Tax Evasion in the Lao PDR: Evidence from Missing Imports with China and Thailand

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Abstract—**Many [low-income] developing countries face difficulties in tax revenues mobilization due to various reasons, amongst others tax evasion seems to be evident. This paper explores the relationship between trade gap, defined by the difference between export values and import values for the same products reported by the exporting partners and the importer country as a proxy for tax evasion, and the corresponding tax rates. This study uses trade data at HS 6 and 8 digits at product level and constructs tax rates (MFN tariff rates plus VAT and excise tax rate) for 2009 and 2011. The findings of this paper confirm that there is evidence for under-reporting of unit value leading to tax evasion in order to pay lower taxes over time. On the other hand, most cases in this study have no evidence for mislabeling, which is considered part of tax evasion.**

Index Terms—**Missing imports, tax evasion, tax rates, tax revenue mobilization.**

I. Introduction

Tax revenue mobilization in developing countries by utilizing domestic fund-raised resources for the long-term development associated with a certain declining degree of foreign aid dependency under liberalized international trade is very important because domestic sources of tax revenue replace lost revenue due to lower trade taxes, while they also strengthens the country's independent financial capacity when there is a risk of unfavorable economic conditions in donor countries. Developing countries generate less tax revenue than developed countries and investigating the tax to GDP ratio illustrates this. Based upon the IMF study (2011), tax to GDP ratio is between 10 percent and 20 percent per annum in low-income countries, whereas this ratio in OECD economies is in the range of 30 percent to 40 percent.

Tax evasion is one of causes of low revenue mobilization in low-income developing countries. Ref. [1] states that "Tax evasion is a situation where individual or business entities decide not to fully honour their tax obligation through non-declaration or under declaration of taxable economic activities…" (p. 98), it is also can cause revenue losses to the public budget, which is crucial for the development of a nation. Ref. [2] noted, "chronic low level of government revenue are considered serious impediments to development for a number of low-income countries" (p. 5). It has been proven that tax evasion and fiscal corruption are correlated and problematic for economic growth resulting in serious economic consequences in developing and developed countries. Tax evasion is believed to be a necessary condition for fiscal corruption [3]. However, many cases are difficult to analyze because the available data is not useful and lacks reliability. Recently, scholars have empirically studied tax evasion in trade flows between countries, where border trade is one of the major channels for products' entry and exit.

Since tax evasion is believed to result in poor tax performance in low-income developing countries, analysis of tax evasion is widely considered and currently at the top of development policy agenda. It is believed that the bigger the underground economy, the higher the likelihood of tax evasion. A recent study of [4] highlighted that the size of the shadow economy 14-16 percent of GDP for most advanced economies, 25-35 percent of GDP in middle east and developing Asian economies, 32-35 percent of GDP in emerging market economies, and 40 percent of GDP in Latin America, Central America, and Africa. Ref. [5] has calculated an index for existing shadow economy for countries. Among the results were China with a shadow economy 12.7 percent of GDP, the Lao PDR with 29.6 percent of GDP, and Thailand with 50.6 percent of GDP.

According to earlier studies, it seems that tax evasion exists in the Lao PDR's trade flows with its key trading partners that share a border. The index of the shadow economy for the Lao PDR is high and is in the middle of the range for Middle East and developing Asian economies. It is interesting to investigate whether this tax evasion in trade flows is in the forms of under-reporting and mislabelling. Interestingly, import values tend to be greater than export values; this leads to a slightly negative trade gap assuming there is no evasion in the trade flow data. The objective of this study is to analyze tax evasion caused by tax rates and mislabeling imports by correlation of trade gap and tax rates using reported exports in values and quantities from its key trading partners and reported imports in values and quantities by the Lao customs office.

II. Literature Review

Ref. [6] theoretically examined tax evasion in an oligopolistic market and they found that tax evasion depended on relative market share and collusion between firms.

Ref. [7] investigated the relationship between tariff revenues and tariff rates in case of Jamaica, Kenya, and Pakistan. They found that there is a weak relationship between the two variables. It was evident that tariff evasion has a strong relationship with tariff rates (Mishra *et al*.,

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Ref. [8] developed a new methodology to examine tax evasion between China and Hong Kong. They found that "a one percentage point increase in tax rate is associated with a three percent increase in evasion" (p. 471).

Ref. [9] found that tax evasion and tax rates have a strong and positive relationship. In addition, they confirmed that under-reporting values of imports and mislabeling higher-taxed products, as lower-taxed types exist widely.

Ref. [10] examined tax evasion and tax rates in Kenya and Tanzania. They showed that there is evidence of tax evasion for Tanzania in terms of under-reporting unit values, but no evidence for Kenya. However, there is no evidence suggesting that Tanzania has a problem of mislabeling in comparison to Kenya.

III. Methodology

This study borrows the methodology used by [10] with some modifications because this methodology takes trade gap as a proxy for tax evasion and it is suitable for this study. For every product, imports in values and in quantities by country A are defined by MV and MQ, respectively, and XV and XQ are export in values and in quantities reported by country B. The measurement of tax evasion is defined by a ratio between the values of export and the value of import as X_i^V / M_i^V is depicted by Y_i^V in equation (1) and X_i^Q / M_i^Q is depicted by Y_i^Q in equation (2). The linear equations can simply be specified as below.

$$\log\left(Y_i^V\right) = \alpha_0 + \alpha_1 taxrate_i + \varepsilon_i^V \quad (1)$$

$$\log\left(Y_i^Q\right) = \beta_0 + \beta_1 taxrate_i + \varepsilon_i^Q \quad (2)$$

where subscript i represents individual product item at AHTN 8-digit category and the Lao PDR's tariff reduction schedule categories corresponding to its customs code used for reported imports in values and in quantities. The subscript V represent value and the subscript Q represent quantity. Taxrate represents tax rate for individual product item. It is a sum of tariff rates, value added tax rates (VAT), and excise tax rates imposed by the importer country. ε_i^V and ε_i^Q are error terms. If tax evasion is induced by the tax rate, α_1 and β_1 are statistically significant (i.e., 1 percent, 5 percent or 10 percent level) and expected to be greater than zero. For instance, if $\alpha_1 = 3$, this means that when tax rate increases by one percentage point, trade gap increases by three percent.

According to [9] and [10], import value and quantity that are reported by country B may not be the true direct imports from country A since there are direct imports and indirect imports through country A from other countries, but misreported as exports from country A. Therefore, we define the misclassified direct imports from country A to country B as follows.

$$M_i^* = \left(1+\theta_i\right) M_i \text{ where } \ 0 \le \theta_i \le 1 \quad (3)$$

where M_i^* represents total reported imports (i.e., imports in values and in quantities) by country B, M_i represents direct imports (i.e., imports in values and in quantities) from country A and $\theta_i M_i$ represents indirect imports by country A (since it is not known for exact indirect imports, we assume that indirect imports takes some small share of the direct imports). θ_i is assumed to be independent and identically distributed (i.i.d.). In that, θ_i also captures the CIF-FOB discrepancy. Considering equation (1) and equation (3), then we can transform and yield the baseline equation for tax evasion in values as below.

$$\log\left(Z_i^V\right) = \alpha_0^* + \alpha_1 taxrate_i + \varphi_i^V \quad (4)$$

where

$$Z_i^V = \frac{X_i^V}{M_i^{*,V}}$$

$$\alpha_0^* = \alpha_0 + E\left(\varepsilon_i^V - \log\left(1+\theta_i\right)\right),$$

$$\varphi_i^V = \varepsilon_i^V - \log\left(1-\theta_i\right) - E\left(\varepsilon_i^V - \log\left(1+\theta_i\right)\right)$$

We assume that α_0^* and φ_i^V to be independent and identically distributed (i.i.d.). Therefore, equation (4) will be used to quantify the relationship between tax evasion (measured by the trade gap) and tax rate, as well as to evaluate the sensitivity of their relationship. Likewise, the baseline equation for tax evasion in quantities follows the same procedure as derivation of the baseline equation for tax evasion in values by considering equation (2) and equation (3), and then we have the baseline equation for tax evasion in quantities, which is similar to equation (4).

There is still a problem when tax evasion occurs in terms of mislabeling imports since there are similar products, which may be mislabeled, [8] introduces a new variable to capture this by using AvgsimTax or average similar tax variable, which is defined by average level of the tax rate of all other products in a goods 4 digit category, weighted by the sum of export values reported by export countries. If there is a case of mislabeling, α_2 and β_2 are less than zero and statistically significant. By introducing AvgsimTax, equation (4) can be rewritten as equation (5). Considering equation (2) and equation (3) with some modifications similar to equation (4), we can derive equation (6) as below.

$$\log\left(Z_i^V\right) = \alpha_0^* + \alpha_1 taxrate_i + \alpha_2 Avg_{sim}Tax_i + \varphi_i^V \quad (5)$$

$$\log\left(Z_i^Q\right) = \beta_0^* + \beta_1 taxrate_i + \beta_2 Avg_{sim}Tax_i + \varphi_i^Q \quad (6)$$

If some parts of tax evasion occur in terms of mislabelling, we expect that the coefficients of AvgsimTax (α_2 and β_2) to be negative and statistically significant, meaning that the lower the tax rates on products within the same category, the greater the incentive to create evasion from moving higher tax paid products to lower tax paid similar products.

There is still a case when non-linear relationship between tax rate and trade gap exists. Therefore, equation (5) can be rewritten by adding up the squared taxrate variable (taxrate2)

and yields equation (7) as follows.

$$\log\left(Z_i^V\right) = \alpha_0^* + \alpha_1 taxrate_i + \alpha_2 Avg_{sim}Tax_i + \alpha_3 taxrate_i^2 + \varphi_i^V \quad (7)$$

Data used in this study are obtained from two main sources at 8-digit and 6-digit product level, respectively. Firstly, export values are obtained from the trademap online database provided by International Trade Center online database. These data are reported in terms of calendar year. Secondly, data on import values, tariff rate, value added tax rates, and excise tax rates are obtained from the Lao authorities such as the Department of Customs (DoC) under Ministry of Finance (MOF) and the Department of Import and Exports (DIMEX) under Ministry of Industry and Commerce (MOIC). These data cover a range of periods from FY2008/09 to FY2012/13. In this study, we use data under the harmonized system (HS) codes that relate to specific product classification because the HS codes provides more detailed and meaningful analysis of transferring prices as well as tax evasion at product level in relation to international trade flows [11].

Since data obtained from trademap database are in calendar year and data from the Lao customs authority are in fiscal year, we have converted data based on fiscal year into calendar year by summing up monthly data in the year under study so as to make the two dataset from different sources are compatible. For instance, the fiscal year for Lao PDR runs from October 1st to September 30th. Therefore, we take monthly data on imports from January to September in FY2008/09 as for imports in 9 months in 2009. Then, we take monthly data on imports from October to December in FY2009/10 and add them up with import data in 9 months from the previous periods in order to make a complete dataset for 2009. After all, we aggregate all monthly data at 8-digit product level first to make yearly imports for 2009. The same procedure is also applied for construction of dataset for 2011.

We construct tax rates by summing up the MFN tariff rates, VAT, and excise tax rates at HS 8 digit product level. Since export values reported by China and Thailand through trademap online database are available only at HS 6 digit product level. For this reason, tax rates are also adapted into HS 6 digit product level in order to be compatible with. Furthermore, there are also the same uniform tax rates among HS 8 digit product level as those of HS 6 digit product level. In a few cases where there are variations in tax rates, we decide to use the tax rate at HS 8 digit product level corresponding to the highest import values as a proxy tax rate for the HS 6 digit product level.

IV. Results

A. Lao PDR and Thailand (2009)

For Table 1 it provides the estimation results for detecting mislabelling by using AvgsimTax and the variable of tax rate2 is also introduced to capture a nonlinear relationship between trade gap and tax rate itself. The results show that the coefficient α_1 is 0.720 at 10 percent significant level in Model 1, meaning that if tax rate increases by one percentage point, tax evasion increases by 0.72 percent. However, there is no evidence that evasion occurs in terms of mislabelling. In Model 2, none of independent variables is statistically significant with exception for the constant term. Nevertheless, Model 3 shows that when we exclude the products lacking observation on quantities, the coefficient α_1 is 1.707 at 10 percent significant level. The coefficient of tax rate2 has an expected sign but statistically insignificant, so does the coefficient of AvgsimTax. This means that there is also no evidence indicating mislabelling, though there is still evidence of tax evasion in terms of under-reporting value.

TABLE I: Final Estimation Results (in Values)

Coefficients	Model 1	Model 2	Model 3
α_0^*	0.917*	0.861*	0.963*
	(0.105)	(0.120)	(0.128)
α_1	0.720***	1.580	1.707***
	(0.407)	(0.992)	(1.016)
α_2	0.926	0.836	0.682
	(0.584)	(0.598)	(0.632)
α_3	--	-1.136	-1.166
	--	(1.189)	(1.224)
R-squared	0.005	0.006	0.006
Observations	1241	1241	1094

Notes. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.

Table II shows that tax evasion seems severe because the coefficient β_1 is 1.542 at 10 percent significant level in Model (1.10). This means that if the tax rate increases by one percentage point, this leads to an increase in tax evasion by 1.542 percent. Considering some parts of evasion in mislabelling, full regression in Model (1.11) shows that the coefficient β_1 is 2.542 and significant at 1 percent level, while β_2 is -3.466 and significant at 1 percent level. This means that there is evidence of mislabelling when we take into account for tax evasion in quantities.

TABLE II: Final Estimation Results (in Quantities)

Coefficients	Model (1.10)[a]	Model (1.11)[b]	Model (1.12)[c]
β_0^*	-5.187*	-4.722*	-5.119*
	(0.136)	(0.179)	(0.136)
β_1	1.542***	2.452*	2.084*
	(0.864)	(0.788)	(0.794)
β_2	--	-3.466*	--
	--	(1.095)	--
R-squared	0.005	0.001	0.008
Observations	1209	1094	1094

Notes. "--" denotes the corresponding values are not estimated in the model. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.
a. Excluding $Avg_{sim}Tax$.
b. Full regression.
c. Excluding products lacking observations on $Avg_{sim}Tax$.

Table III shows that, in case of full regression, it has evidence of tax evasion. This means that if tax rate increases by one percentage point, tax evasion increases by 2.560 percent as shown in Model (2.8). This presents the largest impact, though it is no evidence of mislabelling. In addition, higher tax rates tend to induce higher tax evasion. This means that introduction of VAT seems to cause higher tax evasion in values because inclusion of VAT leads to an increase in tax rates. This may be seen as an incentive for people or firms engage in border trade transactions to evade paying taxes through a mean of under-reporting in values. However, there

is no any evidence of tax evasion in quantities in 2011 (see Table IV).

B. Lao PDR and Thailand (2011)

TABLE III: FINAL ESTIMATION RESULTS (IN VALUES)

Coefficients	Model (2.7)[a]	Model (2.8)[b]	Model (2.9)[c]
α_0^*	0.8712*	0.448*	0.650*
	(0.113)	(0.163)	(0.167)
α_1	-5.401	2.560***	2.530***
	(0.886)	(0.133)	(1.366)
α_2	1.408	1.311	1.077
	(0.863)	(0.904)	(0.942)
α_3	--	-3.343*	-3.294*
	--	(1.191)	(1.205)
R-squared	0.005	0.0004	0.003
Observations	1246	1246	1087

Notes. "--" denotes the corresponding values are not estimated in the model. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.
a. Excluding *taxrate*^{2}.
b. Full regression.
c. Excluding products lacking observations on quantities.

TABLE IV: FINAL ESTIMATION RESULTS (IN QUANTITIES)

Coefficients	Model (2.10)[a]	Model (2.11)[b]	Model (2.12)[c]
β_0^*	1.098*	1.081*	1.098*
	(0.106)	(0.117)	(0.114)
β_1	0.449	-0.594	0.511
	(0.431)	(0.910)	(0.469)
β_2	--	1.178	--
	--	(0.893)	--
R-squared	0.001	0.003	0.008
Observations	1225	1087	1087

Notes. "--" denotes the corresponding values are not estimated in the model. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.
a. Excluding $Avg_{sim}Tax$.
b. Full regression.
c. Excluding products lacking observations on $Avg_{sim}Tax$.

C. Lao PDR and China (2009)

Table V presents the final estimation results in values. On full regression, if tax rate increases by one percentage point, trade gap increases by 3.446 percent in Model (3.8). However, the coefficient of AvgsimTax (3.929) presents an unexpected sign, but it is statistically significant at 5 percent level. In Model (3.9), it indicates that if tax rate increases by one percentage point, tax evasion increases by 4.137 percent. The coefficient of AvgsimTax also presents as unexpected sign with 10 percent significant level. This problem may be affected by the considerable reduction in sample size. As a result, the coefficient of AvgsimTax behaves unexpectedly as shown in Model (3.7) to Model (3.9).

TABLE V: FINAL ESTIMATION RESULTS (IN VALUES)

Coefficients	Model (3.7)[a]	Model (3.8)[b]	Model (3.9)[c]
α_0^*	0.994*	0.789*	0.926*
	(0.220)	(0.261)	(0.291)
α_1	0.999	3.446**	4.137**
	(0.763)	(0.167)	(1.754)
α_2	3.177**	3.929**	3.661***
	(0.863)	(1.759)	(1.899)
α_3	--	-3.518**	-4.355*
	--	(1.605)	(1.621)
R-squared	0.0145	0.0198	0.0237
Observations	362	362	290

Notes. "--" denotes the corresponding values are not estimated in the model. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.
a. Excluding *taxrate*^{2}.
b. Full regression.
c. Excluding product lacking observations on quantities.

Table VI illustrates that all cases present evidence of tax evasion in quantities due to tax rate. However, there is no evidence of mislabelling in Model (3.11) since the coefficient 2.826 is not statistically significant.

TABLE VI: FINAL ESTIMATION RESULTS (IN QUANTITIES)

Coefficients	Model (3.10)[a]	Model (3.11)[b]	Model (3.12)[c]
β_0^*	-5.407*	-5.826*	-5.557*
	(0.246)	(0.353)	(0.269)
β_1	3.453*	4.650*	4.417*
	(1.291)	(1.271)	(1.263)
β_2	--	2.826	--
	--	(2.490)	--
R-squared	0.016	0.029	0.261
Observations	346	290	290

Notes. "--" denotes the corresponding values are not estimated in the model. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.
a. Excluding $Avg_{sim}Tax$.
b. Full regression.
c. Excluding products lacking observations on $Avg_{sim}Tax$.

D. Lao PDR and China (2011)

Table VII also provides evidence (in values) showing that tax evasion exists due to tax rate and is significant at 10 percent level in Model (4.7) and Model (4.8) and 5 percent level in Model (4.9), while the results show no evidence of mislabelling. According to Model (4.1) and Model (4.12) in Table 4.18, they show that there is also evidence of tax evasion in quantities. In addition, this also has larger magnitude of coefficients of tax rate in comparison to the coefficients of tax rate related to tax evasion in values as shown in Model (4.7) to Model (4.9) in Table VII. However, there is no evidence of mislabelling in Table VIII.

TABLE VII: FINAL ESTIMATION RESULTS (IN VALUES)

Coefficients	Model (4.7)[a]	Model (4.8)[b]	Model (4.9)[c]
α_0^*	0.052	-0.202	0.014
	(0.147)	(0.277)	(0.291)
α_1	2.681***	4.530***	4.330**
	(0.162)	(2.399)	(2.454)
α_2	-0.218	-0.367	-0.579
	(0.863)	(1.472)	(1.446)
α_3	--	-1.866	-1.604
	--	(1.312)	(1.367)
R-squared	0.019	0.021	0.020
Observations	571	571	484

Notes. "--" denotes the corresponding values are not estimated in the model. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.
a. Excluding *taxrate*^{2}.
b. Full regression.
c. Excluding products lacking observations on quantities.

TABLE VIII: FINAL ESTIMATION RESULTS (IN QUANTITIES)

Coefficients	Model (4.10)[a]	Model (4.11)[b]	Model (4.12)[c]
β_0^*	-6.471*	-6.332*	-6.329*
	(0.250)	(0.272)	(0.273)
β_1	4.943*	3.121	4.741*
	(0.957)	(3.106)	(1.039)
β_2	--	1.570	--

	--	(2.706)	--
R-squared	0.031	0.029	0.028
Observations	560	484	484

Notes. "--" denotes the corresponding values are not estimated in the model. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level. Robust standard errors are in parentheses.
a. Excluding $Avg_{sim}Tax$.
b. Full regression.
c. Excluding products lacking observations on $Avg_{sim}Tax$.

V. Conclusion

This study explores the correlation between tax evasion and tax rate by examining trade flows data between the Lao PDR and its key trading partners (i.e., China and Thailand). We use empirical approach borrowed from [10], which is based upon the methodology of [8] original work in this field. Unlike [10], we use a case study between a lower-middle income country with moderate level of underground economy (i.e., the Lao PDR) and two larger developing economies (i.e., China and Thailand). We use data at HS eight-digit level reported in values and in quantities from the Lao authorities and its key trading partners for the same products.

In the case between the Lao PDR and Thailand, we find evidence of under-reporting of unit value for both years (i.e., 2009 and 2011). The coefficient of tax rate is 0.973 in 2009 and 1.515 in 2011. This indicates that tax evasion has increased over time. In addition to that, the result also shows evasion in terms of mislabelling in quantities only in 2009. In the case between the Lao PDR and China, there is evidence of under-reporting values for both years. The coefficient of tax rate is 1.561 in 2009 and 3.036 in 2011, meaning that tax evasion has increased over time. However, there is no evidence of mislabelling between the Lao PDR and China.

In both cases, there is strong evidence of tax evasion both in values and in quantities. Furthermore, tax evasion in values is more severe than tax evasion in quantities. This implies that the inspection of imports by the Lao customs authority is weak and there is a huge loophole, which becomes a channel for tax evasion.

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