# Analysis of Tax Performance in East Asia with Special Emphasis on the Lao PDR, 1996-2014

Ka Phaydanglobriayao[*]

*Department of Economics, Faculty of Economics and Business Management, National University of Laos,*

*Dongdok Campus, Xaythany District-7322, Vientiane Capital, Lao PDR*

*Email: k.phaydanglobriayao@nuol.edu.la*

## Abstract

Sufficient tax collection seems less problematic in developed countries, whereas it is a hot topic in developing countries around the world because many developing countries have faced a number of constraints affecting their tax performance. This study explores determinants of tax-to-GDP ratio, which is an important indicator of tax performance in East Asia where rapid economic growth presents; meanwhile previous studies on tax performance are scant, in particular for developing countries in the region. In addition, this study utilizes the empirical results to construct tax effort index so as to shed light on tax capacity of the Lao PDR. The results indicate that per capita GDP and trade liberalization are statistically and positively correlated with tax-to-GDP ratio, whereas manufacturing share and age dependence rate are statistically negative effects on the ratio. This is surprising that economic structure variable (e.g., manufacturing share of GDP) turns to be statistically negative; this could mean that tax incentive policy resulted in unsuccessful outcome over the period. Moreover, tax effort index shows that it is less than unity, meaning that tax capacity of the country remains low and this has caused low level of tax collection in the country over the period.

*Keywords:* Tax collection; Tax performance; Tax capacity; Tax effort index.

## 1. Introduction

Sufficient tax revenue mobilization for supporting development in infrastructure, education, and a healthcare system are prerequisites for sustainable economic growth and development. It is important for developing countries to maintain trade reforms as trade taxes provide more substantial revenue overall.

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* Corresponding author.

Despite the adoption of trade liberalization, sufficient tax collection could be increased using other domestic tax resources. Trade liberalization encourages developing countries to improve and reform their tax policy and administration. Consequently, this requires governments to concentrate their efforts into mobilizing sufficient tax revenue required for socio-economic development.

Since the 1990s, there has been a widespread increase in trade liberalization in developing countries [1]. As stated by [2], an indicator of trade liberalization is when a developing country received structural adjustment loans (SALs) from the World Bank in the 1980s and early 1990s. Trade liberalization begins with the intention to open economically, followed by trade reform, tariff reduction, and the easing of non-tariff measures. Trade liberalization is associated with tariff reduction or removal, which affects various sectors in the whole economy such as the agricultural sector, the mining sector, the manufacturing sector, tourism and services, as well as government tax revenue. Although trade liberalization is believed to be positive for economic growth and development, its impact on government tax revenue mobilization is unclear. Trade liberalization in East Asia has gradually been implemented for decades and has mainly involved developing countries [3]. It appears to perform superior based on average nominal tariff reductions in comparison to other regions. However, it seems that East Asia countries' tax revenue mobilization was affected less due to trade liberalization process (i.e., mainly tariff reduction). This could indicate that trade liberalization may have a positive impact on tax revenue mobilization rather than a negative one.

Developing economies in East Asia have been continuing process of trade liberalization from the early 1980s and 1990s, whereas Japan, South Korea, and "free port economies" such as Hong Kong and Singapore adopted the process of trade liberalization from the 1960s and 1970s. Trade liberalization in East Asia started bilaterally for individual countries and then gradually expanded into trade blocs such as AFTA and AFTA+3 (China, Japan, and South Korea) etc. This demonstrates that trade liberalization in East Asian countries began from different points leading to different stages of trade development. Any negative impact of trade liberalization on tax revenue mobilization in East Asia seemed to be reversed quickly due to the substantial gains from successful outward orientation. Reference [4] noted that trade taxes distort prices of goods and services, and reduction of these distorting factors vastly outweighs the loss of government revenue.

Based upon standard economic theory developed by fiscal economists in the 1960s and 1970s [5], countries extensively adapted their tax structure to fit the changes in economic structure when their economic development proceeded further [6]. Under trade liberalization and the regional economic integration process, countries in East Asia have adopted tariff reductions as well as changes to non-tariff barriers and tend to replace trade taxes with domestically based taxes such as the personal income tax, the consumption tax, and the VAT. Taking the Lao PDR for example, [7: 99] stated that, "the openness index fell from 8.4 percent in 1991 to 2.7 percent in 2011, implying that Laos's foreign trade has been gradually liberalized".

Although studies demonstrate that trade liberalization is positively associated with government tax revenue [1, 2, 4, 8, 9], there are studies, which express an opposing views [10, 11, 12, 13]. As in earlier study of [1], trade liberalization is believed to affect tax revenue mobilization through international trade taxes because it promotes export oriented industries, on which developing countries' governments impose export taxes (e.g., on natural

resources and wood-related products), induces foreign direct investment into high potential sectors for tax bases (e.g., manufacturing sector), and enhances regional economic integration and cooperation through trade blocs by tariffication of imports. However, there are other factors that may also have impact on tax revenue. Furthermore, a study of tax performance in a developing country in East Asia is very interesting for fiscal economists in reassessing and analyzing determinants of tax performance over the years. More specifically, tax effort approach clearly provides information as an indicator for tax revenue performance of a given country [10].

The Lao PDR has adopted comprehensive reform of its economy, followed by tax reforms since early 1990s. Although the Lao PDR has improved its tax systems to generate additional revenues, the country still faces a number of constraints in relation to the fiscal sector. For this reason, the country still relies on external funds in terms of bilateral and multilateral aid/grants and debts to finance part of its expenditure. Aid and grants have played an important role in helping poverty reduction, infrastructure development, as well as offsetting fiscal deficit. Aid and grants in the form of official development assistance (ODA) registered about a half of public expenditure and 80 percent of public investment projects over the period 1994-2001 [15]. Recently, of total aid, bilateral aid was 52.8 percent and international financial institution's aid was 28.9 percent, respectively, of total aid amount over the recent period 2006-2010 [16]. On the other hand, external debt is another source of supporting the government of Lao PDR expenditure. According to [17], the debt share of GDP exhibits 48.1 percent down from 79.8 percent in 2005 [18]. Recent public and publicly guaranteed (PPG) debt increased from US$ 4.5 billion in 2012 to US$ 5.1 billion in late 2013, which corresponded to 47.7 percent of GDP in 2012 to 48.3 percent in late 2013. The increase in PPG debt was due to amortization of debt stock. This clearly illustrates that tax effort index still remains low in the Lao PDR.

There is limited literature on tax revenue performance and tax effort about the Lao PDR. This study aims to fill this gap in academic literature and reassesses variables determining tax revenue performance in East Asia. This study aims to answer the question what are appropriate determinants of tax revenue performance (measured by tax-to-GDP ratio)? According to [7], the tax-to-GDP ratio of the Lao PDR gradually increased from 10.3 percent (period average) in 1993-1997 to 13.6 percent in 2008-2011. This raises the question of whether the Lao PDR can increase its tax collection or it is approaching its full capacity for tax revenue mobilization? And are there resources to generate more domestic revenue?

## 2. Recent Development of Tax Performance in East Asia and in the Lao PDR
### 2.1. Trade Share and Tax-to-GDP Ratio in East Asia and in the Lao PDR

Utilizing data from the WDI, Figure 1 depicts how the international trade share of GDP in East Asia increased from 87.5 percent in 1990 to 131.8 percent in 2014. Although there was a decrease in the second half of 2010, it picked up in 2014 [19]. This is consistent to several studies by early scholars, meaning that trade liberalization has intensified during the periods of the study and this is a real fact for East Asia as a whole. Taking a look at the same period in East Asia picked up from 18.3 percent in 1990 to 19.1 percent in 1995 and plummeted to 17.9 percent in 2000. This was inevitably due to the Asian financial crisis (AFC) impact and structural change on tax revenue mobilization. Since indirect taxes have dominated direct taxes by 10 percent in Asia [20], the AFC impact and structural change reduced tax revenue through loss of indirect taxes. Afterward, tax ratio

picked up further from 17.9 percent in 2000 to 20.4 percent in 2014 in line with ongoing trade liberalization in the region. On the other hand, although there may be evidence that tax ratio partly depends on trade liberalization since 2000, an increase in tax-to-GDP ratio could substantially depend on other factors such as structural and institutional factors because trade liberalization seems to generate economic growth rather than tax revenue alone.
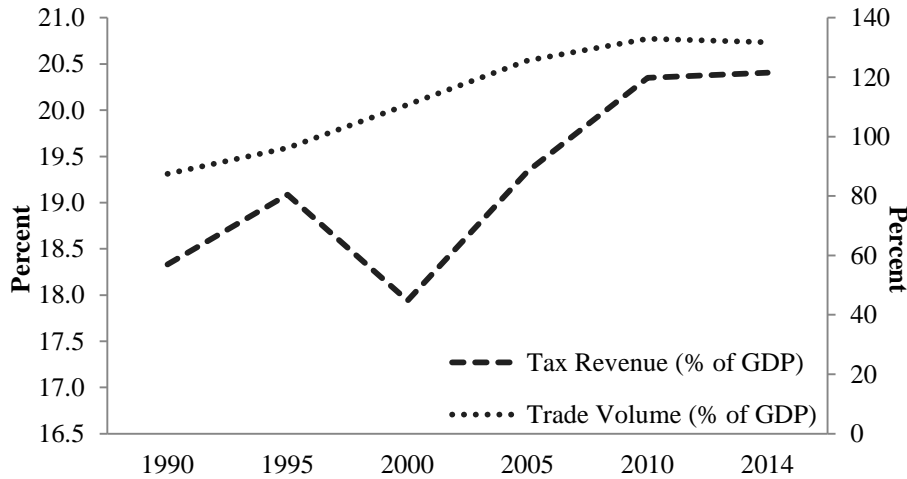


**Figure 1:** Trade Share of GDP and Tax-to-GDP Ratio in East Asia (Period Average)

Now, let us turn to look at the recent trade liberalization and tax ratio in the Lao PDR. To accommodate the whole macroeconomic reform, the country furthered to cooperate regional economic integration by joining ASEAN in 1997 and initiated to apply for WTO membership in the same year. Under ASEAN, the country started to adopt intra-regional tariff reductions under the Common Effective Preferential Tariff Scheme (CEPT) founded in 1992 by five ASEAN founders (i.e., Indonesia, Malaysia, Philippines, Singapore, and Thailand) in 2000. Since the country and other new ASEAN members such as Myanmar and Cambodia were still at the preparation stage, the country was allowed to skip from the CEPT until 2008. The country progressively experienced a moderate increase in trade liberalization from 35.85 percent in 1990 to 74.31 percent in 2000 and 89.77 percent in 2014 [21]. Furthermore, it has also signed bilateral trade agreement with 15 countries so as to further liberalizing its international trade [22]. Although the country still faces a number of difficulties (e.g., good institution and sufficient human resources), the country has signed and put into effect with 8 FTAs, while 2 under negotiation procedure and 4 under proposed/consultation and study. It has 14 FTAs in total. Like other East Asian countries, the Lao PDR also bilaterally has liberalized its trade since early 1990s; this move has significantly contributed to the change in tariff structure of the country [23].

Figure 2 illustrates the movement of trade share and tax ratio of the Lao PDR on upward trend over time since 1990. Trade share increased from 35.85 percent to 73.51 percent in 2000 and 85.23 percent in 2014. This is true for a small and landlocked country; the country needs to cooperate with neighboring countries through a mechanism of trade liberalization. For this reason, the country is not reluctant to take opportunity to join regionally bilateral trade agreements. On the other hand, tax ratio (measured in period average) was around 10

percent in 1990 and slightly increased to 10.61 percent in 2000. Then, it gradually reached 16.72 percent in 2014. The country often experiences a trade deficit over time. The import duties are main source of tax revenue in line with the low rate of preferential trade agreement utilization in the country. Furthermore, an increase in foreign direct investment (FDI) into the country also contributes to increases in imports and exports; this leads the tax ratio to an upward trend since 2000.
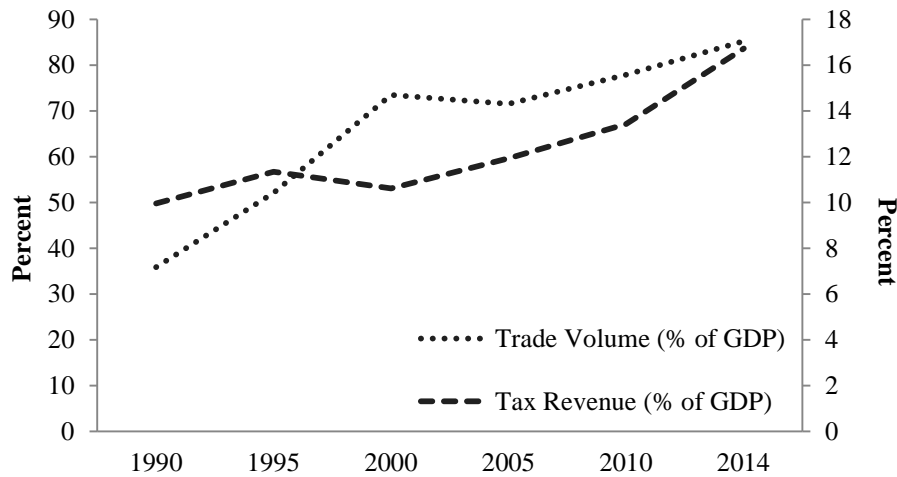


**Figure 2:** Trade Share and Tax-to-GDP Ratio in the Lao PDR (Period Average)

### 2.2. Per capita GDP and Tax-to-GDP Ratio in East Asia and in the Lao PDR

According to recent development in East Asia, the data derived from WDI shows that the growth rate of per capita GDP is on an upward despite the fact of the outbreak of the AFC in 1997. The per capita GDP increased from US$5,265 in 1990 to US$8,158 in 2000. Most part of the increase in per capita GDP could be explained by the Asian Miracle era that brought about fast economic growth in East Asia as compared to other regions. The per capita GDP continued to increase over the period of 2000-2014 with a robust pace, in particular an increase in per capita GDP of leading countries in the region such as Japan, South Korea, and China, as well as newly industrialized economies (NIEs) and some of ASEAN members. Looking at the tax ratio trends over the same period, it shows a sharp drop in 2000. This was due to the huge negative impact of the AFC in 1997. Nevertheless, tax-to-GDP ratio trends picked up and grew in a fast manner over the periods of 2000 to 2014. In general, it shows that the tax ratio is associated with per capita GDP in East Asia.

Figure 4 provides a significant support for the association between tax ratio and per capita GDP in the case of the Lao PDR. However, it seems to show clear evidence since 2005 after the country undertook several major tax reforms over the earlier periods. In addition, it also shows that per capita GDP (measured in period average) increases sharply due to huge influx of FDI into the country's natural resources since 2003, though tax ratio did not increase proportionally as expected. Like Figure 3, Figure 4 demonstrates that tax-to-GDP ratio in the Lao PDR follows the same pattern. This means that per capita GDP is one among other factors determining the level of tax ratio in the country.
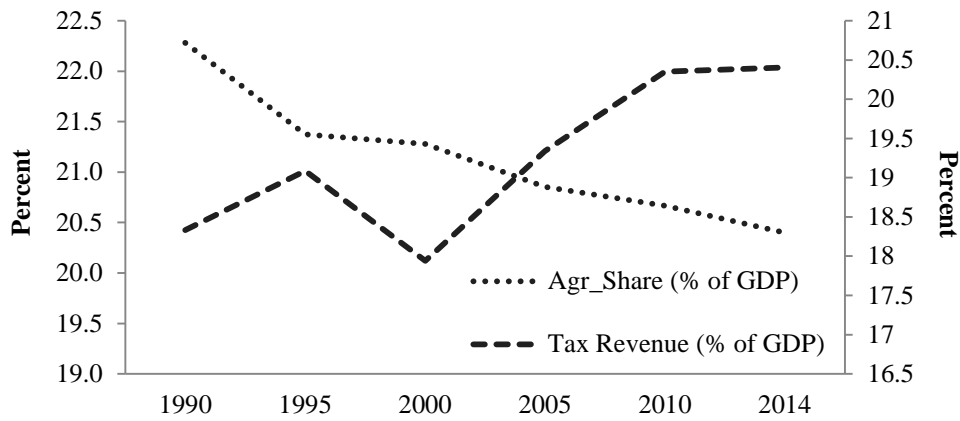
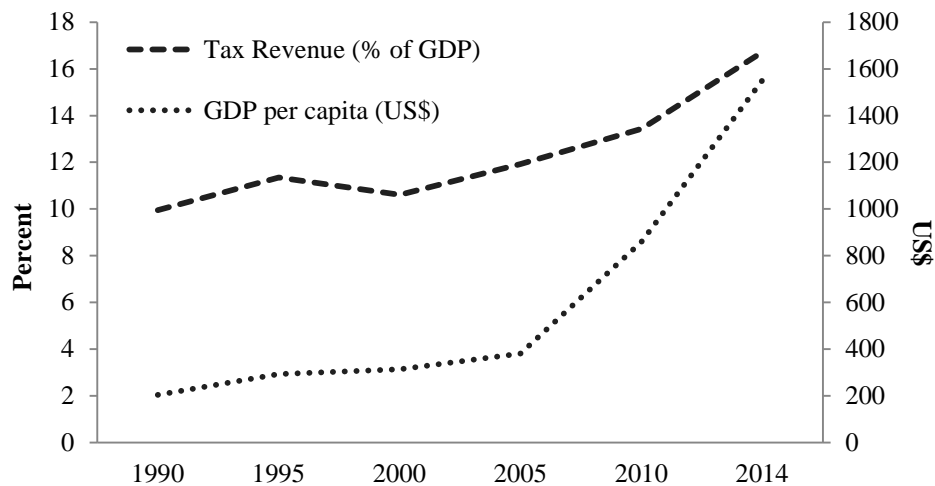**Figure 3:** Per Capita GDP and Tax-to-GDP Ratio in East Asia (Period Average)



**Figure 4:** Per Capita GDP and Tax-to-GDP Ratio in the Lao PDR (Period Average)

### 2.3. Agricultural Sector and Tax-to-GDP Ratio in East Asia and in the Lao PDR

Many developing economies in East Asia rely significantly on the agricultural sector that is considered as the backbone of the whole economy such as Cambodia, Lao PDR, Myanmar Thailand, and Vietnam. Although the agricultural production share of GDP remains very thin in some countries such as Japan and South Korea, this sector is still considered a sensitive area and protected substantially and politically. Furthermore, some countries (e.g., China and Thailand) export a number of agricultural products to other countries within the same region and other regions, agricultural production related taxes are exempted, and this includes some agro-manufacturing industries with an attempt to gain trade benefits with respect to the comparative advantage. Nonetheless, Figure 5 and Figure 6 clearly indicate that all countries in East Asia follow the same pattern of a

declining trend in agricultural share of GDP, while the tax ratio keeps increasing over the periods under this study. This implies that agricultural share of GDP is negatively associated with tax ratio.
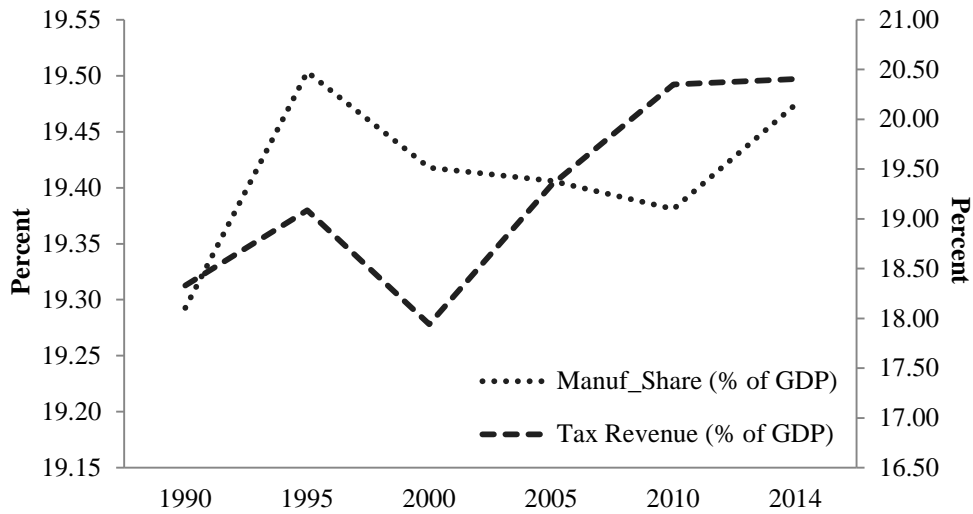


**Figure 5:** Agricultural Share of GDP and Tax-to-GDP Ratio in East Asia (Period Average)
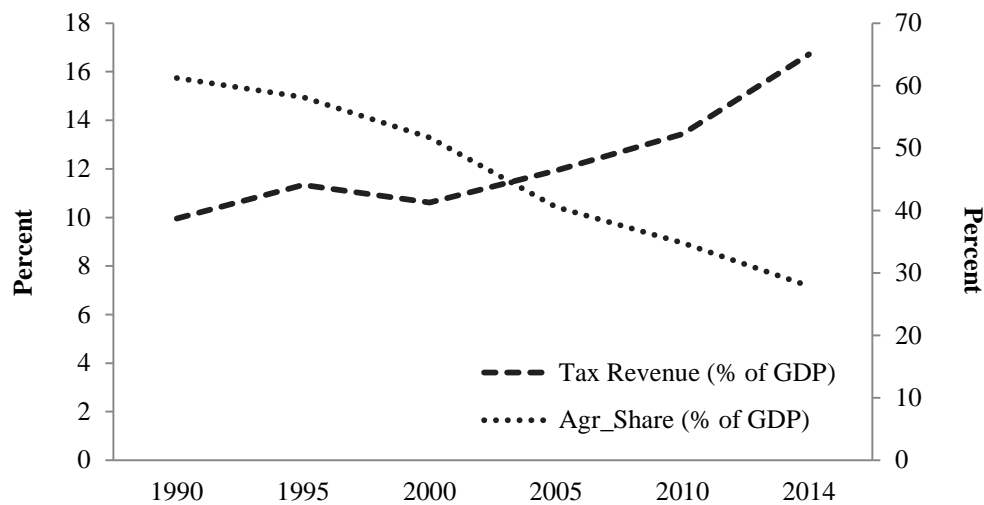


**Figure 6:** Agricultural Share of GDP and Tax-to-GDP Ratio in the Lao PDR (Period Average)

## 2.4. Manufacturing Sector and Tax-to-GDP Ratio in East Asia and in the Lao PDR

Many previous studies argued that the growth of the manufacturing sector in East Asia was the result of the substantial expansion of trade liberalization and production networking led by Japan, South Korea, and China through several channels (e.g., FDI and trade blocs) throughout the 1990s and 2000s. Most manufacturing industries are export-oriented firms [24, 25]. More interestingly, Figure 7 clearly shows that manufacturing share of GDP in East Asia declined over a decade from 1995-2010, though many early studies found it as a key driver engine for economic growth over the same periods. In response to this, many scholars had different explanation on it and some had even no concrete reasoning for. According to [26], a decline in manufacturing

share of GDP was caused by a reduction of manufacturing employment, and this led domestic expenditure on manufactures to decline, while its expenditure on services has increased. This phenomenon occurred in advanced economies such as United States, Europe followed by Japan and four tiger economies of East Asia (Hong Kong, South Korea, Singapore, and Taiwan). Furthermore, this also indicated that wages in manufacturing sector became relatively cheaper, while wages in services sector turned to be upswing. Figure 8 also follows a similar trend as shown in Figure 7 over the period 2000-2010. This may be due to two reasons. One is the chained impact of the deindustrialization occurred in advanced economies through international trade channel. One instance, there was no variety of manufacturing products that could be produced with exception for export-oriented apparel products in the country. Second is the structural change of the country's economy that services sector has grown faster than manufacturing and agricultural sectors. However, because its services sector was so small-scaled that it could not absorb all labor forces moving from the agricultural and manufacturing sectors into services sector. This led to an increase in structural unemployment in the country over the recent years.
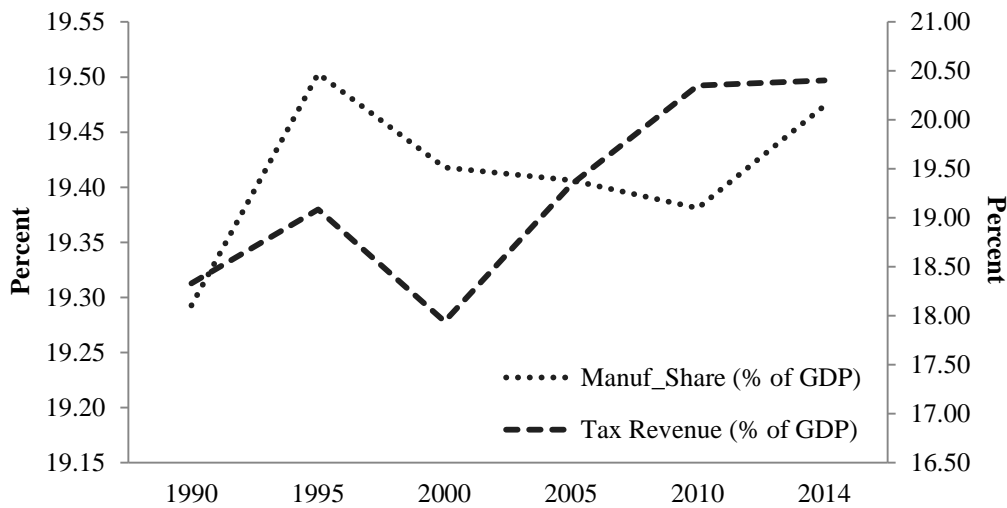


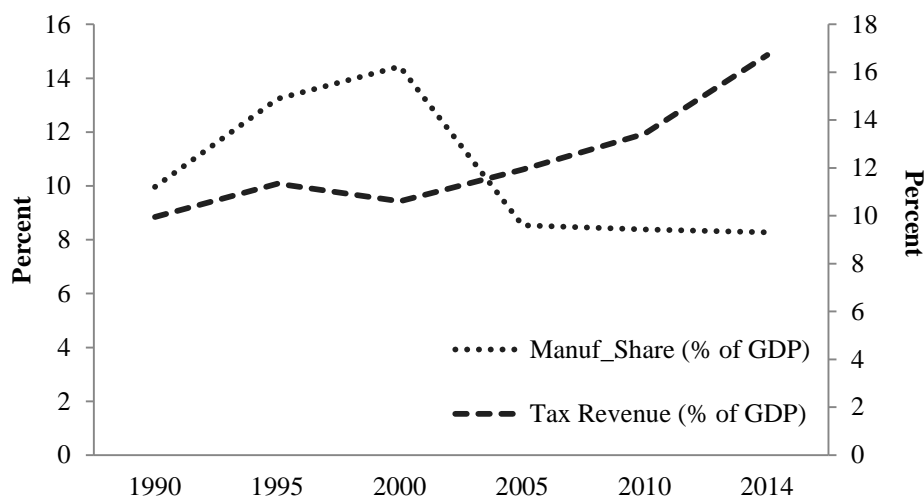**Figure 7:** Manufacturing Share of GDP and Tax-to-GDP Ratio in East Asia (Period Average)



**Figure 8:** Manufacturing Share of GDP and Tax-to-GDP Ratio in the Lao PDR (Period Average)

### *2.5. Institutional Environment and Tax-to-GDP Ratio in East Asia and in the Lao PDR*

According to [21], determination of tax-to-GDP ratio is related to many variables and is also a complex issue. However, it definitely reflects political decision. Likewise, Reference [27] found that a country with good government institution is associated with better tax performance and tax compliance of its local citizens. In general, there has been little major political turmoil over the period 1996-2014 in East Asia, though countries in East Asia have different stages of politically institutional development and standpoint to some extent. For instance, only some countries such as Cambodia, Myanmar, Indonesia, Philippines, and Thailand experienced severe political instability due to political vacuum [28]. Nevertheless, these countries had not been hit hard by the political instability with exception for the AFC in 1997 and the global financial crisis in 2008. On the contrary, countries in East Asia have successfully promoted and maintained good institutional environment over the recent years. One instance, an increase in FDI inflows to the region led FDI share of the world FDI inflows from 19.6 percent in 2011 to 23.9 percent in 2013 [29: 14]. This is considered as one indicator to show that the region remains good environment of institution (e.g., political stability).

Looking at the Lao PDR, the country has enjoyed political stability since 1975. The government of the Lao PDR always maintains the priority to political stability as compared to other governance indicators because it believes that this is a priori to pursue economic growth and development in transition. Nonetheless, the country has some weakness in improving several governance indicators (e.g., control of corruption). Therefore, maintaining political stability in the country seems to be associated with improving tax revenue performance over the recent years.

### *2.6. Other Factors*

According to recent studies, the demographic shift in East Asia (e.g., China and Vietnam) is occurring with over half of one-third-world population, while advanced economies face a more drastic aging process. This leads to rapid growth of urbanization and high age dependency ratios of the elderly at the time in Eat Asia [30: 36-37]. More specifically, rapid urbanization may be a good sign for tax ratio because governments can implement and carry on its tax collection easier in urban areas than in rural areas. Although it seems that the emerging rapid urbanization is often regarded as a sign of economic development, it occurs under unplanned circumstances. Therefore, it could also lead to rising youth unemployment due to recent structural change agricultural production into manufacturing and services sectors [31: 2]. Furthermore, high age dependency ratios may also have negative impacts on tax ratio through several channels (e.g., per capita GDP). In addition, developing countries in East Asia with the exception for China and Brunei Darussalam continue to heavily rely on external debts for public expenditure. Only five economies in this study's dataset are excluded from aid dependency, this includes Brunei Darussalam, Hong Kong, Japan, South Korea, and Singapore. However, Brunei, Hong Kong, South Korea, and Singapore did receive a limited amount of aid in the early 1990s

### 3. Literature Review

Reference [32] investigated buoyancy and elasticity of the tax systems in the Lao PDR over the period 1990-

2014. He employed time series analysis method in this study. The empirical results show that the country experienced low elasticity of main taxes, whereas buoyancies are slightly greater than unity and even greater than their corresponding elasticities. This means that the tax reform in the country has been well improved, but not insufficient; this needs to be reformed deeper. Besides, this study also found that the shares of key taxes (i.e., personal income tax and profit tax) in total tax revenue are very small and this led to insufficient tax collection over the period.

Reference [33] explored determinants of tax effort in eight African countries with panel data covering a period of 1973 to 1981. The author laid a stronger theoretical background to support the tax share model developed previously. The author estimated determinants of tax shares by assuming welfare maximizing behavior done by public decision makers with respect to available tax bases. The researcher theoretically proved how agricultural share of GDP and foreign aid and grants are negatively associated with tax share, whereas desired tax share, international trade share of GDP (i.e., a proxy variable for trade liberalization) and mining share of GDP have a positive relationship with tax share. In addition, the researcher pointed out that a proxy variable for trade liberalization is one among other important determinants of tax share because imports and exports are highly monetized and pass through the ports/border checkpoint of entry and exit. The results of estimation showed that all explanatory variables are of expected sign and only foreign aid and grants share of GDP and mining share of GDP are statistically insignificant. Moreover, the researcher reiterated that interpretation of tax effort indices obtained in the calculation must be carefully taken since there are still the influences of other factors, which are excluded from the present model.

Reference [34] estimated four tax share models using dynamic panel data from 22 countries in Sub-Saharan Africa in the period of 1980-1996. They developed several theoretical models to support the empirical model used for four tax share models: total tax revenue, income tax revenue, indirect tax revenue, and trade tax revenue. The explanatory variables are net aid flows, real exchange rates, terms of trade, inflation, trade share of GDP (i.e., a proxy variable for trade liberalization), real income, and the composition of output (e.g., agricultural share of GDP). The results of estimation showed mixed pictures across the models in pooled estimation using generalized method of moment (GMM) technique, in particular the sign of coefficients on agricultural share and net aid. Furthermore, they found that agricultural share of GDP is negatively correlated to tax revenue and trade liberalization has a strongly positive effect on total revenue for the CFA countries but not for non-CFA countries.

Reference [2] studied the relationship between trade liberalization and growth in 73 developing countries in the period of 1975-1993. Although the study did not link the trade liberalization to tax revenue, the analysis casted light on the importance of trade liberalization that pushes economies more open in terms of international trade, which is one of potential tax bases [33]. However, they asserted that the results of analysis on the effect of trade liberalization yield differently due to the use of different method measuring a proxy for trade liberalization, meaning that there is no single most appropriate measurement of trade liberalization

Reference [35] conducted a study on tax effort for 43 developing in Sub-Saharan Africa over the period of 1990-1995. They reviewed some previous empirical literature. Empirically, they used tax ratio as a dependent

variable and a set of independent variable such as structural variable (i.e., per capita GDP, agricultural share, mining share, import share, export share) and a number of dummy variables capturing the programs provided by the IMF's fund as part of improving fiscal balance for those countries. They found that only import share and manufacturing share are statistically insignificant. Furthermore, they constructed tax effort indices for all countries in their study and pointed out that those countries with high tax ratio were likely to have a relatively high tax effort index.

Adopted from [5], Reference [36] elaborated and intensified the theoretical framework of tax share model. The researcher also conducted an empirical study on the determinants of tax revenue for 39 Sub-Saharan African countries over the period of 1985-1996 by taking into account of the effects of economic policies and control of corruption. The researcher found that per capita income and other composites of tax bases (i.e., agricultural share and the degree of trade liberalization) were associated with tax revenue.

Reference [37] conducted a study on measuring tax effort for 75 developed and developing countries covering the period of 1985-1995. He followed the methodology used by earlier scholars in the 1960s and 1970s and he found that per capita GDP, agricultural share of GDP, and trade share of GDP are statistically significant determinants of tax ratio. Furthermore, he found that, based upon the tax effort comparison, middle-income countries are worse than low-income countries.

Reference [13] examined trade liberalization and tax ratio for 80 developing countries over the period of 1978-1998. They also followed previous tax-to-GDP ratio model and they found that low-income and upper middle-income countries face tax revenue losses due to trade liberalization. Moreover, the structural variables such as per capita income, population size, urbanization, and age-dependency ratio were statistically significant determinants of tax-to-GDP ratio, whereas the higher degree of trade liberalization measured by international trade taxes share of GDP led to the lower level of tax revenue.

Reference [9] conducted a cross-country study on tax revenue performance for 120 countries over the period 1975-1998. They reviewed previous studies on the issue in question and it clearly demonstrates all potential determinants of tax revenue performance. Furthermore, they estimated the determinants of tax ratio and they constructed tax effort indices for all countries (i.e., by country group and by income level). They found that a set of explanatory variables is of expected sign and they have a statistical correlation with tax share. Moreover, they constructed tax effort indices for all countries in the sample dataset and pointed to low tax effort index does not necessarily mean that country ought to increase taxes as well as a high index country should lower its taxes. Countries should carefully take consideration of other factors as well as their level of national development stage. Apart from this, they stated that tax effort index would be applicable to capture the idea of an increase in tax revenue for a given country.

Reference [15] studied how effect of trade liberalization and exchange rate changes on tax revenue in Sub-Saharan Africa for 22 countries over the period of 1980-1996 so as to find their relationship and prove if currency depreciation affects tax revenue in CFA countries and non-CFA countries. They investigated the tax revenue components by dividing them into three equations consisting of income and profit taxes, good and

services taxes, and international trade taxes. They employed GMM estimation. Explanatory variables are log of dependent variables, log of real per capita GDP, agricultural share of GDP, industrial share of GDP, government consumption share of GDP, log of net aid, annual inflation rate, log of terms of trade, log of real exchange rate, trade liberalization indices.

The results of estimation provided mixed pictures on each independent variable and they asserted the importance of trade liberalization as one among other determinants of tax revenue.

Reference [1] explored determinants of tax revenue efforts in 105 developing countries covering 25 years. He also followed the pattern of tax revenue model used in a number of previous studies in [34, 38]. However, he included some non-economic variables such as political stability, economic stability, corruption index, law and order, and government stability. He found that structural variables: per capita GDP, agricultural share of GDP, trade liberalization, import share, and foreign aid are significant determinants, whereas there is no strong evidence from non-economic variables.

Reference [38] explored determinants of total tax revenue and its components for 43 developing countries over the period of 1973-2002. The author provided further improvement of theoretical background on tax share model by including potential tax bases.

The empirical results showed that international trade share, urban population size, adult literacy, and per capita income are strongly positive determinants of tax share, whereas inflation rate, population density, aid inflows, aging population, and degree of monetization had negative effects on tax share.

However, it turned to present a mixed picture when the model includes institutional factors such as economic stability, female economic activity, corruption index, and proxies for democracy degree.

## 4. Methodology and Data Description

### 4.1. Empirical Framework

Following earlier studies by [1, 9, 14, 38], this study adopts their empirical models with minor modifications in order to measure the tax revenue performance using an East Asian dataset. Moreover, we assume that an individual country's specific characteristic impacts the tax-to-GDP ratio. The tax-to-GDP ratio model is as follows.

$$TGDP_{it} = \alpha_0 + \alpha_1 \ln\left(\frac{1}{PGDP_{it}}\right) + \alpha_2 Agr\_share_{it} + \alpha_3 \ln\left(Openness_{it}\right) + \alpha_4 Manuf\_share_{it}$$

$$+ \alpha_5 Aid\_share_{it} + \alpha_6 Debt\_share_{it} + \alpha_7 Adr\_share_{it} + \alpha_8 Ubr\_share_{it} + VIF_{it}\beta_j + \varepsilon_{it}$$

Where *TGDP* is tax-to-GDP ratio (percent), *PCGDP* is per capita GDP (US$), *Agr_share* is the agricultural share of GDP (percent), *Manuf_share* is the manufacturing share of GDP (percent), *Openness* is a proxy

variable for the effect of trade liberalization (percent), *Debt_share* is net debt share of GDP (percent), *Aid_share* is the net aid share of GDP (percent), *Ubr* is the urban population ratio (percent of total population), *Adr* is the age dependency ratio (percent of total population), *VIF* is a vector of institutional factors (i.e., political stability, control of corruption, rule of law, and regulatory quality), $\alpha$ and $\beta$ are parameters, and $\varepsilon$ is disturbance. The subscript *i* represents each country, *j* represents the number of coefficients for *VIF* ($j = 1, 2, 3, 4$), and *t* ($t = 1996, 1997,\ldots, 2014$) represents time in a yearly format.

### 4.6. Data Description

The data used in this study is obtained from 14 East Asian countries and the special autonomous region (SAR) of China, Hong Kong, from 1990 to 2014.

The impetus of selecting countries and period of time is based upon the apparent rise of the degree of trade liberalization in the region as well as in case of the Lao PDR. Table 1 presents short description of data sources and abbreviations for all variables included in the model. Tax revenue and GDP are in real term. Table 2 provides statistic summary for relevant variables in this study.

**Table 1:** Abbreviation of Variables and Data Source

| Variables | Abbreviations | Data Source |
|---|---|---|
| Tax revenue | Tax Rev | ADB |
| Gross domestic product | GDP | WDI |
| Agricultural share | Agr_share | WDI |
| Manufacturing share | Manuf_share | WDI |
| Openness | Openness | WDI |
| Net aid share | Net aid_share | WDI |
| Net debt share | Net debt_share | WDI |
| Age dependency ratio | Adr | WDI |
| Urban population ratio | Ubr | WDI |
| Political stability | Polstab | WGI |
| Rule of law | Rula | WGI |
| Control of Corruption | Concor | WGI |
| Regulatory Quality | Regqua | WGI |

*Notes*. ADB stands for Asian Development Bank. WDI stands for World Development Indicators. WGI stands for World Governance Indicators.

The results of estimation, based upon significant level, goodness of fit as well as economic rationale, shown in Table 3 (see column (3)) indicates that log of inverse per capita income, agricultural share, log of openness (i.e., a proxy variable for trade liberalization), net aid share, and net debt share are of expected sign of coefficients, whereas manufacturing share, age dependency rate (percent of total), urban population (percent of total), and political stability are negatively insignificant.

**Table 2:** Summary of Statistics

| Variables | Mean | Standard deviation | Minimum | Maximum | Observations |
|-----------|------|--------------------|---------|---------|--------------|
| TGDP | 19.341 | 9.925 | 0.013 | 69.164 | 375 |
| ln(1/PCGDP) | -4.078 | 1.528 | -7.392 | -0.946 | 375 |
| ln(Openness) | 4.344 | 1.175 | -1.648 | 6.121 | 375 |
| Agr_share | 17.023 | 16.728 | 0.033 | 63.009 | 375 |
| Manuf_share | 19.619 | 8.818 | 1.368 | 35.822 | 275 |
| Aid_share | 3.537 | 5.492 | -0.661 | 21.515 | 269 |
| Debt_share | 58.56 | 51.022 | 0.098 | 359.564 | 269 |
| Adr | 54.427 | 15.446 | 33.008 | 98.223 | 375 |
| Ubr | 54.813 | 26.919 | 15.437 | 100 | 375 |
| Polstab | -0.005 | 0.916 | -2.12 | 1.4 | 225 |
| Rula | 0.101 | 0.96 | -1.68 | 1.77 | 225 |
| Concor | -0.016 | 1.067 | -1.73 | 2.42 | 225 |
| Regqua | 0.153 | 1.061 | -2.34 | 2.25 | 225 |

## 5. Empirical Results of Estimation

The log of inverse per capita GDP holds a negative significant effect, meaning that an increase in per capita income associated with whole economic development leads to a higher taxable base. Larger share of agricultural sector in economy tends to reduce total revenue because this sector is sensitive to subsistence and it mainly depends on the weather, which unexpectedly affect production in a year. Therefore, it is difficult to tax this sector properly. On the other hand, people who rely on this sector are those with low level of income. As mentioned earlier, East Asia is a leading region in terms of trade liberalization since late 1980s and 1990s. Therefore, trade liberalization significantly contributes to increase tax share in many countries in the region through various channels. The apparent channels are imports, capital movement (i.e., investment), and strong production networking among East Asian countries to maintain robust production that supports employment and economic growth.

Net aid share and net debt share are of expected sign, but not statistically significant. This implies that although some countries (e.g., Cambodia, the Lao PDR, and Myanmar) that are believed to rely heavily on external aid and debt as part of government revenue, aid and debt may be not utilized effectively in strengthening government revenue. The interpretation of aid and debt should be cautious since they are related to various issues, which are not covered by this study.

Political stability shows a negatively insignificant relationship with tax share. This implies that when some countries experienced recent internal political issues, this leads to severe protest campaign or conflict that leads

to political bottleneck and dramatic change in economic policy, which affect domestic investment climate and businesses' activities.

On constructing tax effort index, we use the estimation results based upon statistical significance and goodness of fit in column (3) of Table 3 to support the calculation of tax effort index. Nonetheless, Figure 9 depicts the predicted tax ratio and actual tax ratio so as to provide an insight of the movement of tax effort of the country.

Figure 9 indicates that actual tax-to-GDP ratio is increasing associated with the country's economic development, and the predicted tax-to-GDP ratio remains nearly flat over the period 1999-2013. The decreasing gap between the two over the periods provides evidence that tax effort is getting improved. On the other hand, this may imply that reform of tax systems is effective to some extent. The tax effort index increased from 0.67 in 1996 to 0.98 in 2014, associated with an increase in per capita GDP from US$377.28 in 1996 to US$1,759.78 in 2014 (calculated in nominal terms). The finding is consistent with the results of [32: 51], which indicates that tax reform has improved total tax system performance in raising revenue mobilization. However, the tax effort index is still less than unity. This demonstrates that tax capacity is low and the government of the Lao PDR should put more effort efficiently through enhancing its tax systems with well-improved institutional environment in order to mobilize additional tax revenue in line with economic development. Although this study is based upon the regression results where per capita GDP explains, ratio of personal income tax to GDP is actually small as shown in [32: 79]. As a result, tax effort of the country can be improved further with improvement of the whole tax system through deeper reform of taxes.
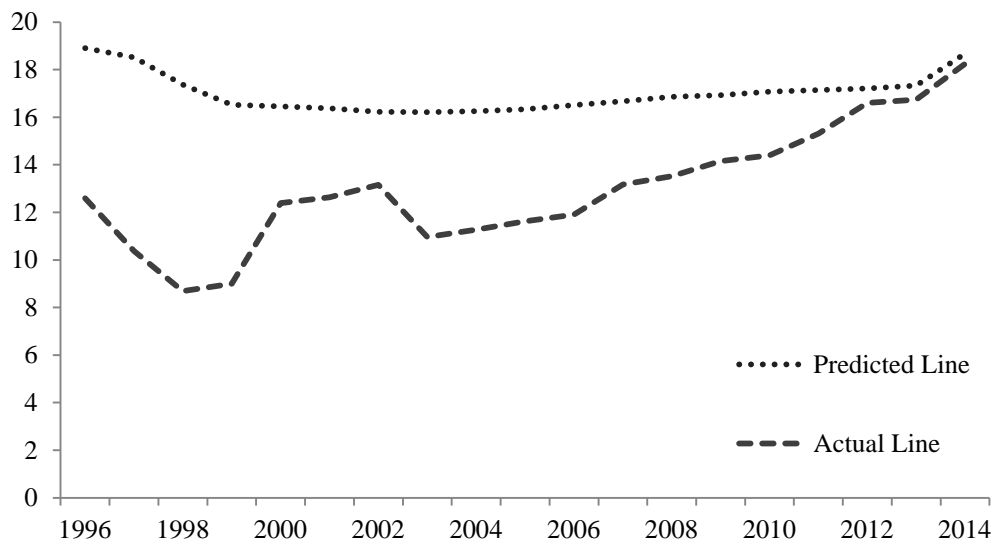


**Figure 9:** Actual Tax-to-GDP Ratio and Predicted Tax-to-GDP Ratio based on Log of Inverse GDP Per capita

**Table 3:** Determinants of Tax-to-GDP Ratio (1996-2014)

| Variables | Fixed effects | Panel correlated standard error estimation (PCSE) | | | |
| --- | --- | --- | --- | --- | --- |
| | | Common correlation | Panel specific | Common correlation[a] | Panel specific[a] |
| | (1) | (2) | (3) | (4) | (5) |
| *Const.* | 3.664 | 12.654** | 14.210** | 12.376** | 14.199** |
| | (10.373) | (6.366) | (7.078) | (6.298) | (6.633) |
| ln(*1/PCGDP*) | -3.292* | -3.049* | -2.705* | -3.036* | -2.711* |
| | (0.759) | (0.761) | (0.904) | (0.765) | (0.901) |
| *Agr_share* | -0.064 | -0.102 | -0.102 | -0.104 | -0.109 |
| | (0.106) | (0.086) | (0.089) | (0.088) | (0.094) |
| ln(*Openness*) | 3.213* | 2.912* | 2.571* | 2.920* | 2.594** |
| | (0.617) | (1.002) | (1.005) | (0.998) | (1.074) |
| *Manuf_share* | -0.221 | -0.214*** | -0.262* | -0.209*** | -0.266** |
| | (0.187) | (0.116) | (0.119) | (0.117) | (0.123) |
| *Aid_share* | -0.156 | -0.138 | 0.150 | -0.201 | -0.188 |
| | (0.150) | (0.156) | (0.165) | (0.225) | (0.245) |
| *Debt_share* | 0.001 | 0.009 | 0.005 | 0.012 | 0.010 |
| | (0.006) | (0.010) | (0.011) | (0.012) | (0.014) |
| *Adr* | -0.042 | -0.034 | -0.071*** | -0.036 | -0.067 |
| | (0.058) | (0.049) | (0.042) | (0.050) | (0.043) |
| *Ubr* | -0.049 | 0.001 | 0.010 | 0.004 | 0.102 |
| | (0.091) | (0.073) | (0.083) | (0.073) | (0.084) |
| *Polstab* | 0.025 | 0.157 | -0.176 | 0.157 | 0.165 |
| | (0.775) | (0.438) | (0.521) | (0.447) | (0.526) |
| *Lagged aid_share* | No | No | No | Yes | Yes |
| *Lagged debt_share* | No | No | No | Yes | Yes |
| Observations | 150 | 150 | 150 | 150 | 150 |
| Countries | 10 | 10 | 10 | 10 | 10 |
| R-squared | 0.426 | 0.845 | 0.924 | 0.846 | 0.922 |

*Notes*. [a]Lagged aid_share and lagged debt_share variables are included as independent variables. *, **, and *** denote significance at the 1 percent, 5 percent, and 10 percent level, respectively. Robust standard errors are in parentheses for fixed effects estimation and PCSE robust standard errors are in parentheses.

## 6. Conclusion

This study explores determinants of tax-to-GDP ratio in East Asia and constructs tax effort index for the Lao

PDR based upon the regression results of the model. The study uses data from 15 East Asian countries for 25 years from 1990-2014. However, the number of countries and years are reduced respectively. This is because some countries with no data on aid share or debt share are excluded, and the data on institutional factors are available only from 1996. Therefore, sample size is finally reduced to 10 countries across 19 years as shown in Table 3.

Based upon the appropriateness of the estimation technique, PCSE estimation is employed. The estimation results show that log of inverse per capita GDP, log of openness, agricultural share, net aid share, net debt share, and age dependency ratio are of expected sign of coefficients, whereas manufacturing share, urban population ratio, and political stability show unexpected sign of coefficients. More interestingly, the negative relationship between manufacturing share and tax-to-GDP ratio may be due to some reasons such as overuse of tax exemptions and incentives, tax evasion and avoidance (e.g., corruption and profit shifting), and low wages and profits in the sector in some East Asian developing countries.

Tax effort index, constructed based upon the results of regional regression of tax revenue determinants, provides an insight of tax performance of the Lao PDR to some extent. Tax effort index with respect to log of inverse per capita GDP shows that the index is less than unity. This means that tax capacity of the country remains low, and this leads to low tax collection. Furthermore, we find that tax effort of the country is improving and looks similar to tax effort in other developing countries because it has an upward trend. This means that although tax collection remains low, it is improving further and this can be successful within certain conditions because the tax effort index is approaching to unity.

Although this study shed light on the tax performance in the Lao PDR, the empirical results of estimation can be changed if other variables that are related to the tax-to-GDP ratio included into the model. Further researches should consider including other institutional variables, demographic variables, and dummy variables for tax reforms in some particular periods of time.

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