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Structural Transformation in Southeast Asian Countries and Key Drivers

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Abstract

This study's objective is to examine the factors that have driven structural transformation (ST) in the Southeast Asian (SEA) economies and the policies supporting the process. It sets the stage by evaluating the ST in each country, quantifying the contribution of "within sector" and "structural change" to overall productivity growth and estimating the turning points (TPs) to gauge the prospects of income convergence. Eight SEA countries, undergoing a steady rate of economic growth —Cambodia, Lao PDR, Myanmar, Viet Nam, Philippines, Malaysia, Indonesia, and Thailand (CLMVPMIT) are chosen for analysis. We find their progress on ST to be consistent with the theory and historical patterns experienced in several developed and developing countries. However, progress is diverse across these countries and lags behind developed countries, indicating that labor is not exiting agriculture as fast as agriculture's share of value added has been declining. The ST has decreased from 49 percent in Thailand to almost 3 percent each in Cambodia and Malaysia during 1991 to 2016. Further, the contribution of *within change* to productivity, which was pivotal during the 1990s in each country is rather subdued during the 2000s, thereby giving comparative primacy to *structural change*. A relatively higher—57 to 80 percent—contribution of *structural change* in Cambodia and Lao PDR, together with productivity growth, may be explained by increasing migration and trade in nonagriculture products. We also find that while Lao PDR, Thailand, and Indonesia have reached their TPs, other nations, especially the poorer ones such as Viet Nam, Myanmar, and Philippines are predicted to take at least a decade towards this goal. Empirical analysis suggests ST in CLMVPMIT is positively driven by agricultural productivity, terms of trade, and public investments in infrastructure, with little role for rural to urban migration and market integration. Large inter-sectoral productivity differentials across SEA countries, other than in Cambodia and Malaysia, necessitates to accelerate agricultural disproportionate share of the labor force in agriculture through higher productivity.

Keywords: structural transformation, turning points, agriculture productivity growth, labor productivity, public policies

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Acronyms

SEA	Southeast Asian
CLMVPMIT	Cambodia, Lao PDR, Myanmar, Viet Nam, Philippines, Malaysia, Indonesia, and Thailand
ST	structural transformation
VA	value added
GDP	gross domestic product
TFP	total factor productivity
GDPA	gross domestic product agriculture and allied activities
TP	turning point
PCI	per capita income
FDI	foreign direct investment

I Introduction

Economic development of a country is closely associated with the patterns of structural transformation (ST) it experiences. The main proponents of this process, namely Clark (1957), Chenery (1960), Kuznets (1966), and Syrquin (1988) maintained that almost all economies pass through a similar growth pattern in their process of development. In the initial phase, the resources are reallocated from agriculture to industry while in the second phase there is a reallocation from industry to the service sector. This transition through different stages depends on a number of factors related to favorable policies, technology, and use of resources. Thereafter, with high economic growth and agricultural productivity, the agricultural sector behaves like any other sector in the economy.

It is further argued that even though the share of agriculture in total income and its labor share goes down in the process, agriculture continues to play a significant role in bringing about convergence in living standards across urban and rural populations and alleviating poverty (Johnston and Mellor 1961; World Bank 2007). According to Timmer and Akkus (2008), stopping the process of ST may not work; however, designing policies to allow the poor to cope with changes in the economy would bring about a reduction in poverty as well as income inequality. The miraculous growth spurt witnessed in many Asian economies, notably in South Korea, Taiwan, Singapore, Hong Kong, and Malaysia, and more recently in Viet Nam and China, was due to sound public policies. These policies include investments in education and skill formation, investment in health, openness and liberalization in external trade (World Bank 1993; Boseworth and Collins 2008).

This study aims to examine the factors that have driven ST in the Southeast Asian (SEA) countries and the policies supporting the process. It sets the stage by evaluating the ST in each SEA country, quantifying the contribution of "within sector" and "structural change" to overall productivity growth, and estimating the turning points to gauge the prospects of income convergence. The study is divided into four sections. Section I introduces the indicators of ST and briefly reviews cross country experiences on the process of ST. This is followed in Section II by a description of methodological approaches and the database used. Section III analyzes the temporal trends across the three economic sectors and the annual rate of growth in gross value added (VA), employment, and other economic parameters such as per capita income (PCI) and labor productivity across the SEA countries between 1991 and 2016. This is followed by the mapping of ST through an indicator known as "GAP,"; estimation of "within sector" and "structural change"; and the contribution of each to productivity growth; and empirical estimates of the factors that impact ST. Last, Section IV draws implications. The focus is on eight selected countries: Cambodia, Lao PDR, Myanmar, Viet Nam, Philippines, Malaysia, Indonesia, and Thailand (CLMVPMIT). Brunei and Singapore are excluded from the analysis due to their relatively lesser dependence on agriculture, both having a less than 1 percent share of agriculture in VA.

I.1 Structural Transformation and the Growth Trajectories of Countries

Past studies have provided ample evidence in favour of the process of ST, wherein the contribution of agriculture to gross domestic product (GDP) and employment declines and that of industry and service (tertiary) sectors increases as the economy grows.[1] The nonagricultural sector, particularly industry, begins to grow at a faster pace. Since the productivity of the industrial sector is much higher than that of the agricultural sector, the share of agriculture in economic output starts to decline faster than its share in employment. This results in an increase in the difference or the structural gap (referred to here as "GAP") between the shares of agriculture in employment and income[2]. Further, with the rise in industrial productivity, labor migrates from the low productivity agricultural sector to the high productivity industrial sector in pursuit of higher wages. The development of industry is followed by that of the tertiary sector, which further intensifies the share of the nonagricultural sector in both the labor force and economic output, eventually leading to a sharp decline in the shares of agriculture in the labor force and economic output (Kuznet 1966).[3]

This structural gap widens in the initial stages of the ST process but tends to decline as agricultural productivity increases. Agricultural productivity may increase due to an increase in investment, technological advancement, and reduction in the labor force dependent on agriculture. The point at which agriculture's share in the labor force tends to decline faster than its share in economic output is termed "the turning point" (TP) (Timmer 2009). In the long run, the share of agriculture in the labor force and its share in economic output approximate each other as well as with output of other economic sectors. At this point, agriculture behaves

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[1] We use VA instead of GDP due to non-availability of GDP for all the countries considered in this study. However, the analysis would not change significantly given that the trends of GDP and VA do not differ significantly.
[2] Income is used interchangeably with GDP, value added and output.
[3] Besides GAP and rural to urban migration of labor, another indicator of ST is demographic transition, with a reduction in population growth rates.

like any other sector in the economy and hence concludes a successful process of ST (Binswanger-Mkhize and Dsouza, 2012).

Most of the currently developed countries—Australia, Canada, Italy, Germany, Sweden, Japan, the United Kingdom, and the United States—have already experienced a successful process of ST as per the theoretical premise (Bah 2009; Herrendorf, Rogerson, and Valentinyi 2013). Studies indicate that it took developed countries 100 years for their share of agriculture to fall to one-fourth of GDP. Industry's share in these countries followed an inverted 'U'-shaped curve; that is, the share was around 25 per cent at the beginning of the "modern" development of most countries, reached its peak of about 50 percent (during industrialization) and then fell to around the same level from where it began (Papola 2005).[4]

In contrast, the developing countries are still experiencing this process, with variations in the stylized structure of ST as followed by the developed countries. Bah (2009) classified developing countries into three continents: Africa, Asia, and Latin America. He found Asian countries following a path that closely resembles that of the developed countries. The reason for this is that Asian economies have higher industrial shares than services shares. Alternatively, Latin American and African countries are undergoing a similar process with low agricultural shares and higher services' sectoral shares at a lower GDP per capita. In their transformation, the industrial sector has not contributed significantly. At the same time, in some countries there is a considerable delay in the reduction of the expected structural GAP—that is, the difference between the share of labor force in agriculture and agriculture's output. This is worrisome as this may lead to inequality, with farm incomes falling behind the rest of the economy (Timmer and Akkus 2008).

Timmer and Akkus (2009) sampled 13 Asian countries (Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, and Thailand) and compared their ST to those of non-Asian countries. The average economic growth was faster for the sampled Asian countries compared to the non-Asian countries. In addition, a rapid decline in agriculture's share of GDP was observed in Asian countries. This has resulted in different TPs for Asian and non-Asian countries. The estimated TPs for the Asian countries were around US$1,663 while that for the non-Asian countries was at

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[4] In 2002, the share of industry in total output was around 26 percent in the United Kingdom, 25 percent in France and Germany, 23 percent in Italy and 23 percent in the United States, whereas the share of services had a secular increase in most of these countries during the period of modern economic development. Since then, the share of services has further increased.

US $11,329. This study found evidence that Asian countries experienced higher growth of the agricultural sector because of favourable agricultural terms of trade, stable domestic prices, and high productivity (Timmer 2004).

Pingali (1997) observed a faster pace of ST in Malaysia, Indonesia, and Thailand. McCraig and Pavcnik (2016) found that in contrast to Indonesia, Viet Nam experienced a faster movement of labor away from agriculture towards manufacturing and services. More than a third of Viet Nam's growth is due to structural change. However, the growth in employment opportunities has been slow, which may be due to the fact that state investment policy is in heavy, capital-intensive industries and the state also follows a minimum wage policy (Abbott, Tarp, and Wu, 2016).

A study by IFAD (2016) reported that the emerging Asian countries (China, Indonesia, Malaysia, Philippines, Thailand, and Viet Nam) are undergoing rapid growth in their agricultural productivity and increasing the pace of rural-urban migration due to their dynamic manufacturing sectors. The outcome is a faster increase in economywide productivity growth. For India, Bathla and D'Souza (2012) and Binswanger-Mkhize and D'Souza (2012) reported that the ST process is atypical due to a slow pace of labor reallocation from a low productivity sector, namely agriculture, to high productivity sectors. The performance of agriculture has been tardy and industry is unable to generate additional employment due to increasing capital intensity. The ST is also characterized as "stunted," with the exiting labor moving primarily into the rural nonfarm and informal sector instead of industry and services and becoming increasingly "casualized" (Binswanger and D'Souza 2011; Lanjouw and Murgai 2008).

As regards the ST in the emerging SEA countries, which is the focus of our study, Briones and Felipe (2013) categorized economies according to their stage of agricultural transformation (1) beginning, with an agricultural surplus; (2) integration, further bifurcated into (a) early, (b) middle, and (c) late; and (3) industrialized. During 2010, Cambodia and Lao PDR were in an agricultural surplus stage (1), projected to reach the early integration stage by 2040. Philippines, Viet Nam, Thailand, and Indonesia were in the early integration stage (2) (a). Viet Nam is projected to remain in this stage until 2040, whereas Thailand and Indonesia would make it to the next stage of middle integration (2) (b). On the other hand, the Philippines is expected to reach the last stage of integration by 2040, that is (2) (c). Malaysia, which had reached late integration stage (2) (c) in 2010 is projected to reach the final stage of agricultural transformation (3), industrialization, by 2040. Based on this classification, the World Bank (2007) classified Myanmar as being in the first stage of agricultural transformation (1).

The stages of agricultural transformation have been divergent across the economies. Fuglie (2000) estimated that during the period 2001-2010, almost 70 percent of the growth in gross agricultural output in SEA countries was due to total factor productivity (TFP) growth. A favourable policy towards agricultural research and development (R&D) and pricing explains the high TFP share. Among countries, Malaysia had the highest public expenditure on agricultural R&D, followed by Thailand and Philippines during 1996—2008. Sharp increases in the price of rice have been observed in a good number of SEA countries (Dawe 2014). Birthal et al. (2019) found the agricultural sector of Southeast Asia to have undergone robust growth and experienced a ST in diverse magnitudes. The study shows faster agricultural growth in comparatively low-income SEA countries, with technological change, area expansion, and diversification being the main drivers of growth. In contrast, agricultural growth in high-income countries has been relatively slow and driven by price increases, mainly of export-oriented commercial crops, such as oil-palm, rubber, and coconut; and also by area expansion. Given the fixed supply of land and the high volatility in global food prices, the study indicates that area expansion and price increases may not be sustainable sources of growth in the long run. The recourse has to be to exploitation of existing and frontier technologies and diversification of production portfolios into higher-value commodities by strengthening the institutions that effectively link farmers to remunerative markets and creating post-harvest infrastructure for food processing.

However, during ST, growth in agriculture output and labor productivity tend to be interrelated. McMillan and Rodrik (2011) decomposed the growth in labor productivity into the "within sector" component and "structural change" component. The within sector component is defined as the weighted sum of productivity growth within individual sectors, where weights are the share of employment in each sector at a specific time. The "structural change" component, however, captures the growth of labor productivity due to worker's movements across sectors. Viet Nam has been experiencing labor productivity growth due to the workers moving from a low-productivity sector, that is, Agriculture, to a high-productivity sector, that is, manufacturing and services. In other words, it is due to structural change (McMillan, Rodrik, and Sepulveda 2016). However, there is no study of other Southeast Asian countries on the sources of labor productivity growth. We intend to fill the gap though this study.

We carry forward the research in the SEA countries with three central objectives. First, to evaluate the contribution of "within sector" and "structural change" to labor productivity growth. Second, to quantify the TPs wherein the process of ST starts to pick up pace. Third, to empirically examine the factors that have driven ST across the SEA economies. The findings will help to identify the issues and delineate policies to bring about a faster and successful ST.

II. Methodological Approaches and Data

Panel data of eight SEA countries from 1991 to 2016 is used for both descriptive and empirical analysis. At the outset, we estimate the contribution of "within sector" and "structural change" to labor productivity growth following the decomposition analysis used in the literature (McMillan and Rodrik 2011; McMillan, Rodrik, and Sepulveda 2016). Algebraically, the decomposition is:

$$\Delta Pt = \sum_{i=1}^{n} \theta_{i,t-k} \Delta\, p_{i,t} + \sum_{i=1}^{n}\; p_{i,t} \Delta\theta_{i,t} \text{ ----- (1)}$$

where Pt and pi,t refer to economywide and sectoral labor productivity levels, respectively, and $\theta i,t$ is the share of employment in sector i at time t. The Δ operator signifies the change in productivity or employment shares between $t - k$ and t. This implies that economywide labor productivity growth can be achieved in one of two ways. The first term—the "within sector" component—captures how much of overall labor productivity growth can be attributed to changes within sectors. It is the weighted sum of productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the time period. The second term—the "structural change" component—denotes how much of overall labor productivity growth can be attributed to movements of workers across sectors. When changes in employment shares are positively correlated with productivity levels, this term will be positive, and structural change will increase economywide productivity growth (McMillan, Rodrik, and Septula 2016).

The decomposition exercise is followed by estimation of TPs for the gap in labor productivity between agriculture and nonagriculture sectors based on the ordinary least squares (OLS) method. Following Timmer and Akkus (2008), the TP for each country is estimated from 1960 to 2016 by specifying:

$$\text{GAP} = \beta_0 + \beta_1 \text{ PCI} + \beta_2 \text{ PCI}^2 + \beta_3 \text{ Terms of trade} + \text{time} + \text{u} \text{ ------- (2)}$$

The explanatory variables that explain GAP, that is, PCI, PCI squared, and terms of trade are taken in the natural logarithm. The TPs here are the per-capita incomes where the first differential of the regression equation (2) equals zero, that is, when the slope of GAP is zero. Along with the quadratic term, a cubic form of per capita is also used in the regression equation. This is done to overcome the issue of local and global TPs for the respective countries. A cubic form of regression for some countries results in the same TPs as in a quadratic form, in which case a quadratic form is considered. Again, in some cases a cubic form results in imaginary roots; in such cases, a quadratic is also considered. The time variable ranges from 1960 to 2016 except for Lao PDR, which has the required data available only from 2006 onwards. The above regression is used for each country separately.

Empirical literature suggests key drivers of ST are strongly associated with productivity growth in agriculture and nonagriculture, external trade, infrastructure, and government policies (Lele et al. 2011). We have identified variables that determine ST in the SEA region and used OLS and instrumental variables (IV) regression models for the analysis (Greene 2003). The OLS regression equation specifies productivity or agriculture income as a function of terms of trade, public and private capital formation in agriculture, labor and workers' educational attainment, and public investment in technology and infrastructure. Two variables, land productivity and terms of trade, in turn have a strong bearing on agricultural transformation, represented by GAP as shown in the equation below.

$$\text{Log GAP}_t = \alpha \log \text{land productivity}_t + \chi \log \text{terms of trade}_t + \varphi \log Y_i + \beta \log z_k + c_t + v_t + \varepsilon_t \quad \text{-----}(3)$$

Y_i represents the ratio of labor productivity in agriculture to that in nonagriculture, urbanisation that promotes jobs out of agriculture, resulting in an increasing share of nonfarm activities in the income portfolio of rural households and the exit of people from agriculture, and external trade in agriculture that may reduce GAP. z_k represents gross fixed capital formation (investment) in agriculture and allied activities and public infrastructure variables: the population's access to electricity and subscription to fixed phones. The c_t represents country fixed effects, and v_t is a vector of period dummies taken to control for country-specific and time-invariant factors that influence GAP. The α, χ, Φ, and β in equation (3) represent the respective coefficients of the explanatory variables of land productivity, terms of trade, agriculture trade flow, crop diversification, public infrastructure, urbanisation, and investments in agriculture.

As mentioned above, land productivity (gross domestic product agriculture and allied activities [GDPA]/crop land), one of the key drivers influencing GAP, is determined by per hectare public and private investments in agriculture and terms of trade (both lagged). It is shown in equation (4) below. X_i is a vector of the variables labor, educated labor, weather conditions represented by rainfall, and availability of land. Some of these may represent control variables influencing productivity in the same year.

$$\text{Log land productivity}_t = \alpha \text{ log investment}_{t-1} + \chi \text{ log terms of trade}_{t-1} + \varphi \log Xi + \pi \log z_k + \mathcal{E}_t \text{ ----- (4)}$$

Land productivity is correlated with the error term, thereby indicating the problem of endogeneity. The source of the problem is identified as the correlation between the error term and one or some of the independent variables, that is, $Cov(x, u) \neq 0$. The Hausman test confirms endogeneity in this variable. The OLS estimates may, therefore, generate biased estimates. To address this problem, we resort to the IV regression method.[5] However, if the IV are more than the endogenous variables, the latter are said to be over-identified and require the use of "two stage least squares" (2SLS) estimation. The first stage of 2SLS is to generate a proxy for the endogenous variable such that it is not correlated with the error or disturbance term. The second stage is simply to substitute the proxy for the endogenous variable and estimate the resulting equation using the OLS. The key is to find a variable that belongs in the second equation (the one predicting the endogenous variable) but does not belong in the first equation (the one predicting the dependent variable).

The IV and 2SLS estimation are in principal the same. The only difference is that the 2SLS allows for dealing with a situation where there are more instruments than there are regressors in the original matrix (Woolridge 2013). The IV 2SLS is used with specification of a fixed effects model. The choice of a fixed effect over random effect model is based on whether variables change over a period of time. The fixed effects model allows the unobserved individual effects to be correlated with the included variables. The differences between units are modelled strictly as parametric shifts of the regression function. In contrast, if the individual effects are strictly uncorrelated with the regressors, then it might be appropriate to model the individual specific constant terms as randomly distributed (Greene 2003). The Hausman test confirms the use of the fixed effect instead of the random effect model.

[5] It is correlated with the error term if (a) there are omitted variables that are correlated with land productivity and GAP, (b) land productivity is measured with errors, and (c) both variables are simultaneously determined.

The following variables are taken to represent the key drivers of structural adjustment across SEA countries. Theoretically, all these variables should bear a negative relationship with GAP. It indicates that an improvement in each (land productivity, sectoral productivity ratios, terms of trade, crop diversification, etc.) will hasten reduction in the structural gap and hence faster structural transformation.

1. Land productivity specified as GDPA per crop land as given in the FAO database
2. Terms of trade estimated as the ratio of deflator GDP agriculture and allied activities and deflator GDP manufacturing at real prices.
3. Urbanization is represented by the percentage of population in urban areas
4. Investment in agriculture is represented by gross fixed capital formation in agriculture and allied activities
5. Infrastructure is represented by the population's access to electricity and subscription to fixed phones.
6. Trade flows are defined as a share of agriculture exports plus agriculture imports in GDP
7. Crop diversification is proxied by the value of non-foodgrains' share in the total value of agriculture and allied activities output.
8. A trend variable is taken to capture the effect of other missing explanatory variables that may influence the GAP.
9. Labor productivity (VA/worker) ratio between agriculture and nonagriculture—a convergence of sectoral productivities due to higher capital intensity or skill formation and hence a better wage rate is expected to reduce the GAP.

Some of these variables are not considered in the analysis. For instance, data on foreign direct investment (FDI), though correlated with GAP, is not considered due to missing values in some years for Indonesia. Similarly, road density, which represents infrastructure to enable movement of agriculture produce from one market/country to another, was not considered for the analysis. The output per worker, that is, labor productivity, is estimated separately for each sector to see the productivity gaps and possibility of convergence. Further, the empirical analysis is undertaken from 2000 to 2016 due to non-availability of time series data for Myanmar from 1991 to 1999. Data for CLMVPMIT is compiled from various sources—the Food and Agriculture Organization of the United Nations (FAO), the World Bank's World Development Indicators (WDI), and the United Nations COMTRADE database—from 1991 to 2016. The time series on VA in the agriculture, industry, and services sectors, and the value of output from agriculture and allied activities and share of each sector are extracted from the FAO. The employment share of agriculture, manufacturing, industry, and services in total employment are taken from the WDI. The other variables extracted from these sources are gross fixed capital formation in agriculture and allied activities, which is inclusive of public and private investments; FDI; urbanization; infrastructure; and the value of agriculture exports and imports. Except for FDI, which is available at US$ at the 2005 price, each variable is at 2010 prices.

III. Structural Transformation in Southeast Asian Economies and Key Drivers

Before we delve into the process of ST in CLMVPMIT, it is pertinent to analyze economic growth and the factors affecting it over time. We deliberately divide the selected period into two—1991-2000 and 2001-2016—to gauge the impact of policies. One key policy change is the regional trade agreements that came into effect in 1998. This has expanded exports and imports of agriculture and manufactured products within SEA countries and across Asian countries (Vos 2018). Another crucial policy change is a considerable increase in FDI in each country's agricultural sector. A concerted effort to improve land productivity through price incentives and fertilizer use is also visible in many SEA countries (Sen 2016).

Table 1 furnishes averages and the annual rate of growth of key economic indicators from 1991 to 2000 and 2001 to 2016. It is observed that the countries with lower PCI (Cambodia, Lao PDR, Myanmar, and Viet Nam) are growing at a faster pace compared to those having relatively higher PCI (Philippines, Thailand, Indonesia, and Malaysia). A similar pattern is clearly visible for agriculture VA and allied activities.

An important variable for the process of ST is labor productivity for the agricultural and nonagricultural sectors. Agricultural labor productivity is growing at a faster pace compared to nonagricultural in most countries, which indicates they are approaching the TP. However, the growth in land productivity between two periods of 1991-2000 and 2001-2016 seems to have increased at a slower pace in some countries while in other countries it has either decelerated or stagnated. USDA (2014) reported that growth in technological progress contributed significantly to rapid output growth in the agricultural sector of CLMVPMIT. This indicates the shift in the factors affecting growth in the agricultural sector of CLMVPMIT.

Another integral aspect of ST is the income shares of agriculture, industries, and services in VA. Recall that in the first phase of ST Kuznets maintained that resources move from agriculture to industries and in the second stage the resources move from agriculture and industries to services. Cambodia, Lao PDR, and Myanmar still have a higher agricultural share in VA with Lao PDR doing better in recent years. There has been a secular decline in agriculture's share of VA in almost all the CLMVPMIT countries, with an increase in the VA shares of the industrial and service sectors. During 1991-2000, substantial growth in the manufacturing sector of Cambodia and Viet Nam occurred. This is important for the process of ST as manufacturing sector provides employment opportunities for the labor migrating from agriculture. Another striking feature is that the share of agriculture in VA in Thailand, Indonesia, and Malaysia was among the lowest, with a relatively higher share in manufacturing and services from 1991 to 2000. These shares changed in the subsequent decade. Among the three countries, Malaysia has the lowest share of agriculture in VA, along with the highest urbanization, and improvements in labor and land productivity. Another notable aspect is that the ratio of labor and land productivity in agriculture has declined in most SEA countries except in Thailand, Malaysia, and Cambodia. It indicates that physical productivity (the ratio of agricultural productivity over land productivity) growth has not led to a corresponding improvement in the standard of living of people working in agriculture, which is the pattern visible in the case of India (World Bank 2014). In other words, slow physical productivity growth represents a large population still stuck in agriculture because of the slow migration of labor from the agriculture to nonagriculture sector. This in turn negatively affects the economic wellbeing of the rural sector.

We observe an increase in the growth of labor productivity, stagnant land productivity, and declining shares of agriculture in VA. This indicates the ongoing process of ST. However, the pace of these performance indicators varies across the countries considered, revealing a mixed picture with respect to the ST process. Some countries may be experiencing a faster transition while others are experiencing a slower process.

Table 1 Key indicators and average annual growth rate in Southeast Asia

1991-2000	Cambodia	Lao PDR	Myanmar	Viet Nam	Philippines	Thailand	Indonesia	Malaysia
Per capita Income (2010 US$)	355.6	569.6	214.8	591.6	1,525.4	3,261.6	2,092.4	6,133.3
Rate of growth (%)	3.9	4.0	6.6	5.7	0.5	2.8	1.2	3.5
Value added agriculture and allied activities (2010 US$ million prices)	2,029.0	933.7	5,127.2	12,626.8	16,643.5	24,912.2	69,599.7	18,390.1
Rate of growth (%)	3.6	5.6	--	4.6	1.9	3.3	1.8	-0.1
Labor productivity – Agriculture (2010 US$ prices)	550.9	510.1	410.7	490.1	1,543.5	1,460.6	1,794.8	11,393.2
Rate of growth (%)	1.5	3.6	--	3.6	0.8	4.4	1.7	0.4
Labor productivity – Nonagriculture (2010 US$ prices)	2,660.7	4,180.7	959.4	2,798.1	4,860.6	15,958.4	7,340.0	20,431.1
Rate of growth (%)	-0.4	9.4	--	8.2	3.7	5.7	-1.3	1.1
Land productivity (2010 US$ prices)	530.1	1,020.4	503.8	1,773.0	1,700.3	1,251.8	2,187.3	2,771.1
Rate of growth (%)	3.5	3.8	--	2.0	2.2	4.2	-0.4	-0.4
Share of agriculture in VA (%)	44.4	40.5	--	28.8	19.1	9.6	18.1	12.5
Rate of growth (%)	-2.2	-3.1	--	-6.1	-4.4	-5.6	0.2	-4.4
Share of manufacturing in VA (%)	16.2	19.7	--	30.3	33.0	37.2	42.4	42.7
Rate of growth (%)	4.9	2.6	--	4.8	0.2	-0.6	0.2	0.2
Share of services in VA (%)	39.6	40.9	--	40.9	47.8	53.1	39.6	45.9
Rate of growth (%)	0.3	1.1	--	3.6	-0.2	0.4	-0.3	2.0
2001-2016								
Per capita income (2010 US$)	736.6	1,091.9	706.0	1,210.4	2,054.7	4,764.6	2,944.1	8,773.2
Rate of growth (%)	5.6	6.1	9.7	5.4	3.5	3.5	3.9	3.0
Valued added agriculture and allied activities (2010 million US$ prices)	3,390.5	1,522.2	13,006.1	20,434.2	23,692.6	35,300.3	10,0687.7	24,760.8
Rate of growth (%)	3.9	3.4	6.4	3.2	2.1	1.1	3.7	2.6
Labor productivity – Agriculture (2010 US$ prices)	920.3	710.2	897.4	815.1	1,979.3	2,316.5	2,409.7	15,492.9
Rate of growth (%)	6.2	2.7	8.6	4.1	1.9	4.2	3.8	1.6

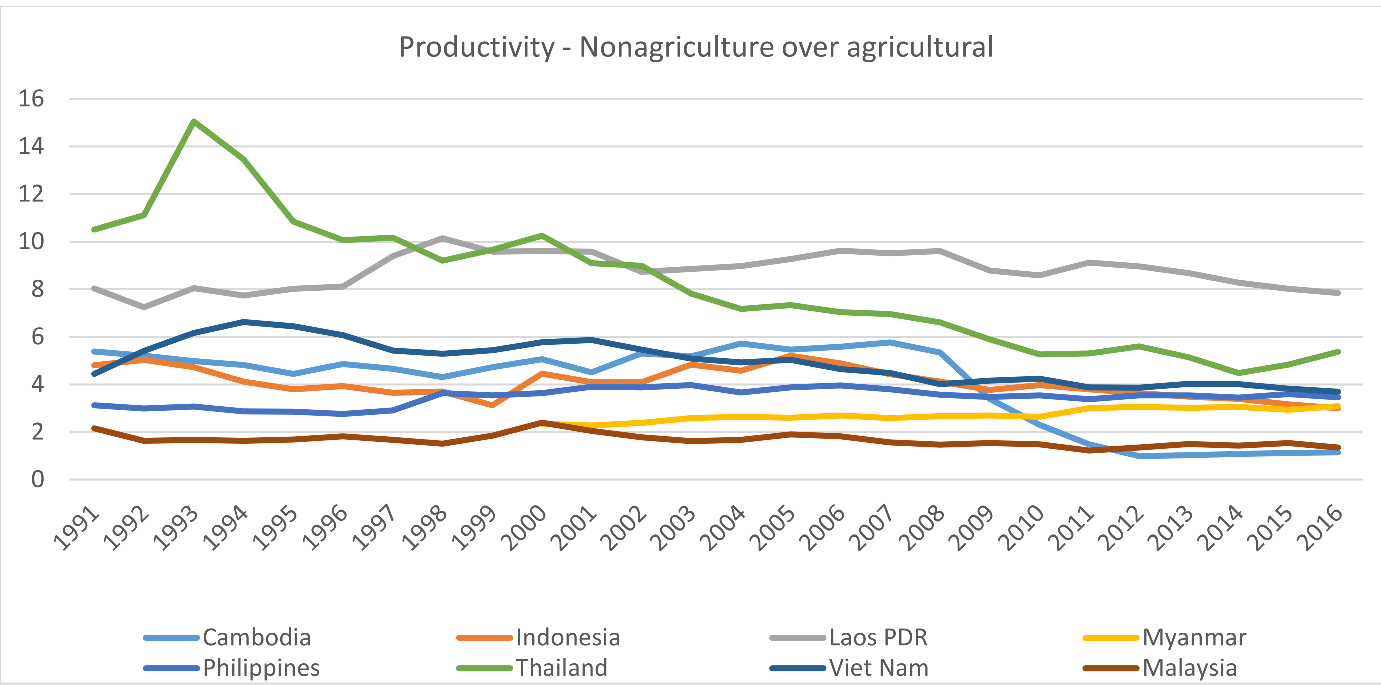
1991-2000	Cambodia	Lao PDR	Myanmar	Viet Nam	Philippines	Thailand	Indonesia	Malaysia
Labor productivity – Nonagriculture (2010 US$ prices)	2,566.9	6,303.1	2,506.5	3,575.0	7,246.8	14,679.1	9,545.5	24,438.3
Rate of growth (%)	-0.5	1.1	9.9	1.5	0.8	-1.0	2.4	0.3
Land productivity (2010 US$ prices)	869.1	1,088.2	1,105.0	2,068.8	2,279.7	1,780.3	2,343.2	3,441.0
Rate of growth (%)	3.7	0.1	5.3	1.0	1.4	0.3	1.6	1.1
Share of agriculture in VA (%)	30.2	24.8	40.2	19.7	12.3	9.7	14.4	9.2
Rate of growth (%)	-3.5	-3.7	-4.8	-2.6	-1.8	-0.6	-1.1	-0.6
Share of manufacturing in VA (%)	24.4	27.3	23.4	36.5	32.7	38.0	44.6	42.8
Rate of growth (%)	1.3	1.6	8.1	-0.5	-0.7	0.1	-0.7	-0.8
Share of services in VA (%)	45.7	47.9	36.3	43.7	55.0	52.3	41.0	48.3
Rate of growth (%)	1.4	1.4	7.8	-2.7	-1.5	0.2	1.1	-1.9

Source: Based on data from the FAO of the United Nations and the World's Bank World Development Indicators.

Note: VA = value added.

Cambodia has done well in reducing the intersectoral labor productivity gaps overtime. Between 1991 and 2000, the nonagricultural to agricultural labor productivity ratio was 4.82: 1, which reduced to 2.78: 1 in 2001-2016. Moreover, the productivity differential was the least for Cambodia over 1991 to 2016 as shown in Figure 1. This is attributed to high agricultural growth and implementation of open market reforms since 1989. The demand for agricultural goods such as rice and rubber has boosted agricultural growth. Simultaneously, expansion of the garment industry has provided job opportunities for the rural laborers migrating from agriculture. This has led to reduction in the intersectoral labor productivity gaps. This indicates Cambodia and perhaps Malaysia too may be closer to convergence between the agricultural and nonagricultural sectors.

Figure 1 Nonagricultural and agricultural labor productivity ratio



Source: The FAO of the United Nations and the World Bank's World Development Indicators

The labor productivity differentials in Lao PDR and Thailand are the highest among all SEA economies. Furthermore, the ratio of nonagricultural to agricultural labor productivity tends to decline by almost 0.09% and 2.3% per year between 1991 and 2016. Lao PDR has been slow in reducing the productivity differentials. On the other hand, comparatively high-income Thailand has performed remarkably well on this front even though its absolute ratio is among the highest. The nonagriculture and agricultural productivity ratios in Indonesia, Myanmar, Philippines, Viet Nam, and Malaysia range from 2 to 6 throughout the period of 1991-2016. The trend in the productivity differentials is either stagnant or declining. In other words, countries experiencing stagnant or slow declining productivity differentials indicates a sluggish transition towards convergence and therefore slower ST.

Table 2 provides details on other indicators that may hasten the process of ST. A closer look at the terms of trade index (representing the ratio of agricultural to nonagricultural prices and also an incentive structure for farmers) shows it to have turned favourable to agriculture in most of the SEA countries over the period, except in Lao PDR and Myanmar. Agricultural trade flows are observed to have increased in 2001-2016 compared to 1991-2000, albeit slowly. Annex Table 1 validates a slow increase in total agriculture trade (Standard International Trade Classification (SITC) chapters 1 to 24) seen at two points of time: 2001 and 2017. Malaysia, Myanmar, and Viet Nam have demonstrated a 2 percent increase in agricultural exports' share while Cambodia and Thailand witnessed an increase in imports' share of GDP from 1 to 2 percent over 16 years.

Table 2: Terms of trade and market integration: Average 1991-2000 and 2001-2016

1991-2000	Cambodia	Lao PDR	Myanmar	Viet Nam	Philippines	Thailand	Indonesia	Malaysia
Terms of trade	0.6	1.4	1.2	0.7	1.1	0.7	0.8	0.7
Rate of growth (%)	3.3	-2.5	0.0	-4.0	-0.7	-1.8	2.7	1.4
Agriculture trade flows (%)	6.7	6.0	1.0	11.7	5.0	7.4	4.6	12.8
Urbanization (%)	17.3	18.3	--	22.4	48.3	30.4	36.7	56.3
FDI (US$2005 prices)	11.7	11.8	--	27.9	18.3	55.4	7.5	386.5
2001-2016								
Terms of trade	0.8	1.1	1.1	0.9	1.0	0.9	0.9	0.9
Rate of growth (%)	3.2	0.8	-2.3	4.0	2.3	2.2	2.7	2.8
Agriculture trade flows (%)	7.5	6.1	7.9	14.2	4.9	9.6	5.6	13.6
Urbanization (%)	19.6	31.0	30.6	29.3	45.8	41.7	48.4	69.1
FDI (US$2005 prices)	44.4	21.9	12.2	42.3	15.8	84.1	20.1	273.4

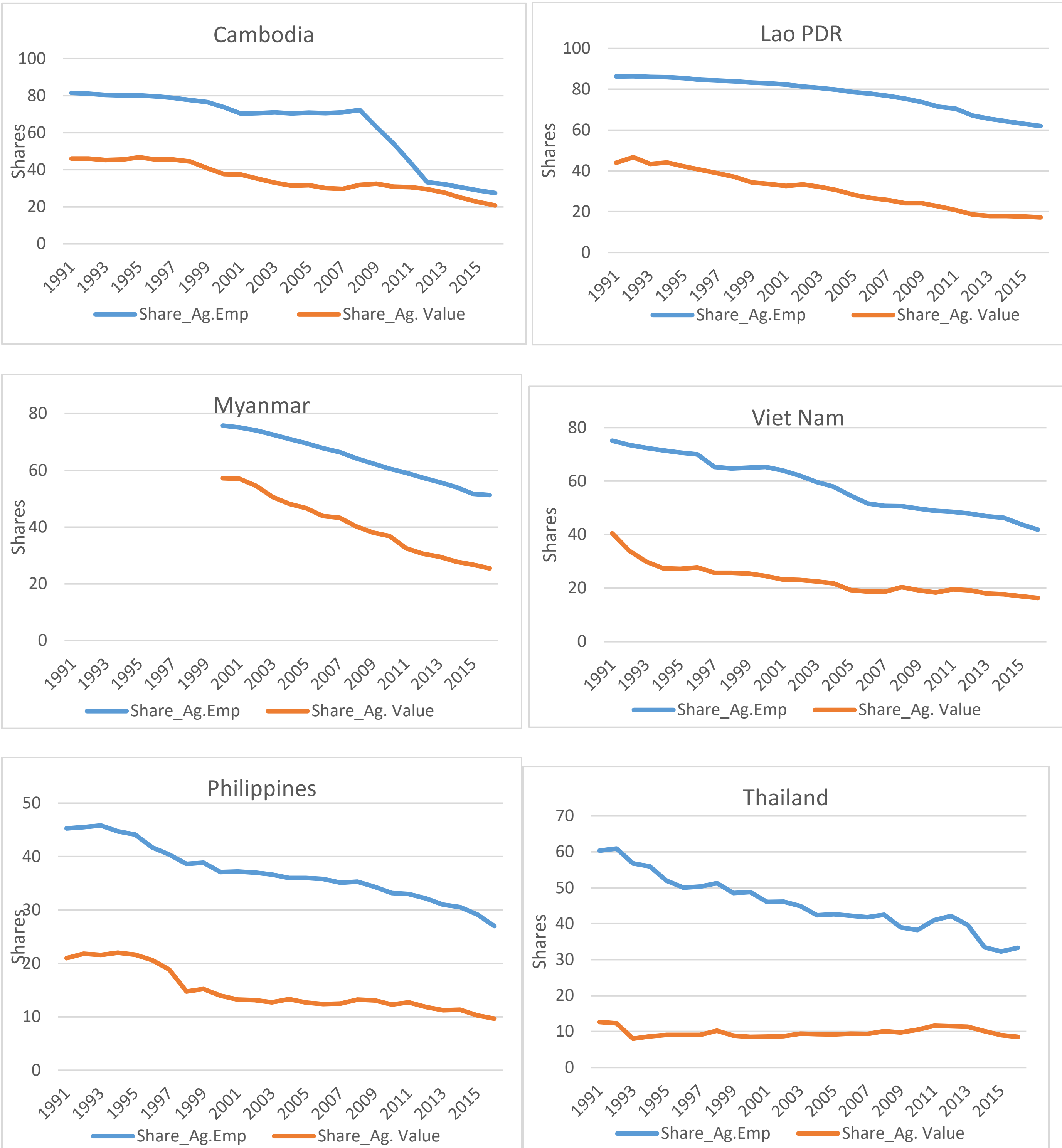
Source: Based on data from the FAO of the United Nations and World Bank's World Development Indicators.
Author: FDI = foreign direct investment.

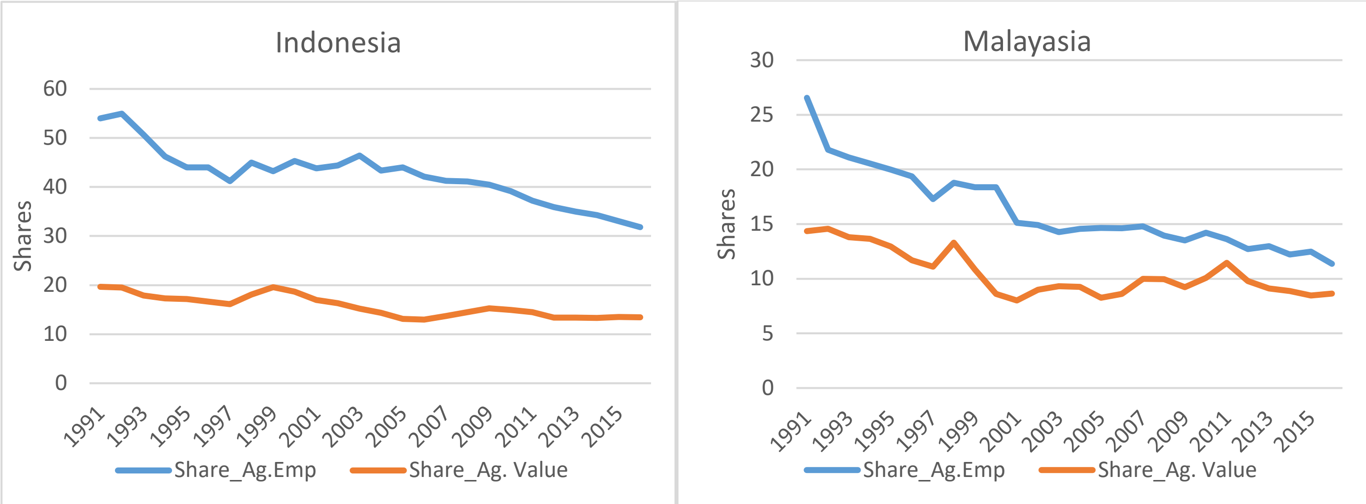
Another important finding on market integration is a slight change in the intra- and intercountry source, as well as destination, of agricultural trade (Annex Table 2). Among CLMVPMIT countries, Malaysia, Thailand, and Viet Nam are much ahead of the others in exporting to and importing from Singapore, China, and the

United States. The indicators FDI and urbanization have been increasing in most countries except in Philippines, where both show a reverse trend. Among all SEA countries, the maximum average FDI at 2005 prices was in Malaysia and Thailand at US$386.5 and US$55.4 during 1991-2000 and US$273.4 and US$84.1 during 2001-2016. We find that favourable terms of trade amid a slow pace of increase in agricultural trade flows, market integration, urbanization, and FDI indicate a gradual but mixed process of ST across the SEA region.

Given the background of the economies of CLMVPMIT, we now turn to analyze the trends in the ST and the GAP. Recall that in the introduction we mentioned the significance of ST in reducing inequality and poverty. In this context, we present the ST for the countries belonging to CLMVPMIT. Figure 2 shows agriculture's value added and employment shares, by country. We observe that all the countries follow the standard process of ST, but there are variations in the magnitude of the decline in both the shares. Cambodia and Malaysia are approaching convergence, followed by Indonesia and Philippines. Myanmar, Thailand, and Viet Nam still need to pick up their pace. Lao PDR is the only country that is experiencing a delay in the ST process. Though Myanmar, Thailand, and Viet Nam are trying to catch up, which can be observed through the increase in growth of PCI, polices addressing the needs of agriculture are required to be implemented to improve productivity. As previously stated, public expenditures on agricultural R&D as a percentage of GDP have been around 1.2 to 2 percent for the period 1996 to 2008 in Malaysia, whereas for other countries in the SEA region it was about 0.7 to as low as 0.1 percent (Dawe 2015). Moreover, the Malaysian government has invested significantly in infrastructure projects in order to promote vertical integration with processing industries. The Malaysian government also spent significantly on smallholder farming through a number of price support schemes, input subsidies, and low-interest credits. Indonesia, on the other hand, stepped up funding for agricultural R&D and rural infrastructure such as roads, irrigation projects, and electricity. Indonesia had to cut down on public investment, however, due to the Asian economic crisis during the late 1990s (Vos 2018). Viet Nam also has increased funding in the agricultural sector but lacked mutual support through better rural infrastructure (De Konick 2013). Following the Asian economic crisis, there has been a slow increase in agricultural spending.

Figure 2 Value added and employment shares in Southeast Asia, 1991-2016 (%)





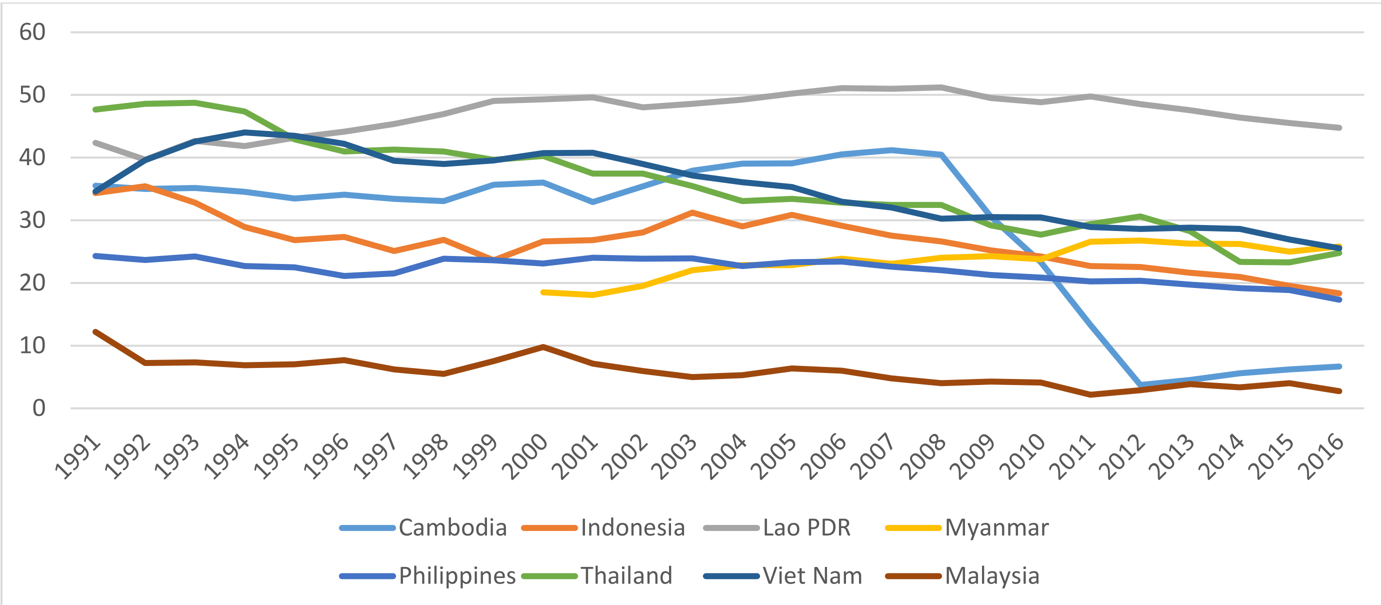
Source: The FAO of the United Nations and the World Bank's World Development Indicators

Note: Share_Ag.Emp = agriculture's share of employment; Share_Ag. Value = agriculture's share of value added.

A common feature among most SEA countries is a significantly slower decline in the share of labor in agriculture. The reason being, the majority of the labor force in agriculture lacks adequate skills for jobs in the manufacturing or services sector. This is further exacerbated by a lack of the necessary infrastructure needed for migration, such as better roads and communication. Lao PDR, for instance, is heavily dependent on capital-intensive natural resource exports. This may come at a cost in terms of high inequality and unemployment. Only a few individuals involved in the natural resource sector tend to benefit in terms of employment leading to inequality. Moreover, this has led to the shrinking of the manufacturing sector. The manufacturing sector is known for possessing growth-enhancing qualities such as positive technological spillovers, learning-by-doing effects and increasing returns to scale in production. The shrinking of the manufacturing sector reduces the scope for providing employment to the labor moving out of agriculture (Brahmbhatt & Vostroknutova 2010).

A graphical representation of the ST indicator GAP (agriculture employment share minus income share) in Figure 3 clearly shows Cambodia and Malaysia ahead of others in reaching ST. The value of GAP is close to 3 percent in each. Three nations—Lao PDR, Myanmar, and Viet Nam—are way behind as the value of GAP is high within the range of 25 to 45 percent.

Figure 3 Structural transformation (GAP) in Southeast Asia, 1991-2016



Source: The FAO of the United Nations and the World Bank's World Development Indicators

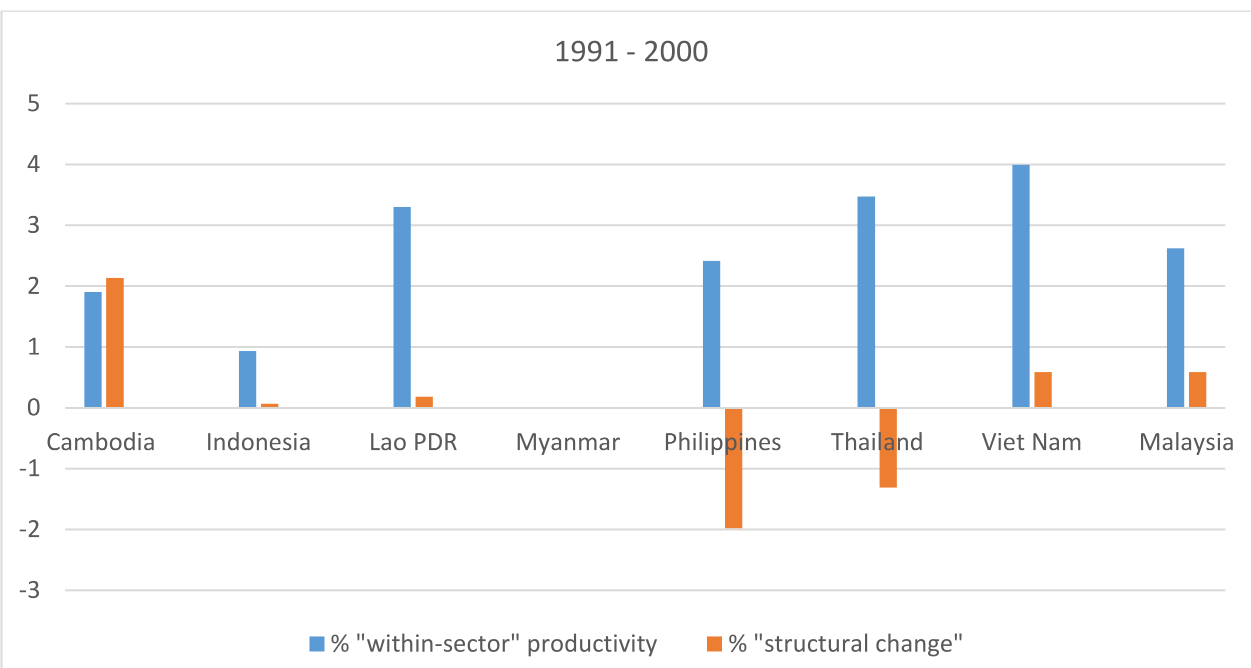
In sum, we find that CLMVPMIT as a region is going through a traditional ST but with significant variations. The GAP, defined as the difference between the share of agriculture in employment and in valued added (VA) is reducing significantly for some countries (Cambodia, Malaysia) while for others (Lao PDR, Myanmar, Viet Nam, Philippines, Thailand, and Indonesia) there is still a long way to go. A delay in reducing GAP may lead to inequality and increased poverty. Concerted efforts are needed to bring about a significant change in the GAP and therefore the ST process.

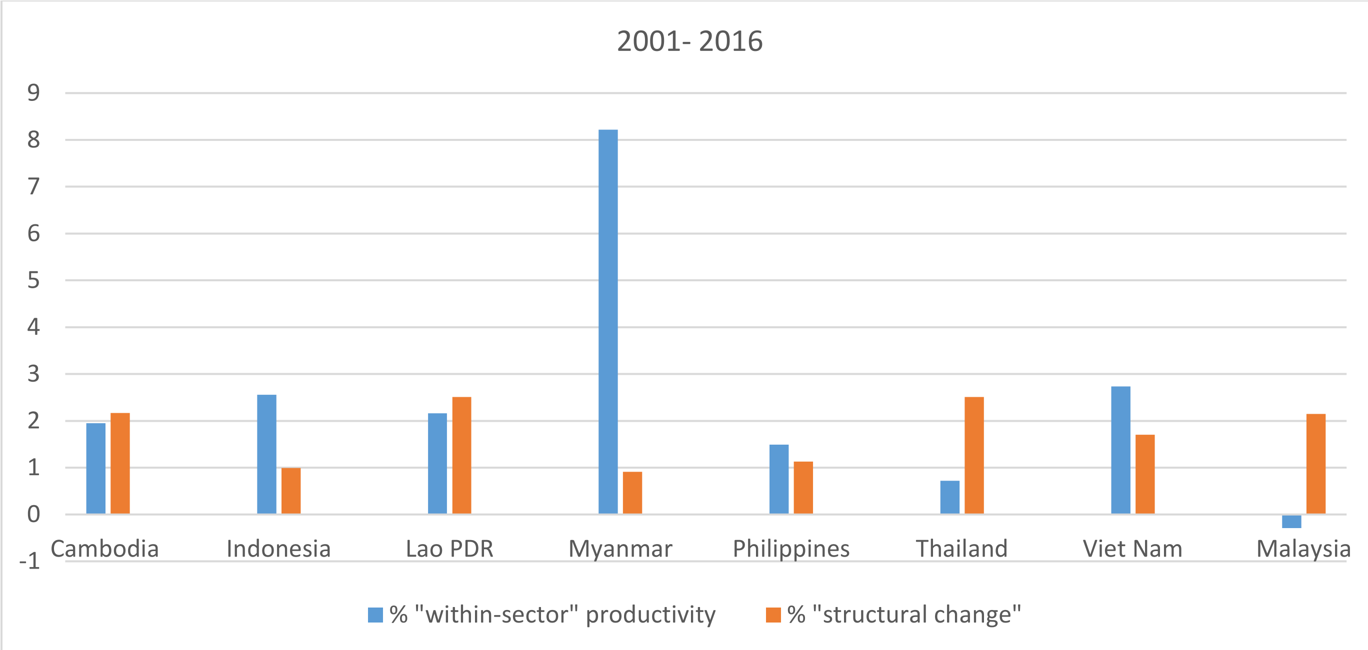
III.1 Decomposition of Labor Productivity into "Within Sector" and "Structural Change"

In the previous section, we observed that there was significant growth in labor productivity across sectors, which was contributing to the ST process. Among all the SEA countries, Cambodia and Malaysia are performing well compared to others in terms of major economic indicators and GAP. Others are catching up fast. The moot question is whether growth in labor productivity is due to inherent growth of the sector, called "within sector," or due to labor moving from an inefficient sector to an efficient sector, called "structural change." A comparison of the average trends is made across two periods: 1990-2000 and 2001-2016 based on the decomposition exercise as explained in Section II.

It is observed from Figure 4 that in the first period, more than 80 percent of growth in labor productivity attained by Indonesia, Lao PDR, Myanmar, Philippines, Thailand, Viet Nam, and Malaysia was due to “within-sector” factors, largely explained by technological change and higher investments. Cambodia stands out in this period because its growth was the result of both “within-sector” and “structural change,” with the latter contributing significantly. However, during 2001-2016, apart from “within sector,” “structural change” affected labor productivity growth significantly across the entire SEA region in the range of 1 to 2.5 percent. Among all SEA nations, Thailand and Malaysia had the lowest “within sector” growth, at 0.86 percent and -0.29 percent respectively. However, Myanmar stands out in this period, where “within-sector” growth is significantly higher compared to that in other countries. Cambodia, Indonesia, and Viet Nam also show a relatively larger contribution of “within sector” growth by 3 percent, apart from the contribution from “structural change.” Compared to all Southeast Asia, Malaysia and Thailand are reaping benefits because of “structural change” or the process of ST. The overall picture highlights a delay, across the countries, in the contribution of structural change. On the other hand, the negative growth of structural change observed in some countries may have a negative impact on economic growth. In other words, there is a gradual movement of the labor force from agriculture to the manufacturing and services sectors, which indicates slow ST. This slow ST could be either due to the lack of adequate skills or opportunities in the nonagricultural sector. A slow movement of labor can also be due to a delay in the convergence of labor productivity in the nonagricultural and agricultural sectors.

Figure 4: Decomposition of productivity in Southeast Asia, 1991-2000 and 2001-2016





Source: Based on data from the FAO of the United Nations and World Bank's World Development Indicators

III.2 Estimates on Turning Points

Growth in agriculture productivity (measured through either land, labor or total factor productivity) is a pre-condition for ST to happen at a steady speed. It must increase so that labor moves out of agriculture. As stated above, income inequalities across sectors tend to widen initially, resulting in a higher concentration of poverty in agriculture. Eventually, a TP is reached when the share of agricultural labor in the economy starts to decline at a faster rate than its share in output. Labor productivity in agriculture begins to increase and converges with labor productivity in the nonagriculture sector, and the process of ST starts to conclude. Based on methodology given in Timmer et al. (2016), we derive the TPs for each country by regressing GAP on PCI, and derive the terms of trade using the OLS method explained in Section II. Annex Table 3 furnishes the estimated coefficients of PCI, PCI^2, and the terms of trade from 1960 to 2016.

The TPs are estimated using the per-capita growth rate for respective countries from the period 2010 to 2016. The TP is the per-capita income at which each country would attain the stage wherein agricultural employment share falls faster than the agricultural VA share. The results presented in Table 3 reveal that Lao PDR, Thailand, and Indonesia have already attained TP in 2009, 2007, and 2016, respectively. Surprisingly none of these countries has accomplished convergence in sectoral productivities. This suggests that along with the structural process, it is crucial to initiate measures to reduce the productivity differentials between the agricultural and nonagricultural sectors. More favourable policies intending to favour agricultural terms of trade may be helpful in this regard. This would increase the pace of convergence of productivity differentials between agricultural and nonagricultural sectors. This is necessary for a successful completion of the ST process.

Table 3: Turning points in per capita income and projected year, 1960 to 2016

Countries	Turning point in per-capita income	Projected year of reaching turning point
Cambodia	$1,214	2020
Lao PDR	$1,098	2009
Myanmar	$2,948	2026
Viet Nam	$2,511	2024
Philippines	$4,265	2029
Thailand	$4,602	2007
Indonesia	$3,902	2016
Malaysia	$12,150	2021

Source: Authors' own estimates based on from the FAO and World Bank's World Development Indicators;
Turning point for Lao PDR is estimated from 2006 to 2016 due to unavailability of data.

Cambodia and Malaysia would reach the TPs by 2020 and 2021, respectively, and perhaps sectoral productivity convergence as well. This is attributed to the proactive steps taken by these countries in improving agricultural productivity. The steps ranged from investing in R&D; building infrastructures such as road, communications, and irrigation projects; providing marginal and small farmers with subsidies; and opening up of international boundaries for trade. Cambodia and Malaysia have been reaping the benefits of these policies over the last decade. On other hand, Viet Nam, Myanmar, and the Philippines would take another decade to reach their respective TPs. The delay in achieving TPs is due to a relatively slow decline of agricultural labor share compared to that of the agricultural VA share. In order to augment reduction of agricultural labor share, emphasis should be laid on improving rural infrastructure, education, and technical skills. An increase in education would help them acquire skills needed for jobs in the nonagricultural sector while rural infrastructure such as roads, communications, and electricity would provide them with opportunities to move out of agriculture.

To sum up, the first stage of a successful ST is achieving the TP followed by the second stage of attaining convergence between nonagricultural and agricultural labor productivity. Lao PDR, Thailand, and Indonesia have already attained TP but have been delayed in attaining convergence (Figure 3). Cambodia and Malaysia will reach TP soon. Viet Nam, Myanmar, and Philippines would need another decade to attain TP. This is evident from stagnant nonagricultural and agricultural labor productivity ratios and less contribution of structural change toward labor productivity growth (Figures 3 & 4).

III.3 Key Drivers of Structural Transformation in SEA Countries

We have taken up a cross-country comparison on the key determinants of ST based on IV regression and IV 2SLS approaches in double log functional form from 2000 to 2016. As elicited in Section II, the choice of these models is determined by the problem of endogeneity found in one explanatory variable: land productivity. The use of OLS makes the estimates biased. The diagnostic tests indicate the robustness of the estimates when the IV method is used. Testing the IV 2SLS model requires one of the simultaneous equations to be overidentified. This has been checked using the Sargan test. Endogeneity has been checked by the Hausman F-test. The model satisfies both the necessary conditions of endogeneity and overidentifying restrictions to run the IV 2SLS fixed effects model.

The results presented in Table 4 reveal that the dependent variable GAP, an indicator of ST, is negatively associated with land productivity, terms of trade, infrastructure, and crop diversification. The variable sectoral labor productivity ratio is found to have a high and significant correlation with GAP at 0.78 but it is dropped due to high multicollinearity with land productivity. Taking country fixed effects and time into consideration, the estimated coefficient of land productivity (1.68) is negative but statistically insignificant, and that of terms of trade (2.18) is negative and significant at the 1 percent level. It indicates that a 1 percent increase in land productivity and favourable prices can reduce GAP or enhance ST by almost 2%. Besides these explanatory variables, GAP is influenced by investment in agriculture but with a much lower value of coefficient i.e. elasticity at -0.47. The positive and statistically insignificant signs of coefficients of trade flows and urbanization suggest their negligible impact in bringing ST and hence easy exit of labor from agriculture to nonfarm sectors may be a better approach. The analysis also shows year effects to be statistically insignificant while the country effects are significant, implying a declining trend of GAP over time for CLMVPMIT.

Table 4: Determinants of structural transformation in Southeast Asia, 2000-2016

Dependent variable: Log GAP (Agriculture employment share – Agriculture VA share)				
Variables in log	Instrumental variable regression method		Instrumental variable 2SLS fixed effects model	
	Coefficient	Standard error	Coefficient	Standard error
Land productivity	-1.68	1.35	-3.21**	1.47
Terms of trade	-2.18*	0.57	-2.99*	0.88
Agriculture trade flows	0.51	0.42	0.80	0.68
Crop diversification	-0.35	1.75	0.46	0.78
Infrastructure: Access to electricity	-1.74**	0.86	-2.12*	0.90
Infrastructure: Fixed phone subscription	-0.39	0.35	-0.34	0.40
Urbanization	1.59***	0.84	0.32	0.94
Investment in agriculture/ha	-0.47	0.79	0.95	0.66
Trend	-0.06	0.10	-0.06***	0.04
Constant	4.43	8.66	26.06*	9.34
Year effects	Yes	Not significant	--	--
Country effects	Yes	Significant	--	--
No. of observations	136			136
R^2 (within)	--			0.39
R^2 (between)	--			0.06
R^2 (overall)	0.66			0.01
sigma_u				1.94
sigma_e				0.80
rho				0.86
F-statistics				11.49
Robust score chi2(1)			0.98 (p=0.32)	
Robust regression F(1,118)			0.94 (p=0.34)	
Test of overidentifying restrictions: Score chi2(1)			3.65 (p=0.06)	

Source: Own estimates based on data from the FAO of United Nations and World Bank's World Development Indicators
Note: 2SLS = two stage least squares; ha = hectare; VA = value added. Variables specified in log. * , **, and *** indicate statistical significance at 1 percent, 5 percent and 10 percent levels, respectively. Instrumented: Land productivity; Instruments used: terms of trade, gross fixed capital formation in agriculture per hectare, crop diversification, population enrolled in primary school (a proxy for education and skill formation). Results pertain to second-stage analysis.

Given that land productivity is influenced by multiple variables—terms of trade, investment, education of labor—we run IV 2SLS with fixed effects, using multiple instruments in the estimation of land productivity equation. Land productivity is instrumented by terms of trade, investment represented by gross fixed capital formation in agriculture, and allied activities and educated labor represented by workers enrolled in primary school. We obtain consistent estimates of the parameters from both the OLS and 2SLS models.[6]

In the IV 2SLS specification, the estimated coefficients on terms of trade, infrastructure, and the time trend remained unchanged, whereas the value of the land productivity variable differs from that obtained in the IV OLS specification. Land productivity in IV 2SLS is highly significant in impacting the GAP as compared to that in the IV OLS specification. The estimated elasticity is -3.21, implying a 1 percent increase in land productivity can bring a faster reduction in GAP by 3.21 percent. The same is the case with terms of trade and infrastructure (access to electricity) variables having a larger effect (elasticity 2.99 percent and 2.12 percent) in bringing ST across the SEA countries.

The ratio of sectoral labor productivity (agricultural/nonagricultural) also has the expected negative sign in impacting the GAP. It is found significant at the 1 percent level but dropped from the model due to high collinearity with land productivity. An improvement in labor productivity through education and skill formation of farm labor can act as a catalyst in bringing ST. Among other variables, investment in agriculture, urbanization, trade flows, and crop diversification all turn out to be insignificant. These variables together explain nearly 66 percent and 39 percent of the variations in GAP as indicated by adjusted R square in IV regression and the IV - 2SLS fixed effects model. The impact of other variables such as economic reforms, road density, rainfall, and markets, captured through a trend variable, is significant at the 10 percent level.

The highlight is that policies that bring improvements in these variables need to be implemented to achieve a successful ST. The impact of crop diversification, captured through percentage share of area under non-food grain, on ST is negligible in the aggregate analysis. As shown in Annex Figure1, a perceptible increase in the percentage share of area under non-food grain in Southeast Asia is visible only from 2000, except in Philippines.

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[6] The IV standard errors are larger compared to the standard errors obtained in the OLS estimation. In case of one endogenous variable and one instrumental variable or the same number of endogenous and instrumental variables, the endogenous variables are just identified.

IV Main Findings and Implications

This study examined the process of ST across the SEA economies and empirically analyzed its key drivers with an aim to ascertain the pertinent issues in the process and propose policies to enhance the pace of transformation and economic growth. In all, eight countries are chosen for the analysis: Cambodia, Lao PDR, Myanmar, Viet Nam, Philippines, Malaysia, Indonesia and Thailand (CLMVPMIT).

The analysis reveals that SEA countries' progress on ST—measured as the difference between agriculture's shares of labor force and VA—has been consistent with the theory and historical patterns experienced in several developed and developing countries. However, the progress is diverse across the SEA countries and lags behind the developed countries, indicating that labor is not exiting agriculture as fast as agriculture's share of VA has been declining. The GAP has decreased from 49 percent in Thailand to almost 3 percent each in Cambodia and Malaysia during 1991 to 2016.

A decomposition of labor productivity again provides distinct results. The contribution of "within change" to productivity, which was pivotal during the 1990s in each country, is rather subdued in the subsequent decade, thereby giving comparative primacy to "structural change." The only exception is Myanmar, where "within sector" holds more prominence in productivity growth. A relatively higher contribution of "structural change," from 57 percent to 80 percent, along with productivity growth in Cambodia and Lao PDR, can possibly be explained by an increase in migration and trade in nonagriculture products. Large productivity differentials between the agricultural and nonagricultural sectors in countries other than Cambodia and Malaysia point towards a critical need to improve labor productivity in agriculture through education and skill formation. A decline in the ratio of agricultural labor and land productivity (except in Thailand, Malaysia, and Cambodia) reflects that physical productivity growth has not brought about a proportionate improvement in the standard of living of people engaged in agriculture.

Surprisingly, none of the eight SEA countries has attained convergence in sectoral productivity but a few—Lao PDR, Thailand, and Indonesia—have already reached their TPs, the point at which a country's agricultural employment share falls faster than the agricultural value added share and eventually moves towards convergence in sectoral labor productivities. Cambodia and Malaysia would reach their TPs by 2021 and are likely to bridge the agricultural and nonagricultural productivity gaps. Viet Nam, Myanmar, and Philippines, relatively poorer economies and agriculturally dependent, are predicted to take at least a decade to reach their respective TPs. It may suggest the urgency of initiating measures to hasten the structural process of labor absorption outside agriculture along with reduction in the sectoral productivity gaps.

As regards the drivers of ST in CLMVPMIT, the IV 2SLS fixed effects model suggests land productivity, favorable price structure (captured through terms of trade), and public infrastructure development holds the key. Rural-to-urban migration, agriculture diversification, and openness to agricultural trade have not been effective in pulling people out of agriculture. The analysis substantiates the extant literature on the critical role of agriculture and a favorable price regime in raising output per hectare and hastening the process of ST (Timmer 2004; IFAD 2016; Fuglie 2012). The main highlight of the empirical analysis is that agricultural productivity—be it land, labor, or TFP—must increase in CLMVPMIT to reverse a disproportionate share of the labor force in agriculture, despite a steady rate of economic growth. However, as pointed out by Birthal et al. (2019), the prerequisites are to raise public investments in infrastructure and R&D for technological improvements after a careful analysis of the status of agriculture in the poor and the rich countries. Agriculture in SEA nations is dominated by smallholder farming with rice as the main crop--except in Malaysia, Thailand, and Indonesia, where farming is dominated by export-oriented oil-palm, rubber and coconut production respectively. A rapid growth has been taking place in the low-income countries that is propelled by area expansion, technological change, and diversification towards high-value crops. An increased investment in technology would yield higher returns in low income SEA nations. On the other hand, in high-income countries such as Malaysia having specialization in export-oriented commercial crops, the output growth has largely been driven by increases in producer prices and to some extent area expansion. Price may have little role to play in the long run in these countries, due to the volatile nature of world prices. The focus therefore should be on encouraging a diverse crop portfolio and raising productivity through technological advancements and establishing market linkages.

We find that Cambodia and Malaysia are much ahead of other SEA economies in terms of ST and close to achieving the TP and convergence in sectoral productivities. Cambodia still has some scope to reduce the share of agriculture in valued added through increased growth in manufacturing and services. Investment in education and skill development may contribute significantly to reduce the structural gap. Malaysia has performed well in improving land and labor productivity along with higher growth in manufacturing and services sectors and exports. Philippines, Myanmar, Indonesia, Viet Nam, and Thailand need to take corrective steps to enhance land productivity while simultaneously investing in infrastructure and skills development. Myanmar has been caught in a low equilibrium trap of low input, low productivity, low quality output, and low returns. Significant investment in agriculture may be a way out of this trap. Thailand experienced slow growth from 2013 to 2015 due to political unrest and stagnant global demand, which may have affected her growth process considerably. The country has substantial scope to improve the agricultural sector. Philippines is lagging behind, particularly in infrastructure and logistics. Better roads and the spread of electricity and communication can help Philippines in attaining higher agricultural growth. Lao PDR on the other hand has been experiencing land productivity almost 2.5 times lower than that of Viet Nam and Philippines. Moreover, labor productivity is almost half that of Thailand and Philippines. A better infrastructure can make Lao PDR more competitive in global trade.

To conclude, CLMVPMIT, though at dissimilar stages of ST and economic growth, should enhance capital formation in irrigation and other rural infrastructure and pursue technological advancement through increased expenditure on R&D. A big push in resource allocation towards agriculture, irrigation, and R&D is therefore vital in stimulating private investment and capital deepening and thus accelerating productivity growth. Higher labor productivity in turn would lead to more employment opportunities in rural nonfarm activities and to higher real wages due to a fall in the prices of agriculture commodities. This needs to be accompanied by an investment in the nonfarm sector and improvement in intersectoral linkages for a rapid movement of labor out of agriculture. The cross-country experience corroborates that capital deepening in agricultural and nonagricultural activities and infrastructure in rural areas contributes to much higher growth in productivity and reduction in the incidence of poverty.

ANNEX Tables and Figures

Annex Table 1: Market integration (trade flows 2001 and 2017)

Countries	Agriculture exports' % of GDP		Agriculture imports' % of GDP		Agriculture imports + exports' % of GDP	
	2001	2017	2001	2017	2001	2017
Cambodia	6.72	7.50	0.28	2.07	6.99	9.57
Indonesia	0.38	0.31	0.41	0.70	0.79	1.01
Lao PDR	5.45	5.20	0.64	1.09	6.10	6.29
Malaysia	5.50	6.90	4.30	4.80	9.80	11.70
Myanmar	2.38	3.40	1.84	0.86	4.22	4.25
Philippines	0.81	1.25	0.23	0.18	1.03	1.43
Thailand	0.38	0.95	1.09	2.17	1.46	3.13
Viet Nam	1.26	2.73	1.03	1.14	2.28	3.87

Source: 2001 and 2017 data from UN UNCOMTRADE
Note: GDP = gross domestic product.

Annex Table 2: Destination (exports) and source (imports) of agriculture products in 2017

	Exports (destination)		**Imports (source)**	
	Within ASEAN	World	Within ASEAN	World
Cambodia	Viet Nam, Malaysia, Thailand	China, France, Viet Nam	Thailand, Indonesia, Viet Nam	Thailand, Indonesia, Viet Nam
Viet Nam	Thailand, Indonesia, Malaysia	China, United States, Japan, Korea	Thailand, Philippines, Malaysia	Argentina, United States, Brazil, Thailand
Myanmar	Thailand, Singapore, Viet Nam	China, India, Thailand	Indonesia, Thailand, Malaysia	Indonesia, Thailand, India
Thailand	Viet Nam, Indonesia, Myanmar	Japan, China, United States, Viet Nam	Indonesia, Viet Nam, Malaysia	China, United States, Brazil, Indonesia
Indonesia	Malaysia, Philippines, Singapore	India, China, United States, Malaysia	Thailand, Malaysia, Singapore	United States, Australia, China, Thailand
Philippines	Malaysia, Thailand, Viet Nam	United States, Japan, Netherlands, China	Indonesia, Malaysia, Thailand	United States, Indonesia, China, Malaysia
Malaysia	Singapore, Viet Nam, Philippines	Singapore, China, India, Netherlands	Indonesia, Thailand, Singapore	Indonesia, China, Brazil, Thailand
Lao PDR	Viet Nam, Thailand, Singapore, Cambodia	Viet Nam, China, Thailand, Singapore	Thailand, Viet Nam, Singapore, Malaysia	Thailand, Viet Nam, China, Singapore

Source: 2017 data from UN COMTRADE
Note: ASEAN = Association of Southeast Asian Nations.

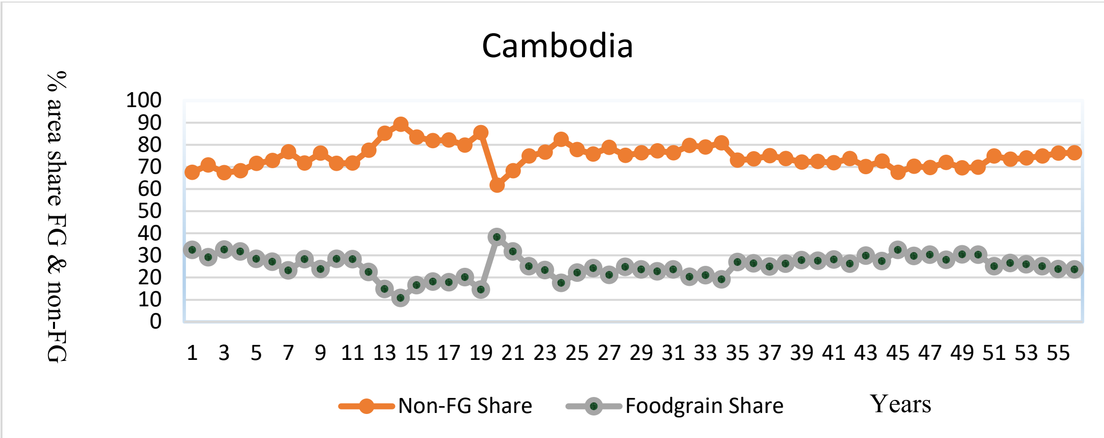
Annex Table 3: Estimation of turning points in CLMVPMIT from 1960 to 2016

Country/Variables	Cambodia	Indonesia	Lao PDR	Myanmar
Dependent variable: GAP				
Log VA per capita	641.42*** (108.53)	-303.52* (159.31)	142.27** (46.32)	160.03*** (32.82)
Log VA per capita^2	-44.86*** (8.50)	18.76* (10.11)	-10.15** (3.57)	-10.01** (2.75)
Log VA per capita^3	—	—	—	—
Terms of trade	-38.39*** (9.76)	-37.44*** (10.07)	-4.46*** (1.16)	10.48 (12.00)
Year	-4.31*** (0.80)	0.28 (0.19)	-0.40 (0.31)	-1.82 (1.18)
Constant	- 2,137.05*** (351.27)	1,280.43* (631.77)	-435.04** (631.77)	-435.04** (631.77)

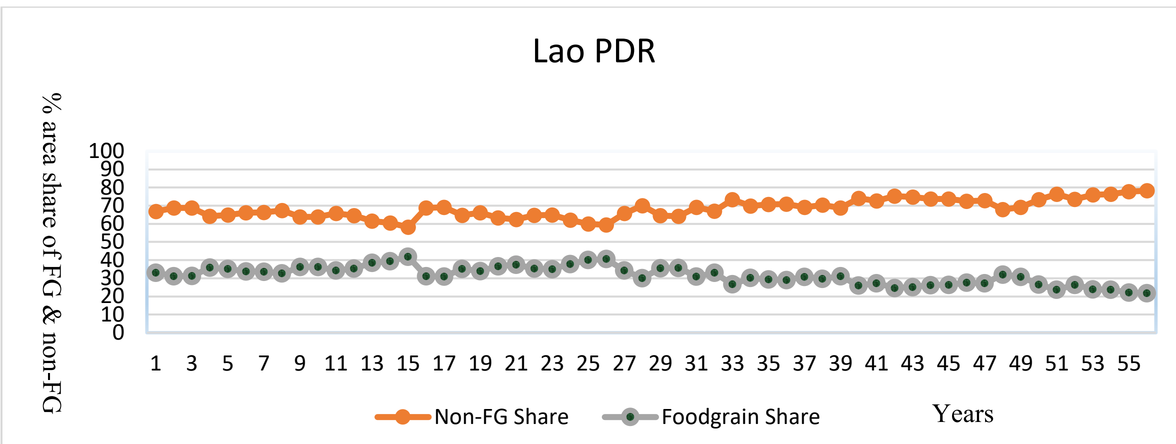
Country/Variables	Philippines	Thailand	Viet Nam	Malaysia
Dependent variable: GAP				
Log VA per capita	-57.78 (85.62)	4,301.04 (5,694.85)	2,920.99*** (697.10)	-8,431.43* (4,691.04)
Log VA per capita^2	3.45 (5.50)	-527.76 (686.51)	-427.91*** (102.22)	937.42* (526.30)
Log VA per capita^3	—	21.56 (27.56)	20.55 (5.02)	-34.67* (19.66)
Terms of trade	-8.17*** (1.45)	2.91 (4.61)	7.93* (4.57)	-9.56 *** (2.52)
Year	-4.31 (0.11)	-1.00*** (0.20)	1.76 (1.24)	-0.429** (0.19)
Constant	269.87 (332.17)	-11,623.48 (15,738.29)	- 6,518.50*** (1,589.56)	25,249.6* (13,923.3)

Source: Author's estimates based on the FAO; *, **, and *** indicate 1, 5, and 10 percent level of significance.
Note: CLMVPMIT = Cambodia, Lao PDR, Myanmar, Viet Nam, Philippines, Malaysia, Indonesia, and Thailand.

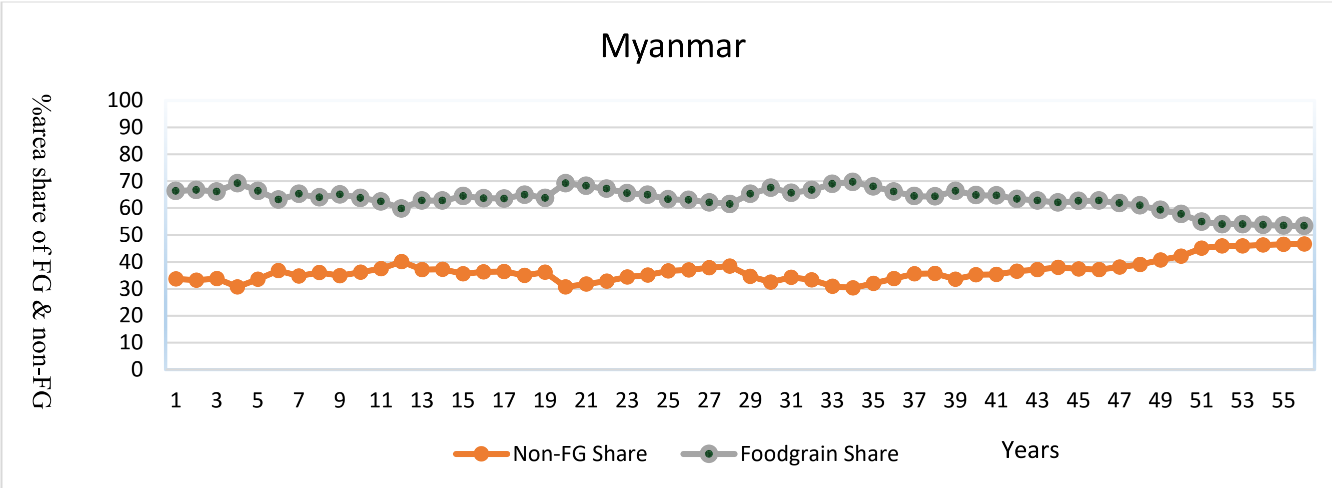
Annex Figure 1: Crop diversification, 1961-2016: Percentage share of area under food grain and non-food grain



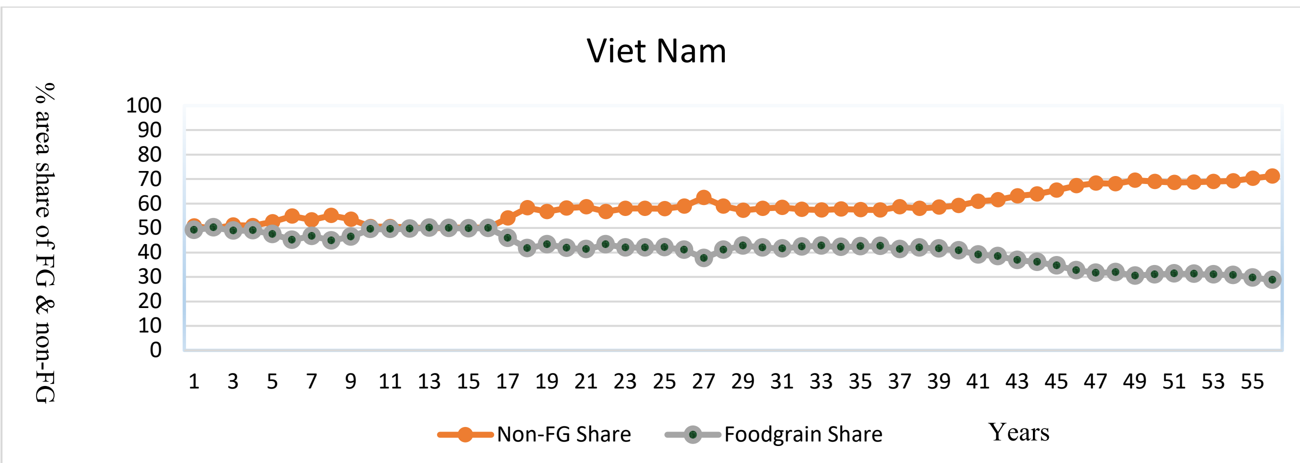
Note: FG = food grain



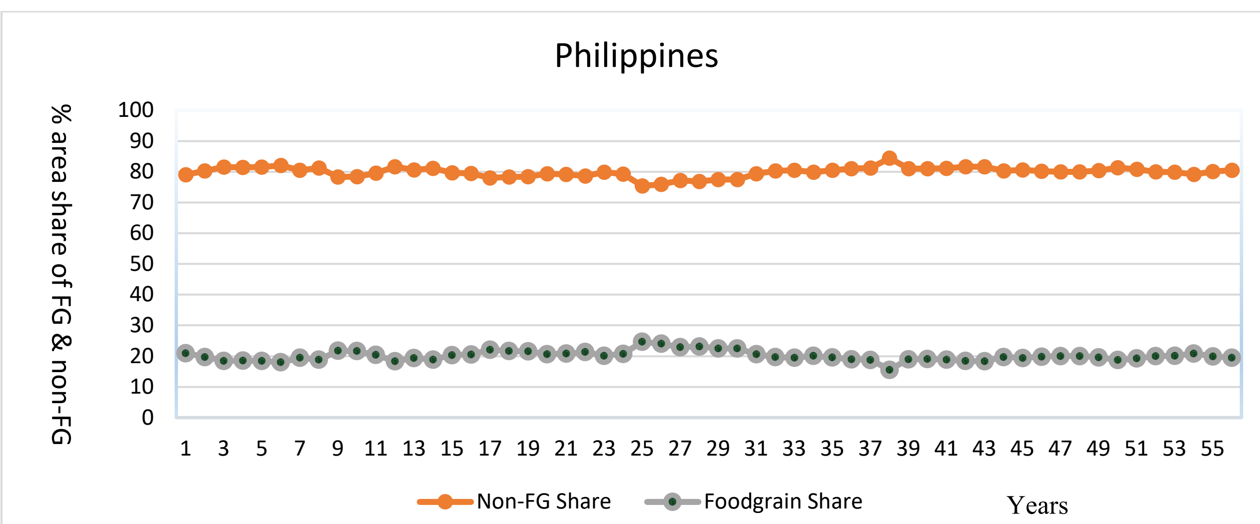
Note: FG = food grain.



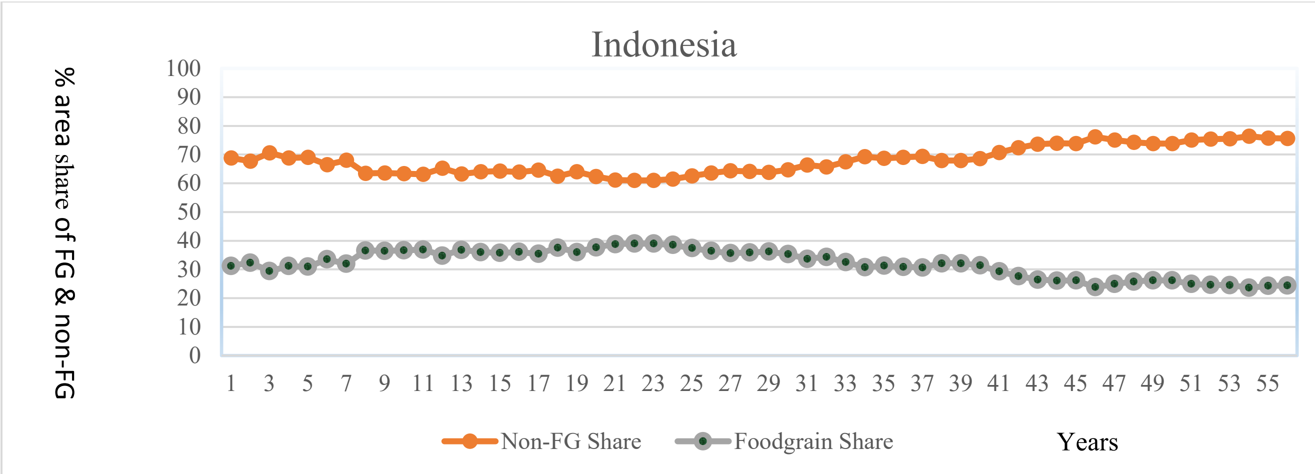
Note: FG = food grain.



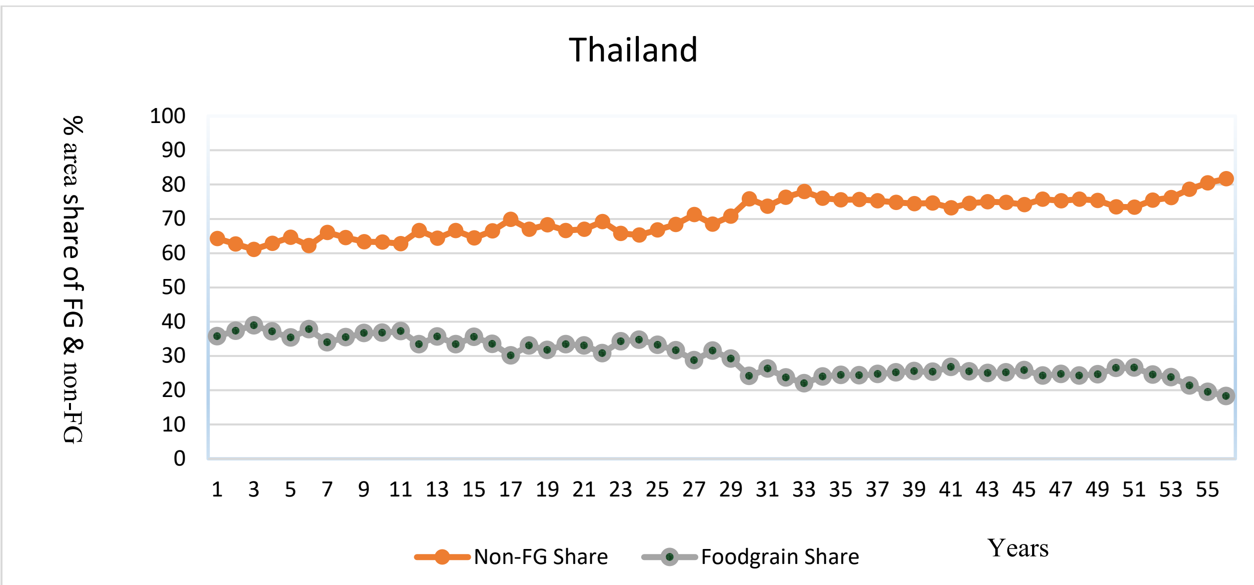
Note: FG = food grain.



Note: FG = food grain.



Note: FG = food grain.



Source: The FAO of the United Nations

Note: FG = food grain.

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