICs.

Finally, in the estimation of the regression model, three multiplicative dummy variables, namely, $LCUST_i*LEOS_i$, $LCUST_i*LLOGSER_i$ and $LCUST_i*LINFRA_i$ are also considered. In addition to overall LPI variable ($LLPI_i$) and customs efficiency ($LCUST_i$), these interaction terms are incorporated in the models for capturing the relationship between export orientations of a country with its performance in the respective measures of TF. Customs efficiency is considered in all three interaction terms as this influences both exports and imports.

Data

The data for the cross-section regression analysis is obtained from two major databases maintained by World Bank. The data on *MEREXP*, *PCGDP*, *MERIMP*, *GDPIMD* and *FDIINSTK* have been obtained from *World Development Indicators* database (World Bank, undated b). The composite (*LPI*) as well as component-wise LPI indicators (i.e., *CUST*, *EOS*, *LOGSER*, *INFRA*) have been obtained from the *Logistics Performance Indicators* database (World Bank, undated c).

Table 1 shows the summary statistics of the trade variables and LPI indices used in the regression model. A total of 148, 154, 146 and 144 countries have been included in the regression models estimated for 2007, 2010, 2012 and 2014 respectively. The declining number of countries in the analysis can be explained by the fact that while the LPI database is expanding with inclusion of more number of countries over the period, the *MEREXP* and *MERIMP* data are not yet available for several countries during 2012 and 2014. The present analysis includes only those countries which have data for both TF and trade variables in a particular period.

It is observed from the table that both mean merchandise export and import as a percentage of GDP are gradually increasing over 2007-2014, indicating deeper trade orientation across countries. A similar observation is noted for the mean overall LPI index, signifying that on an average the TF scenario is improving across the world. The score is also generally increasing for the six reported components as well, signifying general improvement under those categories.

Empirical Results

A cross-section regression analysis has been undertaken with the help of the STATA software (version 13.1). The results are summarized in Tables 2-5. The analysis for 2007 is summarized in Table 2. While PCGDP is not found to be significant barring one model specification, MERIMP and GDPIND are positively related to MEREXP. FDIINSTK is however not found to be significantly related. The results indicate that a percentage increase in share of merchandise import and industry sector in GDP leads to percentage increase in share of merchandise export in GDP. The positive relationship between rising import and export shares underlines the deepening of IPNs across countries. The growth in the industrial sector in the economy (i.e., GDP) on the other hand indicates strengthening of export potential, as a major proportion of the world trade takes place through contract manufacturing in intermediate (i.e., parts and components) sector. The coefficient of composite LPI as well as efficiency of customs and border measures (CUST) significantly influence export orientation. Moreover, the coefficients of interaction terms between CUST and EOS, LOGSER and INFRA are positive and significantly influence export orientation. In other words, improvement in TF enhances export inclination across countries. Finally, to conduct a stability analysis, the dataset is spliced into two groups; while the LIC and LMIC countries are considered as lower-income countries, the UMIC and HIC countries are clubbed as higher-income countries. The regression results for the two groups are summarized in models 8 and 9 respectively. While the coefficients of most of the variables in the analysis, namely, PCGDP, MERIMP and GDPIND are found to be in line with earlier results, composite LPI displays an interesting dynamics. The variable is positive and significant only for higher-income countries. The result indicate that for higher-income countries, growth in LPI index caused a more than proportionate growth in export orientation in the economy.

The analysis for 2010 is summarized in Table 3. It is observed that the results for the independent variables, namely, PCGDP, MERIMP and GDPIND resemble earlier findings reported in Table 2. Moreover, growth in FDI inward stock in GDP increases export orientation of the economy, as FDI inward movement may be associated with inflow of technical know-how and better management practices. Though coefficients of LPI variables turn non-significant in the regression models involving all countries, the coefficient in model 9 (for higher-income countries in the stability analysis) turns inelastic.

The analysis for 2012 is summarized in Table 4, and the results portray a difference with respect to the earlier results. While the results for the independent variables, namely, PCGDP, MERIMP, GDPIND and FDIINSTK conforms to earlier results, the coefficients of LPI variables turn negative and significant in all model specifications. The results underline that growths in various measures of TF may be associated with fall in export orientation across countries. Models 8 and 9 are run to understand the developmental perspective of the interrelationship, which display an interesting result. It is observed that while growth in LPI index causes a more than proportionate growth in export orientation in lower-income countries, the reverse scenario is witnessed in their higher-income counterparts. The result indicates that with rise in TF measures, volume of exports as well as export orientation in lower-income countries would rise, as the size of domestic market is limited. On the other hand, in higher-income countries TF rise may be accompanied by rise in volume of exports, but export orientation may still decline. The underlying reason is that at a higher development level, the size of the services sector and other activities relative to merchandise exports may increase faster, thereby causing a counter-intuitive outcome. In addition, with rise in domestic wage level, the multinational corporations (MNCs) located in high-income countries may send FDI abroad (often a developing country), to take advantage of the skilled workforce or crucial raw materials present there. Exports from low-income countries may benefit through that channel as well.

The analysis for 2014 is summarized in Table 5, and estimated coefficients exhibit similar relationship with export reported in the last period (Table 4). The only difference is that the coefficient of LPI variable in model 8 (for lower-income countries in the stability analysis) now turns non-significant. The coefficient for the higher-income countries however remains negative and significant.

The scatter diagrams displaying the relationship of MEREXP and composite LPI during the four years of analysis are summarized in Figure 1.

Conclusion

The WTO negotiations on multilateral TF agreement intensified from Cancun Ministerial (2003) onwards, finally reaching the conclusion at the Bali Ministerial (2013). All the WTO Member countries now require to implement the agreed upon reform commitments, in line with their development status. In addition, a number of RTAs have incorporated extensive TF provisions in their agreements for seamless export promotion. The emerging policy framework indicates that in coming days the TF measures, both from the ‘soft’ and ‘hard’ as well as ‘gateway’ and ‘behind-the-border’ perspective, are going to be more closely integrated and facilitate trade. Such a development is crucial, given the deepening of the IPNs across countries over the last decade. The present analysis in this background explores the emerging relationship between improvement in TF measures across countries and their export orientation.

In this background, the empirical estimates raise the following concerns. First, the positive relationship between MEREXP and MERIMP observed here underlines the deepening of IPNs across countries. On the whole, the results underline the need for both developed and developing countries to conform to their TF commitments as per the WTO provisions. Second, after the Hong Kong Ministerial (2005) deliberations it was evident that technical assistance would play a crucial role in reducing trade costs across lower-income countries, thereby enabling them to enhance export volume from their territories. Accordingly a significant volume of 'Aid-for-Trade' has been disbursed by the multilateral (e.g., World Bank) as well as country (e.g., Japan) donors to these economies over the last decade. A significant proportion of this aid has been channelized to direct TF measures as well as creation of transport and storage facilities (OECD-WTO, 2015). However, barring the exception of 2012, the rise in export orientation and growth in TF indices has not been found significant for the lower-income countries. This implies that there is need to continue the 'Aid-for-Trade' flows to these economies, by devising a mechanism to ensure proper utilization of such transfers in improving the TF scenario in recipient countries. Third, there is a need to construct a more comprehensive index for measuring and comparing actual TF scenario across countries. For instance, while the LPI in the current form may consider a decrease in number of documentations required for trade operations as improvement in customs and border procedure efficiency, the degree of complexity therein may still continue to obstruct trade flows. Moreover, the method of seeking responses from logistics professionals on their perceptions about the TF scenario of a partner country may inherently constitute an upward or downward bias. Such modified TF measure will play a crucial role in mapping the influence of TF on trade flows. One interesting area of future research will be to analyse the effect of composite LPI index and the sub-components on export orientation of countries in a panel data set-up.

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Table 1: Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
2007					
Merchandise Export as % of GDP	148	32.82	25.02	0.46	168.77
Merchandise Import as % of GDP	148	40.60	22.91	9.27	177.53
Overall Logistics Performance Index	148	2.74	0.63	1.21	4.19
Customs	148	2.55	0.62	1.30	3.99
Infrastructure	148	2.58	0.72	1.10	4.29
Ease of shipments	148	2.71	0.60	1.22	4.05
Logistics quality and competence	148	2.70	0.67	1.25	4.25
Tracking and tracing	148	2.73	0.69	1.00	4.25
Timeliness	148	3.17	0.65	1.38	4.53
2010					
Merchandise Export as % of GDP	154	33.41	27.48	0.53	194.02
Merchandise Import as % of GDP	154	39.80	24.21	9.17	192.96
Overall Logistics Performance Index	154	2.86	0.57	1.34	4.11
Customs	154	2.59	0.62	1.33	4.04
Infrastructure	154	2.63	0.73	1.35	4.34
Ease of shipments	154	2.84	0.47	1.33	3.86
Logistics quality and competence	154	2.75	0.63	1.33	4.32
Tracking and tracing	154	2.91	0.65	1.17	4.27
Timeliness	154	3.41	0.58	1.38	4.58
2012					
Merchandise Export as % of GDP	146	45.48	31.68	5.52	225.56
Merchandise Import as % of GDP	146	50.45	28.83	12.94	224.43
Overall Logistics Performance Index	146	2.88	0.56	1.61	4.13
Customs	146	2.68	0.58	1.67	4.1
Infrastructure	146	2.79	0.67	1.27	4.26
Ease of shipments	146	2.83	0.51	1.57	4.18
Logistics quality and competence	146	2.84	0.59	1.43	4.14
Tracking and tracing	146	2.89	0.61	1.57	4.14
Timeliness	146	3.27	0.55	1.67	4.39
2014					
Merchandise Export as % of GDP	144	44.52	32.21	4.54	219.44
Merchandise Import as % of GDP	144	49.69	28.38	12.45	219.32
Overall Logistics Performance Index	144	2.89	0.55	1.77	4.12
Customs	144	2.72	0.59	1.5	4.21
Infrastructure	144	2.76	0.66	1.5	4.32
Ease of shipments	144	2.86	0.49	1.7	3.82
Logistics quality and competence	144	2.85	0.58	1.75	4.19
Tracking and tracing	144	2.89	0.58	1.75	4.17
Timeliness	144	3.25	0.59	1.88	4.71

Source: Constructed by Authors

Table 2: Regression Results for Relationship between Exports and LPI (2007)

Independent Variables	Dependent Variable = lmerexp														Lower Income		Higher Income	
	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**		**Model 6**		**Model 7**		**Model 8**		**Model 9**	
Constant	-1.8846 (0.3555)	***	-1.9337 (0.3466)	***	-1.8219 (0.3419)	***	-1.8755 (0.3365)	***	-1.7382 (0.3142)	***	-1.7714 (0.3228)	***	-1.6853 (0.3147)	***	-1.4254 (0.4352)	***	-2.0799 (0.4154)	***
lpcgdp	0.0880 (0.0430)	**	dropped		-0.0213 (0.0379)		-0.0058 (0.0721)		-0.0065 (0.0734)		-0.0013 (0.0789)		-0.0305 (0.0782)		0.0647 (0.1161)		-0.1351 (0.1502)	
lpcgdp2			-0.0097 (0.0367)															
lmerimp	0.8575 (0.1177)	***	0.8312 (0.1047)	***	0.7642 (0.1073)	***	0.8213 (0.1030)	***	0.8239 (0.1028)	***	0.8416 (0.1050)	***	0.8294 (0.1015)	***	0.5495 (0.1392)	***	0.9849 (0.1159)	***
lgdpind	1.1240 (0.2156)	***	1.1494 (0.2019)	***	1.1234 (0.1978)	***	1.1424 (0.2020)	***	1.1599 (0.2068)	***	1.1657 (0.2068)	***	1.1719 (0.2018)	***	1.0564 (0.2527)	***	1.1931 (0.2787)	***
lfdiinstk					0.1937 (0.1428)													
llpi			1.0253 (0.4663)	**	1.0639 (0.4484)	**									0.5005 (0.6324)		1.7017 (0.7551)	**
lcust							0.9006 (0.4463)	**										
lcust*leos									1.0902 (0.5462)	**								
lcust*llogser											0.9718 (0.5511)	*						
lcust*linfra													1.1879 (0.5250)	**				
R^2	0.54		0.57		0.57		0.57		0.56		0.56		0.57		0.44		0.74	
F-Statistics	33.44		29.62		25.67		29.51		31.01		29.62		30.18		11.87		38.39	
N	148		148		148		148		148		148		148		82		66	

Source: Author's estimation

Note: Figure in the parenthesis shows the robust standard error of the estimated coefficient.

***, **, and * implies estimated coefficient is significant at 0.01, 0.05, and 0.10 level, respectively.

Table 3: Regression Results for Relationship between Exports and LPI (2010)

Independent Variables	Dependent Variable = lmerexp														Lower Income		Higher Income	
	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**		**Model 6**		**Model 7**		**Model 8**		**Model 9**	
Constant	-1.6654 (0.2920)	***	-1.7339 (0.0488)	***	-1.7121 (0.3469)	***	-1.6761 (0.2925)	***	-1.5683 (0.2781)	***	-1.5430 (0.2836)	***	-1.5052 (0.2834)	***	-1.3483 (0.7748)	*	-2.7521 (0.2997)	***
lpcgdp	0.1145 (0.0363)	***	dropped		0.0140 (0.0246)	***	0.0308 (0.0446)		-0.0065 (0.0421)		0.0323 (0.0451)		0.0087 (0.0454)		-0.0123 (0.1099)		0.1819 (0.0613)	***
lpcgdp2			0.0221 (0.0224)															
lmerimp	0.8652 (0.0851)	***	0.8548 (0.0855)	***	0.7786 (0.0939)	***	0.8339 (0.0859)	***	0.8327 (0.0845)	***	0.8419 (0.0836)	***	0.8436 (0.0837)	***	0.8527 (0.1860)	***	0.9326 (0.0893)	***
lgdpind	0.9170 (0.1339)	***	0.9345 (0.1459)	***	0.9438 (0.1496)	***	0.9663 (0.1429)	***	0.9659 (0.1432)	***	0.9625 (0.1435)	***	0.9829 (0.1410)	***	0.8399 (0.2544)	***	1.2070 (0.1599)	***
lfdiinstk					0.2917 (0.1281)	**												
llpi			0.7066 (0.5613)		0.6781 (0.5965)										0.5150 (1.4354)		0.5431 (0.3101)	*
lcust							0.7546 (0.3751)	**										
lcust*leos									1.0208 (0.4692)	**								
lcust*llogser											0.8233 (0.3291)	**						
lcust*linfra													0.9572 (0.3108)	***				
R^2	0.51		0.53		0.57		0.53		0.53		0.53		0.54		0.46		0.73	
F-Statistics	52.99		40.19		25.67		40.40		39.48		39.55		38.71		12.06		73.57	
N	154		154		152		154		154		154		154		71		83	

Source: Author's estimation

Note: Figure in the parenthesis shows the robust standard error of the estimated coefficient.

***, **, and * implies estimated coefficient is significant at 0.01, 0.05, and 0.10 level, respectively.

Table 4: Regression Results for Relationship between Exports and LPI (2012)

Independent Variables	Dependent Variable = lmerexp														Lower Income		Higher Income	
	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**		**Model 6**		**Model 7**		**Model 8**		**Model 9**	
Constant	-0.5244 (0.1351)	***	-0.5031 (0.1390)	***	-0.4286 (0.1326)	***	-0.4702 (0.1237)	***	-0.5378 (0.1259)	***	-0.5693 (0.1253)	***	-0.6055 (0.1256)	***	-1.4158 (0.3534)	*	-0.2378 (0.1522)	
lpcgdp	0.1827 (0.0201)	***	dropped		0.2150 (0.0300)	***	0.2339 (0.0285)	***	0.2239 (0.0292)	***	0.2361 (0.0295)	***	0.2458 (0.0292)		0.2231 (0.1108)	**	0.2180 (0.0432)	***
lpcgdp2			0.1105 (0.0150)	***														
lmerimp	0.8508 (0.0559)	***	0.8549 (0.0541)	***	0.8021 (0.0608)	***	0.8220 (0.0575)	***	0.8138 (0.0598)	***	0.8148 (0.0590)	***	0.8207 (0.0585)	***	0.9108 (0.0798)	***	0.8506 (0.0568)	***
lgdpind	0.0148 (0.0483)		0.0228 (0.0448)		0.0226 (0.0461)		0.0241 (0.0458)		0.0197 (0.0460)		0.0204 (0.0436)		0.0214 (0.0444)		0.0022 (0.0665)		0.0049 (0.0432)	
lfdiinstk					0.0441 (0.0205)	**	0.0380 (0.0197)	*	0.0402 (0.0199)	**	0.0366 (0.0193)	**	0.0385 (0.0198)					
llpi			-0.4015 (0.2611)		-0.3624 (0.2522)										1.7481 (0.4491)	***	- 0.8443 (0.2722)	***
lcust							-0.5389 (0.1964)	***										
lcust*leos									-0.5298 (0.2512)	**								
lcust*llogser											-0.6166 (0.2299)	**						
lcust*linfra													-0.6689 (0.2141)	**				
R^2	0.70		0.71		0.72		0.73		0.72		0.73		0.73		0.62		0.76	
F-Statistics	128.73		105.18		86.89		90.01		84.09		84.42		85.96		35.74		71.93	
N	146		146		146		146		146		146		146		35		111	

Source: Author's estimation

Note: Figure in the parenthesis shows the robust standard error of the estimated coefficient.

***, **, and * implies estimated coefficient is significant at 0.01, 0.05, and 0.10 level, respectively.

Table 5: Regression Results for Relationship between Exports and LPI (2014)

Independent Variables	Dependent Variable = lmerexp														Lower Income		Higher Income	
	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**		**Model 6**		**Model 7**		**Model 8**		**Model 9**	
Constant	-0.7116 (0.1359)	***	-0.6637 (0.1391)	***	-0.6116 (0.1327)	***	-0.6421 (0.1246)	***	-0.7438 (0.1295)	***	-0.7623 (0.1293)	***	-0.7837 (0.1365)	***	-2.0703 (0.7320)	***	-0.4581 (0.1424)	***
lpcgdp	0.1898 (0.0216)	***	dropped		0.1163 (0.0176)	***	0.2437 (0.0319)	***	0.2417 (0.0323)	***	0.2558 (0.0348)	***	0.2551 (0.0365)	***	0.4135 (0.0906)	***	0.1940 (0.0409)	***
lpcgdp2			0.1162 (0.0181)	***														
lmerimp	0.9123 (0.0538)	***	0.9122 (0.0541)	***	0.8657 (0.0627)	***	0.8772 (0.0613)	***	0.8760 (0.0619)	***	0.8690 (0.0617)	***	0.8737 (0.0618)	***	0.9953 (0.1708)	***	0.8977 (0.0509)	***
lgdpind	0.0527 (0.0323)	***	0.0551 (0.0295)	*	0.0542 (0.0292)	*	0.0477 (0.0285)	*	0.0552 (0.0286)	*	0.0506 (0.0275)	*	0.0514 (0.0280)	*	0.1107 (0.0512)	**	0.0446 (0.0333)	
lfdiinstk					0.0540 (0.0317)	*	0.0532 (0.0308)	*	0.0547 (0.0313)	*	0.0537 (0.0309)	*	0.0536 (0.0310)	*				
llpi			-0.4566 (0.2890)		-0.4465 (0.2809)										1.2616 (1.3651)		-0.4745 (0.2687)	*
lcust							-0.5254 (0.1906)	***										
lcust*leos									-0.6221 (0.2552)	**								
lcust*llogser											-0.7012 (0.2421)	**						
lcust*linfra													-0.6432 (0.2426)	***				
R^2	0.75		0.76		0.77		0.78		0.77		0.78		0.78		0.58		0.82	
F-Statistics	140.47		103.51		87.21		89.88		89.48		89.68		89.39		14.58		110.70	
N	143		143		152		143		143		143		143		34		109	

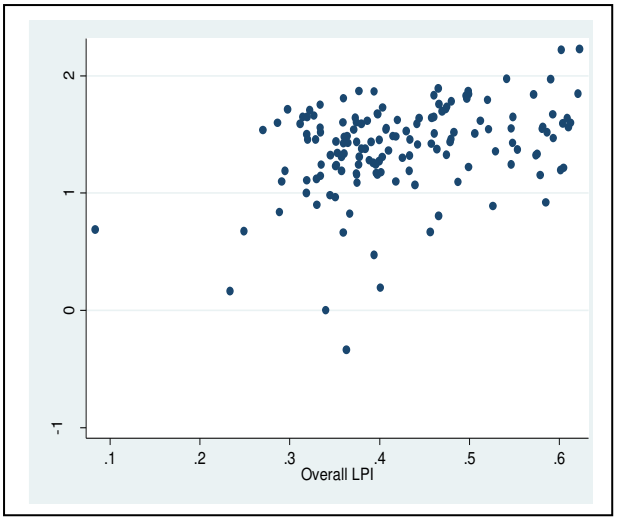
Source: Author's estimation

Note: Figure in the parenthesis shows the robust standard error of the estimated coefficient.

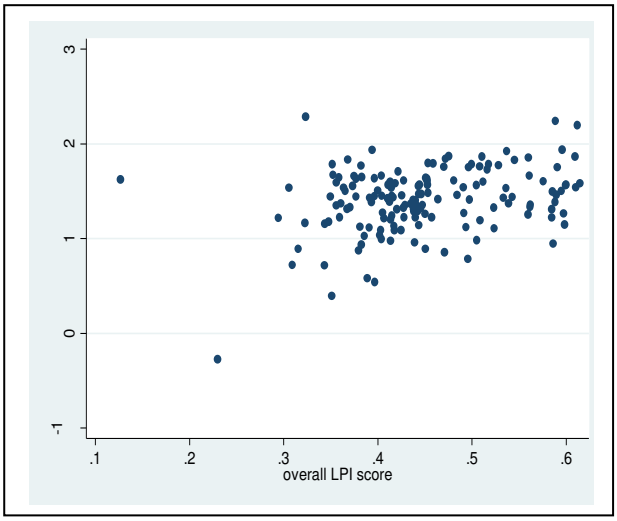
***, **, and * implies estimated coefficient is significant at 0.01, 0.05, and 0.10 level, respectively.

Figure 1: Relationship between Logarithmic Transformation of Merchandise Trade Share in GDP and Overall Logistics Performance Index

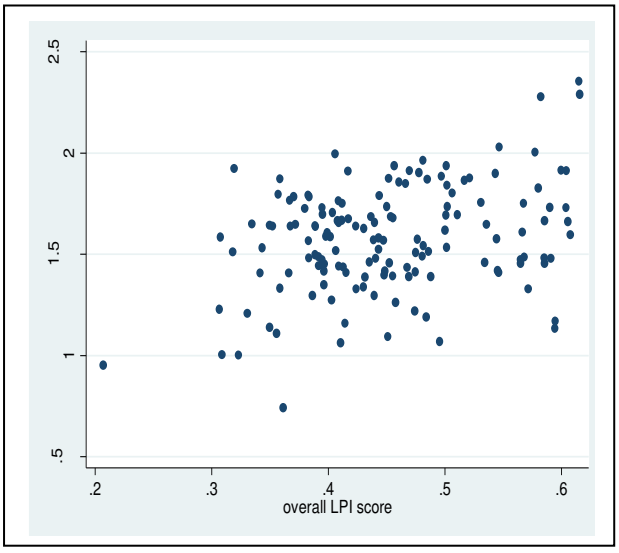
Panel 1: Relationship in 2007



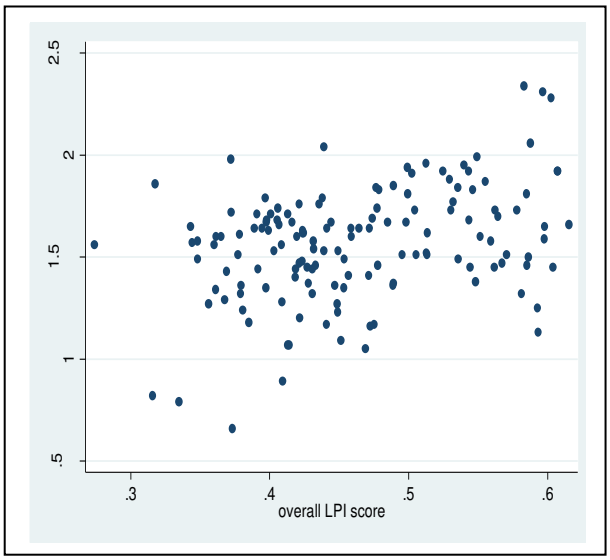
Panel 2: Relationship in 2010



Panel 3: Relationship in 2012



Panel 4: Relationship in 2014



Source: Author's estimation