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DOES TRADE LIBERALIZATION AFFECTS INTERNATIONAL TRADE TAX REVENUE? EVIDENCE FROM DYNAMIC PANEL THRESHOLD METHOD

This paper examines the relationship between trade liberalization and trade tax revenues applying an advanced dynamic panel threshold technique. The empirical analysis is based on a large panel-dataset including 103 developing countries for the period 1993-2012. The empirical finding results indicate that the relationship between trade liberalization and trade tax revenue is non-liner and also provide evidence of a Laffer effect. In particular, we find that additional trade liberalization has a negative impact on trade tax revenue, but this negative effect will disappear at the higher levels of trade liberalization. The results point to harness the benefits of trade liberalization without having worry a lot about its impact on trade tax revenues.
JEL: F40; H20; H87

1. Introduction

For most of developing countries that are well-integrated into the world economy, trade liberalization is a major policy concern. Though free trade theory advocates greater economic gains from trade liberalization, the transition to free trade may involve a substantial adjustment cost in terms of decline in tariffs (or trade tax) revenues. Despite significantly liberalizing trade regimes over the past decades, many less-developed and developing economies persist to rely heavily on international trade taxes as one of the main source of government revenue. For instance, in Sub-Saharan Africa, trade taxes accounts for an average of 25% of the total government revenues. Meanwhile in Asian and Pacific

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developing countries trade taxes accounts for around 15% (Baunsgaard & Keen, 2010). Since developing countries often rely heavily on trade tax revenue, some believe that a reduction or elimination of these taxes may create fiscal instability (Blejer & Cheasty, 1990; Khattry & Mohan Rao, 2002; Peters et al., 2002; Khattry, 2003).

While many studies have considered the positive effects of trade liberalization, a limited number of studies have paid attention on the concerns from the reduction in trade tax revenues resulting from trade liberalization. This leads to debates and questions on whether trade liberalization is a potential source of fiscal instability, particularly in countries that are strongly depended on their trade tax revenue. There is a general believe that international trade tax revenue will decrease as countries liberalize their trade. According to many researches, the reduction in import tariffs which is related to trade liberalization, often results in a decrease in trade tax revenue, particularly for developing economies where the tax revenues is inclined to be more heavily dependent on international trade (Devarajan et al., 1999; Peters et al., 2002). However, this does not imply that trade tax revenues will be decrease by the value of the tariff reduction (Ebrill et al., 1999; Hisali, 2012).

Blejer and Cheasty (1990) demonstrate that the response of revenue will depend not only on the change in the tariff rate, but also on the price and income elasticities of the demand for imports, the elasticity of substitution between imports, the import trade's market structure, announcement effects and the degree of exchange rate flexibility. Additionally, Ebrill et al. (1999) and Peters et al. (2002) highlight that the initial tariff levels, the extent of tariff coverage and the extent to which the tariff are reduced also play a significant role in determining the impact of tariff reduction on international trade tax revenue. This is because if the initial tariff rates are high, tariff reduction may lead to an increase in trade tax revenue since the price elasticities of demand and supply are not constant over the whole range of prices. This impact can be illustrated in a "Laffer curve", which implies that the relationship between tariff rate reduction (due to trade liberalization) and trade tax revenue is a nonlinear one. More specifically, the Laffer curve is an inverted U-shape, where there is a turning point due to the effect of trade liberalization.

For instance, Pritchett and Sethi (1994) suggest that the relation between tariff rates and collected trade tax revenue is non-linear, such that the increase in the tariff collection for a certain increase in tariff rates is much smaller for higher rates than for lower rates, however, they do not find strong evidence of Laffer effects. Ebrill et al. (1999) also try to estimate empirically the level of import duty at which a country begins to lose revenue from foreign trade taxes. The finding indicates that a country will begin to lose revenue when the effective tariff rate (that is, the average tariff as a percentage of imported goods) falls to about 20 percent.

The above studies of non-liner relationship between trade liberalization and trade tax revenue also consistence with some recent empirical studies. For example, Khattry and Mohan Rao (2002) discover the existence of Laffer effect in their study and demonstrated that the low income countries are operating on the rising part of the Laffer curve. They find the tariff rate turning point (revenue-maximizing tariff rate) equal to 38.5% for all sample countries that beyond which tariff rate starts having a negative impact on trade tax. The turning point for low income, lower-middle income, and upper-middle income country groups is 37.5, 26.5 and 17.5%, respectively. In line with Khattry and Mohan Rao (2002),

a recent article from the African Trade Policy Centre (ATPC 2004), also provides evidence of the existence of a Laffer effect. The estimated Laffer curve for African countries shows revenue maximization between 10 percent and 15 percent of the index of trade restrictions.[5] In conclusion, determining the precise and exact impact of trade liberalization on trade tax revenues is quite difficult because of the dual effect of trade liberalization on trade tax revenue. The total effect of trade liberalization on trade tax revenue is an empirical matter and there is a need to re-evaluate the relationship between trade liberalization and trade tax revenue.

The modeling strategy used by previous literature to search a non-linear relationship between trade liberalization and trade tax revenue or capturing the Laffer effect is based on quadratic model. The square term of trade liberalization variable used to capture the turning point or threshold effect, as Law and Singh (2014) stated, has one important limitation. It imposes a prior restriction that the effects of trade liberalization on trade tax monotonically and symmetrically increase and decrease with the level of trade liberalization. This paper provide new evidence that sheds light the impact of trade liberalization on trade tax revenues by exploring whether there is threshold level of trade liberalization on the relationship between trade liberalization and trade tax revenue. This relationship may be contingent on a country's level of trade liberalization, where tariff reduction lessens trade taxes after a certain threshold level.

The current study extends the literature in several respects. First, we use a dynamic panel threshold method developed by Kremer et al. (2013) that extends Hansen (1999) original static setup to endogenous regressors. This method has not been used before in analyzing the non-linear relationship between trade liberalization and trade tax revenue. The recent studies in trade liberalization-tax revenues nexus follow a dynamic process, thus using a dynamic panel method is more appropriate rather than a static threshold specification such as Hansen (1999). Therefore, the dynamic panel threshold proposed by Kremer et al. (2013) certainly is more appropriate. Second, we employ two trade liberalization indicators – average applied tariff rate and traditional measure of openness that is defined as international trade as a share of GDP – to capture various aspects of trade liberalization. Finally, a sufficiently broad (unbalanced) panel dataset covering 103 developing countries over the period 1993-2012 is used in this study.

The plan of study is as follow. The next section describes the methodology including empirical model and estimation method. Section 3 introduces the used data and variables. Section 4 presents the empirical result and discussion of the finding; and section 5 concludes with some policy implications.

[5] This index captures average "realized" tariffs, being defined as trade tax revenues divided by total trade value.

2. Methodology

2.1. Empirical model

In order to account for the effects of trade liberalization on trade tax revenues this study employs the basic approach from Adam, Bevan, and Chambas (2001) and Agbeyegbe et al. (2006), with some modifications. The starting point for the analyzing is the specification of a linear model, which in our case is an unbalanced panel of the form of:

$$TT_{it} = u_i + \alpha TT_{it-1} + \beta LIB_{it} + \theta Z_{it} + \varepsilon_{it}, \quad (1)$$

Where, TT is share of trade tax in GDP, TT_{t-1} is the lagged dependent variable to allow for plausible dynamics in policy adjustment.[6] LIB is country's level of trade liberalization, and Z is a vector of control variables (real GDP per capita, population, real effective exchange rate, services as share of GDP, urban population percentage, and age dependency ratio). u_i is a country fixed effect, and ε_{it} is an unobserved random error term. The subscript *i* indexes the individual country and the subscript *t* indexes the time period.

To explore the nonlinear relationship between trade liberalization and international trade tax revenue we employ the dynamic panel threshold approach introduced by Kremer et al. (2013). By using the forward orthogonal deviations transformation as suggested by Arellano and Bover (1995), Kremer et al. (2013) combine the cross-sectional instrumental variable threshold model of Caner and Hansen (2004) with Hansen (1999) static panel threshold model. The model based on dynamic panel threshold regression can be represented as the following form:

$$TT_{it} = u_i + \alpha TT_{it-1} + \beta_1 LIB_{it} I(LIB_{it} \leq \gamma) + \delta_1 I(LIB_{it} \leq \gamma) + \beta_2 LIB_{it} I(LIB_{it} > \gamma) + \theta Z_{it} + \varepsilon_{it}, \quad (2)$$

Where TT_{it-1} is endogenous regressor and Z_{it} is a *k* vector of the exogenous regressors. $LIB_{it}$is the threshold variable used to sort the data and split the sample into regimes, γ denotes the unknown threshold value and $I(.)$ is the indicator function. Contingent on whether the threshold variable LIB_{it} is lesser or bigger than the threshold γ, the observations are alienated into two regimes which are discriminated by differing regression slopes, β_1 and β_2. This specification also encompasses an unobservable country-specific effect u_i and an error term ε_{it}. Following Kremer et al. (2013) and Law and Singh (2014), we also allow for difference in regime intercepts by adding $\delta_1$in the model.

[6] The empirics showing significant serial correlation in its absence (Baunsgaard & Kenn, 2010).

2.1. Estimation

According to Kremer et al. (2013), in the estimation of dynamic panel threshold model such as equation (2), the main challenge is the transformation method to eliminate the country-specific fixed effects without violating the distributional assumptions underlying Hansen (1999) and Caner and Hansen (2004). This is because the standard within transformation and first-differencing methods are not applicable. Thus, Kremer et al. (2013) suggested Arellano and Bover (1995) forward orthogonal deviations transformation method.

Following Kremer et al. (2013); firstly we estimate a reduced form of regression for the endogenous variable, TT_{it-1}, as a function of instruments by the ordinary least squares (OLS) estimator. We use higher lags of trade tax as instruments and then TT_{it-1} is replaced by its predicted value $\widehat{TT}_{it-1}$. In second step, equation (2) is estimated with OLS for a fixed threshold γ value of threshold variable LIB and the resulting sum of squared residuals are kept. This step is repeated for each value of the threshold variable LIB. In step 3, the threshold value γ is selected as the one which minimizes the sum of squared residuals, as suggested by Chan (1993) and Hansen (1999, 2000). Consequently, the least squares estimators of γ is $\hat{\gamma} = \underset{\gamma}{argmin}\, S_n(\gamma)$. Finally, in forth step, we test for the significance of chosen threshold value. The likelihood ratio statistic was used by Hansen (2000) for the testing on γ to form confidence intervals for γ. According to Hansen (2000) and Caner and Hansen (2004), the asymptotic 95% confidence interval for γ is the set of values of γ such that $LR(\gamma) \leq c(\alpha)$. Where, $c(\alpha)$ is the 95% percentile of asymptotic distribution of the likelihood ratio statistic $LR(\gamma)$. If a significant threshold value γ is determined, the slop coefficients can be estimated by the generalized methods of moments (GMM) estimator.

3. Data and variables

This study is based on an unbalanced dataset of 103 developing countries, which are divided into two income level groups; namely, high and upper-middle income developing countries and low and lower-middle income developing countries over the period 1993-2012 (Appendix A). The study focuses on the developing countries because the issue of revenue implication of trade liberalization is found to be more of a concern in less developed and developing countries rather than developed nations. The choice of the developing countries selected for this study is primarily dictated by the availability of reliable data over the sample period. During the 1990s and 2000s, there has been significant trade liberalization undertaken by the developing countries, for this reason the period of 1993-2012 was selected for the purpose of the study. In line with the empirical literature, the dataset is based on 2 years average to decrease the time period to maximum 10 and

validate the use of GMM method, which it requires large cross section units (*N*) and small time periods (*T*). The 2 years average data give us 849 observations; 358 for 54 high and upper-middle income and 385 for 49 low and lower-middle income countries.

There are several different ways that the degree of trade liberalization has been measured in the literature. In this study the simple mean applied tariff rates (*tar*) and trade openness (*trade*) are used. Tariff rates were collected from World Development Indicators (WDI), UNCTAD and WTO databases, while the trade openness data were collected from World Development Indicators. Simple mean applied tariff rate is defined as the unweighted average of effectively applied rates for all products subject to tariffs calculated for all traded goods. Trade openness is defined as the sum of imports and exports as a portion of GDP. The taxes on international trade as a percentage of GDP were collected from Government Finance Statistics (GFS) produced by the IMF.

Table 1

Summary of Variables and Descriptive Statistics

Variable	Measurement unit	Mean	Std. Dev.	Min	Max
Tax on international trade	% of GDP	3.47	4.33	-2.90	37.05
Applied tariff rates	849	12.22	7.85	0.00	53.50
Trade openness	% of GDP	89.81	55.55	0.31	447.53
Real effective exchange rate	Index (2005 = 100)	103.07	21.58	45.31	301.73
Real GDP per capita	2005 constant US$ (in logarithm)	7.71	1.29	4.55	10.96
Population	Total (in logarithm)	15.75	2.06	10.72	21.02
Services as share of GDP	% of GDP	54.45	13.27	13.06	93.57
Age dependency ratio	% of working-age population	64.79	18.64	16.75	118.10
Urban population	% of population	52.05	22.68	9.30	100.00

Observation = 849. N=103. T= 1993-2012.

Following Khattry and Mohan Rao (2002), logarithm of real GDP per capita in constant 2005 US$ price (*lgdp*), logarithm of population (*lpop*), real effective exchange rate (*reer*), urban population percentage (*urb*), and age dependency ratio (*age*) are considered as control variables. We also add the share of the services sector in GDP (*ser*). This variable is used to characterize the structure of the production system of a country. All these data are collected from World Development Indicators, except real effective exchange rate, which is from Darvas (2012). Table 1 summarizes the data and table 2 shows the correlation matrix of variable used in the analysis.

Table 2

Correlation matrix

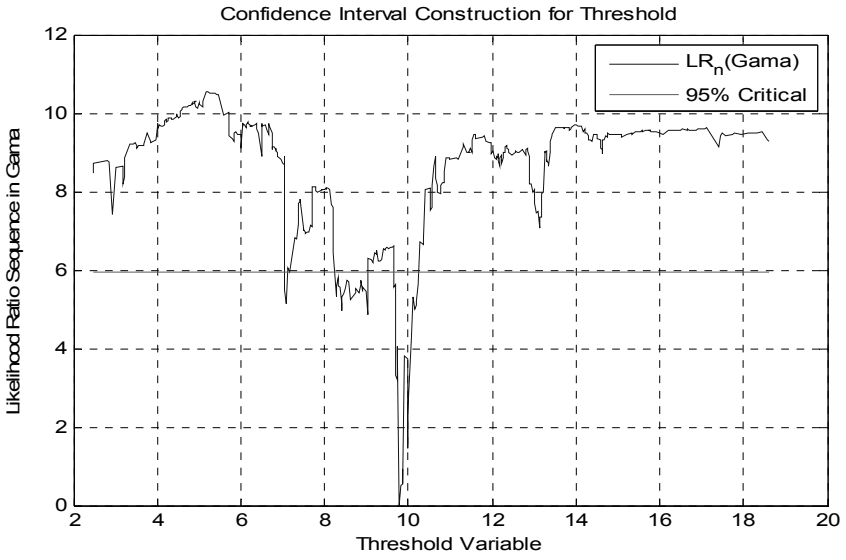
	tax	tar	trade	reer	lgdp	lpop	ser	urb	age
tax	1.00								
tar	0.29	1.00							
trade	0.13	-0.28	1.00						
reer	0.04	0.19	-0.06	1.00					
lgdp	-0.06	-0.25	0.40	0.02	1.00				
lpop	-0.41	0.06	-0.35	-0.04	-0.39	1.00			
ser	0.16	-0.10	0.25	0.08	0.55	-0.45	1.00		
urb	-0.30	-0.29	0.24	0.08	0.70	-0.09	0.37	1.00	
age	0.23	0.33	-0.29	0.05	-0.70	0.07	-0.34	-0.54	1.00

4. Empirical results

The results of estimating equation (2) where trade liberalization measure is applied tariff rate are reported in Table 3 for all sample countries and sample splitting into low (group 1) and high (group 2) income countries.[7] Referring to model 1(first column in Table 3), the estimated tariff rate threshold is 9.78% that is contained in 95% interval confidence [7.04-10.23]. This threshold value of tariff rate (9.78%) splits observations into two regimes, 485 out of 849 observations (or 57%) exceed this threshold value and other 364 observations are below the threshold. More information can be learned about the threshold estimates from plots of the concentrated likelihood ratio function presented in Figure 1. The point estimate is the value of tariff rate at which the likelihood ratio hits the zero axis (9.78%), which is in the far left part of the graph. The 95% confidence interval for estimated threshold value ($\hat{\gamma}$) can be found by the values of γ for which the likelihood ratio lies beneath the blue line.

Figure 1

The confidence interval of estimated threshold level of applied tariff rate for the full-sample



After the ensuring of existence of a threshold, it is important to know how trade liberalization affects trade tax revenues in different regimes. In both regimes, when the tariff rate is less and more than 9.78%, the impact of additional tariff rate on trade tax is significantly positive but in different values.[8] The coefficient of tariff rate in below the threshold ($\hat{\beta}_1 = 0.282$) is more than the coefficient in above the threshold

[7] The authors thank Bruce Hansen and Stephanie Kremer for sharing their MATLAB codes.
[8] Here, additional tariff rates means less trade liberalization.

($\beta_2 = 0.080$). The finding indicates a non-linear relationship between tariff rate and trade tax revenues and this could be an evidence of potential Laffer effect, because the slope coefficient is decreasing with increasing in tariff rate. The trade tax revenue-maximizing tariff rate is expected to be in higher tariff rates, where afterwards the slop coefficient of tariff rate might be negative. Consequently, the sample countries are operating in rising part of Laffer curve. We can conclude that trade liberalization has different impact on trade tax revenues. Its impact is negative in high level of trade liberalization (low tariff rates) and this negative impact is decreasing with decreasing in level of trade liberalization (higher tariff rates). The non-liner relationship between tariff rate and trade tax revenue are in line with previous studies, where tariff collection for a certain increase in tariff rates is much smaller for higher rates than for lower rates (Pritchett & Sethi, 1994; Ebrill et al., 1999; Khattry & Mohan Rao, 2002).

Model 2 and 3 (second and third column in Table 3) represent the results of the repeated analysis, which the sample countries are divided in two groups according to the income level. The threshold value of tariff rate for developing countries with higher income (10.70%) is less than developing countries with lower income (17.45%). Again, as was found in the case of full sample countries, the estimated tariff rate (trade liberalization) coefficients below and above the thresholds are positive, whereas the coefficients below the thresholds are greater than coefficients above the thresholds. It indicates that the relationship between trade liberalization and trade tax revenue is contingent to level of trade liberalization in all three models.

The results also indicate, in all three models, the coefficients on lagged dependent variable is positive and significant. Real effective exchange rate is negatively linked to international trade taxes and its coefficient is significant in model 1 and 2. The presence of positive link between level of GDP per capita and dependent variable is surprising, as we had expected a negative relationship. Perhaps the coefficient for higher income countries (model 3) is not significant and for lower income countries (model 2) we must consider the fact that because income levels are so low, higher income facilitates trade and thus it causes higher trade taxes. In line with Khattry and Mohan Rao (2002), scale of the economy measured by the population size positively and significantly affects the trade tax revenue in full sample (model 1) and in low and lower-middle income group of countries (model 2); however, in upper-middle and high income group of countries the coefficient is negative and insignificant. Service share is positively link to international trade taxation, indicated that the share of services increase the level of trade taxation. Although, the structural factors such as the urbanization and age dependency are not significant, but their signs in model 1 and 2 are as expected.

For robustness check we used different method of estimation and also another indicator of trade liberalization. Firstly, the dynamic system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) is used, in which the squared term of the tariff rates is added to confirm the non-liner relationship between trade liberalization and trade tax revenues. As reported in Table 4 both coefficients of tariff rate (trade liberalization indicator) and squared term are significant at 10%. The positive coefficient of LIB is indicative of a tradeoff between reduced international trade tax revenue and reduced

protection. The negative magnitude of LIB^2 suggests that a potential Laffer effect exists for trade tax revenue. The revenue maximizing tariff rate is obtained by solving for LIB in the following equation: $a + 2b(LIB) = 0$ *or* $LIB = -a/2b$, where a and a are coefficient of LIB and LIB^2, respectively. The trade tax revenue-maximizing tariff rate is estimated to be 26.5% while, from the dataset, it is clear that the effective tariff rate (LIB) is well below this rate in 794 of 849 observations. Thus, most countries have been operating in rising part of Laffer curve. The result is similar to that we found in the dynamic panel threshold model as reported in Table 3.

Table 3

Result of dynamic panel threshold estimation, applied tariff rate as a threshold variable

	Model 1 All countries	Model 2 Group 1	Model 3 Group 2
Threshold estimates			
$\hat{\gamma}$	9.78	17.45	10.70
Confidence interval (95%)	[7.04-10.23]	[2.41-18.14]	[9.76-18.10]
Impact trade liberalization (tariff rate)			
$\hat{\beta}_1$	0.282***	0.158***	0.197***
	(0.066)	(0.036)	(0.055)
$\hat{\beta}_2$	0.080***	0.149***	0.061***
	(0.025)	(0.0443)	(0.014)
Impact of covariates			
tr_{it-1}	1.039***	0.919***	0.691***
	(0.232)	(0.126)	(0.176)
$reer_{it}$	-0.010***	-0.016***	-0.003
	(0.003)	(0.004)	(0.004)
$lgdp_{it}$	1.226***	1.937***	0.401
	(0.266)	(0.352)	(0.297)
$lpop_{it}$	1.166**	1.495***	-0.669
	(0.497)	(0.485)	(0.823)
ser_{it}	0.014	0.012	0.016
	(0.011)	(0.016)	(0.016)
urb_{it}	-0.024	-0.021	0.004
	(0.019)	(0.020)	(0.032)
age_{it}	0.002	0.028	-0.008
	(0.012)	(0.017)	(0.014)
$\hat{\delta}_1$	-1.359***	0.993	-0.487
	(0.455)	(1.093)	(0.439)
Observation	849	464	385
N	103	54	49

Notes: Group 1: high and upper-middle income developing countries; Group 2: low and lower-middle income developing countries. Standard errors are in parentheses. ** indicates significance at 5% level and *** significance at 1% level. The dependent variable is international trade tax as share of GDP. Sample period from 1993 to 2012 (two years average).

Besides using the tariff rate as indicator of trade liberalization, we also estimate again the equation (2) with trade openness as an alternative proxy of trade liberalization for full sample countries. The results presented in Table 5, indicate that the threshold value of trade openness is 73.01% with a 95% confidence interval of [72.62-104.20]. When trade openness is below 73.01%, the impact of additional openness is significantly negative ($\hat{\beta}_1 = -0.051$). If the trade openness is above the threshold value, the coefficient increases to $\hat{\beta}_2 = 0.004$, though it is insignificant. Additional trade liberalization has a negative impact on trade tax revenue; however this negative effect disappears in higher levels of trade liberalization. The results are in line with the results in Table 3 and 4. Thus the empirical results of non-liner relationship between trade liberalization and trade tax revenue are robust to the use of dynamic panel threshold model.

Table 4

Results of system GMM estimation

	Model 4 All countries
TT_{it-1}	0.879***
	(47.64)
LIB_{it} (tariff rate)	0.053*
	(1.76)
LIB_{it}^2	-0.001*
	(-1.88)
$reer_{it}$	-0.007*
	(-1.66)
$lgdp_{it}$	0.403
	(1.21)
$lpop_{it}$	0.158
	(0.94)
ser_{it}	0.001
	(0.05)
urb_{it}	-0.047**
	(-3.16)
age_{it}	0.030**
	(2.31)
Sargan test of overidentifying restrictions	22.076
	(0.106)
Arellano-Bond test for zero autocorrelation AR(1)	-3.309
	(0.001)
Arellano-Bond test for zero autocorrelation AR(2)	-1.954
	(0.051)
Observation	849
N	103

Notes: the t-statistic are in parentheses, except for Sargan test, AR(1) and AR(2) that the p-values are in parentheses. * indicates significance at 10% level, ** significance at 5% and *** significance at 1% level. The dependent variable is international trade tax as share of GDP. Full set of time dummies are included in the regression and jointly significant. Sample period from 1993 to 2012 (two years average).

Table 5

Result of dynamic panel threshold estimation, trade openness as a threshold variable

	Model 5 All countries
Threshold estimates	
$\hat{\gamma}$	73.01
Confidence interval (95%)	[72.62-104.20]
Impact trade liberalization (trade openness)	
$\hat{\beta}_1$	-0.051***
	(0.010)
$\hat{\beta}_2$	0.004
	(0.003)
Impact of covariates	
TT_{it-1}	1.014***
	(0.113)
$reer_{it}$	-0.017***
	(0.004)
$lgdp_{it}$	1.016***
	(0.302)
$lpop_{it}$	0.832*
	(0.510)
ser_{it}	-0.012
	(0.019)
urb_{it}	0.007
	(0.023)
age_{it}	0.020
	(0.017)
$\hat{\delta}_1$	5.729***
	(1.019)
Observation	849
N	103

Notes: Standard errors are in parentheses. * indicates significance at 10% level, ** significance at 5% and *** significance at 1% level. The dependent variable is international trade tax as share of GDP. Sample period from 1993 to 2012 (two years average).

5. Conclusions and policy implications

This paper has investigated the relationship between trade liberalization and international trade tax. It provides new evidence of non-linearity in relationship between trade liberalization and trade tax revenues using data from 103 developing countries covering 1993 to 2012. Applying the dynamic panel threshold model, proposed by Kremer et al. (2013) to the analysis of thresholds in the "tariff rate"-"trade tax revenue" nexus, confirmed the general consensus in the literature. In particular, our empirical results suggest that additional trade liberalization has a negative impact on trade tax revenue, but this negative effect will disappear at the higher levels of trade liberalization. This is called as the evidence of Laffer effect. However, there are some differences for countries in different

level of national income concerning both the level of estimated threshold value and the impact of trade liberalization in various trade liberalization regimes. The estimated threshold value of tariff rate is smaller in countries with higher income than countries with lower income.

The empirical findings suggest that more trade liberalization will not always decrease the international trade tax revenues and it may increase that after a turning point. This result has important implications for developing countries that have been hesitant to embark on trade liberalization for fear of revenue losses. The main policy implication of our finding is that developing countries can maximize the benefits associated with trade liberalization without having to worry about its consequences on trade tax revenue. Therefore, providing a favorable environment and infrastructure with a stable trade policy and effective trade regulation is a significant task facing most of developing countries.

Despite the important findings, some caveats are in order. This study attempted to generalize the effects of the trade liberalization on trade tax revenue for all developing countries. Behind these generalizations, it has also been seen, are quite diverse country experiences. This suggests the need for closer examination on particular or small group of countries. We leave this possibility for future research.

Appendix A

Sample countries classification by income level

Group 1: low income and lower-middle income countries		Group 2: upper-middle income and high income countries	
Afghanistan	Mali	Albania	Lebanon
Armenia, Republic of	Moldova	Algeria	Macao
Bangladesh	Mongolia	Angola	Macedonia, FYR
Benin	Morocco	Argentina	Malaysia
Bhutan	Myanmar	Bahamas, The	Maldives
Bolivia	Nepal	Bahrain	Mauritius
Burkina Faso	Nicaragua	Barbados	Mexico
Cabo Verde	Pakistan	Belarus	Namibia
Cambodia	Papua New Guinea	Belize	Oman
Congo, Democratic Republic of	Paraguay	Bosnia and Herzegovina	Peru
Congo, Republic of	Philippines	Botswana	Qatar
Cote d'Ivoire	Sao Tome and Principe	Brazil	Romania
Egypt	Senegal	Bulgaria	Russian Federation
El Salvador	Sierra Leone	Chile	Seychelles
Ethiopia	Sri Lanka	China, P.R.	Singapore
Gambia, The	Swaziland	Colombia	South Africa
Georgia	Syrian Arab Republic	Costa Rica	St. Kitts and Nevis
Guatemala	Tajikistan	Dominica	St. Lucia
Honduras	Togo	Dominican Republic	St. Vincent
India	Uganda	Fiji	Suriname
Indonesia	Yemen, Republic of	Grenada	Thailand
Kenya	Zambia	Hong Kong	Trinidad and Tobago
Kyrgyz Republic		Iran	Tunisia
Lao People's Democratic Republic		Jamaica	Turkey
Lesotho		Jordan	United Arab Emirates
Liberia		Kazakhstan	Uruguay
Madagascar		Kuwait	Venezuela

Source: World Development Indicators (WDI) 2014.

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