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The shaded areas of the map indicate ESCAP members and associate members.*

The Economic and Social Commission for Asia and the Pacific (ESCAP) serves as the United Nations’ regional hub promoting cooperation among countries to achieve inclusive and sustainable development. The largest regional intergovernmental platform with 53 Member States and 9 Associate Members, ESCAP has emerged as a strong regional think-tank offering countries sound analytical products that shed insight into the evolving economic, social and environmental dynamics of the region. The Commission’s strategic focus is to deliver on the 2030 Agenda for Sustainable Development, which it does by reinforcing and deepening regional cooperation and integration to advance connectivity, financial cooperation and market integration. ESCAP’s research and analysis coupled with its policy advisory services, capacity building and technical assistance to governments aims to support countries’ sustainable and inclusive development ambitions.

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Explanatory notes

References to dollars ($) are to United States dollars, unless otherwise stated. References to “tons” are to metric tons, unless otherwise specified. A solidus (/) between dates (e.g. 1980/81) indicates a financial year, a crop year or an academic year. Use of a hyphen between dates (e.g. 1980-1985) indicates the full period involved, including the beginning and end years.

The following symbols have been used in the tables throughout the journal: Two dots (..) indicate that data are not available or are not separately reported. An em-dash (—) indicates that the amount is nil or negligible. A hyphen (-) indicates that the item is not applicable. A point (.) is used to indicate decimals. A space is used to distinguish thousands and millions. Totals may not add precisely because of rounding.

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EDITORS' INTRODUCTION

The 2030 Agenda for Sustainable Development, which includes 17 Sustainable Development Goals and many targets, offers a decidedly ambitious, comprehensive and universal framework for global development policymaking. In essence, it promotes a broad and holistic concept of well-being and prosperity; one that recognizes that the welfare of people, countries and the planet encompasses much more than just expansion of economic output and emphasizes the importance of social inclusiveness and environment sustainability.

The Asia-Pacific region holds the key to the success of the 2030 Agenda. It is home to almost 60 per cent of humanity and has some of the world’s largest and most dynamic and innovative economies. Changes in the economic conditions and direction of policies in those countries have notable implications for its regional counterparts and beyond. At the same time, the region is home to several small countries that are dependent on and influenced by larger economies in the region.

The region has experienced unprecedented economic growth in the past few decades. However, this rapid economic growth, facilitated by globalization and technological advances, has led to rising inequalities and environmental degradation. To think afresh and to make a conceptual transition, policymakers of the region can benefit considerably from research that provides in-depth analysis of various sustainable development challenges and offers evidence-based policy solutions. To that end, we have decided to revisit the mission of the journals produced by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP).

The Asia-Pacific Sustainable Development Journal (APSDJ) builds on the success of two previous ESCAP journals, the Asia-Pacific Development Journal and the Asia-Pacific Population Journal, which have been merged in recognition of the interconnected and multidisciplinary nature of sustainable development. Backed by the reconstituted Editorial Advisory Board comprising eminent development experts from around the world, APSDJ will be published biannually in English by ESCAP.

This inaugural issue comprises five contributions covering different aspects of development. Kunal Sen reviews evidence on why the pace of structural transformation has differed widely across countries in Asia, with a specific focus on China, India and Thailand. Observing that government and market failures can negatively affect the demand for labour from high productivity sectors and the supply of labour from low productivity sectors, Sen suggests that governments in developing Asian countries enact a set of complementary policies that affect both the demand side and supply side of labour to accelerate the pace of structural transformation.

Guna Raj Bhatta analyses the impact of external sector openness and financial sector development on per capita income in the South Asian economies of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. Observing that although external liberalization contributes substantially to per capita income, financial development is a prerequisite
to realize the benefits, and that premature external liberalization in small and poor economies tend to be very beneficial to the large neighbouring economy and leads to resource exploitation. Bhatta advises that unless financial markets and institutions are strong enough to effectively deal with domestic resource mobilization, liberalizing the external sector alone may impede the economic development process.

Kalaichelvi Ravinthirakumaran and Navaratnam Ravinthirakumaran investigate the effect of foreign direct investment (FDI) inflows on income inequality in Asia-Pacific Economic Cooperation (APEC) economies by using panel data for the period 1990–2015. Confirming that FDI inflows narrow the level of income inequality in APEC economies, the authors suggest that policymakers and government authorities in those economies initiate appropriate policies and provide various types of financial and non-financial support to help domestic firms continue to reap benefits from multinational enterprises. However, as frequent economic policy changes relevant to FDI inflows in host APEC economies can foster an unstable environment for attracting more FDI into the region, policymakers and government authorities need to be aware of the effects of such changes.

M. Govinda Rao and Sudhanshu Kumar examine under-taxation in India and the best practice approach to tax reforms to raise the revenue productivity of the Indian tax system. They argue that the tax-GDP ratio must be raised to enhance allocations to education, health care and physical infrastructure to ensure demographic dividends by making the increasing workforce more productive, and that the best practice approach to tax policy and reform is to broaden the base, reduce rates and their differentiation, and develop a simple and transparent system.

Anh Tru Nguyen, Janet Dzator and Andrew Nadolny analyse the determinants of tea productivity, in particular, the impacts of contract participation in the rural areas of Viet Nam. Noting that tea productivity significantly affects poverty reduction, employment generation and income improvement for farm households, the authors recommend that factors that influence tea productivity, foster technical innovations to reduce technical inefficiency, and affect the volatility associated with agricultural production inputs be considered to improve the income and livelihood of tea growers.

It is our hope that APSDJ can enrich the policy debate and support policymaking in the region towards the successful implementation of the 2030 Agenda. Contributions as per the editorial guidelines are welcome.

Nagesh Kumar
Hamza Ali Malik

Chief Editors
WHAT IMPEDES STRUCTURAL TRANSFORMATION IN ASIA?

Kunal Sen*

Structural transformation – the movement of workers from low productivity to high productivity activities – is an essential ingredient of inclusive growth. In the present paper, evidence on why the pace of structural transformation has differed widely across countries in Asia is reviewed, with a specific focus on China, India and Thailand. It is argued that government failures relating to the functioning of labour, land and product markets, and market failures relating to coordination of investment, credit market imperfections and human capital formation have been the primary causes of the slow pace of structural transformation in several Asian countries. In the paper, it is suggested that emphasis be placed on reforming policies that impede the functioning of labour, land and product markets and strengthening industrial and education policies to tackle specific market failures pertaining to investment coordination and human capital formation.

JEL classification: P51, O14, O53

Keywords: structural transformation, government failure, market failure, Asia

I. INTRODUCTION

Structural transformation – the transfer of workers from low productivity to high productivity sectors or activities – is a necessary and sufficient condition of economic development (Herrendorf and others, 2013; UNIDO, 2013; McMillan and Rodrik, 2014). In low-income countries, workers are stuck in low productivity sectors, such as agriculture. The movement of workers from low productivity activities to high productivity sectors, such as manufacturing and some components of services, has led to an increase in overall productivity and income (Duarte and Restuccia, 2010). The speed at which that structural transformation takes place differentiates successful countries from unsuccessful ones (Felipe and others, 2015).

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Large differences in productivity not only exist across sectors but also within sectors. Recent research has highlighted the existence of significant productivity differentials within such sectors as modern manufacturing (World Bank, 2013). Large productivity gaps can exist among firms and plants in the manufacturing sector as well; those productivity gaps are typically larger in developing countries than in developed countries. This implies that the reallocation of labour and other resources across and within sectors can be an important source of growth and structural change. Countries that have experienced such growth-enhancing productivity are more likely to achieve sustained economic growth that is accompanied by a steady decline of workers in the low productivity sectors, such as agriculture (Bah, 2011).

In the Asian context, the pace of structural transformation has differed widely across countries (Felipe and others, 2014). Among the early industrializing Asian economies, such as the Republic of Korea and Taiwan Province of China, the transfer of workers from agriculture to manufacturing was rapid, leading to a very sharp increase in economic growth that was sustained for a prolonged period of time (Commission for Growth and Development, 2008). The pace of structural transformation was slower in the late industrializing Asian countries, which implied that a large proportion of the workforce was still employed in agriculture, even after rapid economic growth was attained in several of those countries. As indicated in figure 1, while the average share of employment in agriculture in 2010 was 38 per cent across all developing countries, the shares of developing countries in Europe and Central Asia, and Latin America and the Caribbean were relatively low, at 23 and 17 per cent respectively. In contrast, the share of employment in agriculture was 37 per cent in developing countries in East Asia and the Pacific and 51 per cent in South Asia. This suggests that in spite of a successful record of economic growth, Asian countries have not done equally well with regard to structural transformation. Within Asia, large shares of employment in agriculture in 2010, even after several years of economic growth, were prevalent in China (38 per cent), India (51 per cent), Indonesia (38 per cent), the Philippines (33 per cent), Sri Lanka (33 per cent), Thailand (38 per cent) and Viet Nam (48 per cent). In contrast, very low employment shares of agriculture were prevalent in the Republic of Korea (7 per cent) and Malaysia (13 per cent) (table 1).

Why have several Asian countries performed poorly in terms of structural transformation, even though they enjoyed growth success? In this paper, the evidence on the determinants of structural transformation pertaining to Asia is reviewed to assess the most likely causes for the slow pace of structural transformation in the late Asian industrializing countries. The paper also contains case-study evidence from three Asian countries – China, India and Thailand – to illustrate the main arguments. The paper concludes with a synthesis of the main findings and some lessons drawn for policymaking.
What impedes structural transformation in Asia?

Figure 1. Share of employment in agriculture (percentage of total employment), 2010

Table 1. Share of employment in agriculture, individual Asian countries (percentage)

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Bangladesh</td>
<td>38.2</td>
</tr>
<tr>
<td>China</td>
<td>36.7</td>
</tr>
<tr>
<td>India</td>
<td>51.1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>38.3</td>
</tr>
<tr>
<td>Philippines</td>
<td>33.2</td>
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<tr>
<td>Sri Lanka</td>
<td>32.7</td>
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<tr>
<td>Thailand</td>
<td>38.2</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>48.4</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>6.6</td>
</tr>
<tr>
<td>Malaysia</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Source: World Bank (2015), World Development Indicators.
II. THE DETERMINANTS OF STRUCTURAL TRANSFORMATION IN ASIA

Structural transformation – the movement of labour from low productivity to high productivity sectors – is an outcome of two independent sets of factors; one of them influences the demand for labour in high productivity sectors, and the other one influences the supply of labour from low productivity sectors. The pace of structural transformation increases as the demand for labour in high productivity sectors rises and labour from low productivity sectors can move more easily to high productivity sectors. In related literature, two broad sets of determinants of the demand and supply of labour are identified. The first set is related to government failures that impede the functioning of factor and product markets and the second one is related to market failures, such as coordination problems in investment and technological acquisition and learning externalities that push the private return to below social return, leading to under-investment in areas of potential dynamic comparative advantage (McMillan and Rodrik, 2014).

Government failures can affect the demand for labour from high productivity sectors and the supply of labour from low productivity sectors. Policies that constrain the growth of high productivity sectors, such as product market and labour regulations, can adversely affect the demand for labour in the high productivity sectors (Dabla-Norris and others, 2013). Policies that affect the movement of labour from low productivity to high productivity sectors, such as land reforms and those pertaining to migration, affect the supply of labour from the low productivity sectors.

Similarly, market failures can also affect the demand from high productivity sectors and the supply of labour from low productivity sectors. Market failures that depress the growth of the manufacturing sector, such as coordination problems in investment, adversely affect the demand for labour in the high productivity sectors. Credit market imperfections that prevent potential borrowers in high productivity sectors from attaining access to loanable funds at reasonable rates can also lead to a level of investment in high productivity sectors that is lower than what is socially desirable, inhibiting the demand for labour in those sectors. With respect to the supply of labour, market failures in human capital formation that lead to a low level of skill and education in the workforce affect the supply of skilled labour required for rapid industrialization. The relationships between government and market failures, the demand and the supply of labour and the rate of structural transformation is set out in figure 2 followed by a discussion of the types of government and market failures, using examples from Asia to illustrate this argument.
What impedes structural transformation in Asia?

Figure 2. The determinants of structural transformation

GOVERNMENT FAILURES
Factor market regulations/policies
  (land, labour)
Product market regulations

MARKET FAILURES
Coordination failures in investment
Credit market imperfections
Human capital formation

The demand for labour from high productivity sectors
The supply of labour from low productivity sectors

THE PACE OF STRUCTURAL TRANSFORMATION

Source: Authors’ illustration.
Government failures can impede the functioning of labour, land and product markets, all of which, in turn, can affect the reallocation of labour from low productivity to high productivity sectors.

Two types of labour policies can affect the rate of structural transformation. One type involves the regulation of the labour market, such as employment protection legislation, minimum wage legislation and rules that govern trade union activity. The other one involves the nature of migration policies that may affect the movement of labour from the rural sector to the urban sector. Those sets of policies are discussed below.

**Labour regulations:** Regulating the labour market with a view to protecting the interests of workers can impede the smooth functioning of it. Labour regulations typically add adjustment costs to hiring and firing labour and to making modifications in the organization of production. Firms respond to strict labour regulations market by substituting capital for labour in the first instance. If the labour regulations are particularly onerous, they may decide not to expand the size of their workforce. Furthermore, labour regulations can increase the bargaining power of workers, deterring investment if investors choose not to invest over concerns that workers will expropriate a greater part of the returns ex post (Besley and Burgess, 2004). The net result of strict labour regulations is reduced demand for labour from the manufacturing sector directly, as firms substitute capital for labour and indirectly, as firms do not make the investment they would have otherwise chosen to make to increase the scale of their operations and by not making investment for growth.

As demand for labour from the manufacturing sector declines, the rate of labour movement from the agricultural to the manufacturing sector slows, impeding the pace of structural transformation. An extensive amount of literature has provided country level and cross-national evidence on the detrimental effect that stricter labour regulations have on growth of the formal manufacturing sector and on the pace of structural transformation (Fallon and Lucas, 1993; Heckman and Pagés, 2002; Besley and Burgess, 2004; Botero and others, 2004; McMillan and Rodrik, 2014).

Labour markets have been flexible in economies that have experienced rapid structural transformation, such as the Republic of Korea and Taiwan Province of China. In those economies, the respective Governments placed greater emphasis on the flexibility of labour markets than most other countries of the world (Agarwal and others, 2000). Employers had no problem firing workers when there was a need to do so, such as in instances in which there was technological change or when the firm wanted to cease or cut back production. In other economies of Asia, there were government sponsored mechanisms for dismissal, or permission from the government was required to terminate an employee’s employment. In South Asian economies, job security legislation has created disincentives for the expansion of
What impedes structural transformation in Asia?

firms in the formal sector, especially in India, Nepal and Sri Lanka. In much of South Asia, job security laws are often too restrictive, compliance too complicated, and enforcement too weak and discretionary (World Bank, 2012a). In South-East Asia, on the other hand, labour markets are, on the whole, lightly regulated. There are, however, wide differences within the subregion, with Indonesia, the Philippines and Thailand having the most tightly regulated markets. In Indonesia, in particular, high rates of redundancy payments mandated by the Indonesian Labour Law of 2003 has put Indonesia at a higher ranking in terms of redundancy costs than its neighbouring countries (Manning, 2014). In addition, increases in the minimum wage higher than the rate of inflation has had a negative effect on the demand for labour in the formal urban sector in Indonesia (Suryahadi and others, 2003). As made clear in figure 3, several economies in Asia have more tightly regulated labour markets than the countries in the region that have experienced rapid structural transformation, such as Malaysia and the Republic of Korea.

Migration policies: Governments can impede the flow of labour from rural to urban areas directly or indirectly. An example of a policy that affects the flow of labour directly from rural to urban areas is the hukou system set in China, which is explained in greater detail in the next section in a discussion of the factors behind the relatively low pace of structural transformation in China (as compared to Malaysia and the Republic of Korea). Such direct government-induced impediments to movement of labour from the countryside to the city has not been commonly imposed in other Asian economies. Government policies that indirectly affect rural-urban labour migration by making it less attractive for rural residents to move to urban areas are more prevalent. The foremost example of such government policies is social insurance schemes, which, if they are not fully portable, can constrain the movement of labour from low productivity to high productivity sectors (World Bank, 2012a). Social insurance schemes that are not fully portable lack the ability to preserve the actuarial value of accrued pension rights when moving from one job to another job (Pasadilla and others, 2011). Portable social insurance systems have been particularly difficult to implement in low-income Asian economies where there is a large proportion of agricultural, casual wage and informal workers (Park and others, 2012).

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1 The difference in the stringency of labour regulations between East Asia and South Asia can be attributed to the low political strength of trade unions in economies, such as the Republic of Korea and Taiwan Province of China, in the early stages of industrialization, as compared to the strong political voice unions enjoyed in the governments formed in South Asian economies, such as India and Sri Lanka immediately after independence (Agarwal and others, 2005).

2 The data on labour regulations comes from Campos and Nugent (2012), who provide time-series data on 140 countries on (a) cost of increasing hours worked, (b) cost of firing workers, (c) dismissal procedures and (d) alternative employment contracts (part time or fixed term versus regular full-time. The higher the score on labour regulations, the more regulated is the labour market.
In addition to the lack of portable social insurance in most low-income Asian economies, another set of government failures have been evident in the severe urban housing, infrastructure and service deficiencies and the various forms of urban congestion that have constrained the ability of migrant workers to obtain housing at reasonable rates and access services, such as water and sanitation, when they have moved from rural to urban areas (Tacoli and others, 2015). Among developing Asian countries, South Asian countries have not fared well, with rankings that are only slightly better that those of countries of sub-Saharan Africa with respect to the proportion of urban households with access to safe drinking water, and among the lowest with respect to improved sanitation (Ellis and Roberts, 2016).

**Figure 3. Labour regulations in selected Asian countries**

![Labor regulations in selected Asian countries](image)


*Note*: Data are for the period 2000-2004. Higher scores indicate more regulated labour markets.

Government policies related to land transfer and acquisition are relevant for structural transformation in two important ways. First, land reform – purposive transfer of land ownership from households with large landholdings in rural areas to those with little or no ownership of land or the provision of security of tenure to tenant cultivators – can lead to higher agricultural productivity because of the inverse relationship between size of land holdings and farm productivity (Berry and Cline, 1979). This, in turn, frees up labour in the countryside to move to manufacturing or
services jobs in urban areas. Second, an egalitarian distribution of land that leads to greater income for the poorer sections of the rural population can create a larger home market for manufacturing goods, facilitating the expansion of the manufacturing sector.

Redistributive land reform played an important part in the rapid growth in the Republic of Korea and Taiwan Province of China after World War II and the rapid growth in China and Viet Nam in the 1970s and 1980s (Putzel, 2000). The land reforms in the Republic of Korea and Taiwan Province of China also led to a rapid structural transformation in three ways. First, the land reforms resulted in higher income among poor farmers in the two economies, who then were able to invest some of the income in the schooling of their children. This led to the expansion of the skilled workforce in the two economies, which was required in the effort to achieve rapid export-oriented industrialization. Second, the increased income in rural areas resulted in the expansion of the domestic market for the manufacturing sector, fostering rapid industrialization. Third, the more egalitarian land distribution provided a stable political environment, which allowed the political leaders of the two economies to focus more heavily on rapid industrialization (Ban and others, 1983; Putzel, 2000; Studwell, 2013).

In contrast to the successful land reform experiences of the Republic of Korea and Taiwan Province of China (as well as of China and Viet Nam), in the Philippines, land reforms were not implemented despite several attempts to do so (most land in the country is cultivated by landless peasants) (Hayami and others, 1990; Studwell, 2013). Similar unsuccessful attempts at land reforms occurred in other Asian countries, such as India and Pakistan. As a consequence, high inequalities in land ownership in rural areas remained in those countries, limiting the potential for the agrarian change necessary for rapid structural transformation (Herring, 1983).

A second set of policies relating to land that are relevant for structural transformation are those that govern the manner in which agricultural land is acquired to set up factories or for infrastructural projects. In land-scarce Asian countries where population densities are high, obtaining agricultural land for industrialization is essential for the manufacturing sector to expand. Burdensome land acquisition policies can increase the price of land artificially by providing generous government mandated

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3 The increase in agricultural productivity in the Province of Taiwan was particularly striking, with yields of traditional crops, such as rice and sugar, increasing by 50 per cent, and that of fruits and vegetables doubling (Studwell, 2013).

4 As Studwell (2013) notes, “in the wake of the Second World War, progressive politicians in Northeast Asia recognized the capacity of land reforms to deliver simultaneously on both the economic and political fronts” (p. 66). In contrast, “elites in South-east Asia (and South Asia, our insertion) were sufficiently co-opted by colonial rulers (before and after independence) that they lost their ability … to think clearly about national economic development” (p. 70).
compensation packages for sellers of land (usually poor smallholder agriculturists) or make the process of acquiring land bureaucratically complex and cumbersome may discourage potential investors from investing in the manufacturing sector. In addition, essential infrastructural projects (whether in the public or private sector) that are critical inputs for the growth of the manufacturing sector, such as power plants or road and rail transportation networks, may not take place in the light of inefficient land acquisition policies.

The experience of Asian countries regarding land acquisition policies has been uneven. In some countries, such as China and Viet Nam, existing legislation allows the State to requisition land owned by farmers' collectives, which enables the State to forcibly acquire land for industrialization or infrastructural projects if needed. In other countries, such as Indonesia and India, land acquisition processes are more complex and time-consuming, and have led to significant delays and widespread corruption in acquiring land for large infrastructural projects (Reerink and Bakker, 2015).

Government policies and procedures that increase the cost of doing business or create artificial barriers to firm entry in the high productivity sectors, such as formal manufacturing and tradable services, are likely to depress private investment in those sectors and constrain growth of the high productivity sectors (World Bank, 2015). Regulatory reforms that make it easier to start a business or to close down an unprofitable enterprise are strongly associated with the more rapid reallocation of labour from low productivity to high productivity sectors (World Bank, 2013). The performance of Asian economies in term of ease of doing business varies widely, with Singapore and Taiwan Province of China ranked first and fifth among 189 countries. In contrast, the Philippines is ranked 103rd, Indonesia 109th, India 130th and Bangladesh 174th. Across the different dimensions of product market regulations, some subregion of Asia perform better than other subregions in some dimensions and worse in other dimensions. With respect to the ease of starting a business, it is quicker and cheaper in South Asia than it is in East and South-East Asia. On the other hand, it is less costly and timely for businesses to export and import in East and South-East Asia than in South Asia. The sharp variations in regulatory quality within Asia is indicated in figure 4, where the quality of regulations set in East Asia is equivalent to that of advanced economics, while the quality of regulations in Central Asia, South Asia and the Pacific are worse than that of Latin America.
Figure 4. Regulatory quality, in different subregions of the world or country classifications

Source: World Bank (2016), World Development Indicators.

Note: A higher score implies better regulatory quality.
Market failures

A common market failure in low-income countries are coordination failures resulting from the high costs of collecting and processing information for new products, technologies and industries in low-income country settings (Rodrik, 2004). By investing in new information collection and processing and making information about the relevant new industries freely available to firms, the State can play a facilitating role in the introduction of new products and the move to new industries. As a consequence, the State can spur structural change and technological upgrading in the economy (Lin and Monga, 2010). Coordination failures also result from the fact that private returns to investment in sectors that offer the potential of dynamic comparative advantage may be less than social returns, as firms need to go through a learning process to build their capabilities to become competitive in new industries (Stiglitz and Yusuf, 2001). As this learning process may involve substantial financial losses at least at the initial stage, the private return to such investment may well be negative, even though the investment may lead to significant positive spillover effects and the building up of social and human capital. Risk averse entrepreneurs with low wealth endowments may not be willing to invest in such investments that have high sunk costs, and prefer to invest in activities with a high short-term possibility of profits, but offer less possibilities for technological upgrading.

The divergence of the private and social returns to investment may be particularly evident in more modern manufacturing activities or in knowledge-based services as compared to unskilled labour-intensive manufacturing or primary commodity production. As the economy moves into those modern sectors, economies of scale and scope become more important, and reliance of firms on highly skilled labour and access to long-term finance to make the lumpy investments in equipment, working capital and export financing increases. Consequently, there is need for the State to play a coordinating role in directing scarce investible funds and limited foreign exchange (to purchase imported capital goods and technology from abroad) to the most productive firms and facilitate the upgrading and diversification of individual firms (Lin and Monga, 2010).

A key determinant of the rapid pace of structural transformation witnessed in East Asia was the adoption of interventionist industrial policies by the Government of the Republic of Korea and the government of Taiwan Province of China, after those economies had moved past the labour-intensive manufacturing phase in their industrialization processes (Pack, 2001). Interventionist industrial policies allowed them to overcome coordination failures in investment decisions of private and State firms, as those firms moved into more technologically complex sectors, such as automobiles and electronics, and activities. Such industrial policies included dynamic strategies to advance the prospects of individual sectors by enabling them to exploit
What impedes structural transformation in Asia?

In contrast to the Republic of Korea and Taiwan Province of China, there is limited evidence of interventionist industrial policy in the other Asian economies (barring India, which is discussed later). Most of the South-East Asian countries have followed a hands-off policy towards the industrial sector and encouraged labour-intensive export-oriented industrialization with the aid of export subsidies and competitive exchange rates, rather than selective intervention (Hill, 1996). In economies of South-East Asia and South Asia that tried to adopt a more interventionist industrial policy, such as Malaysia, with an emphasis on heavy industry, greater corruption and rent-seeking occurred rather than rapid industrial growth driven by technological adoption, as was the case in the Republic of Korea and Taiwan Province of China (Perkins, 2013).

A second type of market failure observed in low-income country settings is the inability of credit markets to allocate funds to projects that have a high social rate of return though they may not have sufficiently high private rates of return. Financial markets are characterized by asymmetric information that exists between the providers of capital and those seeking capital (Stiglitz and Weiss, 1981). In a low-income country setting, with weak property rights in land and other assets that may be offered as collateral and lack of information gathering agencies, such as credit rating agencies, banks and development finance institutions may typically ration credit to small and medium firms that offer the highest possibility of technological development and productivity growth in the manufacturing sector (Sen and Vaidya, 1997). Government interventions may be required to address such credit market failures to ensure that projects with high social rates of return are adequately funded. Again, in the East Asian case, governments have typically directed credit at preferential rates of interest to exporting firms in technology-intensive industries, allowing those firms to obtain long-term loans to finance their investment in fixed assets and technology development. The role of the government in addressing credit market failures by providing directed credit to exporting firms has been seen to be an important catalyst in the rapid movement of firms in the Republic of Korea and Taiwan Province of China into areas of potential dynamic comparative advantage, and in accelerating the pace of structural transformation in those two economies (Lin, 2010).

Selective credit policies were not followed in other Asian economies, in part because to carry out such policies, a high level of administrative work is required to select firms with the highest potential for growth and to monitor the performance of those firms to ensure that they meet their targets. For most other Asian economies, the administrative capability of the bureaucracy was not high enough to implement successful selective credit policies. As a consequence, the South-East Asian countries
had not had applied selective credit policies to support domestic industrialists; instead, they courted multinationals by the means of attractive tax incentives (Jomo, 2001). In South Asian countries, there was greater use of selective credit policies, but they had generally limited success in fostering technological progress and innovation (Sen and Vaidya, 1997).

A third type of market failure is in the rate of human capital formation. The private return to primary schooling is often below the social return to education because of the presence of positive externalities in human capital formation (Lucas, 1988). Governments play an important role in increasing the educational attainment of their populations in the early stages of economic development. Furthermore, the acquisition of skills that are necessary for shifting workers from low-skilled jobs in agriculture and the informal service sector to high productivity jobs in manufacturing and knowledge-based services are sometimes insufficient if job training and skill acquisition are left to the market (Stiglitz, 2001). Because companies that spend money on job training may not recoup their costs, job training and skill acquisition is often underfunded without State coordination. The East Asian economies have invested in large amounts in State-provided educational systems that place an increasing emphasis on technical subjects (Pack, 2001). Primary education was emphasized at their early stage of economic development, leading to impressive rates of increases in years of schooling. The high levels of skills and educational attainment that was evident in the general population in the Republic of Korea and Taiwan Province of China by the 1970s made it possible for workers to move in large numbers from agriculture to manufacturing, as the demand for labour increased in the manufacturing sector under rapid export-oriented industrialization.

South-East Asian and South Asian countries have had limited success with human capital formation and the creation of a skilled labour force. This is shown in figure 5, which provides years of schooling for 25+ year olds. The figure indicates that the average years of schooling in Central and East Asia are very similar to that observed in advanced market economies, while years of schooling for South Asia is close to that observed in sub-Saharan Africa. Years of schooling for South-East Asia are lower than that for Latin America and the Caribbean.
Figure 5. Years of schooling for 25+ year olds, for different regions of the world or country classifications

Source: Quality of government database, January 2016.

III. COUNTRY CASE-STUDIES

In this section, case studies of three Asian countries that experienced a slow pace of structural transformation are discussed. The first two are India and China, the two largest countries in developing Asia; in both countries, a substantial portion of their workforce is employed in agriculture (37 per cent in China, 50 per cent in India). The third country is Thailand, which has had noted success in economic growth, but a disappointing record in terms of structural transformation.
INDIA

The rate of structural transformation in India has been very slow, with a decline of only 14 percentage points of the proportion of the workforce employed in agriculture during the years 1994 to 2012, a period of rapid economic growth in the country (figure 6). In that respect, the pattern of structural transformation in India has been atypical in the Asian context in three important respects (Sen, 2014). First, unlike the major Asian economies, starting with Japan, then the Republic of Korea, Singapore, and Taiwan Province of China, and more recently China and Viet Nam, which moved from the import-substituting phases of their economic development to an export-oriented development strategy through strong growth in the labour-intensive segment of the manufacturing sector, the labour-intensive manufacturing’s share in total output has fallen over time in India (Sen, 2009). Second, though there has been a large decline in the share of agriculture in total output in the post-independence period (from 55 per cent in 1955 to 20 per cent in 2008), much of the shift in economic activity has occurred towards services and not towards manufacturing as was the case in other Asian high-growth economies. In fact, the service sector’s share in output was 41 per cent in 2008, much higher than what may be expected, given the level of per capita income in India. Second, a distinctive feature of the Indian manufacturing sector has been its dualism – the existence of a relatively small set of formal sector firms that has a largely protected workforce, and a large number of firms in the informal sector in which workers have little access to social security, employment protection and other benefits (Mazumdar and Sarkar, 2008). Labour productivity in formal sector firms was significantly higher than that in informal sector firms, and the gap between the two types of firms has been increasing (Sen, 2014). Those three facts suggest that there is large potential for reallocation of labour across and within sectors to increase economic growth in India. However, the reallocation of labour has not yet occurred to date because of a range of policy impediments in the proper functioning of factor and product markets and market imperfections relating to access to credit and human capital formation.

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5 Economic growth averaged more than 7 per cent per annum in this period.
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Government failures

The most significant policy constraints to efficient transfer of labour from low productivity to high productivity activities in the Indian economy have been labour regulations, followed by land acquisition policies, and product market regulations.

Labour regulations

The labour laws in India are among the most restrictive in the world, especially with regard to retrenchment. According to the rigidity of the employment index proposed by the World Bank, Indian labour laws are more protective than the international average or an average of a group of comparator countries composed of large developing countries and countries in East and South Asia (Ahsan and others, 2008). Much of the rigidity in labour laws is derived from the Industrial Disputes Act of 1947 in which the conciliation, arbitration and adjudication procedures to be followed in the case of an industrial dispute are set. The Act imposes significant restrictions on employers

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*Figure 6. Share of agriculture in total employment, India, 1994-2012 (percentage)*

Source: World Bank (2015), World Development Indicators.

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6 In a sample of 34 Organisation for Economic Cooperation and Development (OECD) and emerging market economies, the employment protection legislation set in India was the third most stringent, after those set in the Czech Republic and Portugal with respect to permanent (indefinite) contracts and the most stringent with respect to collective dismissals (Dougherty, 2009).
regarding changes in conditions of employment, such as hours of work, leave and holidays, and compensation to workers, such as wages and pension provisions, layoffs, retrenchments and closures. As a consequence, the labour laws exemplified by the Act have reduced the incentive of firms in the modern manufacturing sector to hire workers on permanent contracts and have pushed them to implement more capital-intensive modes of production than warranted by existing costs of labour relative to capital (Saha and others, 2014; Dougherty, 2009; Hasan and others, 2013). In addition, the restrictive labour laws have had a negative effect on the growth of the formal manufacturing sector, especially the labour-intensive industries, leading to limited possibilities for the formal manufacturing sector to absorb the high levels of surplus labour that are present in the relatively low productivity agricultural sector (Besley and Burgess, 2004; Gupta and others, 2008).

Land policies

Under the 1949 Indian Constitution, the Government of India was granted the power to enact and implement land reforms. Different state governments have used this autonomy to enact legislation, some as early as the 1950s. Land reform legislation has consisted of four categories: (i) abolition of intermediaries who were rent collectors under the pre-independence land revenue system; (ii) tenancy regulation that attempts to improve the contractual terms faced by tenants; (iii) a ceiling on landholdings to redistributing surplus land to the landless; and (iv) attempts to consolidate disparate landholdings. Abolition of intermediaries has been the most successful set of land reforms among the four categories. There has been less success in the implementation of other land reforms, with some notable exceptions, such as tenancy reforms in West Bengal. Moreover, the evidence on whether land reforms increased productivity in the agriculture sector is mixed (Besley and Burgess, 2000).

There are severe policy constraints to the acquisition of land for industrial use for public projects in infrastructure. Given that the labour-land ratios in rural areas are high, land remains a scarce resource and a source of livelihood for millions of Indian farmers. Land acquisition in India is governed by the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. Under this Act, the minimum compensation payable to farmers is four times the market price in rural areas and two times the market price in urban areas. The Act also stipulates a comprehensive resettlement and rehabilitation package for displaced

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7 Under Chapter VB of the Industrial Disputes Act, labour courts and tribunals can set aside any discharge or dismissal referred to them as not justified. In units employing more than 100 workers, retrenchment requires seeking authorization from the state government, which is rarely granted.

8 As Bardhan (1984) argues, the lack of political will to implement far-reaching land reforms may be attributed to the strong presence of the landed farmers in the ruling coalition of India.
farmers and places severe restrictions on the exercise of eminent domain. The Act was passed with the intention to protect the interests of small farmers, which was not addressed in the previous legislation that governed land acquisition in India (that dated to the colonial period). However, there are concerns that the current legislation significantly impedes the transfer of land from low productivity agricultural use to higher productivity use in industry and infrastructural provision, with an arbitrarily set minimum price for compensation that does not take into account local market conditions and cumbersome procedures to obtain land either for private or public use (Ghatak and Ghosh, 2011). Accordingly, existing land acquisition policies are an important barrier to the growth of the manufacturing sector in India, and in bringing about structural transformation.9

Product market regulations

Regulation of product markets was considerably eased in India in 1991 with the dismantling of industrial licensing, and a significant reduction in the number of industries reserved for the public sector. In addition, restrictions on foreign direct investment were lifted in high technology and high investment priority industries. Significant trade reforms were also enacted with the removal of quotas and a shift to tariffs, and a gradual reduction in tariffs over time. However, there has been little evidence of “creative destruction” accompanied by the reallocation of resources from low productivity to high productivity firms in the manufacturing sector (Goldberg and others, 2010). The industrial sector is still dominated by incumbents State-owned firms and business groups – and a limited number of new firms are trying to enter the formal manufacturing sector (Alfaro and Chari, 2009). The reasons for this appears to be first, significant impediments for firms to close in the form of stringent bankruptcy laws, which still favour the restructuring of existing loss-making firms rather than closure, and second, the strong political connections of the incumbents enables them to prevent new firms from entering the sector, especially in concentrated, profitable industries and in industries dominated by State-owned corporations (Mody and others, 2011). Despite reforms instituted over several decades, several government policies that impede firm closing still remain in place and act as constraints to the reallocation of labour from low productivity to high productivity sectors.

9 Why have Indian state and central governments not attempted to dismantle the stringent labour regulations or made it easier for land to be acquired for non-industrial purposes? Reform of labour laws and land acquisition policies are seen to be controversial and difficult to implement in the era of coalition governments that have characterized the country’s political system in the 1990s and beyond (Sen, 2009). Labour laws and changes in land acquisition policies belong to what may be termed as “mass politics reforms” – which are reforms that may be considered anti-populist and are therefore, difficult to implement under the current political system (Varshney, 1999).
Market failures

Coordination problems in investment

Unlike most other economies in Asia (with the exception of the East Asian economies), the Government of India has historically played a strong role in industrial policy by coordinating the activities of private sector, and by investing directly itself in many sectors of the economy. For the first four decades following independence, the Government intervened in almost all aspects of the activities of manufacturing firms. Industry in India was subject to rather formidable legal barriers to entry. Investment, in terms of expansion of capacity of existing firms and creation of new firms, was controlled by the Government through its licensing policies that were, in turn, determined according to plan priorities. Though the purported objective of the licensing regime was better coordination of private investment so that the private return to investment was closer to its social return, it effectively led to a more monopolistic structure and significantly encouraged rent-seeking by corporations entrenched with public powers (Aghion and others, 2008). The consequence of those policies was slow total factor productivity growth for much of the 1970s and 1980s (Ahluwalia, 1991). Accordingly, while the Government of India followed similar interventionist industrial policies set in East Asian economies, the consequences of those policies for structural transformation were very different. This can mostly be attributed to the lack of capacity of the Indian State to implement industrial policies effectively and the ad hoc and discretionary nature of these policies, which led to high rates of uncertainty among potential investors and limited private investment (Bhagwati, 1993). This changed in the early 1990s with the dismantling of the License Raj, when market signals rather than government diktat guided the private investment decisions. In the case of India, lack of State action to rectify market failures resulting from coordination problems in investment cannot be seen as an important contributory factor behind the country’s slow rate of structural transformation; it can be argued that too much intervention, not too little, was a significant cause of its weak performance in manufacturing historically.

Credit market imperfections

Credit markets in India are characterized by a high degree of segmentation. Large corporate firms are able to access credit at reasonable terms from public sectors banks, which dominate the banking system (Sen and Vaidya, 1997). In contrast, micro, small and medium firms are rationed out from credit markets or face high rates of interest for their loans. As Banerjee and Duflo (2004) note, borrowers face much higher interest rates than depositors, which reflects the extent of credit rationing in the economy. While there is a long history of government intervention in the Indian credit markets to ensure adequate access to small and medium firms, evidence suggests that such intervention has been largely unsuccessful in tackling credit market failures for smaller
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borrowers, with commercial banks reluctant to lend to potential borrowers who do not have adequate collateral to offer, or lack a credit history (Banerjee and Duflo, 2004). The lack of loanable funds at competitive interest rates for small and medium firms in formal manufacturing in India has been viewed as an important constraint to firm growth in the sector; much of the employment creation in India has occurred in the smallest firm size class, which is mostly comprised of firms operating in the informal sector (Mazumdar and Sarkar, 2013; Hsieh and Klenow, 2014). This has led to weak demand for labour in the manufacturing sector, especially in the smaller-sized firms, constraining the pace of structural transformation.

Human capital formation

In contrast to the experiences of the economies of East Asia, India has had limited success in human capital formation. The estimated means years of schooling for those aged 25 years and above in 2011 was 4.4 as compared to 7.5 for China and 11.6 for the Republic of Korea (see Drèze and Sen, 2013). In addition to low attainment in the quantity of schooling, there has been only limited progress in improving the quality of schooling as well, with only 6.6 per cent of children in the first grade able to read a level 1 text (Pratham, 2008). Even though the Indian Constitution calls for free compulsory education for all children aged 14 years or less, successive Governments at the national and state levels have not invested sufficiently in primary education, with greater stress put on the provision of tertiary education (Dreze and Sen, 2013). In addition, there has been a lack of monitoring of public schools in India, leading to large-scale teacher absenteeism, which has contributed to the poor learning outcomes observed in the country (Panagariya, 2008). The low levels of educational attainment in India (in quantity and quality of schooling) have led to a relatively unskilled workforce that is not suitable for modern manufacturing (Wood and Calandrino, 2000). This has negatively affected the rate of structural transformation, as there has not been an adequate supply of skilled labour in low productivity sectors, such as agriculture, to fill potential jobs in the high productivity manufacturing and services sectors.

THAILAND

Thailand has had prolonged success in economic growth since the 1960s, posting growth rates that have been among the highest in the world.¹⁰ This rapid rate of growth has been accompanied by an equally impressive increase in the share of manufacturing value added as a percentage of GDP (figure 7) and a steady increase in the economic complexity of its exports (figure 8).

¹⁰ The Commission for Growth and Development in its growth report names Thailand as one of the thirteen growth successes, as the country has recorded an average rate of growth of GDP at 7 per cent or more a year for more than 25 years (Commission for Growth and Development, 2008).
Figure 7. Manufacturing value added as a percentage of gross domestic product

Source: World Bank (2015), World Development Indicators.

Figure 8. Economic complexity, Thailand, 1964-2012

Note: Hausman-Hidalgo measure of economic complexity.
However, despite the country’s success with regard to sustained economic growth, its structural transformation has been weak (Warr, 1993). As figure 9 makes clear, the proportion of workers employed in agriculture has fallen slowly over the decades of rapid economic growth. In 2012, about 40 per cent of the proportion of the labour force still remained in agriculture. The following section includes a discussion on the reasons for the slow rate of structural transformation observed in Thailand, focusing on government and market failures.

![Figure 9. Share of agriculture in total employment, Thailand, 1980-2012 (percentage)](image)

Source: World Bank (2015), World Development Indicators.

**Government failures**

The key government failure that has impeded the pace of structural transformation in Thailand has been the absence of widespread land reforms. The case for land reform was strong because of the high prevalence of tenancy farming in some parts of the country, especially in Central Thailand, and the growing landlessness problem with increased commercialization of agriculture (Ramsay, 1982). In 1975, the Government of Thailand passed a land reform bill that stipulates that the Government purchase land from large landowners and offer the land to the landless in rural areas under a long-term hire purchase plan. The Government set up an agency – the Agricultural Land Reform Office – to implement the land reform. The priority of the land reform programme was to implement the reforms in areas where tenancy arrangements were high or where crop yields were low. However, the land reforms have been weakly implemented and the concentration of land has remained fairly high among...
large landowners (Ramsay, 1982). This has contributed to a sharp rural-urban divide, with large differences in income between rural and urban households. The rapid economic growth recorded in Thailand since the 1960s was mostly driven by foreign direct investment in manufacturing and did not benefit large sections of the rural population, especially residents in the North of the country (Krongkaew, 1995). The income polarization has contributed to increasing political instability, which has had a negative effect on the growth of the manufacturing sector, especially after the financial crisis of 1997 (Sen and Tyce, 2018).

With respect to government policies relating to migration and labour market regulations, successive Governments have followed a liberal approach, which entails not constraining the movement of labour from rural to urban areas and not controlling the hiring and firing of labour. With respect to product market regulations, Thailand has received a score of 71 in terms of ease of doing business, just below the score received by Malaysia of 79, but well above the regional East Asian average of 61 (World Bank, 2014). This suggests that while Thailand can still do better in easing constraints to private investment in high productivity sectors, Government policies relating to product market entry and exit are not an important factor behind the country’s disappointing record with regard to structural transformation.

**Market failures**

A clear difference between the Thai and East Asian growth experiences is that the Government of Thailand has not attempted to follow the interventionist industrial policies and selective credit policies set by the Government of the Republic of Korea and the government of Taiwan Province of China. Since the late 1950s, the Board of Investment, which was set up by the Government of Thailand, has used tax and other promotional incentives to encourage industrial investment, especially for export-oriented industrialization. However, there was no discretion in the manner in which those incentives were offered; the incentives were applied equally to Thai and foreign firms and included exemptions from import duties and business taxes on imported raw materials and tax holidays to promoted firms from three to eight years (Sen, 1995). The Board of Investment has played a critical role in the country’s industrialization and its move to export more technically sophisticated products. Initially, until the 1980s, the Board of Investment promoted firms engaged in traditional industries, such as food processing and textiles. However, since the 1980s, it has promoted firms involved in electrical and non-electrical machinery and chemical industries, and more recently, in automotive industries (Sen and Tyce, 2015). The technocrats responsible for the country’s industrial policy were conservative in their approach and avoided “picking winners” to a large extent (Perkins, 2013). While this has helped to foster the country’s rapid export oriented industrialization, such a “light touch” industrial policy might not have contributed to the growth of a strong indigenous
set of Thai industrialists, and consequently constrained the growth of a dynamic domestic manufacturing sector (Doner, 2009).

Market failures are most clearly obvious in the low rate of human capital formation in Thailand. While universal primary education has been achieved, secondary school attainment has been weak in rural and disadvantaged regions of the country (Khoman, 1993). A large proportion of secondary school-level educated workers and university graduates are unemployed, despite the severe skill shortages in several manufacturing and service sectors. This is the result of the lack of skills of the secondary school and university educated population relative to the labour market needs of high productivity sectors, such as manufacturing, and service sectors, such as banking. In addition, the quality of schooling has been low, leading to low and declining learning outcomes, as compared to other countries with similar levels of per capita income (World Bank, 2012b). Furthermore, learning outcomes in other parts of Thailand have been far worse than in Bangkok (World Bank, 2012b). The weak performance in educational quality can be attributed to lack of school autonomy over budgeting and education content and a lack of educational resources. Market failures in human capital formation in Thailand have been an important factor as it has constrained the supply of skilled workers from rural to urban areas, slowing the rate of structural transformation.

CHINA

The economy of China expanded at about 9 per cent over the period 1960-2013 (in per capita GDP terms). As a result of that rapid rate, it is generally expected that economic growth would have been accompanied by a rapid rate of structural transformation. While there has been a large movement of workers from the rural to urban area in the country, with the rapid export-oriented industrialization, China became the “factory of Asia” from the 1980s onwards, the rate of structural transformation still lags behind other high growth Asian economies, such as the Republic of Korea (Felipe and others, 2014). As indicated in figure 10, even though the proportion of workers employed in agriculture has declined by 50 per cent from 1980 to 2012, 33 per cent of the workforce still remains in agriculture.
Among government policies that have impeded the rate of structural transformation in China, the most significant one has been the household registration system, referred to as the hukou system, in which workers who want to migrate from rural to urban areas have to apply for permission from the government to switch their hukou from a rural to an urban residence. The purpose behind the hukou system was to initially shore up capital intensive heavy industrialization, which was mostly planned in the cities, and to conserve key resources and food grains to sustain urban labour (Solinger, 2014). In the post-reform period, it was used as a way to control the movement of workers from rural to urban areas as the country embarked on its massive programme of export-oriented industrialization with the objective to ensure a certain level of health, social security and education for urban dwellers (Cai and others, 2008; Naughton, 2007). In effect, the hukou was “a mechanism to block the free flow of resources (including labour) between... the cities and countryside (Chan and Zhang, 1999, p. 821). Accordingly, the hukou system had served as a brake to the movement of labour from agriculture to manufacturing, and is the main factor behind the relatively low rate of structural transformation in China (as compared to what may have been expected, given its rapid rate of industrialization).
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With respect to labour regulations, the Labour Contract Law of 2008 and Minimum Wage Law of 2004 may have raised unemployment among less-skilled workers and increased the costs of firing for Chinese firms (Park, 2015), adversely affecting the demand for labour in the manufacturing sector.

With respect to land policies, radical land reforms focusing on the confiscation of land from landlords and rich peasants were enacted from 1945 to 1953 as the Chinese Communist Party took control of the country. The land reforms were implemented in Northern China during the period 1945-1948 and then in southern China between 1949 and 1953 (Moise, 1983). Confiscated land was redistributed to poor peasants and agricultural labourers, leading to a significant equalization in land ownership within localities. Collectivization followed from 1954 onwards in which private ownership and trade of land was banned. This resulted in a highly egalitarian distribution of rights to land among households within the same locality. The land reforms are largely seen as being successful in terms of generating income among rural households and providing a stable political base for the rapid industrialization that has occurred in China since the 1980s (Burgess, 2004).

**Market failures**

Government policies to address market failures in technological spillovers and investment coordination may have also constrained the pace of structural transformation in China. Industrial policies emphasized the development of heavy, capital-intensive industries, such as automobiles, machinery, and steel. Those sectors received preferential access to cheap credit, favourable tax treatment and supportive public investments (Park and others, 2010). In contrast, investments did not flow to light industries that had the capability to create more employment opportunities, especially for unskilled workers. Furthermore, entry into non-industrial, labour-intensive sectors, such as services, was often restricted, which, in turn, limited the development of them. Financial sector policies have also distorted the rate of structural transformation, as large, capital-intensive firms continued to receive favourable treatment from State-owned commercial banks. In addition, non-performing loans have been a problem for the public sector banks, as an incentive was extended to them to steer funds to large, State-owned enterprises or to State-supported projects implicitly backed by the Government. In contrast, private enterprises, many of which were small- and medium-sized, found it difficult to obtain loans from State commercial banks and as a result, turned to alternative financing channels, including foreign direct investment, though they accounted for the majority of the new job creation since the mid-1990s, government restrictions notwithstanding (Park and others, 2010).
Government action to address market failures in human capital formation is generally seen as a success in China, as shown by the low rates of illiteracy and the provision of universal elementary education early on in the development process (Naughton, 2007). By 2000, the proportion of the population with no formal schooling had fallen from 35 per cent in 1982 to less than 10 per cent. A large part of the increase in educational attainment can also be explained by the rapid increase in the returns to education with fast economic growth (Park and others, 2010).

IV. CONCLUSIONS AND POLICY IMPLICATIONS

Structural transformation – the reallocation of labour from low productivity to high productivity activities and sectors – is at the core of economic development (Dabla-Norris and others, 2013). Countries that have successfully transferred workers from low productivity sectors, such as agriculture, to high productivity sectors, such as manufacturing, have recorded sustained inclusive growth. However, few Asian economies have successfully combined structural transformation with rapid growth – the notable high achievers in that regard are Malaysia, the Republic of Korea and Taiwan Province of China. In this paper, it is argued that the pace of structural transformation is determined by two independent sets of factors – the demand for labour from the high productivity sectors and the supply of labour from the low-productivity sectors. It is further argued that government failures and market failures can negatively affect the demand for labour from high productivity sectors and constrain the mobility of labour from low productivity sectors. Government failures, such as labour regulations and product market regulations, can have a negative impact on the demand for labour in high productivity sectors, such as manufacturing, while land policies, such as the lack of effective land reforms or government induced barriers to rural-urban migration, can create impediments in process to smooth out the movement of labour from low productivity sectors, such as agriculture. Market failures, such as lack of coordination in investment, and credit market imperfections can adversely affect the demand for labour in the modern sectors of the economy unless addressed by effective industrial and financial policies, while human capital-related market failures can limit the supply of skilled workers from low productivity sectors to high productivity sectors.

This review of the factors that constrained structural transformation in Asian countries suggest that government failures and market failures have also affected structural transformation in several of those economies. The most important government failure has been the lack of land reform in South-East and South Asian countries. The most significant market failure has been in human capital formation, especially in creating a skilled workforce that is necessary for technological upgrading and modern manufacturing activities. Other government failures, such as stringent labour
regulations and lack of portable social insurance schemes to ease the mobility of labour, have also played a role in limiting structural transformation in developing Asian countries. Market failures, such as coordination of investment and credit market imperfections, have not been addressed in South-East Asia and South Asia as effectively as they have been in North East Asia, largely because of the lack of capacity of the State to undertake successful interventionist policies.

Case-study evidence of three Asian countries—China, India and Thailand, which have seen rapid growth but not structural transformation to the same degree is also reviewed in this paper. The evidence suggests that different factors are behind the slow rate of structural transformation in China, India and Thailand. In China, the hukou system created an artificial barrier to the movement of labour from rural to urban areas, and perhaps is the single most important factor behind the surprisingly slow rate of structural transformation in China, given its high rates of manufacturing-led economic growth. In addition, government policies that attempted to bias investment towards capital-intensive industries may also have played a role in limiting the demand for labour in the manufacturing sector, and thereby inhibited structural transformation in the country. There have been several reforms in the hukou system in recent years— in 2014, the Government of China removed hukou transfer limits in small cities, relaxed restrictions on medium-sized cities and set new qualifications for larger cities (Goodburn, 2014). However, those reforms are a modification of the hukou system and not the abolition of it, as residence certificates are still required for all Chinese citizens moving to new areas. Although it will be easier for migrants to settle in smaller cities, strict requirements will continue to make it difficult to settle in the megacities (Goodburn, 2014). This suggests that while the constraint that the hukou system poses to the process of structural transformation in China has eased somewhat, it has not been completely removed.

With respect to India, the review of the evidence suggests that not just one factor, but a range of factors are important in explaining the country’s slow rate of structural transformation. The most important among those factors are stringent labour regulations, burdensome land acquisition policies and market failures related to human capital formation and skill development of the labour force. Given the very large share of workers employed in Indian agriculture and the need to increase the rate of structural transformation in the economy, a strong focus on easing government policies relating to the functioning of labour and land markets is necessary. In addition, there is need to reform the educational system, especially relating to the quality of schooling and skill formation in the workforce.

The weak record of Thailand with regard to structural transformation can be mostly attributed to lack of effective land reforms and low rates of educational attainment among the rural poor in remote regions of the country. The Government has failed
to set an effective industrial policy aimed at building the capabilities of domestic firms and allowing the manufacturing sector to move towards products with greater technological spillovers. In the case of Thailand, there is need for educational policies that address the skills shortages in the Thai workforce and effective industrial policies that accelerate the rate of growth of local Thai firms.

The overall policy message from the review of the evidence is that governments in developing Asian countries need to enact a set of complementary policies that affect both the demand side and supply side of labour in order to accelerate the pace of structural transformation. This would imply concerted government action across a range of policies – labour policies, land policies, industrial and financial policies, educational policies – rather than a narrow focus on one or two policy domains.
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What impedes structural transformation in Asia?


What impedes structural transformation in Asia?


The paper provides an analysis on the impact of external sector openness and financial sector development on per capita income in the South Asian economies of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. For the annual series from 1980 to 2015, the instrumental variable model using a generalized method of moments (GMM) approach is estimated. The results show that liberalizing the external sector raises per capita income, conditional on the level of financial sector development. The large-economy influence analysis shows that India will benefit the most from external sector liberalization and other economies involved in this study still need to focus on financial sector development as opposed to on liberalizing capital flows. It further indicates that premature external liberalization in small and poor economies tends to be beneficial to the large neighbouring economy, which in this case is India, leading to resource exploitation. Accordingly, unless financial markets and institutions are strong enough to effectively deal with domestic resource mobilization, opening up the external sector alone may impede the economic development process.

**JEL classification**: F21, F36, O19

**Keywords**: liberalization, external sector development, financial development, income, South Asia

**I. INTRODUCTION**

The economic liberalization policies initiated during 1980s are still being implemented by many developing and emerging economies. The major policy objective of those policies, which deal with trade, finance and technology, is to achieve higher economic growth (Temple, 1999; Thirlwall, 2004). Specifically, the objective
of efforts to liberalize trade is to attain a competitive advantage in tradable goods while for capital, the objective is to facilitate inward financial flows so as to stimulate investment and thereby boost productivity.

Many researchers have favoured openness in an economy to foster rapid development. Santos-Paulino and Thirlwall (2004) and Hur and others (2006) argue that economic liberalization reduces inefficiencies in the production process by allocating resources efficiently through competition and supporting an increase in human and physical capital. In the high-performing Asian economies,¹ two common features have been observed: a stable macroeconomic environment; and a high share of trade in gross domestic product (GDP) (Krugman and Obstfeld, 2011) as they embarked on an export-led growth strategy.

It should be noted, however, that trade liberalization alone may not reap the benefits of economic liberalization. Some researchers argue that it is desired to also have financial sector development and trade facilitation (Atje and Jovanovic, 1993; Levine and Renelt, 1992; Roubini and Sala-i-Martin, 1991). Comparative advantage, the major source of international trade, can only be achieved if trade liberalization and financial sector development are carried out in a similar pace. Furthermore, liberalization positively affects financial development politics as incumbent opposition weakens when an economy allows cross-border trade and capital flow (Rajan and Zingales, 2003).

Financial integration is beneficial in risk-sharing and efficiency-allocation, as it enhances the growth prospects of an economy by fostering productive use of capital (Rogoff and others, 2006; Edison and others, 2002; García-Herrero and others, 2008). Similarly, trade liberalization can affect financial development, as an underdeveloped financial market may restrict the flows of international trade through external capital constraints to exporters (Manova, 2013). An imperfect financial market may also affect the availability and cost of the credit required for the export-oriented industries. Furthermore, external sector liberalization may foster financial sector development, as increasing global financial integration raises the need to strengthen the financial infrastructure (Buiter, 2003) and introduce innovative products.

Basically, external liberalization helps to promote growth in the developing countries through direct and indirect channels. The direct benefits are increased saving, lower production costs and technology transfer, while the indirect benefits are improvements in the macroeconomic policies and better risk management practices (Prasad and

¹ World Bank (1993) has identified Japan; the “Four Tigers”, namely Hong Kong, China, the Republic of Korea, Singapore, and Taiwan Province of China; and the three newly industrializing economies of South-East Asia, Indonesia, Malaysia, and Thailand, as the eight high-performing Asian economies in the study entitled The East Asian Miracle: Economic Growth and Public Policy.
A developed financial sector is necessary for the efficient and effective intermediation of resources, whatever the source. Furthermore, higher investment requirements need to be supported by the domestic financial system through mobilizing savings.

External liberalization and the financial sector can be linked through the credit channel. Allowing foreign capital flow increases the amount of funds available for domestic credit that boosts aggregate spending. Furthermore, the inflow of foreign funds depends on domestic interest rates, as higher interest rates attract increased flows of foreign funds. In contrast, volatility in the capital flow can affect relative prices through appreciation and depreciation in the real exchange rates (Sen, 1999). Accordingly, external liberalization is directly and indirectly related to the status of financial development.

More liberalized economies tend to have developed at a more rapid pace. For example, it is argued that without the openness to the external world, China and India could not have achieved their current level of economic success (Stiglitz, 2006). However, it should also be noted that economies that have liberalized with controls have benefited much than those that have been more open, based on analyses conducted on the reform policies of China and India (Goyal, 2012). Although in the 1980s and 1990s, the pace of liberalization in South Asia was asymmetric, major economic reforms can be attributed to stabilization and structural adjustments (Dev, 2000).

The argument that openness makes everyone better off is questionable (Schott, 2011; Kose and others, 2006). Free trade may, for example, result in lost jobs for labourers, farmers to quit farming and erode natural heritages. (Economist, 2016; Scott, 2003). Similar arguments are made for international capital flows. Foreign capital flows may further pose additional challenges by transmitting economic shocks and risks in the domestic economy (OECD, 2011). The major concern is pro-cyclicality of capital flows (Rogoff and others, 2006) and contagion of risks. Developing economies with imperfect markets may further worsen if there is a premature openness without the required financial infrastructures being in place. It may also make an economy vulnerable to currency and financial shocks.

In South Asia, the countries are very diversified in terms of economics, politics, religion and geography. India is the centrepoint for the subregion because it has the largest economy and population, promising economic growth, shares its border with most of the other countries in the subregion and is the dominating power in terms of trade and finance. Smaller and poorer economies that have liberalized in a similar pace to India may not be able to reap the benefits of liberalization. This is because many reform activities need to be synchronized with domestic economic conditions. For example, capital liberalization should also be carried out in alignment with domestic
financial conditions in order to attain an inclusive and deepened financial system with adequate financial infrastructures in place (Goyal, 2012).

In this backdrop, a scientific tripartite analysis of liberalization, financial development and income is conducted in the South Asian region. The effect of liberalization of a large economy on its smaller neighbours can serve as a good example of liberalization-contagion. The examination of the role of external openness, its nexus with financial development and its impact on the income in South Asian economies provides a policy input for future economic reforms. Furthermore, identification of the influence of those variables while excluding India from the panel is also important for determining whether to harmonize their economic policies with those implemented by India. Likewise, the issue of premature liberalization and reaping its benefits also needs to be explored further.

The following section contains a summary of the pattern and trend of income, financial development and trade in South Asia. Section three consists of a description of the methodology of the study. In the next section, the models and an explanation of the results obtained are given. Finally, the paper concludes with observations and policy prescriptions.

II. STATUS OF INCOME, FINANCIAL DEVELOPMENT AND EXTERNAL LIBERALIZATION IN SOUTH ASIA

It is generally agreed that liberalization and globalization have a positive influence on economic growth and development. Some developing countries have transformed their economies into emerging economies having a higher growth trajectory characterized by rapid integration at the regional and global levels (Sinha and Pradhan, 2008; Akin and Kose, 2007). From the mid-1980s to the 1990s, most of the South Asian economies were liberalized. The Government of India introduced the New Economic Policy in 1990-1991 by opening the capital account with the aim to boost exports and ultimately growth (India, 1991). Similarly, Nepal implemented several reforms during the period 1984-2000 to transition to a market-based economy. Many of those reforms were also related to financial sector reform (Ozaki, 2014).

With the exception to Bangladesh and Nepal, the per capita income of South Asian economies have increased significantly as a result of an initiative aimed at liberalization. For example, income rose substantially in Bhutan and Sri Lanka the post-2000 years (figure 1). Most of the economies had a significant turning point in

2 For the analytical purpose, the six major South Asian economies are used throughout the paper. Details about the data and sources used are explained in section 3.
financial development in the mid-1990s. However, it appears that there were substantial changes in financial development in Bhutan and Nepal. Their financial markets, based on specific indicators, were found to be much less developed compared to the countries’ institutions during the sample period. On the other hand, India and Pakistan exhibited better developed financial markets compared to their institutions during that period (figure 2).

![Figure 1. Per capita income by country](source)

Source: Word Bank (2016), World Development Indicators; Databank.
Despite divergence in income level and pace of growth, a positive upward relationship is seen between income and international trade in South Asia (figure 3). The graphical observation shows that Bangladesh, Bhutan and India have a very strong relationship in terms of international trade to per capita income. In contrast, that relationship was insignificant in the three other economies examined, Nepal, Pakistan and Sri Lanka (figure 4).

**Figure 2. Status of financial development by country**

Source: Svirydzenka (2016); IMF (2016), IMF data.

Note: FD stands for financial development, which consists of FI (financial institutions) and FM (financial markets).
Figure 3. Relationship of income to trade openness in South Asia

Source: World Bank (2016), World Development Indicators; Databank.
The geographical size and the size of the economy along with historical, political, economic and cultural relations influence the pattern of trade in South Asian economies. For this study, India continued to be the centre of the analysis because of its strategic location, the size of its economy and population, and the country’s capacity to exert influence at the regional and global levels. Table 1 shows the pattern of international trade within the region.
Table 1. International trade in South Asia  
(three-year averages, 2013-2015)

<table>
<thead>
<tr>
<th>Country</th>
<th>Total trade</th>
<th>Share of India</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Export</td>
<td>Import</td>
<td>Export</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>34 123</td>
<td>38 812</td>
<td>582</td>
</tr>
<tr>
<td>Bhutan</td>
<td>188</td>
<td>352</td>
<td>155</td>
</tr>
<tr>
<td>India</td>
<td>306 179</td>
<td>438 720</td>
<td>17115</td>
</tr>
<tr>
<td>Nepal</td>
<td>808</td>
<td>6 885</td>
<td>571</td>
</tr>
<tr>
<td>Pakistan</td>
<td>23 977</td>
<td>45 103</td>
<td>489</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>10 580</td>
<td>18 714</td>
<td>683</td>
</tr>
</tbody>
</table>

*Note:* The share of export and import for India is calculated based on the sum of imports and exports by the five other sample countries for this study.

A preliminary observation of the Indian influence in the South Asian region can be seen in table 1. Out of the total exports from India to the rest of the world, the other five South Asian countries account for about 6 per cent. However, the share of Indian imports, exports from the other five countries to India, is below 1 per cent. The bilateral data also provides further evidence of this. For example, more than 80 per cent of all imports to Bhutan are from India, while, in Nepal, the share exceeds 50 per cent. Meanwhile, the shares for Sri Lanka, Bangladesh, and Pakistan are 27 per cent, 15 per cent and, at least, 5 per cent, respectively.

The share of exports is minimal from Bangladesh, Pakistan and Sri Lanka to India and significant from Bhutan and Nepal. These analyses indicate that the policy to open up trade in India substantially affects the other South Asian economies because of their high dependence on India as compared with the dependence of India on them.
III. METHODOLOGY

Data and sources

Popular global datasets pertaining to trade and capital openness may not be suitable for analyses of South Asian economies, due to the divergent nature. Accordingly, data are collected from different sources. Total capital flows and total trade volume are assumed to be major proxy indicators of external liberalization.

To estimate the impact of capital account liberalization on economic growth, the standard practice is to augment the growth identity with a measure of capital account openness. Furthermore, as indicated by Levine and Renelt (2001), two measures: total capital inflows as percentage of GDP (tcf); and total trade as percentage of GDP (trade_GDP) can represent greater external sector openness.

The dependent variable gdp_pc is real per capita GDP. The control variables are gfcf, namely gross fixed capital formation as a share of GDP (representing investment in physical capital) and financial development, fd, which includes the status of financial institutions and financial markets.

The annual series of gdp_pc, fd, gfcf, trade_GDP and tcf during the period 1980-2015 of six South Asian countries, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka, are incorporated in the analysis. The logic behind choosing 1980 as a benchmark year is that liberalization policies, especially with regard to international trade, were introduced during the 1980s in most of the economies included in the sample. Two other South Asian countries, Afghanistan and Maldives, are excluded because of problems with attaining sufficient data. Trade and capital variables are indexed to GDP to neutralize the size bias. Series are in log to measure the elasticity.

Series of gdp_pc, gfcf and trade_GDP are extracted from the World Bank database. The tcf variable is self-calculated using the extracted data of capital inflows and outflows under various titles. The financial development variable, fd, is taken from a recent International Monetary Fund (IMF) paper in which the financial development index is developed based on the two major factors that influence it: financial markets; and financial institutions (Svirydzenka, 2016). Under each factor, depth, access and efficiency are considered. Similarly, as instruments of financial development, the exchange rate stability index (ersi) and monetary independence index (mii) are taken from the updated series of the Trilemma Index of Aizenman and others (2010).

The detail variable definition and data sources are listed in the annex.

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3 See Levine and Renelt (1992) for details.
Based on the assumption of cross-sectional dependence among the series and due consideration of fixed and random effects (Hausman, 1978; Greene, 2003; Hansen, 1982), generalized methods of moments (GMM) is applied with instrumental variables (IV) as proposed by (Baum and others, 2003). Thus, as proposed by Baum and others (2003), the efficient GMM estimator is:

\[
\hat{\beta}_{EGMM} = (X'ZS^{-1}Z'X)^{-1}X'Z S^{-1}Z'y
\]  

(1)

Where,

\(\hat{\beta}\) = The coefficient of \(gdp_{pcit}\)

\(X = n \times K\) matrix of regressors \(fd_{it}, gfcf_{it}, trade_{GDP_{it}}\) and \(tcf_{it}\)

\(Z = Instrumental\ variables\) which are \(ersi_{it}\) and \(mii_{it}\)

\(S = \) the optimal weighting matrix, which is given by

\[
S = \frac{1}{n}E(Z'\Omega Z)^5
\]  

(2)

\(n = \) number of observations.

\(\Omega = n \times n\) covariance matrix

Also, the asymptotic variance is:

\[
V(\hat{\beta}_{EGMM}) = \frac{1}{n} (Q'_{xz} S^{-1} Q_{xz} S)^{-1}
\]  

(3)

Where,

\(Q_{xz} = E(X'_{i} Z_i)\)

The model (1) and (2) are estimated in the Stata econometric software.

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4 Baum and others (2003) have assumed that there would be S\(^{-1}\)optimal weighting matrix \(W\) for the efficient GMM estimator, and \(S = \frac{1}{2} E(Z'\Omega Z)\). Here, \(\Omega\) is an assumption factor for the covariance matrix of the distribution term.
IV. RESULT ANALYSIS

Various econometric tests, including the Hausman test, Breusch-Pagan LM Test of Independence and the Pesaran test favour the application of the IV model with the GMM approach. The coefficients are estimated based on the methods proposed by Baum and others (2003).

As illustrated in the methodology, \( \text{lngdp}\_pc \_it \) is incorporated as a dependent variable and, \( \text{lngfcf}\_it, \text{lngfd}\_it, \text{lngtrade}\_gdp\_it, \) and \( \text{lngtcf}\_it \) are incorporated as regressors. External sector openness is represented by \( \text{lngtrade}\_gdp\_it \) and \( \text{lngtcf}\_it \). Furthermore, the financial development variable, \( \text{lngfd}\_it \), is instrumented by two instruments: \( \text{lngmii}\_it \) (monetary independence index) and \( \text{lngersi}\_it \) (exchange rate stability index), as they are presumed to be key to fostering financial development in an economy.

For the observation of Indian influence on other South Asian economies, the whole analysis is conducted including India (all samples) and excluding India. Similarly, the analysis is further expanded by including trade and capital flows as external sector openness indicators and then assuming only the single variable: either trade or capital flows, as an indicator of such openness.\(^5\)

All variables case

In the all variables case, the most substantial factor influencing South Asian per capita GDP is capital formation. The elasticity coefficient of \( gfcf\_it \) is as high as 0.584. Similarly, the financial development variable can influence income by more than 50 per cent (\( lngfd\_it = 0.582 \)), but the variable is significant only at the 10 per cent level. Both variables of the openness criterion of the economy: \( lngtrade\_gdp\_it \) and \( lngtcf\_it \), are significant with an expected positive sign. The coefficients are valid in line with the theoretical context and previous literature. The impact of capital flows on per capita income is observed to have a lesser impact compared to impact of international trade (table 2).

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\(^5\) It can be argued that in some economies, capital account is highly regulated, such as in Nepal, while current account is fully convertible. Accordingly, although incorporating capital and trade flow variables is a good idea, separate analysis may also give unique information.
Table 2. IV-GMM estimates, all variables case

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Variable</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnfd</td>
<td>0.582*</td>
<td>lnfd</td>
<td>1.283**</td>
</tr>
<tr>
<td></td>
<td>(1.92)</td>
<td></td>
<td>(3.24)</td>
</tr>
<tr>
<td>lngfcf</td>
<td>0.584**</td>
<td>lngfcf</td>
<td>0.88**</td>
</tr>
<tr>
<td></td>
<td>(4.38)</td>
<td></td>
<td>(5.08)</td>
</tr>
<tr>
<td>Intcf</td>
<td>0.070**</td>
<td>Intcf</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>(2.33)</td>
<td></td>
<td>(1.1)</td>
</tr>
<tr>
<td>Intrade_gdp</td>
<td>0.375**</td>
<td>Intrade_gdp</td>
<td>0.154</td>
</tr>
<tr>
<td></td>
<td>(3.90)</td>
<td></td>
<td>(1.53)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.049</td>
<td>Constant</td>
<td>-0.92</td>
</tr>
<tr>
<td></td>
<td>(0.98)</td>
<td></td>
<td>(-0.74)</td>
</tr>
</tbody>
</table>

F-Stat: 52.6  P-Value: 0.000  Centered R²: 0.615  Instrumented: lnfd  Instruments: lnmii, lnersi

Note: * Significant at 10 per cent level of significance, ** significant at 5 per cent or lower level of significance. Data in parenthesis ( ) are robust Z-stats.

Nevertheless, if India, an emerging market economy, which is the largest in South Asia, is excluded, openness does not support the income. Both external openness indicators: Intcfit and Intrade_gdpi are insignificant. However, financial development has a multiplier effect, with the coefficient of lnfdit, being 1.28. Similarly, capital formation is also a substantial factor for raising income (table 2).

The results indicate that external liberalization does not affect the economic growth of the other five countries. This may be because the dominance of India in trade and capital flows have shadowed the impact on other neighbouring countries. India has a size and location advantage coupled with being the dominating culture in the subregion. Even though some of the other economies, such as Bangladesh and Sri Lanka, produce some globally competitive products, they may not be strong enough to have an impact on growth.

Diagnostics tests of the model confirm an i.i.d error terms with proper model identification and correct instruments chosen. Kleibergen-Paap rk LM statistic for the under-identification test indicates that the model is correctly identified. At the 5 per cent level of significance, the null hypothesis that the model is under-identified is rejected. Similarly, as given in Stock-Yogo (2005), the Cragg-Donald Wald F statistic for weak identification test shows that F-stat is above the critical values from OLS bias. The null hypothesis of weak model identification is rejected in
both 10 per cent and 20 per cent maximal IV size. Finally, the null hypothesis of $J = 0$, a Hansen J statistic for over-identification tests for all instruments is not rejected. This indicates that the over-identification restrictions are true, showing the validity of the instruments included in the model.

**Only trade as an openness variable**

Next, the capital variable is dropped from the estimation, assuming that trade-GDP ratio can alone represent the external openness. In the all country-sample case, the impact of financial development becomes dominant, similar to the all variables case excluding India (table 3). This indicates that financial development may be a prerequisite to foreign capital flows thereby making a contribution to economic growth. The impact of gross capital formation eases, showing that external financing in South Asia plays a role in total capital formation.

The India excluded sample shows an interesting result; $\text{lntrade}_\text{gdp}$ is insignificant. This further proves that with the exception of India, none of the sample countries have benefited from external trade liberalization. Financial development and capital formation are found to be primary sources of income for those economies (table 3).

**Table 3. IV-GMM estimates with only trade as an openness indicator**

<table>
<thead>
<tr>
<th>Variable</th>
<th>All samples Coefficient</th>
<th>Variable</th>
<th>Excluding India Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{lnfd}$</td>
<td>1.01** (5.42)</td>
<td>$\text{lnfd}$</td>
<td>1.752** (4.87)</td>
</tr>
<tr>
<td>$\text{lngfcf}$</td>
<td>0.454** (3.59)</td>
<td>$\text{lngfcf}$</td>
<td>1.02** (5.12)</td>
</tr>
<tr>
<td>$\text{lntrade}_\text{gdp}$</td>
<td>0.53** (8.42)</td>
<td>$\text{lntrade}_\text{gdp}$</td>
<td>0.49 (0.36)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.171 (-0.25)</td>
<td>Constant</td>
<td>-2.15 (1.90)</td>
</tr>
</tbody>
</table>

F-Stat : 63.05  F-Stat : 45.81  
P-Value: 0.000  P-Value: 0.000  
Centered $R^2$: 0.575  Centered $R^2$: 0.6257  
Instrumented: $\text{lnfd}$  Instrumented: $\text{lnfd}$  
Instruments: $\text{lnmii, lnersi}$  Instruments: $\text{lnmii, lnersi}$

*Note: * Significant at 10 per cent level of significance, ** significant at 5 per cent or lower level of significance.

---

6 It is also possible to have validity of trade-GDP ratio than capital flows because unlike the trade-GDP ratio, the capital flows are more pro-cyclical and might be influenced by non-economic factors.
The diagnostic tests of the model show an \(i.i.d\) error terms with proper model identification and correct instruments chosen in the case of the all-countries sample. Nevertheless, when India is excluded in the sample (remember the capital variable is excluded here), the model identification does not confirm the validity. This shows some degree of negative spillover of trade liberalization on other South Asian countries.\(^7\)

**Only capital flows as an openness indicator**

Next, the trade-GDP variable from the estimation model is excluded in order to compare the result with only capital liberalization. In the all-country-sample case, financial development \((fd_{it})\) is insignificant. In that case, \(lntrf_{it}\) has a slightly larger impact than before and the impact of gross capital formation is stronger (table 4).

### Table 4. IV-GMM estimates, only capital flows as openness indicator

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Variable</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infd</td>
<td>0.55</td>
<td>Infd</td>
<td>1.276**</td>
</tr>
<tr>
<td></td>
<td>(1.56)</td>
<td></td>
<td>(2.87)</td>
</tr>
<tr>
<td>lngfcf</td>
<td>0.931**</td>
<td>lngfcf</td>
<td>1.02**</td>
</tr>
<tr>
<td></td>
<td>(7.29)</td>
<td></td>
<td>(7.89)</td>
</tr>
<tr>
<td>lntcf</td>
<td>0.096**</td>
<td>lntcf</td>
<td>0.039</td>
</tr>
<tr>
<td></td>
<td>(3.01)</td>
<td></td>
<td>(1.16)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.35</td>
<td>Constant</td>
<td>-0.76</td>
</tr>
<tr>
<td></td>
<td>(1.14)</td>
<td></td>
<td>(-0.53)</td>
</tr>
</tbody>
</table>

F-Stat : 47.29  F-Stat : 58.95  
P-Value: 0.000  P-Value: 0.000  
Centered R2 : 0.56  Centered R2 : 0.6055  
Instrumented: Infd  Instrumented: Infd  
Instruments: Inmii, Inersi  Instruments: Inmii, Inersi

\( Note: * \) Significant at 10 per cent level of significance, \( ** \) significant at 5 per cent or lower level of significance.

In the without India sample, as before, capital flow has nothing to do with economic growth. Although the sample countries, with the exception of Bhutan and Nepal, have capital account convertibility, it appears that capital liberalization does play a significant role in the economic growth. However, from the financial

\(^7\) While there is trade and a capital variable, the model is robust in the all-country sample and excluding India. However, when India and the total capital flows variable are excluded, the coefficient of \(intrade_{gdp},\) GDP is also insignificant. As weak model identification and weak instruments are indicated, it can be inferred that Indian trade liberalization would have no impact (or a negative impact) on the per capita income of the other five countries.
development channel, a larger impact on economic growth can be witnessed than before ($lnfd_{it} = 1.276$) when India is excluded in the estimation (table 4). This provides another indication that financial development is a precondition for external sector liberalization.

V. CONCLUSION

The objective of economic liberalization policies in general are to enhance economic growth and, in turn, the development of a country. However, fulfillment of prerequisites and sequencing of the liberalization play a substantial role in reaping the benefits of economic reforms, especially those related to external openness. In addition to openness to external sectors, the objective of regional economic unions are to share development initiatives and complementarity in using resources. It is commonly understood that despite some issues, higher growth trajectory would be challenging without the rapid and phased integration of a country into regional and global economic unions.

For this paper, an analysis of the impact of external openness and financial development on economic growth in South Asian economies is conducted. To compliment this, the influence of a large dominating economy on other neighbouring countries is also observed. For the study, annual series of capital formation, financial development and external openness covering the period 1980-2015 are modeled at an instrumental variable (IV) model using a GMM approach to identify the impact on per capita GDP. A monetary independence index and an exchange rate stability index are chosen as instruments for financial development. The South Asian economies of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka are incorporated in the analysis.

The estimates show that external liberalization contributes substantially to the per capita GDP, but financial development is a prerequisite to realize the benefits. Capital formation is found to be the most substantial component of higher income followed by financial development. Similarly, external openness variables are also significant, but capital liberalization is less effective than trade liberalization.

An altered analysis, either excluding largest and emerging market economy, India, or by incorporating only one variable of openness, trade or capital flow, portrays a slightly different context. Except in India, external liberalization does not support income growth, as both external openness indicators are found to be insignificant in the India-excluded sample. However, financial development has a multiplier effect in the five economies as compared to India.
If the capital flows variable is omitted, the impact of financial development becomes dominant over foreign trade (in all country-sample), which is a similar result obtained in the all variables case excluding India. The trade-GDP variable is insignificant if India is excluded from the estimation. Accordingly, it shows no impact on trade liberalization in the five economies. This indicates that financial development is necessary for international trade to boost economic growth.

Finally, with only capital flow as an external openness indicator (while excluding the trade variable), the financial development variable is insignificant in the all-country estimation. Interestingly, the financial development variable becomes significant if India is excluded from the analysis. It has been further clarified that financial development is the most significant prerequisite for capital account liberalization in South Asian economies, except India.

In line with the discussion by Ito (2005), while financial development spurs investment through different channels, including the equity market, trade openness can be a prerequisite for the development of the financial sector. The sequencing of economic liberalization should start with trade liberalization and financial sector development together and then entail capital account liberalization as an ultimate end of the process.
REFERENCES


External sector liberalization, financial development and income in South Asia


ANNEX: VARIABLE DEFINITION AND DATA SOURCES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP_Gr</td>
<td>Annual percentage growth rate of GDP at market prices based on constant local currency</td>
</tr>
<tr>
<td>GDP_PC</td>
<td>GDP per capita (constant 2005 $)</td>
</tr>
<tr>
<td>Trade_GDP</td>
<td>Trade (percentage of GDP), the sum of exports and imports of goods and services measured as a share of GDP</td>
</tr>
<tr>
<td>TCF</td>
<td>Net FDI Inflow plus Portfolio investment (debt +equity) net, (percentage of GDP)</td>
</tr>
<tr>
<td>CAB</td>
<td>Current account balance (percentage of GDP)</td>
</tr>
</tbody>
</table>


Financial Development Index

FD       | Financial Development                                                                                                                                 |

Source: Svirydzenka; IMF (2016).

Trilemma Index

ERSI     | Exchange rate stability index                                                                                                                                 |
| MII      | Monetary independence index                                                                                                                                 |

Source: Aizenman, Menzie and Ito (2010).
In the present paper, the effect of foreign direct investment (FDI) inflows on income inequality in Asia-Pacific Economic Cooperation (APEC) economies is investigated by using annual data for the period 1990–2015. The variables used are the Gini coefficient, FDI inflows, gross domestic product (GDP) per capita, trade openness and human capital. Also, panel Autoregressive Distributed Lag (ARDL) and panel heterogeneous non-causality tests are used in this study. The panel ARDL results suggest that, in the long run, FDI inflows decrease income inequality. This supports the argument that encouraging FDI inflows does not harm the distribution of income in APEC economies. The results also confirm that GDP per capita and trade openness help reduce income inequality while human capital widens income inequality. The results from this study suggest that APEC authorities could implement sound policies to attract more FDI, as evidence indicates that those inflows would narrow income inequality in APEC economies.

**JEL classification:** C23, D30, F21

**Keywords:** foreign direct investment, income inequality, panel ARDL
I. INTRODUCTION

The effect of foreign direct investment (FDI) has been one of the most widely debated issues among economists and policymakers in developed and developing countries in recent years. The debate has been greatly reinforced because of the rapid increase in FDI flowing to least developed countries. It is estimated that total FDI inflows to least developed countries reached $35 billion in 2015, a 133 per cent increase since 2005.¹ (UNCTAD, 2016). Economist and policymakers believe that FDI could contribute to the growth and development of the host least developed countries through such channels as transfer of modern technology and management skills, human capital development and exporting market access. While the potential role of FDI in the least developed countries development process is once again the focus of attention, some fundamental issues remain unresolved. Among those issues, the impact of FDI on the host country’s income inequality is perhaps the most complicated and controversial. While least developed countries have been experiencing an increase in inequality in recent decades, it is also experiencing rapid globalization of economic activities through the means of international trade and international investment, particularly in the form of FDI.

Since 1995, special attention has been devoted to examining the impact of FDI on income inequality, including by, among others, Tsai (1995), Choi (2006), Wu and Hsu (2012), and Bogliaccini and Egan (2017). However, the theoretical and empirical studies have explored the diverse arguments on the association between FDI inflows and income inequality. While the first group reveals that increasing FDI inflows have contributed to greater income inequality, the second group claims that FDI inflows have helped to reduce income inequality; and the third group indicates that no significant relationship exists between FDI inflows and income inequality. The association between FDI inflows and income inequality remains an area of unresolved controversy in open economy macroeconomics. Accordingly, the objective of the present paper is to investigate whether the FDI inflows are associated with greater income inequality for a sample of 13 Asia-Pacific Economic Cooperation (APEC) developing economies over the period 1990-2015.

Achieving equitable and balanced growth is important for people, society, and government. Increasing inequality leads to social unrest and political instability, which, in turn, undermine economic growth and sustainable development. The relationship between sustainable development and income inequality has been one of the most interesting research areas among academics and policymakers. It is

¹ The average of FDI net inflows into APEC developing economies for the selected period is given in the figure in the appendix.
expected that sustainable development cannot be achieved if extreme inequalities are not addressed. The degree to which inequality has been included in the 2030 Agenda for Sustainable Development has been debated. According to the *World Inequality Report 2018*, income inequality has increased in almost all parts of the world since 1980, but at different speeds (Alvaredo and others, 2017); and hence, the 2030 Agenda has included the issue of inequality. Those factors have motivated the selection of this topic.

The present paper contributes to the FDI and income inequality literature in the following ways. First, though there are some single country studies available on the APEC region, this may be the first study to investigate the impact of FDI on income inequality in APEC developing economies as a group. Second, various recently developed econometric techniques are used: (a) the cross-sectional dependence (CD) test (Pesaran, 2004) and the cross-sectionally augmented Im-Pesaran-Shin (CIPS) unit root test (Pesaran, 2007), in which, the former is based on the assumption of cross-section independence and in the latter, cross-section dependence is considered; (b) the panel Autoregressive Distributed Lag (ARDL) approach developed by Pesaran, Shin, and Smith (2001); (c) the more recently developed panel heterogeneous non-causality test (Dumitrescu and Hurlin, 2012) to examine the causal relationship among the variables.

The empirical investigation of this paper yields several results, which show that FDI inflows reduce income inequality in APEC developing economies in the long-run. They also reveal that an increase in gross domestic product (GDP) per capita and trade openness leads to a reduction in income inequality. Furthermore, the heterogeneous panel non-causality test shows that, in the short-run, there is no causality run from FDI inflows to income inequality.

The rest of the paper is structured as follows. Section II includes a review of relevant theoretical and empirical literature on FDI and income inequality. Section III provides data and the preliminary analysis on APEC developing economies. In section IV, the empirical results and analysis are presented, followed by the conclusion and policy implications.
II. REVIEW OF THE LITERATURE

Theoretical literature

The impact of FDI inflows on income inequality has received only limited coverage in theoretical literature. However, theoretical predictions on the impact of FDI inflows on income inequality have become more ambiguous. In this section, the arguments of the modernization, dependency theories and North–South models with respect to the impact of FDI on income inequality are briefly touched upon.

Modernization theorists argue that FDI is an ideal mechanism for the diffusion of capital, markets and knowledge, which leads to development for newly independent economies (King and Váradi, 2002). They treat foreign and domestic capital as homogeneous goods, so the capital fosters economic growth and its benefits ultimately spread throughout the whole economy. The theorists address the Kuznets effect wherein income inequality increases at first as per capita income grows, but declines later once a certain level of development is reached. Even though FDI initially stimulates growth in some leading sectors and regions, and provides benefits to some skilled elites, growth in the leading sectors and regions facilitate more equal income distribution within a country in the long-run (Tsai, 1995). Several researchers have drawn conclusions in line with the modernization theory (Hanad and Harrison, 1993; Coe, Helpman and Hoffmaister, 1994; Blomstrom and Kokko, 1996; Batra and Tan, 1997; Markusen and Venables, 1999). Their results indicate that because of the increased levels of technology and capital within a country, the overall level of efficiency and labour productivity increased.

Contrary to the modernization theory, dependency scholars argue that FDI increases income inequality. The theory qualifies the existing income inequality as a result of historical events. Furthermore, the theory states that the influence of institutional factors and the strength of the government are very important for the distribution of income. Tsai (1995) argues that the inequality problem is based on the world economy and historical perspective. The influence of where a country fits into the world economy and its relative position determines its income distribution. It demonstrates that as FDI increases, a country’s foreign control increases; and the degree of income equality also increases (Bornschier and Chase-Dunn, 1985). According to the theory, the most common argument is that FDI raises relative wages of skilled labour in a host country by bringing in skill-biased technology. In addition, the capital-intensive techniques used by foreign investors promote unemployment among unskilled workers and distort income distribution by creating an economy with a small advanced sector and a large backward sector (Lall, 1985; Jenkins, 1996; Reuveny and Li, 2003).
Both theories identify the influence of FDI inflows on the rising levels of inequality within countries and make a clear distinction between the consequences for developed and developing countries. The modernization theory views the increased income inequality during the development stage of a country as a necessary stage that eventually leads to more equal income distribution. The dependency theory argues that because of initial differences between countries in terms of government strength, internal market control and foreign market dependency, countries develop in different ways, resulting in differences in the level of income inequality within countries. Based on those theories, it is not possible to state if FDI inflows are increasing or decreasing the income distribution. The modernization theory clearly states the negative side effect in the development stage, but it also points out that once a country is past that stage, FDI inflows in other sectors eventually improve the overall income inequality. The dependency theory acknowledges that FDI inflows are an evident factor for worsening the income inequality.

The impact of FDI inflows on income inequality is also dealt with in the North-South models. Those models, which were introduced by Feenstra and Hanson (1996), explain that an increase in the Southern capital stock relative to that of the North can increase the relative wage of skilled labour in both regions. Accordingly, the availability of relatively cheap labour in the poorer host countries may encourage firms based in the richer source countries to undertake cost-oriented, vertical FDI by offshoring labour-intensive parts of the production process. This type of FDI may increase the skill premium not only in the richer source country, but also in the poorer host country. Several empirical studies (Aitken and others, 1996; Feenstra and Hanson, 1997; Mah, 2002; Hanson, 2003; Lipsey and Sjöholm, 2004) support the hypothesis derived from endowment-driven North-South models, according to which FDI is associated with greater inequality by raising the skill premium in poorer host countries.

Empirical literature

A summary of the empirical literature review is available in table in the appendix. From that table, a few important studies are reviewed.

Focusing on income inequality in least developed countries using cross-country data, Tsai (1995) examines the relationship between FDI and income inequality in 33 least developed countries (in Latin America and South-East Asia), and finds that FDI rises to more unequal income distribution in the host least developed countries, particularly in countries in South-East Asia. The findings of Tsai (1995) are generally consistent with the argument of the dependency theorists. Along similar lines, Te Velde (2003) investigates the effects of FDI on income inequality in four Latin American countries.
for the period 1978–2000. The findings of the study show that FDI does not reduce inequality, with the exception of Colombia. Moreover, FDI raises wage inequality by boosting the wages of skilled workers more than the wages of less-skilled workers. On average, the results indicate that not all types of workers necessarily gain from FDI to the same extent. Furthermore, Choi (2006) uses pooled data for the period 1993–2002 for 119 countries to determine the relationship between FDI and income inequality. The results show that there is a highly significant and positive relationship between FDI and income inequality in those selected countries.

The finding of Tsai (1995) is supported by Basu and Guariglia (2007), who examine the interactions between FDI, inequality, and economic growth in 119 developing countries, over the period 1970–1999. The study indicates that FDI and inequality are positively correlated and that FDI fosters growth. The study concludes that FDI could increase inequality, particularly in an environment where the poor are unable to access the modern FDI-based technology because of low initial human capital. In particular, human capital inequality increases as FDI drives the modern sector’s growth. This suggests a positive relationship between FDI and inequality. Furthermore, Herzer, Huhne and Nunnenkamp (2014) investigate the long-run impact of FDI on income inequality in five Latin American countries (Bolivia, Chile, Colombia, Mexico and Uruguay) for the period 1980–2000. The findings reveal that FDI has a significant and positive effect on income inequality. That implies that FDI leads to wide income gaps in Latin America and hence supports the previous study. In a country-specific analysis, FDI also increases inequality in all the individual countries, except for Uruguay.

In contrast to there being a positive relationship, other studies argue that FDI has a negative impact on income distribution. Among them, Wu and Hsu (2012) assess the impact of FDI on income inequality, using a cross-sectional dataset for 54 countries (33 developing countries and 21 developed countries) over the period 1980–2005. The findings show that FDI reduces the income inequality for countries with well-developed absorptive capacity more than for those countries whose absorptive capacity is less developed. That is, FDI could be harmful to the income distribution of those host countries that have low levels of absorptive capacity.

Furthermore, in contrast to positive and negative effects, using 29 least developed countries, Sylwester (2005) examines how FDI is associated with income inequality for the period 1970–1989. The findings of that study provide no evidence to suggest that there is a significant association between FDI and changes in income inequality within this group of least developed countries. Im and McLaren (2015) investigate the effects of FDI on income distribution and poverty in 127 developing countries for the period 1977–2012 and find that FDI does not influence income inequality.
III. DATA AND PRELIMINARY ANALYSIS

Data sources and description of the variable

For this study, a balanced panel data for 13 APEC economies, namely, Chile; China; Hong Kong, China; Indonesia; Malaysia; Mexico; Republic of Korea; Peru; Philippines; Singapore; Taiwan Province of China; Thailand; and Viet Nam, from 1990 to 2015 are used. Even though there are 21 economies in the APEC region, this study considers only developing economies. Among the fifteen developing economies, the noted 13 economies are chosen for the analysis, as reliable and consistent series of data on them for the above period are available. The two developing countries not covered in the study are Brunei Darussalam and Papua New Guinea.

After reviewing the literature, the important variables for the study were selected: annual time series data on Gini coefficient, FDI inflows, GDP per capita, trade openness and human capital. The Gini coefficient is used as a dependent variable. The Gini coefficient, as an indicator of income inequality, is denoted by $L_{GINI}$. The Gini coefficient data are obtained from the Standardized World Income Inequality Database (Solt, 2009; 2016). FDI is defined as FDI inflows ($ million), denoted by $L_{FDI}$. GDP per capita (constant 2005 $), as an indicator of economic growth, is denoted by $L_{GDPPC}$. Human capital ($L_{HC}$) is measured as index of human capital per person. Trade openness ($L_{TO}$), which is total exports and imports, is measured as a percentage of GDP. The data for FDI inflows, GDP per capita, and trade openness are collected from World Bank (2017) and United Nations Conference on Trade and Development Statistics (UNCTADstat, 2017) online database. The Index of human capital per person is gathered from Penn World Table 9.0 (Feenstra, Inklaar and Timmer, 2015).

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2 The country classification is based on United Nations (2014).

3 One of the tools for measuring inequality of a distribution is the Gini coefficient. Inequality on the Gini scale is measured between 0, where everybody is equal, and 1, where all the country’s income is earned by a single person. The Gini coefficient has been the most popular method for operationalizing income inequality in the economic literature. However, a number of alternative methods exist (Atkinson index, Coefficient of variation, Decile ratios, Generalised entropy index, Kakwani progressivity index, proportion of total income earned, Robin Hood index and Sen Poverty measure); they offer researchers the means to develop a more nuanced understanding of the distribution of income.

4 It is a measure of how a country is liberalized to the rest of the world. Reviewing the existing literature on trade openness shows that there is not a clear proxy of trade openness. Many different measures of trade openness (openness index by Leamer, 1988; price distortion and variability index by Dollar, 1992; and openness index of Sachs and Warner, 1995) have been proposed and used in empirical analyses, but for this paper, the simplest ones, which are based on actual trade flows, such as the sum of exports and imports as percentage of GDP, are used.
Preliminary analysis and discussion

Before starting the investigation, a preliminary analysis check is conducted to determine whether FDI inflows and income inequality are an issue in APEC developing economies. Average annual growth rates on the considered variables are provided in this study for the period 1990–2015. Those growth rates are shown in table 1 (column a). The results show that, out of 13 APEC developing economies, eight economies have average positive growth rates for income inequality. The highest positive average growth rates for income inequality are attained by China (1.50 per cent), Indonesia (1.46 per cent) and Hong Kong, China (0.98 per cent). The highest negative average growth rates for income inequality are attained by Malaysia (-0.57 per cent) followed by Thailand (-0.51 per cent). A positive growth of income inequality is a concern as it indicates the widening of income inequality in those economies while negative growth rates suggest a reduction in income inequality in those economies.
### Table 1. Average annual growth rates and mean statistics for individual economies, 1990–2015

<table>
<thead>
<tr>
<th>Country</th>
<th>GINI a</th>
<th>FDI b</th>
<th>GDPPC a</th>
<th>TO a</th>
<th>b</th>
<th>HC a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>-0.37</td>
<td>49.07</td>
<td>21.87</td>
<td>8 775.19</td>
<td>3.79</td>
<td>7 127.19</td>
<td>-0.12</td>
</tr>
<tr>
<td>China</td>
<td>1.50</td>
<td>44.66</td>
<td>0.22</td>
<td>66 333.5</td>
<td>9.21</td>
<td>1774.86</td>
<td>2.52</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>0.98</td>
<td>43.87</td>
<td>44.73</td>
<td>41 347.69</td>
<td>2.91</td>
<td>25 447.12</td>
<td>2.07</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.46</td>
<td>34.89</td>
<td>5.77</td>
<td>10 728.74</td>
<td>3.51</td>
<td>1360.04</td>
<td>0.50</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>0.06</td>
<td>29.91</td>
<td>13.74</td>
<td>7 290.35</td>
<td>4.49</td>
<td>16 836.54</td>
<td>2.37</td>
</tr>
<tr>
<td>Malaysia</td>
<td>-0.57</td>
<td>39.18</td>
<td>43.72</td>
<td>6 190.26</td>
<td>3.58</td>
<td>5 298.96</td>
<td>-0.18</td>
</tr>
<tr>
<td>Mexico</td>
<td>-0.05</td>
<td>46.56</td>
<td>18.19</td>
<td>19 220.73</td>
<td>1.17</td>
<td>7 634.04</td>
<td>3.38</td>
</tr>
<tr>
<td>Peru</td>
<td>-0.37</td>
<td>49.68</td>
<td>14.89</td>
<td>3 916.37</td>
<td>3.29</td>
<td>2 822.65</td>
<td>1.97</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.06</td>
<td>42.56</td>
<td>46.94</td>
<td>1 860.28</td>
<td>2.20</td>
<td>1 195.31</td>
<td>0.48</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.39</td>
<td>39.98</td>
<td>31.32</td>
<td>25 733.13</td>
<td>3.55</td>
<td>27 436.69</td>
<td>0.00</td>
</tr>
<tr>
<td>Taiwan Province of China</td>
<td>0.43</td>
<td>29.46</td>
<td>8.50</td>
<td>4 036.73</td>
<td>4.11</td>
<td>15 263.15</td>
<td>1.63</td>
</tr>
<tr>
<td>Thailand</td>
<td>-0.51</td>
<td>38.23</td>
<td>23.36</td>
<td>6 457.64</td>
<td>3.51</td>
<td>2 722.54</td>
<td>2.34</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>0.38</td>
<td>35.16</td>
<td>25.33</td>
<td>4 109.13</td>
<td>5.60</td>
<td>631.19</td>
<td>3.57</td>
</tr>
</tbody>
</table>

**Source:** Authors’ calculations on data from Penn World Table 9.0, Solt (2016); World Bank (2017); UNCTADstat (2017).

**Note:** Columns a and b represent average growth rates and mean statistics on individual economies, respectively. Average growth rates and mean statistics are calculated using original data.
Similarly, the average growth rates on FDI inflows indicate that all the economies had significant positive growth rates during the study period, with the exception of China, for which the lowest growth rate (0.22 per cent) was recorded. Regarding GDP per capita, the highest rates were achieved by China (9.21 per cent), Viet Nam (5.60 per cent), Republic of Korea (4.49 per cent) and Taiwan Province of China (4.11 per cent), while the lowest GDP per capita was attained by Mexico (1.17 per cent). Considering trade openness, 11 economies recorded positive growth in trade openness, while only two economies (Chile and Malaysia) had negative growth rates during the sample period. Finally, the considered 13 economies showed remarkable positive average growth rates in human capital, with the highest growth rates obtained by Singapore (2.13 per cent) and Viet Nam (1.73 per cent).

Table 1 (column b) also presents the mean statistics on individual economies for the 1990–2015 period. The results suggest that income inequality among the economies differs significantly. The income inequality was highest in Peru (49.68), Chile (49.07), and Mexico (46.56) while some other economies had relatively low income inequality, such as Taiwan Province of China (29.46) and the Republic of Korea (29.91). Similarly, FDI inflows were significantly higher for China ($66.3 billion), Hong Kong, China ($41.4 billion) and Singapore ($25.7 billion) while it was considerably lower in the case of the Philippines ($1.86 billion), and Peru ($3.92 billion).

Among the 13 sample economies, four of them (Hong Kong; China, Republic of Korea, Singapore and Taiwan Province of China) recorded a GDP per capita that exceeded $15,000 while for six economies (China, Indonesia, Peru, the Philippines, Thailand and Viet Nam) it was less than $5,000. For the same period (1990–2015), the average GDP per capita for APEC countries was $9,071.67. This indicates that only four economies, out of 13, had a higher GDP per capita than that of average for APEC countries. The trade openness was higher in Singapore (359.29) and Hong Kong; China (336.10), while some other economies had relatively low trade openness, such as Peru (40.46) and China (43.59). Finally, human capital was higher for the Republic of Korea (3.37), Malaysia (3.24) and Hong Kong, China (3.03) while it was lower for Indonesia (0.82).

For the same sample period (1990–2015), the world’s average GDP per capita was $7,234.19. This indicates that only five out of the 13 APEC developing economies had a higher GDP per capita than that of world average. The results on summary statistics on individual economies indicate that a majority of the APEC economies were suffering from higher income inequality. As a result of the preliminary analysis, there was sufficient evidence for research to be conducted on the impact of FDI inflows on income inequality in APEC economies. Accordingly, the empirical analysis is presented in the following sections.
Table 2 displays the descriptive statistics and correlation matrix on panel data set. The results show that the average income inequality among the APEC economies is about 40.25 per cent. This implies that those economies had significantly higher income inequality during the sample period. The average FDI inflows are $15.82 billion while GDP per capita is $8,888.46. However, the average trade openness is substantially higher at 119.29 per cent. Finally, human capital per person is 2.47. In addition, to avoid the problems associated with their distributional properties, the variables are transformed into the natural logarithm form, as variables considered in this study are measured differently. GINI and human capital are measured as indexes, FDI inflows and GDP per capita are measured in monetary units and trade openness is measured in percentage. Then, the correlation coefficients between them are calculated. The correlation matrix for the five selected variables confirms that none of the variables are highly correlated, in table 2.

### Table 2. Preliminary statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Summary statistics</th>
<th>Correlation matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std.Dev</td>
</tr>
<tr>
<td>GINI</td>
<td>40.25</td>
<td>0.38</td>
</tr>
<tr>
<td>FDI</td>
<td>15 818.00</td>
<td>1 373.25</td>
</tr>
<tr>
<td>GDPPC</td>
<td>8 888.46</td>
<td>518.44</td>
</tr>
<tr>
<td>TO</td>
<td>119.29</td>
<td>5.98</td>
</tr>
<tr>
<td>HC</td>
<td>2.47</td>
<td>0.03</td>
</tr>
</tbody>
</table>

*Source*: Authors’ calculations on data from Penn World Table 9.0; Solt (2016); World Bank (2017); UNCTADstat (2017).

*Note*: Summary statistics and correlations are calculated using original data and log data, respectively.

### IV. EMPIRICAL RESULTS AND ANALYSIS

#### Model specification

Panel econometric models are used for this analysis, as they provide more information and also control individual heterogeneity. Accordingly, this raises the efficiency of the econometric estimation. Income inequality is expressed as a function of FDI, GDP per capita (GDPPC), human capital (HC) and trade openness (TO).

\[
GINI_{it} = f(FDI_{it}, GDPPC_{it}, HC_{it}, TO_{it})
\]  

(1)
Equation (1) can be rewritten in a linear regression framework as follows:

\[ LGINI_{it} = \delta_0 + \delta_1 LFDI_{it} + \delta_2 LGDPPC_{it} + \delta_3 LHC_{it} + \delta_4 LTO_{it} + \varepsilon_{it} \]  

(2)

In equation (2), all variables are in natural logarithms. Cross nations are denoted by \( i \) (\( i = 1, 2, ..., N \)) and \( t \) denotes time (\( t = 1, 2, ..., T \)). \( \varepsilon \) is a random error term.

**Empirical results and analysis**

**Cross-sectional Dependence (CD) test**

To adopt the type of panel unit root test suitable for this study, an investigation is made to determine whether the sample data have cross-sectional dependence. Accordingly, a cross-sectional dependence test (Pesaran, 2004) is used to examine the cross-sectional dependency of the series. The null hypothesis of the CD test is that the given series is cross-sectionally independent. Table 3 presents the CD test results. As can be seen, the null hypothesis of cross-sectional independence should be rejected at the 5 per cent and 1 per cent significance levels for the considered variables: LGINI, LFDI, LGDPPC, LHC and LTO. Hence, it can be proved through evidence that all the selected variables have cross-sectional dependence. Based on the CD test, it is inappropriate to use a conventional panel unit root test, such as Im, Pesaran, and Shin (2003), which work under the assumption of cross-sectional independence.

**Table 3. Cross-sectional Dependence test results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGINI</td>
<td>1.99*</td>
<td>0.05</td>
</tr>
<tr>
<td>LFDI</td>
<td>28.01**</td>
<td>0.00</td>
</tr>
<tr>
<td>LGDPPC</td>
<td>43.44**</td>
<td>0.00</td>
</tr>
<tr>
<td>LHC</td>
<td>43.37**</td>
<td>0.00</td>
</tr>
<tr>
<td>LTO</td>
<td>25.46**</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*Source*: Authors’ calculations on data from Penn World Table 9.0; Solt (2016); World Bank (2017); UNCTADstat (2017).

*Note*: *, ** denotes the rejection of null hypothesis of cross-sectional independence (CD test) at 5 per cent and 1 per cent significance levels.
Cross-sectionally augmented Im-Pesaran-Shin unit root test

The cross-sectionally augmented Im-Pesaran-Shin (CIPS) unit root test (Pesaran, 2007) is applied to investigate the order of integration of the variables. That test was developed on the assumption of cross-sectional dependence. Table 4 presents the CIPS panel unit root test results.

Table 4. Cross-sectionally augmented Im-Pesaran-Shin panel unit root test results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Levels Statistic</th>
<th>Levels P-value **</th>
<th>First differences Statistic</th>
<th>First differences P-value **</th>
<th>Order of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGINI</td>
<td>-2.35</td>
<td>0.00 **</td>
<td>-</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>LFDI</td>
<td>-2.37</td>
<td>0.00 **</td>
<td>-11.45</td>
<td>0.00 **</td>
<td>I(1)</td>
</tr>
<tr>
<td>LGDPCC</td>
<td>1.87</td>
<td>0.96</td>
<td>-7.29</td>
<td>0.00 **</td>
<td>I(1)</td>
</tr>
<tr>
<td>LHC</td>
<td>-3.08</td>
<td>0.00 **</td>
<td>-</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>LTO</td>
<td>0.81</td>
<td>0.79</td>
<td>-6.51</td>
<td>0.00 **</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations on data from Penn World Table 9.0; Solt (2016); World Bank (2017); UNCTADstat (2017).
Note: ** Indicates the rejection of null hypothesis of unit root at 1 per cent significance level. The CIPS test is estimated using constant and trend variables in the model.

It can be seen that the null hypothesis of panel unit root cannot be rejected for the three variables, FDI inflows, GDP per capita and trade openness, in their level form, while the unit root test can be rejected for the two variables, GINI and human capital. However, at the first difference, the null hypothesis of the panel unit root can be rejected for those three variables, FDI inflows, GDPP per capita and trade openness. Hence, the results confirm that income inequality and human capital are integrated of order zero, I(0), and the other three variables are integrated of order one, I(1).

Panel Autoregressive Distributed Lag approach

The ARDL (Pesaran, Shin and Smith, 2001) approach has several desired properties, including whether the regressors are purely of I(0) or purely I(1) in the model, and can be used to estimate short-run and long-run relationships of the model simultaneously. Accordingly, the panel ARDL is applied to this study to examine the relationship among the variables. The unrestricted error correction model for the panel ARDL can be represented as follows:
\[ \Delta \text{GINI}_{it} = \beta_0 + \beta_1 \Delta \text{GINI}_{i,t-1} + \beta_2 \text{LFDI}_{i,t-1} + \beta_3 \text{LGDPPC}_{i,t-1} + \beta_4 \text{LHC}_{i,t-1} + \beta_5 \text{LTO}_{i,t-1} \]
\[ + \sum_{j=1}^{f} \alpha_{ij} \Delta \text{GINI}_{i,j} + \sum_{j=0}^{g} \alpha_{2j} \Delta \text{LFDI}_{i,j} + \sum_{j=0}^{h} \alpha_{3j} \Delta \text{LGDPPC}_{i,j} \]
\[ + \sum_{j=0}^{i} \alpha_{4j} \Delta \text{LHC}_{i,j} + \sum_{j=0}^{j} \alpha_{5j} \Delta \text{LTO}_{i,j} + \varepsilon_{it} \]  

where \( \Delta \) is the first difference operator, \( \beta_{oi} \) are the fixed effect components, and \( \varepsilon_{it} \) are the standard normal residuals. The coefficients \( \beta_1, \beta_2, \ldots, \beta_5 \) represent the long-run relationship whereas the remaining coefficients with summation sign \( \alpha_{1j}, \alpha_{2j}, \ldots, \alpha_{5j} \) represent the short-run dynamics of the model. The optimal lags \( (f, g, h, i, j) \) are determined by using the Akaike Information Criterion (The estimated coefficients for the long-run model are given in table 5).

**Table 5. Estimated long-run coefficients of the panel Autoregressive Distributed Lag model**

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Parameter</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFDI</td>
<td>( \delta_1 )</td>
<td>-0.08</td>
<td>0.01</td>
<td>0.00**</td>
</tr>
<tr>
<td>LGDPPC</td>
<td>( \delta_2 )</td>
<td>-0.11</td>
<td>0.01</td>
<td>0.00**</td>
</tr>
<tr>
<td>LHC</td>
<td>( \delta_3 )</td>
<td>0.43</td>
<td>0.08</td>
<td>0.00**</td>
</tr>
<tr>
<td>LTO</td>
<td>( \delta_4 )</td>
<td>-0.17</td>
<td>0.02</td>
<td>0.00**</td>
</tr>
</tbody>
</table>

*Source:* Authors’ calculations on data from Penn World Table 9.0; Solt (2016); World Bank (2017); UNCTADstat (2017).

*Note:* ** Indicates statistical significance at the 1 per cent level.

As can be seen, in the long-run, the coefficient of FDI on the Gini coefficient is negative and significant at the 1 per cent level. This supports a positive view that encouraging FDI inflows causes a reduction in income inequality. This result is consistent with previous studies of Jensen and Rosas (2007), Figini and Gorg (2011), Wu and Hsu (2012), Herzer and Nunnenkamp (2013) and Im and McLaren (2015), which are group country studies, Mexican states, developing and developed economies, European economies and developing economies, respectively.

GDP per capita contributes negatively to income inequality and is statistically significant at the 1 per cent level, confirming that GDP per capita plays a significant role in reducing income inequality. This result is in line with the results reported in Tsai (1995) and Choi (2006). It may be because higher GDP per capita is associated with higher investments and higher employment generating processes, which consequently, provide increased access to jobs and income. In addition, to illustrate the Kuznets (1955) inverted U-shaped curve hypothesis (nonlinear relationship
between the GDP per capita and income inequality), GDP per capita squared is also included as an additional variable in the analysis. The result (sign and significant) is not any different from the estimated coefficient of GDP per capita reported in table 5, indicating that there is no non-linear effect of income on income inequality in APEC economies. Accordingly, GDP per capita squared is excluded. The result, which is not reported but available upon request, implies that the hypothesis of Kuznets is not supported by APEC economies’ data. This could be possibly because the economies, considered in this study are classified in different income groups (for example, five high, five upper middle and three lower middle income economies).

Human capital positively affects income inequality and is statistically significant at the 1 per cent level, implying an investment in human capital tends to increase income inequality. The index of human capital that is used in this study is based on years of schooling (Barro and Lee, 2012) and returns to education (Psacharopoulos, 1994). Accordingly, the impact of human capital on income inequality depends not only in the years of schooling but also on the rate of return of those investments. According to Colclough, Kingdon and Patrinos (2010) and Montenegro and Patrinos (2014), the returns to education in the 1990s and 2000s are larger for higher education than for primary or secondary schooling in many economies. Hence, the improvements in education, in general, do not benefit all people (with different education levels) equally. As a result, human capital increases income inequality, which implies that an increase in human capital (skills and knowledge of workers) is the fundamental source of labour productivity growth. Increasing labour productivity is likely to cause a rise in labour demand. This, in turn, increases the wage rate and results in greater income inequality.

The trade openness coefficient is significant at the 1 per cent level and has a negative impact on inequality, which confirms that international trade leads to a narrowing in the income inequality. The result in relation to trade openness is consistent with the previous studies by Tsai (1995), Reuveny and Li (2003), and Wu and Hsu (2012). It may reflect that trade openness is associated with more equitable income distribution within APEC economies. This indicates that an increase in trade openness leads to a reduction in income inequality, which may be because APEC economies are able to reap the benefits of international trade as those economies have enough competition power in international markets. Accordingly, economies with more openness have more equal income distribution.
Robustness checks

In addition, robustness checks are carried out. For this purpose, first, FDI net inflows are used instead of FDI inflows. The result shows that FDI net inflows have a negative effect (-0.04) and are statistically significant at the 1 per cent level. This result also suggests that FDI inflows narrow income inequality in APEC developing economies. Subsequently, the findings are robust and provide consistent results in terms of using FDI inflows or FDI net inflows on income inequality in APEC developing economies. Second, a dummy variable is used to capture the effect of the financial crises on income inequality. The “financial crises” variable takes the value 1 for the years 2007 and 2008 and 0 otherwise. However, the financial crises variable is not significant. This implies that financial crises do not affect income distribution in the APEC developing countries.

To estimate the short-run dynamic parameters, the following error correction model is used:

\[
\Delta LGINI_{it} = \alpha_0 + \sum_{j=1}^{r} \alpha_{1j} \Delta LGINI_{i,t-j} + \sum_{j=0}^{q} \alpha_{2j} \Delta LFDI_{i,t-j} + \sum_{j=0}^{b} \alpha_{3j} \Delta LGDPPC_{i,t-j} \\
+ \sum_{j=0}^{l} \alpha_{4j} \Delta LHC_{i,t-j} + \sum_{j=0}^{l} \alpha_{5j} \Delta LTO_{i,t-j} + \lambda \cdot ECT_{i,t-1} + \varepsilon_{it}
\]

(4)

where \(\alpha_1, \alpha_2, \ldots, \alpha_5\) are the short-run coefficients, \(\lambda\) is the speed of the adjustment parameter and ECT is the Error Correction Term. The ARDL (3, 3, 3, 3, 3) is selected based on Akaike Information Criterion, and the results of the short-run dynamic coefficients associated with the long-run relationships are shown in table 6.

The equilibrium ECT is -0.31, which has the expected negative sign and is significant at the 5 per cent level. The absolute value of the coefficient of error correction term (i.e. 0.31) implies that about 31 per cent of the disequilibrium of the previous year’s shock adjusts back to the long-run equilibrium in the current year. Consequently, the adjustment process is not quick.
Table 6. Estimates of the error correction model

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Parameter</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM (-1)</td>
<td>λ</td>
<td>-0.310</td>
<td>0.065</td>
<td>0.02 *</td>
</tr>
<tr>
<td>ΔLGINI (-1)</td>
<td>α_{11}</td>
<td>0.189</td>
<td>0.139</td>
<td>0.17</td>
</tr>
<tr>
<td>ΔLGINI (-2)</td>
<td>α_{12}</td>
<td>0.247</td>
<td>0.132</td>
<td>0.04</td>
</tr>
<tr>
<td>ΔLFDI</td>
<td>α_{20}</td>
<td>0.008</td>
<td>0.006</td>
<td>0.19</td>
</tr>
<tr>
<td>ΔLFDI (-1)</td>
<td>α_{21}</td>
<td>0.007</td>
<td>0.005</td>
<td>0.14</td>
</tr>
<tr>
<td>ΔLFDI (-2)</td>
<td>α_{22}</td>
<td>0.010</td>
<td>0.007</td>
<td>0.18</td>
</tr>
<tr>
<td>ΔLGDPCC</td>
<td>α_{30}</td>
<td>-0.141</td>
<td>0.116</td>
<td>0.22</td>
</tr>
<tr>
<td>ΔLGDPCC (-1)</td>
<td>α_{31}</td>
<td>0.133</td>
<td>0.231</td>
<td>0.56</td>
</tr>
<tr>
<td>ΔLGDPCC (-2)</td>
<td>α_{32}</td>
<td>0.009</td>
<td>0.086</td>
<td>0.91</td>
</tr>
<tr>
<td>ΔLHC</td>
<td>α_{40}</td>
<td>0.542</td>
<td>0.817</td>
<td>0.33</td>
</tr>
<tr>
<td>ΔLHC (-1)</td>
<td>α_{41}</td>
<td>-0.016</td>
<td>0.771</td>
<td>0.36</td>
</tr>
<tr>
<td>ΔLHC (-2)</td>
<td>α_{42}</td>
<td>0.204</td>
<td>0.533</td>
<td>0.08</td>
</tr>
<tr>
<td>ΔLTO</td>
<td>α_{50}</td>
<td>-0.205</td>
<td>0.258</td>
<td>0.32</td>
</tr>
<tr>
<td>ΔLTO (-1)</td>
<td>α_{51}</td>
<td>0.579</td>
<td>0.532</td>
<td>0.31</td>
</tr>
<tr>
<td>ΔLTO (-2)</td>
<td>α_{52}</td>
<td>-0.840</td>
<td>0.828</td>
<td>0.31</td>
</tr>
<tr>
<td>C</td>
<td>α_{0}</td>
<td>0.615</td>
<td>0.339</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Mean dependent variable 0.001 S.D dependent variable 0.024
S.E. of regression 0.013 Akaike information criterion -5.120
Sum squared residuals 0.023 Schwarz criterion -2.722
Log likelihood 1077.353 Hannan-Quinn criterion -4.164

Source: Authors’ calculations on data from Penn World Table 9.0; Solt (2016); World Bank (2017); UNCTADstat (2017).

Note: * Indicates statistical significance at the 5 per cent level.

Heterogeneous panel causality test

This section presents the short-run causal bivariate panel causalities among LGINI, LFDI, LGDPCC, LHC, and LTO in APEC economies by using a model that deals with a specification of the heterogeneity between the cross nations. Dumitrescu and Hurlin (2012) developed this approach to investigate the null hypothesis of homogeneous non-causality hypothesis against an alternative of heterogeneous non-causality. For this approach, variables need to be stationary so that the first differences of the data series are employed. The causality test results are reported in table 7.
Table 7. Results of heterogeneous panel non-causality test

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Zbar- Stat</th>
<th>P-value</th>
<th>Causal direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFDI does not homogeneously cause LGINI</td>
<td>1.561</td>
<td>0.118</td>
<td>No</td>
</tr>
<tr>
<td>LGINI does not homogeneously cause LFDI</td>
<td>1.327</td>
<td>0.184</td>
<td>No</td>
</tr>
<tr>
<td>LGDPPC does not homogeneously cause LGINI</td>
<td>4.351 **</td>
<td>0.002</td>
<td>LGDPPC → LGINI</td>
</tr>
<tr>
<td>LGINI does not homogeneously cause LGDPPC</td>
<td>0.940</td>
<td>0.113</td>
<td>No</td>
</tr>
<tr>
<td>LHC does not homogeneously cause LGINI</td>
<td>6.601 **</td>
<td>0.000</td>
<td>LHC → LGINI</td>
</tr>
<tr>
<td>LGINI does not homogeneously cause LHC</td>
<td>1.076</td>
<td>0.152</td>
<td>No</td>
</tr>
<tr>
<td>LTO does not homogeneously cause LGINI</td>
<td>5.554 **</td>
<td>0.000</td>
<td>LTO → LGINI</td>
</tr>
<tr>
<td>LGINI does not homogeneously cause LTO</td>
<td>1.059</td>
<td>0.289</td>
<td>No</td>
</tr>
<tr>
<td>LGDPPC does not homogeneously cause LFDI</td>
<td>11.047 **</td>
<td>0.000</td>
<td>LGDPPC → LFDI</td>
</tr>
<tr>
<td>LFDI does not homogeneously cause LGDPPC</td>
<td>1.414</td>
<td>0.157</td>
<td>No</td>
</tr>
<tr>
<td>LHC does not homogeneously cause LGDPPC</td>
<td>5.671 **</td>
<td>0.000</td>
<td>LHC → LGDPPC</td>
</tr>
<tr>
<td>LGDPPC does not homogeneously cause LHC</td>
<td>-0.967</td>
<td>0.333</td>
<td>No</td>
</tr>
<tr>
<td>LTO does not homogeneously cause LGDPPC</td>
<td>3.454 **</td>
<td>0.000</td>
<td>LTO → LGDPPC</td>
</tr>
<tr>
<td>LGDPPC does not homogeneously cause LTO</td>
<td>0.664</td>
<td>0.785</td>
<td>No</td>
</tr>
<tr>
<td>LHC does not homogeneously cause LFDI</td>
<td>6.002 **</td>
<td>0.000</td>
<td>LHC → LFDI</td>
</tr>
<tr>
<td>LFDI does not homogeneously cause LHC</td>
<td>0.297</td>
<td>0.765</td>
<td>No</td>
</tr>
<tr>
<td>LTO does not homogeneously cause LFDI</td>
<td>1.600</td>
<td>0.098</td>
<td>No</td>
</tr>
<tr>
<td>LFDI does not homogeneously cause LTO</td>
<td>-0.249</td>
<td>0.803</td>
<td>No</td>
</tr>
<tr>
<td>LTO does not homogeneously cause LHC</td>
<td>0.153</td>
<td>0.877</td>
<td>No</td>
</tr>
<tr>
<td>LHC does not homogeneously cause LTO</td>
<td>5.774 **</td>
<td>0.000</td>
<td>LHC → LTO</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations on data from Penn World Table 9.0; Solt (2016); World Bank (2017); UNCTADstat (2017).

Note: ** Indicates rejection of the null hypothesis of no causality at the 1 per cent significance levels.

The results of heterogeneous panel non-causality test show that, in the short run, the results reveal that the evidence of unidirectional causality runs from GDP per capita to GINI and FDI; human capital to GINI, GDP per capita, FDI and trade openness; and trade openness to GINI and GDP per capita. This means that economic growth increases income inequality and FDI inflows; human capital increases income inequality, economic growth, FDI inflows and international trade; and trade openness increases income inequality and economic growth. In the analysis, there is no short-run causal relationship between FDI inflows and income inequality (FDI inflows do not increase income inequality), but a long-run relationship exists. From the causality test, it can be concluded, that in the short run, the benefits that are accumulated from GDP per capita, human capital and trade openness cannot be distributed equally in APEC economies.
V. CONCLUSIONS AND POLICY IMPLICATIONS

The objective of this paper is to investigate the effect of FDI inflows on income inequality in APEC economies by using panel data for the period 1990–2015. The panel long-run estimation suggests that FDI reduces income inequality. This supports the argument that encouraging FDI inflows does not harm the distribution of income and also result in more equal income distribution in APEC developing economies in the long-run.

The findings of this paper confirm that FDI inflows narrow the level of income inequality in APEC economies. Currently, a 1 per cent increase in FDI inflows reduces income inequality by 8 per cent. This enables domestic firms to compete with multinational enterprises and many of them merge their businesses, which will eventually lead to an equal income distribution. Policymakers and government authorities in those economies should initiate appropriate policies and provide various types of financial and non-financial support to help domestic firms continue to reap benefits from multinational enterprises. Furthermore, increasing FDI inflows are important to keep up the momentum in reducing income inequality. Frequent economic policy changes relevant to FDI inflows in host APEC economies can foster an unstable environment for attracting more FDI into the region. Accordingly, policymakers and government authorities should be aware of the effects of such changes. Some evidence indicates that FDI inflows decrease income inequality in this region. Based on that, FDI inflows should be considered as a best strategy for income inequality reduction. A policy implication of the paper is that to reduce income inequality, APEC economies should define appropriate strategies and policies to attract more FDI. Because of the unavailability of disaggregate data, the scope of this study was limited to the aggregate level of FDI. However, a firm-level study can provide better results than the aggregate study if data become available for a reasonable period of time.
REFERENCES


The impact of foreign direct investment on income inequality


APPENDIX

Average FDI net inflows into Asia-Pacific Economic Cooperation Developing Economies, 1990-2015

Source: Authors, based on World Bank (2017); UNCTADstat (2017).
### A summary of findings on foreign direct investment and income inequality

<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Period</th>
<th>Country</th>
<th>Technique</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feenstra and Hanson (1997)</td>
<td>1975–1988</td>
<td>Mexico</td>
<td>OLS</td>
<td>Wage, FDI stock, domestic capital and real value added in manufacturing</td>
<td>FDI leads to increased wages of skilled workers relative to unskilled workers and thus probably increases income inequality.</td>
</tr>
<tr>
<td>Sylwester (2005)</td>
<td>1970–1989</td>
<td>29 Less developed economies</td>
<td>OLS</td>
<td>Gini coefficient, FDI inflows to GDP ratio and GDP per capita growth</td>
<td>FDI does not lead to more income inequality.</td>
</tr>
<tr>
<td>Choi (2006)</td>
<td>1993–2002</td>
<td>119 economies</td>
<td>OLS</td>
<td>Gini coefficient, inward FDI stock to GDP ratio, outward FDI stock to GDP ratio, total FDI stock to GDP ratio, GDP, GDP per capita, GDP Per capita growth and dummy (Asia, Latin America)</td>
<td>The positive effect of FDI on income inequality is greater in the case of outward FDI than in the case of inward FDI.</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Period</td>
<td>Country</td>
<td>Technique</td>
<td>Variables</td>
<td>Findings</td>
</tr>
<tr>
<td>----------------</td>
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</tr>
<tr>
<td>Figini and Gorg (2011)</td>
<td>1980–2002</td>
<td>103 developing and developed economies</td>
<td>OLS and Generalized method of moments (GMM)</td>
<td>Gini coefficient, FDI stock to GDP ratio, GDP per capita, Openness to trade and education</td>
<td>Wage inequality decreases with FDI in developed economies, for developing economies, wage inequality increases with FDI.</td>
</tr>
<tr>
<td>Chintrakarn, Herzer and Nunnenkamp (2012)</td>
<td>1977–2001</td>
<td>United States</td>
<td>OLS</td>
<td>Top decile income earners and FDI stock to gross state product ratio</td>
<td>The short-run effects of FDI on income inequality are insignificant and negative; in the long-run, FDI has a significant negative effect on income inequality.</td>
</tr>
<tr>
<td>Tang, Eliyathamby and Selvanathan (2012)</td>
<td>1978–2004</td>
<td>China</td>
<td>OLS</td>
<td>Gini coefficient, FDI inflows to total investment ratio, trade, real GDP per capita, agriculture labour force to total labour force ratio, human capital and total government expenditure to GDP ratio</td>
<td>FDI increases regional income inequality at the national level, as well as in rural and urban regions.</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Period</td>
<td>Country</td>
<td>Technique</td>
<td>Variables</td>
<td>Findings</td>
</tr>
<tr>
<td>----------------</td>
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<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Wu and Hsu (2012)</td>
<td>1980–2005</td>
<td>54 economies (33 developing economies and 21 developed economies)</td>
<td>OLS</td>
<td>Gini coefficient, initial Gini, initial GDP, FDI inflows to GDP ratio, schooling, inflation and trade</td>
<td>FDI reduces the income inequality for economies with well-developed absorptive capacity than less absorptive capacity.</td>
</tr>
<tr>
<td>Deng and Lin (2013)</td>
<td>1970–2007</td>
<td>102 economies</td>
<td>Generalized likelihood ratio test</td>
<td>FDI flows to GDP ratio, FDI stocks to GDP ratio, human capital, trade and private credit</td>
<td>FDI inflows increase inequality in low-income economies where human capital is scarce.</td>
</tr>
<tr>
<td>Franco and Gerussi (2013)</td>
<td>1990–2006</td>
<td>17 transition economies</td>
<td>GMM</td>
<td>Gini coefficient, FDI stock, GDP per capita, trade and inflation rate</td>
<td>FDI does not have significant effect on income inequality.</td>
</tr>
<tr>
<td>Herzer and Nunnenkamp (2013)</td>
<td>1980–2000</td>
<td>8 European economies</td>
<td>Cointegration and Dynamic OLS</td>
<td>Gini coefficient, FDI stock to GDP ratio, GDP per capita, trade to GDP ratio and human capital</td>
<td>Both inward FDI and outward FDI have, on average, a negative long-run effect on income inequality; bidirectional causality between FDI and income inequality.</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Period</td>
<td>Country</td>
<td>Technique</td>
<td>Variables</td>
<td>Findings</td>
</tr>
<tr>
<td>----------------</td>
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<td>-------------------</td>
<td>----------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bogliaccini and Egan (2017)</td>
<td>1989–2010</td>
<td>60 middle-income economies</td>
<td>Error Correction Model</td>
<td>GINI, FDI stock in primary, secondary and tertiary sectors; FDI stock in utilities and communications and wholesale, hotels, restaurants and construction, employment in primary, secondary and tertiary sectors; employment in utilities and communications and wholesale, hotels, restaurants and construction, trade openness, GDP per capita, unemployment and democratic record</td>
<td>FDI in services is more likely to be associated with inequality than FDI in other sectors.</td>
</tr>
</tbody>
</table>
ENVISIONING TAX POLICY FOR ACCELERATED DEVELOPMENT IN INDIA

M. Govinda Rao and Sudhanshu Kumar

The objective of the present paper is to demonstrate that despite several years of reform, the tax-GDP ratio in India is well below international standards and has been static over the last decade. Based on a cross-country analysis of tax-GDP ratios in 115 countries over the period 2005-2015, an estimate is made of the extent of under-taxation in India. Considering that children in the age group of 0-14 years constitute about 40 per cent of the population of 1.3 billion in India, in the paper, it is argued that the tax-GDP ratio must be raised to enhance allocation to education, health care and physical infrastructure to ensure demographic dividends by providing the increasing workforce with productive employment opportunities. The reforms needed to raise the revenue productivity of the tax system while taking into account the best practice approach to tax reform are identified in the paper.

**JEL classification:** H29, E62, O23, P35

**Keywords:** India, tax policy, taxable capacity

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I. INTRODUCTION

To accelerate the development of a country, its government must take a proactive role in creating an enabling environment by providing competitive levels of physical and social infrastructure and ensuring inclusion through adequate social protection and a safety net for the weak and vulnerable members of society. An economy striving to industrialize requires a significant amount of public investment in physical infrastructure to create generalized externalities. In India, with the age group of 0-14 years constituting 40 per cent of the population, significant investment must be directed to education, health care and other social services. Because of limited borrowing space available as a result of high deficits and debt, the latter exceeding 70 per cent of gross domestic product (GDP), significant additional resource mobilization is the only way through which the required level of public investment can be made in physical and social infrastructure. For the present paper, the tax system and reforms are reviewed and the reform areas to improve the revenue productivity of the tax system in terms of a higher tax-GDP ratio are identified.

There are a number of reasons for undertaking a review of the tax policy in India. First, despite attempted reforms in the country over a number of years, the ratio of tax to GDP has remained stubbornly stagnant. Second, the motivation for reforming the tax system has arisen also from the desire to enhance public investment in physical infrastructure and to increase allocation to such sectors as education and health care, which is critical to realize the demographic potential. Third, the federal nature of the country has posed constraints in calibrating tax policies in a coordinated and harmonized manner to attain broad-based direct and indirect tax systems. Fourth, in recent years, there have been widespread conflicts between the taxpayers and collectors, underlining the need to not only reform the tax administration but also to gear up the system to global best practices to combat the menace of base erosion and profit shifting by multinational companies.

The principal objective of tax policy in a developing market economy is to raise revenue in an equitable manner and with minimal distortions. The tax system needs to be reformed as it is plagued by low revenue productivity (in terms of the tax-GDP ratio) and significant distortions. Keeping in view the principles of an efficient tax system based on developments in theory of tax reform and best practice approaches, reform areas to complement the vision of accelerating inclusive development in the country are identified. Section II contains a summary of the principles of tax policy as derived from theory and best practice approaches. In section III, estimates to the tax potential in India are given to demonstrate that the tax-GDP in the country is low by international standards. In section IV the problems and reform measures required to develop a productive, efficient and equitable tax system in India are discussed. In section V, recent reform initiatives are documented and critically evaluated and Section VI is comprised of a summary of the conclusions of the paper.
II. WHAT MAKES A SOUND TAX SYSTEM?

Tax policies stand on the tripod of three equally important and interdependent constituents, the architecture, engineering and management. Architecture provides the design of tax policy guided by the objectives. The engineering aspect relates to the mechanics of applying the design, which are influenced by the nature and quality of the systems and institutions involved in tax collection. The management aspect of tax policy determines the implementation strategy and action taken, which depends on the political support, competence of the administration, application of technology in the administration and the information system. A tax policy is only as good as it can be effectively administered. In the real world, tax policy is affected by a host of factors, including, among them, the role of the State, level of development, administrative capacity and interest group politics. As economic administrative and political conditions vary and the responses of relevant economic agents to tax changes are non-uniform, each country has to choose a tax system that fits with its specific conditions. However, the general principles are helpful to design and reform tax policies.

The thinking on tax policy and reforms has undergone significant changes over the years. The traditional view was that income tax was a major instrument to reduce inequalities in incomes and, therefore, it should be a preferred instrument for raising resources. Accordingly, an increase in the share of direct taxes in the total was considered desirable. The theory posits that the optimal tax rate schedule depends on the distribution of abilities and that it also declines at high incomes. In the absence of lump sum taxes, the search for the second best optimum shows that increasing marginal tax rates with income to tax people having high abilities could result in disincentives in their effort to earn more income. As shown by Mirrlees (1971), high marginal tax rates lead to large economic distortions relative to the revenue raised. Further research has shown that the distortions can be significant when the labour supply is relatively inelastic, which implies that the distortions from high marginal tax rates can affect wage rates, thereby defeating the very purpose of reducing inequality (Feldstein, 1995). Given the difficulties in getting the information on abilities and efforts, it is suggested that a flat tax may be close to being optimal.

In the case of commodity taxes, Ramsey (1927), in an early contribution, showed that distortions can be minimized by levying higher tax rates on commodities with low compensated price elasticity of demand. However, the information for designing such a tax system is simply unsurmountable and administering such a tax with several rates is well beyond the capacity of tax administrations. Rate differentiation can also provide scope for lobbying by special interest groups. In addition, that tax system is politically infeasible because of its regressive nature.
While there is a large body of research on optimal tax theory, the practical application of them for designing the tax system has not been commensurate. Indeed, the perfect and costless information assumed in those models does not simply exist. The models do not take into account the administrative and compliance costs. They focus on determining the tax bases and rates and fail to take into account issues of enforcement tools and capacity. Furthermore, they essentially analyse the behavioural responses in consumption and production decisions and not the responses in terms of avoidance and evasion of taxes. There is also an implicit assumption that people understand and rationally react to the tax system and therefore, the government has no reason to manipulate the perceptions of the people (Slemrod and Gillitzer, 2014).

It must, however, be admitted that the results of optimal theories of direct and commodity taxes provide useful guidance in calibrating the real world tax systems. As stated by Hahn (1973, p. 106), “optimum formulas are either guides to action or nothing at all”. Despite this pessimism, it is obvious that the theoretical advances have helped to understand what constitutes a desirable tax system and to develop the best practice approaches to calibrating tax policies. One of the most important lessons from optimal tax theory is that distortion from a tax is equivalent to the square of the tax rate. This has led to recommending uniformity and simplicity in designing and reforming the taxes. While traditionally, the Haig-Simons income tax was considered the bedrock of the tax system, there is much less consensus on that today in the view of the undesirable economic effects of capital taxation. In fact, there has been a movement towards differentially taxing “dual” income taxation with capital income taxed at lower and less progressive rates (Auerbach, 2008). Notably, in many countries, the balance has shifted in favour of a broad-based value added tax on goods and services tax (GST). Even as income taxes continue, the step progressivity that existed in most countries in the 1950s and 1960s is no longer commonplace.

The most important objective of tax policy is to raise revenue by minimizing the three costs associated with taxation, the cost of collection, the compliance cost and the distortion costs, as people change their behaviour in response to tax policy. To minimize administrative and compliance costs, the tax system must be simple and transparent and the tax policy must not be loaded with multiple objectives but, instead, designed mainly to raise revenue in an equitable manner. To raise the same amount of revenue with lower tax rates, tax bases must be broadened with minimum exemptions and preferences and an effective administration and intelligence system needs to be in place to ensure compliance. While raising revenue is important (taxes exist primarily to meet this objective), the focus of tax policy and reforms should

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1 The most recent attempt to distil balanced and well-grounded tax reform proposals in the United Kingdom of Great Britain and Northern Ireland was the Mirrlees Review. See Johnson and Myles (2011) and Gordon (2011).
be to enhance long-run revenue productivity and not to meet short-term exigencies through ad hoc changes.

Consequently, as Bird and Zolt (2008) argue, the best practice approach to tax policy and reforms requires that governments move towards a broad base, low rate approach, have in place a simple and transparent tax system and avoid arbitrary tax differentiation across people and economic activities. The distortions increase exponentially with the tax rates. As a result most countries desist from levying taxes at high rates. Thus, the preferred strategy for raising a given amount of revenue and putting in place a simple and transparent system is to broaden the base, reduce the rate and minimize rate differences. In the same vein, an important piece of advice given to most developing countries is to levy a broad based and simple goods and services tax (GST) at a single rate.

In most developing countries, including India, taxes are deployed to achieve many objectives, in addition to raising revenue in an equitable manner. Many countries complicate their tax system by providing exemptions and preferences for such objectives as increasing the levels of savings and investment, increasing investments in particular sectors, achieving balanced regional development, augmenting infrastructure, enhancing exports and encouraging the development of small and medium industries. Even when the assigned objectives are clear, such as promoting investment or exports, it is difficult to ascertain their effectiveness. Most often, they are redundant and ineffective and contribute towards making the tax system more complicated and open up avenues for avoidance and evasion of taxes. Often, they result in an uneven tax burden with domestic companies bearing a higher burden than foreign companies. Although experience suggests that sound macroeconomic factors, competitive infrastructure, effective governance and stable and predictable policies are the most important determinants of investment, most countries continue to extend a variety of incentives to attract investment, which not only causes significant revenue losses from tax-expenditure, but also tends to distort resource allocation.

The major challenge is to design a tax system that incorporates fairness in its impact. The most important lesson from optimal taxation is that the distortions in the tax increases exponentially with tax rates and therefore, even when the tax is seen to be progressive, the adverse effects on economic activity and employment may negate the progressivity. Furthermore, too much attention to the fairness of individual taxes is misplaced. When the tax system is designed to reduce distortions, it may contain some individual taxes that can be viewed as being regressive. What matters is the effect of the tax system as a whole and not the impact of individual taxes on the distribution of income (Johnson and Myles, 2011; Bird and Zolt, 2005; 2008).
The general presumption is that as indirect taxes are regressive, direct taxes should be designed to reduce inequalities. Accordingly, the traditional approach is to design highly progressive personal income tax systems and levy high rates on corporate income. This has, however, come into serious questioning. First, it is possible to design non-regressive consumption taxes by exempting essential unprocessed food items. Second, the effectiveness of personal income tax in reducing inequality itself is doubtful. This is because only a small proportion of the population pay income tax in developing countries. In most of those countries, income tax is neither comprehensive nor progressive and much of the revenue comes from withholding taxes, with very little of it emanating from self-employed businesses, which can be attributed to a poor information system and the existence of a large unorganized sector. High rates of taxes on corporate income, given the high mobility of capital, can drive out businesses. Furthermore, progressive tax systems are not costless. They increase administrative, compliance and even more economic efficiency costs, and when the distortions are taken into account, the adverse impact on economic activity on the income of the poor may outweigh the gains from progressivity.

Empirical studies in developed and developing countries have shown that the tax system has not been effective in redistributing incomes. The study by Pechman and Okhner (1985) in which alternative assumptions about the distribution of burden of individual taxes for the period 1966-1985 are used shows that the tax system of the United States of America is not significantly progressive. Similarly, a careful study of the tax system of Chile by Engel, Galetovec and Raddatz (1999) indicates that the tax system is moderately regressive with the Gini coefficient higher at 0.4881 when the incidence of tax is taken into account as compared to 0.4861 without the tax. Accordingly, the focus of redistribution in fiscal policy needs to shift from reducing the income of the rich to increasing the income of the poor. This implies that the focus of the redistributive instrument should shift from the tax to the expenditure side of the budget.²

In recent discourse on optimal tax systems, discussion on the issue of an appropriate tax base-income versus consumption has resurfaced. Most versions of consumption tax avoid taxing normal returns on savings or capital or both. Of course, applying an expenditure tax may not be an option; also, it is not possible to impose a zero effective tax rate on the normal returns to capital. Nevertheless, a consensus among

² As Harberger (2005, p. 13) argues, “Society is not going to bring about major changes in the income distribution by operating either on the tax side or on the expenditure side of the budget of the public sector…..it is more realistic to think of the struggle against poverty to be a major goal”. He recommends that that should be done by helping the poor to meet their basic needs and providing opportunities for advancement by ensuring access to education and health care to those who cannot afford it. For similar arguments see also Bird and Zolt (2008).
tax theorists is that labour and capital income should be taxed differently because of the different effects they have on taxation. In fact, Auerbach, Devereux and Simpson (2010), recommend the replacement of the present system of corporation tax with a destination-based value added tax (VAT) on goods and services with labour costs deductible in addition to the input costs.

While doing away with the corporation tax would be politically unacceptable in all countries, the discussion brings out that a comprehensive VAT on goods and services is an important instrument in any modern tax system. The tax has been found to be particularly important to overcome a decline in revenue when developing countries try to rationalize import duties. This is demonstrated in the study by Keen and Lingthart (2002), which shows that a revenue-neutral tariff reduction accompanied by a price-neutral GST enhanced revenue and efficiency. An increase in revenue arises from the self-enforcing nature of the tax. An increase in efficiency arises, as it avoids distorting the input prices and to that extent, reduces production inefficiency (Keen, 2007). Emran and Stiglitz (2005), however, contest that GST on recorded transactions, when combined with weak administrations in developing countries, can work as a tax on the formal sector. In contrast, Keen (2007) considers GST as one of the least costly ways of taxing the informal sector because of its self-enforcing nature. In effect, as long as the gains from participating in the formal market are greater than the tax loss, the taxpayer prefers to pay the tax; this explains why the simplicity of the tax is important. Consequently, as Bird and Gendron (2007) argue: “On the whole, while further theoretical and particularly empirical research on the effects of value added tax in developing and transitional countries is needed, the case for a value added tax in such countries remains solid.”

Accordingly, a good tax system is one that minimizes, administrative, compliance and distortion costs to the economy. It should have broad base, low marginal rates and less differentiated rates with a simple structure. Fairness in tax policy should be judged by totality and not individual taxes. Furthermore, the focus of fiscal policy should shift from reducing inequality to alleviating poverty, which is more effectively done through the expenditure side of the budget. An important component of a good tax system is a comprehensive goods and services tax. It is not enough to focus on the design of the tax structure; building capacity and orientation in tax administration is equally important. A good tax system is supported by a good information system not only to enforce the tax but also to calibrate changes with full information. A hallmark of good tax administration is the taxpayer service, which not only builds confidence among the taxpayers, but it also improves compliance. Use of information technology promotes transparency and provides information for the enforcement of taxes.
III. ANALYSIS OF TAX REVENUE IN INDIA

Tax revenue trends in India

The tax-GDP ratio in India increased from less than 10 per cent in the 1970s to 14 per cent in the 1990s and 16.5 per cent after 2008/09. As shown in table 1, the highest ratio was 17.5 per cent, achieved in 2007/08, which followed the reduction in the consumption tax rates in the wake of global financial crisis. The ratio declined to 15.5 per cent in 2009/10 and thereafter gradually recovered to 16.5 per cent in subsequent years. The important point is that the tax-GDP ratio has been stubbornly stagnant since 2008/09. The decline in the ratio after 2007/08 by two percentage points was mainly on the back of lower central tax collections. Revenue from state taxes has steadily increased, albeit at a slow rate, from 5.5 per cent in 2008/09 to 6.3 per cent in 2014/15. The decline in the tax-GDP ratio after 2008/09 can mainly be attributed to lower collections in central taxes, by slightly less than two percentage points. Meanwhile, revenue from state taxes gradually trended higher, increasing by one percentage point after the cascading type sales taxes were replaced by a VAT on goods in 2005/06.
Table 1. Trends in tax-GDP ratio at union and state levels (percentage)

<table>
<thead>
<tr>
<th>Year</th>
<th>Centre</th>
<th>States</th>
<th>Total</th>
<th>Centre</th>
<th>States</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct</td>
<td>Indirect</td>
<td>Total</td>
<td>Direct</td>
<td>Indirect</td>
<td>Total</td>
</tr>
<tr>
<td>1950-1960</td>
<td>1.57</td>
<td>2.77</td>
<td>4.33</td>
<td>0.65</td>
<td>1.69</td>
<td>2.34</td>
</tr>
<tr>
<td>1961-1970</td>
<td>1.93</td>
<td>4.49</td>
<td>6.42</td>
<td>0.44</td>
<td>2.48</td>
<td>2.92</td>
</tr>
<tr>
<td>1971-1980</td>
<td>2.21</td>
<td>6.21</td>
<td>8.42</td>
<td>0.26</td>
<td>3.71</td>
<td>3.97</td>
</tr>
<tr>
<td>1981-1990</td>
<td>1.96</td>
<td>7.77</td>
<td>9.74</td>
<td>0.20</td>
<td>4.79</td>
<td>4.99</td>
</tr>
<tr>
<td>1991-2000</td>
<td>2.64</td>
<td>6.21</td>
<td>8.85</td>
<td>0.16</td>
<td>4.97</td>
<td>5.13</td>
</tr>
<tr>
<td>2001-2008</td>
<td>4.43</td>
<td>5.46</td>
<td>9.89</td>
<td>0.15</td>
<td>5.57</td>
<td>5.72</td>
</tr>
<tr>
<td>2007-2008</td>
<td>6.26</td>
<td>5.63</td>
<td>11.89</td>
<td>0.13</td>
<td>5.43</td>
<td>5.56</td>
</tr>
<tr>
<td>2008-2009</td>
<td>5.68</td>
<td>5.07</td>
<td>10.75</td>
<td>0.14</td>
<td>5.37</td>
<td>5.51</td>
</tr>
<tr>
<td>2009-2010</td>
<td>5.67</td>
<td>3.97</td>
<td>9.64</td>
<td>0.15</td>
<td>5.66</td>
<td>5.81</td>
</tr>
<tr>
<td>2000-2011</td>
<td>5.63</td>
<td>4.55</td>
<td>10.19</td>
<td>0.16</td>
<td>5.99</td>
<td>6.15</td>
</tr>
<tr>
<td>2011-2012</td>
<td>5.42</td>
<td>4.45</td>
<td>9.87</td>
<td>0.15</td>
<td>6.28</td>
<td>6.43</td>
</tr>
<tr>
<td>2012-2013</td>
<td>5.48</td>
<td>4.77</td>
<td>10.25</td>
<td>0.14</td>
<td>6.33</td>
<td>6.47</td>
</tr>
<tr>
<td>2013-2014</td>
<td>5.54</td>
<td>4.42</td>
<td>9.96</td>
<td>0.14</td>
<td>6.44</td>
<td>6.59</td>
</tr>
<tr>
<td>2014-2015</td>
<td>5.53</td>
<td>4.36</td>
<td>9.89</td>
<td>0.14</td>
<td>6.49</td>
<td>6.64</td>
</tr>
<tr>
<td>2008-2015</td>
<td>5.55</td>
<td>4.50</td>
<td>10.05</td>
<td>0.15</td>
<td>6.18</td>
<td>6.33</td>
</tr>
</tbody>
</table>

**Source:** India, Ministry of Finance. Public finance statistics, (various years, for 2013/14 and 2014/15; budget documents of the government and Reserve Bank of India (2016).

**Note:** The data for 2014-2015 refer to a revised estimate for the government and budget estimate for the states.
How does India compare itself with other countries with a similar level of development in mobilizing revenue? A number of studies have estimated the tax potential using cross-country regressions. Those studies estimate the tax potential by running a regression with tax-GDP ratios as the dependent variable and a vector of taxable capacity variables as independent variables. The predicted tax-GDP ratio obtained by substituting the actual values of the determinants in the estimated equation is taken as the tax potential and the ratio of actual tax-GDP ratio to the predicted value is taken as tax effort. The predicted value represents the potential tax-GDP ratio according to the average behavioural relationship between tax collection and its determinants across countries.

More recent advances in estimating tax potential extend beyond the simple regression approach mentioned above. Estimates can be made of the tax potential not on the basis of average behavioural relationships but also by using the stochastic frontier analysis (Cyan, Martinez-Vazquez and Vulovic, 2012; Langford and Oldenburg, 2016). Under this approach, the envelop for the tax-GDP ratio is estimated by employing tax frontier determinants representing taxable capacity and effort. The relevant frontier for the country represents the highest tax ratio that would result for a given set of determinants.

The empirical studies, by and large, show that the actual tax-GDP ratio in India is much lower than its potential. Bird and Zolt (2003) show that in 2000, the average tax ratio for the middle income countries (per capita income ranging from $1,000 to $17,000) was 22 per cent. A more recent study, conducted by the International Monetary Fund (IMF), covering 174 countries, shows that the average tax ratio for lower middle income countries (per capita gross national product (GNP) ranging from $995 to $3,945) for the period 1980-2009 was about 18 per cent (IMF, 2011). In comparison, the ratio in India was much lower. After reaching 17.5 per cent in 2007/08, the ratio declined to 15.5 per cent in 2009/10 and has been hovering between 16.2 and 16.5 per cent over the past years.

For this paper, an attempt was made to determine the extent of under-taxation in India by estimating the tax-GDP ratio that the country should raise based on the cross-country relationship between tax ratio and per capita income in a regression model. In the analysis, a panel of 115 countries for the years 2005 to 2015 is used. The selection of the sample is based on availability of continuous data for the variables used. The ICTD Government Revenue Dataset for tax-GDP ratio is used. The determinants of taxable capacity used in the equation are the ratio of urban population to total population, the consumer price index for inflation, per capita income in purchasing power parity, and the education level of the workforce.

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3 For a more recent study see Le, Moreno-Dodson and Bayratkar (2012).
power parity (PPP). Dollars and the share of revenue from natural resources variable is collected from WDI (World Development Indicator) database of the World Bank. The log of the per capita income in the estimation is used.

Tax potential is analysed by estimating the equation of the form:

\[
\left( \frac{T}{Y} \right) = c + \left( \frac{Rn}{R} \right) + \ln \left( \frac{Y}{P} \right) + U + \ln f + \varepsilon \tag{1}
\]

Where, \( T/Y \) denotes tax-GDP ratio, \( Y/P \) represents per capita GDP, \( Rn/R \) represents the share of revenue from natural resources in total revenues, \( U \) denotes the urbanization share in total population, \( \text{Inf} \) denotes consumer price index inflation. Tax revenue data are the sum total of the tax revenue being generated at different levels of government(s) in a country. While \( Y/P \) represents the ability of the people to pay taxes, \( Rn/R \) takes into account the need to raise tax revenue is lower in countries that derive substantial revenue from natural resources.

The predicted value of tax-GDP ratio (year 2015) for India based on the above estimates using pooled data, fixed effect and random effect model are 20.16, 19.27, and 19.008, respectively. The Hausman test suggests use of fixed effect model estimates according to which, India should have generated a tax-GDP ratio of 19.27 per cent in 2015. as compared to its actual ratio of 16.5 per cent.

<table>
<thead>
<tr>
<th>Table 2. Tax-GDP ratio estimate using panel data</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Pooled estimate (Robust SE)</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>Share of revenue from natural resources in total revenue</td>
</tr>
<tr>
<td>Urbanization</td>
</tr>
<tr>
<td>Log (per capita income in PPP $ terms)</td>
</tr>
<tr>
<td>Inflation</td>
</tr>
<tr>
<td>Number of observations</td>
</tr>
<tr>
<td>Predicted value of Tax-GDP ratio for India (year 2015)</td>
</tr>
</tbody>
</table>

Note: Hausman test indicates use of fixed effect model over the random effect model. Standard errors are in parenthesis. *** , ** denotes significance at 1% and 5% level of significance.
This estimate, as mentioned above, is based on the average cross-country behavioural relationship between the tax-GDP ratio and its determinants. In contrast, the study of Langford and Oldenburg (2016), based on the stochastic frontier analysis, estimate the potential at 28.4 per cent. While this is the highest that can be raised, from the policy perspective, the government should at least try to enhance the tax ratio to the average level of 19.3 per cent. Surely, a country that aspires to accelerate its development has to substantially augment its public spending on physical infrastructure and human development. With about 40 per cent of its 1.3 billion people in the age group of 0-14 years, the expenditure on education and health care relative to GDP must be much higher than 3 per cent and 1.2 per cent, respectively. The country has to increase significantly money spent on physical infrastructure and a large proportion of it must come from the budget. It is estimated that for financing the Sustainable Development Goals set in the 2030 Agenda for Sustainable Development, the tax-GDP ratio should be increased to about 20 per cent of GDP, which is close to the estimate of the tax potential in this paper. It is, therefore, important that efforts are made to increase the fiscal space by increasing the tax-GDP ratio at least to the average levels.

IV. WHAT AILS THE TAX SYSTEM OF INDIA?

Despite several attempts at reforms, the revenue productivity of the tax system of India has remained low, constraining the government’s ability to spend adequately on social services and physical infrastructure. This is because the reforms to date have failed to address the fundamental causes of low revenue productivity, which can be associated with the narrow tax bases. Several factors are keeping the taxes bases narrow. Among them are (a) the fragmented constitutional assignment; (b) wide ranging tax preferences; (c) multiplicity of objectives incorporated into tax policy, resulting in complications in the tax laws, wide avenues for evasion and avoidance, and large and increasing amounts held in disputes; (d) tax abuse by multinational companies, resulting in base erosion and profit shifting; and (e) poor capacity of the tax administration, including the information system, to effectively administer and enforce the taxes.

Inability to levy a comprehensive income tax in India, in part, lies in the constitutional assignment itself. The assignment of the tax on income from agriculture to the states has resulted in the national Government levying tax only on non-agricultural income. The states do not levy the agricultural income tax, except on the income from plantation crops. Even corporations investing in the agricultural sector do not have to pay the tax (Rao, 2015; Rao and Rao, 2010). Many studies have focused on estimating the potential from taxing agriculture, In a more recent study, by Rao and Sengupta (2012), for 2008-2009, the potential is estimated to be 0.6 per cent of GDP.
The exemption to the agricultural sector prevents the levy of comprehensive income taxation and provides an easy avenue for evasion and avoidance.

The second important reason for the narrow base of taxes is the plethora of exemptions, concessions and deductions given for direct and indirect taxes. A close look at the number of objectives pursued by the tax system is enough to understand the complications and its ineffectiveness in achieving the multiple objectives. In addition to raising revenue, the tax system is required to fulfil a number of objectives, such as incentivizing savings, promoting exports, achieving balanced regional development, promoting investments in infrastructure, expanding employment, promoting scientific research and development, and encouraging cooperatives and charitable activities. Similarly, the excise duty is expected to provide preferential treatment to small-scale industries by keeping the threshold high, promoting backward area development. Incorporation of those objectives in tax laws creates enormous avenues for evasion and avoidance and it is not possible to determine how much of those objectives are achieved if at all (Rao, 2015).

Since 2006, the Government of India has been publishing estimates of revenue foregone from various tax concessions in the budget. For 2014/15, the budget estimates of the revenue foregone was a staggering 5.89 trillion Indian rupee (Rs) ($843.4 billion), which equates to 4.7 per cent of GDP. This alone exposes the enormity of tax preferences in constraining the revenue productivity of the tax system in India. The revenue foregone on account of customs duty concessions amounted to 2.4 per cent of GDP and the revenue lost because of excise duty concessions amounted to 1.4 per cent of GDP. The revenue cost of special economic zones for 2014/15 was estimated at Rs 203.76 billion, area based incentives cost another Rs. 172.84 billion from union excise duties and another Rs. 80 billion from corporate income tax.

The fourth important factor eroding the base is the way in which multinationals operate in the country. “Base erosion and profit shifting” by multinational companies is a worldwide phenomenon. Multinational companies indulge in a variety of ways to avoid taxes. Creating a web of complex subsidiaries and shifting the profits to subsidiaries in low tax jurisdictions and taking advantage of tax treaties is a common method employed. Manipulating prices in related party transactions, or what is usually referred to as transfer pricing, to reduce the tax liability is another method used. Although there are “arm’s length pricing rules” to deal with the transfer pricing issue, it is difficult to apply them in practice when intangible assets, such as trade names, goodwill, brand recognition or intellectual property, such as patents, copyrights, brands and trademarks and business methodologies, are involved. Multinational companies also act as intermediaries in product sales and distribution, make loans and interest payments and charge fees to one another for activities, such as management services, treasury services and investment services, to reduce the tax liability.
Tax avoidance by multinational companies is a global phenomenon. There is overwhelming evidence of this tax abuse even in developed countries, such as the United Kingdom, the United States, and member States of the European Union. This prompted the Group of 20 (G20) countries to request the Organisation for Economic Co-operation and Development (OECD) to develop a base erosion and profit shifting system action plans in September 2013. OECD has come up with 15 action plans for countries to follow in its various reports. However, those proposals do not go far enough. In fact, there is considerable unease among the developing countries about the OECD proposals because of the discussion on this in OECD is dominated by developed countries and the representatives of multinational enterprises and the interests of developed and developing counties do not always converge.

The Independent Commission for the Reform of International Corporate Taxation, a group of leaders from government, academia and civil society created to promote reforms, in its review of the action plans states that they are a patchwork of existing approaches. Multinational enterprises are essentially unified firms organized to maximize profits across jurisdictions and treat them as independent entities, making the application of the arm’s length principle for transfer pricing meaningless. Large multinational enterprises are oligopolies; there are no comparable local firms that can serve as benchmarks. In addition, the OECD action plans fail to deal with the problem of shifting profits through the exploitation of intangible assets mentioned above. The Independent Commission for the Reform of International Corporate Taxation (2018) declaration calls for a paradigm shift. In the declaration, it is stated that to seriously attempt to stop base erosion and profit shifting, there must be a change in the mindset that a multinational enterprise is comprised of separate independent entities. The Independent Commission for the Reform of International Corporate Taxation has recommended that that a multinational enterprise and its subsidiaries be considered as a single firm and that it allocate worldwide profits to individual countries according to an agreed formula that includes such factors as employment, sales and resources used and fixed costs. Almost all multinational enterprises are listed on the stock market and would not understake their worldwide profits. It should, however, be noted that formulary allocation can result in tax competition by individual countries to attract investment in their jurisdictions. To avoid such a race to the bottom, a consensus on a minimum tax rate be reached.

However, the challenges of arriving at a consensus formula at the international level are formidable, as the interest of countries are not single peaked. When there are differences, multinational enterprises tend to play one country against another. Accordingly, even though taking the unitary approach and applying a formulary apportionment remains the goal, the Commission recommends interim approaches with a single entity as the centrepiece of reform. The important point is that forcing the multinational enterprises to pay legitimate taxes, particularly to developing countries,
is a formidable task. While this is work in progress, the way forward is not to treat the affiliates of multinational enterprises as different entities but to consolidate their profits and allocate them based on a formula. This also requires a change in the global system of tax governance to ensure universal membership and an open and democratic structure. There is a strong basis behind bringing international taxation matters under the United Nations aegis, as this institution alone can provide the sanctity for rules based on the principle of sovereignty of all countries.

In the Indian context, there is considerable evidence to show that multinational companies have been indulging in abusive tax practices. Patnaik and Shah (2011) show that the effective corporation tax rate on multinational companies is significantly lower than domestic companies. Rao and Sengupta (2014), in their more detailed study, indicate that during the period 2006-2011, the effective interest rate paid by multinational companies was higher than the market rate and the amount of tax paid per unit of borrowing was lower. A more recent study, conducted by Petr and Prats (2013), is based on sample data of multinationals in India. It shows that those entities report 1.5 per cent less profits, pay 17.4 per cent less in taxes per unit of asset, pay 30.3 per cent less taxes per unit of profit and have 11.4 per cent higher debt ratios than companies with no connection to tax havens. The Government of India has passed the General Anti Avoidance Rule and has been applying it. Nevertheless, building administrative capacity to enforce tax payments by the multinational enterprises remains a major challenge.

Another important factor constraining the revenue productivity of the tax system is poor administrative capacity. Tax administration is a critical element not only in collecting revenue, but also in reducing the compliance burden and overall management of the tax system. According to Bird (2004), “the best tax policy is worth little if it cannot be implemented effectively”. However, the issue of tax administration is not just its operations. It has to do with the ability to enforce the tax on the complex dealings of taxpayers, the attitude of the tax administration towards taxpayers, the taxpayers’ confidence and trust with the tax administration, and clarity in laws to avoid discretion to tax administrators.

By all accounts, the Indian tax administration does not evoke the confidence and trust required of a modern tax administration. There have been a number of reports on the reform of the tax administration beginning with the Report of the Tax Reforms Commission (1991). Careful studies conducted by Das-Gupta and Mookherjee (1998) and Bagchi, Bird and Das-Gupta (1995), and more recently the Reports of the Tax Administration Reforms Commission (India, 2014; 2015) have dealt with various aspects of the reform of the tax administration in detail. The issue is the implementation of the reforms, which requires political will rather than identification of reforms areas.
The important problems of tax administration in India deals with the following: (a) lack of autonomy; (b) low morale of tax administrators arising from low prospects of progression in the careers of administrators; (c) organizational problems of separation of direct and indirect tax administration and lack of coordination, effective communication and information exchange among them; (d) area-wise rather than functional divisions and lack of functional specialization, including developing an intelligence system; (e) a poor information system and limited use of technology for tax administration; (f) perverse incentive from setting targets to tax administrators and judging their performances based on the fulfilment of the targets; (g) poor capacity to forecast revenue; (h) lack of clarity in tax laws, wide discretion to tax officials and build-up of a vast amount of arrears; and (i) an adversarial attitude of the tax administration towards taxpayers in which they are essentially considered to be tax evaders. While the problems with the organizational set up and the functioning of the tax administration are well known, there have been few attempts to address them.

One of the consequences of ambiguity in tax laws and arbitrary administration is the build-up of a large amount of tax arrears. At the end of 2013/14, the amount of tax arrears from various taxes amounted to more than Rs 5.83 trillion or 5.1 per cent of GDP. Almost 86 per cent of the tax in arrears is held up in disputes. In fact, about 47 per cent of the arrears have been accumulated in disputes up to two years and the arrears held in disputes up to five years total 76 per cent of the arrears. In most cases, the tax authorities routinely make unfair assessments to meet their revenue targets and the taxpayers have no option but to take recourse to legal remedy. According to the recent report of the Comptroller and Auditor General (India, 2017), in 2015/16, 65 per cent of the cases in the Income Tax Appellate Tribunals were decided in favour of assessees, and the corresponding figures in High Courts and the Supreme Court were 9 per cent and 71 per cent, respectively.

An important innovation, however, has been the creation of large taxpayers units, which have helped to coordinate the functioning of the Central Board of Direct Taxes and the Central Board of Excise and Customs and reduce the compliance cost for large taxpayers. However, with the introduction of GST in July 2017, which replaced a plethora of taxes, the large taxpayers’ units have been disbanded. Another important reform has been the requirement to file electronically directly to the accounts of the taxpayers for returns and payment of refunds. Those are only small initiatives, and by and large, the tax administration does not invoke much confidence among the taxpayers to improve voluntary tax compliance. The recent decision of the Ministry of Finance of not to proceed with the prosecution of cases involving less than Rs 2 million to reduce the piling up of cases is also an important step in the right direction.

As mentioned earlier, professionalizing the administration is important for building the confidence of the taxpayers with the tax department. Some of the initiatives
required for that purpose include, among them, organization of the department on functional lines to achieve functional specialization, improvement in the information system and the capacity to undertake data mining, and enhancing the intelligence networks. This analysis shows that in 2012/13, non-corporate taxpayers totalled about 3.7 million, which was less than 3.4 per cent of the population. More than 75 per cent of them had taxable income of less than Rs 200,000. Assessees with an income that exceeded Rs 1 million totalled about 660,000, which implied a very poor coverage of the tax. The number of tax payers with more than Rs 10 million reported income of about Rs 42,800.

V. RECENT REFORMS AND THE WAY FORWARD

Direct and indirect taxes must be reformed at the national level and the state level in India in order to boost the revenue productivity of the tax system to raise the tax ratio required for development. Some of those reforms can be implemented immediately whereas others can be carried out only in the medium and long term. Some of the reforms can be set easily, while for others, the challenges associated with carrying them out are formidable, as emphasized by Johnson and Myles (2011, p. 323).

In the real world, proposals for tax reform are constrained by politics; those that lose from tax reforms tend to be vengeful while those who gain from them tend to be ungrateful. This can lead in tax policy, perhaps more than in any other areas of public policy, to a “tyranny of the status quo”. There is always a tension between what is economically desirable and what is politically practical.

The most formidable task in developing a comprehensive income tax in India, as pointed out earlier, is the fractured assignment system. While it may not be easy to integrate income from agricultural and non-agricultural sectors, the practical solution may be to enter into an agreement with the states. Under such an agreement, tax would be levied according to applicable rates on the income declared as agricultural income after allowing deductions for crop insurance premiums while computing the agricultural income and distributing the proceeds to the states from which the income originates. This, however, is not going to be easy, as it would face a wild political storm. Nevertheless, this type of agreement should be in the reform agenda for the medium term. Ways and means must be found to tax the income from corporations involved in farm activities and a mechanism is needed to provide a check against misdeclaring non-farm income as agricultural income to evade the tax.

4 Report No. 10 of 2014 (Direct Taxes), India (2017).
The first discussion paper on a direct taxes code was a well thought out document. Many of the suggestions contained in it, particularly those relating to grandfathering the tax exemptions and concessions merit consideration to broaden the base, increase revenue productivity and reduce unintended distortions in resource allocation. It is also important to work on a time-bound plan to effectively apply the general anti-avoidance rules applied to multinational companies. To develop the capacity to administer it, a special unit may be created and a time-bound plan for building capacity should be followed. Indeed, there is need to overhaul the administrative framework to enable functional specialization and coordination among various tax departments, including sharing of information. However, the transition is not likely to be easy. In the short term, it would be advisable to create specialized agencies, such as the one for administering the general anti-avoidance rule and, effect proper administrative divisions into various functionally specialized groups from the prevailing region-based divisions. The reform process needs to be initiated with the intention to simplify and rationalize the tax system with a view to broaden the base, simplify the tax by weeding out various tax preferences and strengthen the information system technology assisted enforcement.

Regarding indirect taxes, following more than 14 years of discussion, the Government has implemented a major tax reform by consolidating a number of national and state indirect taxes to introduce GST at both the national and state level. The reform was unveiled with much fanfare at midnight on 1 July 2017, and has been touted as a “good and simple tax” and the “one nation, one market, one tax”. The tax has three components, a general GST, a state GST and an interstate GST. The tax is administered by a seamless input tax credit mechanism throughout the country with interstate transactions subject to the interstate GST and a clearing house mechanism ensuring that the tax accrues to the state of destination. A separate body, the GST Council, was constituted with representation by the centre and state finance ministers and chaired by the national finance minister. It makes all decisions relating to the structure and operational decisions.

In India, the power to levy consumption taxes is vested with the central government in the form of excise duty on manufactured products which in effect is a sales tax at the first point of sale. The tax on services is exclusively levied by the centre. The states also has had a plethora of consumption taxes, including taxes on sale and purchase of goods, passangers and goods tax, motor vehicles tax, entertainment tax, taxes on the entry of goods into a local area for consumption, use or sale (called entry tax or octroy), and luxury taxes. As a result, harmonizing the consumption tax system between different levels of government presents a major challenge. Replacing those taxes with GST is, therefore, an important reform. However, as the entire reform process involved reaching a consensus among the Central Government , the 29 states and two union territories, compromises were inevitable. Consequently,
it is not surprising that the structure of GST finally implemented is far from being perfect. The threshold for registration is low at Rs 2 million and the tax is levied at four different rates – 5 per cent, 12 per cent, 18 per cent and 28 per cent – in addition to the exemption and low rate on precious metals. To compensate states for any loss of revenue on account of the reform, cesses are levied on different items of consumption at three different rates in addition to the regular rates. Taxpayers with turnover up to Rs 7.5 million are given the option to compound the tax and with less compliance requirements. Petroleum products, real estate transactions and alcohol are not included in the GST base.

Much disruption in economic activity, particularly for small and medium enterprises and traders, has occurred following the complicated nature of the tax. Multiplicity of rates has led to ambiguity and classification disputes. The GST Council has been receptive and has made changes to ease the pain associated with the transition. Revenue collections have fallen short of the expectations though they are likely to stabilize over the medium term. The technology platform was not able to handle the magnitude of matching every return for input tax credit. Consequently, the Government has reduced the compliance requirements of submitting a monthly return as against three returns mandated earlier. In other words, the GST tax reform is a work in progress. It is hoped that over the medium term, the number of tax rates will be reduced to two, the threshold will be increased to Rs 5 million and the compliance burden will be reduced to filing only a quarterly return for small businesses. As mentioned earlier, the GST Council has been receptive to the concerns of taxpayers. GST is likely to stabilize in the medium term and significantly improve the revenue productivity of not only consumption taxes but also of income taxes because of the linkage of the GST number with the permanent account number of the income tax.

VI. CONCLUDING REMARKS

Taxes matter for government, businesses and citizens alike. Governments have to collect them to provide public services. Taxes affect the profitability of businesses. People are concerned about parting with their hard earned money for the services they cannot clearly see and perceive. From the perspective of the economy, tax policy is an important factor in determining the business climate.

In the present paper, it is argued that the best practice approach to tax policy and reform is to broaden the base, reduce rates and their differentiation and develop a simple and transparent system. Loading the tax policy with too many objectives complicates the tax system. The objective of reform should be to reduce administrative, compliance and distortion costs. Accordingly, the major reform agenda for the government should be to phase out tax preferences to develop a simple tax system.
The tax system is characterized by low revenue productivity and stagnancy in the tax-GDP ratio. In this paper, the reasons for the low revenue productivity of the tax system are outlined. The fractured assignment of taxes on agricultural and non-agricultural income has prevented the levy of a comprehensive income tax. Although, it is possible to coordinate the levy between the national Government and the States, political differences have constrained this. Narrow tax bases of direct and indirect taxes are consequences of wide-ranging exemptions, concessions and deductions extended to pursue a variety of objectives though tax policy. Pursuit of several objectives, while their effectiveness in achieving the desired objectives are doubtful, have narrowed the bases, reduced revenue productivity and complicated the tax system, resulting in high compliance costs and distortions in resource allocation. Lack of clarity in tax laws and extensive building of tax arrears, an overwhelming proportion of which is stuck in tax disputes, is another problem. In this paper, the following topics are highlighted: the problem of base erosion and profit shifting by multinationals; the organizational and functional problems with tax administration; and the need to build capacity and professionalism in administering the tax, including the building and the application of information system and technology.

The need to reform direct and indirect tax systems not only to increase the revenue productivity but also to improve the business climate in the country is underlined in the paper. The replacement of a plethora of indirect taxes with GST is an important reform which holds much promise of simplifying the consumption tax system and improving revenue productivity. However, major reform involving the Central and state governments in the largest democratic polity seeking to build consensus has resulted in complicated structure and operational problems. The reform must be considered a work in progress and if the exercise in simplification of the structure and operations are accomplished over the next couple of years, it is likely to yield the promised benefits. With regard to the reform of direct taxes, a committee appointed to simplify and rationalize the structure and rewrite the tax code is expected to submit a report within the next few months. It is important to rationalize the tax preferences and reduce corporate income tax rates to 25 per cent as was promised by the finance minister in the 2015/16 budget. The report of the committee should help encourage this.
REFERENCES


Interest in contract farming is increasing because of its potential as an alternative channel for linking producers to international markets. However, there is limited knowledge on contract farming of tea production in Viet Nam, especially in more inaccessible provinces where tea production plays an important role in generating employment, improving livelihood and reducing poverty. In the present paper, the impact of contract farming on productivity is reviewed in Pho Tho province, a major tea production area that has not been the focus of any other studies. Using survey data, an analysis is conducted on the factors affecting tea productivity and the impact of contract farming on tea productivity in the province. The results indicate that the impact of factors on tea productivity is ambiguous. They also indicate that technical efficiency of tea production of contracted farmers is higher than that of other types of farmers by almost 5 per cent and that contract farming has a positive influence on tea productivity in the province. Because of different climatic conditions, the results from this study are not generalizable across Viet Nam, but they can be applied in the Northern midlands and mountainous areas.

**JEL classification:** C31, D24, Q12

**Keywords:** contract farming, Phu Tho, poverty reduction, tea productivity, Viet Nam

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I. INTRODUCTION

Tea production generates employment, improves income for small farm households and contributes towards poverty reduction in the rural areas of Viet Nam. Tea products from Viet Nam are exported to more than 100 countries and territories around the world (Khoi and others, 2015). By 2014, about 40 per cent of the tea production in Viet Nam was traded between producers and enterprises through contracts (ActionAid, 2015).

Located in the Northern midlands and mountain area of Viet Nam, Phu Tho province is comprised of 277 commune-level administrative units, which includes 218 mountainous communes and 72 extremely poor communes. At the end of 2016, the rate of poor and near poor households in this province was 10.51 per cent and 8.03 per cent, respectively, and the average income per capita was $1,454.8 (Phu Tho Statistics Office, 2017). Among the provinces of Viet Nam, Phu Tho is ranked third in terms of production and fourth in terms of planted area of tea (Department of Agriculture and Rural Development in Phu Tho province, 2015).

In Phu Tho province, linkages between enterprises and farmers in tea production have developed recently. Obviously, there are several factors affecting tea productivity, such as weather, tea varieties, production and harvest techniques, fertilizers and chemical applications. Previous studies have mostly focused on the determinants of technical efficiency of tea production in Viet Nam. Contract farming is increasingly used by tea farmers in Viet Nam, but there is limited knowledge on the effects it has had on tea productivity, especially at the provincial level. The present paper contains a review of the impact of contract farming on tea productivity and the factors affecting tea productivity in general in Phu Tho province.

The specific reasons for selecting tea farming and Phu Tho province are as follows. First, the production of tea features largely in national policies aimed at poverty reduction, employment generation and income improvement for farm households. Second, Phu Tho province is a significant Vietnamese tea producing region. Finally, Phu Tho province faces particular challenges in efforts to improve tea production, such as low yield, overdependence on chemicals, poor coordination between producers and enterprises and lack of owned brands for tea products. It is hoped that this study will increase local knowledge and contribute to efforts aimed at tackling those issues.

The rest of this paper is organized as follows. The second section includes a review of what is known about the link between contract farming and improved productivity for farmers. Poverty, income and tea production of Viet Nam is discussed in the third section. Research methods are presented in the fourth section. The fifth section contains a discussion on the results and the sixth section includes the conclusion and policy implications.
II. CONTRACT FARMING AND PRODUCTIVITY IN AGRICULTURE: AN OVERVIEW

The review of empirical evidence presents differing conclusions on the effects of contract farming on productivity of agricultural products, as discussed below.

Paul and others (2004) examine productivity, economies, and efficiency in agriculture in the United States of America. Although contracts are found to have no strong impacts on those factors, lower contract levels are less efficient than contract-intensive entities, implying that there are competitive pressures on small farms in terms of improving their productivity in a contract. In a similar study, Ramaswami and others (2005) analyse efficiency and distribution in contract farming of Indian poultry growers. Their findings indicate that technology and management practices of contracted growers have improved because of standardization of production practices in contracts.

Further support for contract farming is provided by Birthal and others (2008), who explored the relationship between farms and markets through contract farming in the dairy sector of India. They conclude that contract farming contributes towards improving milk yield and reducing production costs because of the advantages small households have by using family labourers and in disposing of milk. Setboonsarng and others (2008) assess the impact of contract farming on rural poverty and farm household income with rice contracts in the Lao People’s Democratic Republic. Their research shows that contract farmers obtain higher productivity and improve rice varieties compared to independent ones. Saigenji and Zeller (2009) investigate the impact of contract farming on productivity and the income of farmers in tea production in Moc Chau district, Son La province, Viet Nam. Their findings indicate that contracted farmers gain higher technical efficiency compared to independent ones. Similarly, Begum and others (2012) assess contract farmers in the poultry sector in Bangladesh and their level of efficiency. Their results show that contract farming is a feasible alternative for improving efficiency at the farm level because of technological transfer from integrators to producers. Similar to the findings of Begum and others (2012), Ajao and Oydele (2013) have conducted a study on economic efficiency of contract farming in the tobacco sector in Oyo state, Nigeria, which shows that contract farming can create opportunities for farmers to obtain the maximum output by improving the efficiency of certain resources. Velde and Maertens (2014) research the influence of contract farming on rice production in Benin. Their results indicate that rice productivity of contracted households is higher than that of independent ones because of larger planted areas and intensification in rice cultivation. A study by Kalimangasi and others (2014) examines the contribution of contracts in cocoa production to the livelihood of small farmers in the United Republic of Tanzania.
Their findings indicate that participation of farmers in contract farming can lead to an increase in production quantity.

Other studies do not provide such clear support for contract farming. Miyata and others (2009) examine the influence of contract farming on the income of farmers in the production of apples and green onions in China. Their conclusions regarding the effects of contract farming on the productivity of apples and green onions are controversial. Specifically, contracted apple producers gain a higher yield compared to non-contracted households because of technical assistance and specialized inputs provided by packers. In contrast, the yield of contracted green onion growers is lower than that of independent producers. A study by Ngoc and others (2014) entails investigating production efficiencies of contracted and independent farmers in tea production in Thai Nguyen and Phu Tho provinces, Viet Nam. Their findings show that there is no difference in statistical significance of technical coefficients between contracted and non-contracted farmers.

III. SITUATION OF POVERTY, INCOME AND TEA PRODUCTION OF VIET NAM

Poverty

Viet Nam made great strides in its efforts to achieve the Millennium Development Goals. Notably, the rate of Vietnamese inhabitants who live below the national poverty line, declined from 58.1 per cent to 7.1 per cent between 1993 and 2015. Although poverty has decreased sharply, adverse economic events and natural disasters have increased because of climate change and environmental degradation. In addition, about three quarters of the population are classified as near poor or in living in the lower middle-income bracket (United Nations, 2016).

The number of poor households in Viet Nam has declined sharply, by four percentage points to 5.8 per cent in 2016 from 9.8 per cent in 2013. In 2016, the rate of poor households was three times higher in rural areas than in urban areas. Between 2013 and 2016, the rate of poor households throughout the country trended lower. In 2016, the rate of poor households in Viet Nam was the highest in the Northern midlands, at 13.8 per cent, and the lowest in the South-East region, at only 0.6 per cent (table 1).
Table 1. Rate of poor households in Viet Nam (percentage)

<table>
<thead>
<tr>
<th>Country and areas</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole country</td>
<td>9.8</td>
<td>8.4</td>
<td>7.0</td>
<td>5.8</td>
</tr>
<tr>
<td>Urban areas</td>
<td>3.7</td>
<td>3.0</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Rural areas</td>
<td>12.7</td>
<td>10.8</td>
<td>9.2</td>
<td>7.5</td>
</tr>
<tr>
<td>Red River Delta</td>
<td>4.9</td>
<td>4.0</td>
<td>3.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Northern midland and mountainous area</td>
<td>21.9</td>
<td>18.4</td>
<td>16.0</td>
<td>13.8</td>
</tr>
<tr>
<td>North Central and Central coastal area</td>
<td>14.0</td>
<td>11.8</td>
<td>9.8</td>
<td>8.0</td>
</tr>
<tr>
<td>Central Highlands</td>
<td>16.2</td>
<td>13.8</td>
<td>11.3</td>
<td>9.1</td>
</tr>
<tr>
<td>South East</td>
<td>1.1</td>
<td>1.0</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Mekong River Delta</td>
<td>9.2</td>
<td>7.9</td>
<td>6.5</td>
<td>5.2</td>
</tr>
</tbody>
</table>


The number of people undernourished in Viet Nam is presented in figure 1.

**Figure 1. Number of people undernourished in Viet Nam**

The number of undernourished people in Viet Nam declined from 12.7 million during the period 2008–2010 to 10 million during the period 2014–2016. While this outcome is representative of the significant effect of national food security measures on poverty reduction (figure 1), the country’s efforts to alleviate poverty remains strong with specific targets and strategies, many of which involve agriculture, which potentially can affect the majority of the population.

**Income**

Annual gross domestic product (GDP) per capita of Viet Nam is presented in figure 2.

**Figure 2. Annual gross domestic product per capita of Viet Nam (2010–2016)**

![Graph showing annual GDP per capita of Viet Nam (2010–2016)](image)

*Source: FAO (2018).*

From 2010 to 2016, the annual GDP per capita of Viet Nam increased by $1,500 from $4.486 in 2010 to nearly $6,000 in 2016. This implies that the livelihoods of the country’s inhabitants have improved in recent years (figure 2).
Tea production

Table 2. Harvested area of tea in Viet Nam (thousand hectares)

<table>
<thead>
<tr>
<th>Country and regions</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Annual growth rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole country</td>
<td>114.3</td>
<td>114.5</td>
<td>114.8</td>
<td>115.4</td>
<td>0.32</td>
</tr>
<tr>
<td>Red River Delta</td>
<td>4.5</td>
<td>4.6</td>
<td>4.4</td>
<td>4.6</td>
<td>0.34</td>
</tr>
<tr>
<td>Northern midlands and mountain area</td>
<td>79.3</td>
<td>80.0</td>
<td>81.8</td>
<td>82.9</td>
<td>1.48</td>
</tr>
<tr>
<td>North Central and Central coastal area</td>
<td>6.8</td>
<td>6.9</td>
<td>7.1</td>
<td>7.1</td>
<td>1.66</td>
</tr>
<tr>
<td>Central Highlands</td>
<td>23.7</td>
<td>23.0</td>
<td>21.5</td>
<td>20.8</td>
<td>-4.21</td>
</tr>
</tbody>
</table>

Source: General Statistics Office of Vietnam (2015); author’s calculation.

Harvested areas of tea in the country in general and in regions varied slightly over the period 2011–2014. For instance, the harvested area of tea in the country increased by only 0.32 per cent, while it rose by 1.66 per cent in the North Central and Central coastal area, 1.48 per cent in the Northern midlands and mountain area, 0.34 per cent in the Red River Delta, and declined in the Central Highlands by almost 5 per cent. Because of the large planted area of tea in the Northern midlands and mountain area and Central Highlands, in those regions, the harvested area was greatest in 2014 at 82.9 thousand hectares and 20.8 thousand hectares, respectively. In contrast, in 2014, the harvested areas of tea in the North Central and Central coast area and the Red River Delta were small, 71,000 hectares and 4,600 hectares, respectively (table 2).

Table 3. Tea production in Viet Nam (thousand tons)

<table>
<thead>
<tr>
<th>Country and regions</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Annual growth rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole country</td>
<td>879.0</td>
<td>909.8</td>
<td>936.3</td>
<td>962.5</td>
<td>3.07</td>
</tr>
<tr>
<td>Red River Delta</td>
<td>30.3</td>
<td>30.3</td>
<td>30.0</td>
<td>31.9</td>
<td>1.72</td>
</tr>
<tr>
<td>Northern midlands and mountain area</td>
<td>576.1</td>
<td>595.3</td>
<td>617.5</td>
<td>637.8</td>
<td>3.45</td>
</tr>
<tr>
<td>North Central and Central coastal area</td>
<td>64.0</td>
<td>68.3</td>
<td>70.6</td>
<td>70.8</td>
<td>3.43</td>
</tr>
<tr>
<td>Central Highlands</td>
<td>208.6</td>
<td>215.9</td>
<td>218.2</td>
<td>222.0</td>
<td>2.10</td>
</tr>
</tbody>
</table>

Source: General Statistics Office of Vietnam (2015); author’s calculation.
Tea production in the country as whole and regionally increased gradually over the period 2011–2014. For example, during that period, tea production in Viet Nam increased by more than 3 per cent annually, with the largest gain recorded in the Northern midlands and mountain area, 3.45 per cent annually, following by 3.43 per cent in the North Central and Central coast area, 2.1 per cent in the Central Highlands, and 1.72 in the Red River Delta. By 2014, the Northern midlands and mountain area had become the dominant region in terms of tea production, with production of 637,800 tons followed by the Central Highlands (222,000 tons), the North Central and Central coast area (70,800 tons) and the Red River Delta (31,900 tons) (table 3).

Table 4. Yield of fresh tea in Viet Nam (100kg/hectare)

<table>
<thead>
<tr>
<th>Country and regions</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Annual growth rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole country</td>
<td>76.9</td>
<td>79.5</td>
<td>81.6</td>
<td>83.4</td>
<td>2.74</td>
</tr>
<tr>
<td>Red River Delta</td>
<td>66.7</td>
<td>65.9</td>
<td>68.2</td>
<td>69.3</td>
<td>1.30</td>
</tr>
<tr>
<td>Northern midlands and mountain area</td>
<td>72.6</td>
<td>74.4</td>
<td>75.5</td>
<td>76.9</td>
<td>1.94</td>
</tr>
<tr>
<td>North Central and Central coastal area</td>
<td>94.7</td>
<td>99.0</td>
<td>99.4</td>
<td>99.7</td>
<td>1.74</td>
</tr>
<tr>
<td>Central Highlands</td>
<td>88.1</td>
<td>93.9</td>
<td>101.5</td>
<td>106.7</td>
<td>6.58</td>
</tr>
</tbody>
</table>

Source: General Statistics Office of Vietnam (2015); author’s calculation.

Tea yield varied only slightly during the period 2011–2014. For example, average annual growth of tea yield in the country as a whole increased by 2.74 per cent, while in the Central Highlands, which became the leading region in terms of average growth, the rate was 6.58 per cent and in the other regions, it was below 2 per cent. By 2014, the tea yield of the country as a whole was 83,400 kg/hectare. By region, it was 106,700 kg/hectare in the Central Highlands, 99,700 kg/hectare in the North Central and Central coast area, 76,900 kg/hectare in the Northern midlands and 69,300 kg/hectare in the Red River Delta (69,300 kg/hectare). The Central Highlands have become the leading region in terms of tea yield because of its soil, climate and the application of advanced techniques (new varieties, fertilizer and chemical applications, irrigation, and harvested methods) to produce tea (table 4).

The limited volatility associated with tea yield in the country and regions during the period 2011–2014 can be attributed to the limited expansion in the harvested area of tea. Accordingly, in terms of tea cultivation, tea yield can be increased by planting new varieties, adapting fertilizer and pesticide applications and using harvested techniques instead of implementing intensification.
IV. METHODOLOGY

Sample

The research for this study was conducted in Phu Tho province. In that province, eleven districts are planting tea. However, as farmers in some of the districts were not interviewed because of the limitations in time and human and financial resources, it was necessary to carry out sampling in this study. As a result, a four-stage sample was designed to collect primary data. First, at the provincial level, five districts, including Tan Son, Thanh Son, Thanh Ba, Yen Lap, and Ha Hoa in Phu Tho province, were chosen because they satisfy the following criteria: (1) farmers plant tea and harvested areas in those districts comprise the five largest areas for growing tea in Phu Tho province; (2) existence of coordinated models between producers and enterprises in tea production; (3) permission granted from provincial and district authorities to carry out this study; and (4) access to the list of contracted farmers from enterprises that operate in those districts. Second, nine communes were selected from five districts, including Thai Ninh, Dong Linh, and Van Linh communes in Thanh Ba district, Yen Ky commune in Ha Hoa district, Tan Phu, Van Luong, and Minh Dai communes in Tan Son district, Van Mieu commune in Thanh Son district, and Ngoc Lap commune in Yen Lap district. The next step taken was the selection of 18 villages from the nine communes (two villages in a commune) for conducting interviews. To do this, discussions were held with the chairmen of the communes and leaders of the villages to confirm that there were at least two types of tea households, such as either tenants and independent farmers or contracted and independent farmers in a chosen village. Finally, 358 households were chosen randomly to interview from the 18 villages.

In addition, it must be noted, that the researchers are not sure about the exact number of tea households in Phu Tho province or how many of them are engaged in contracted farming because of limited data released by statistical offices. Based on the objective to obtain a significant level at 5 per cent the sample size for the household survey is as follows:

\[ n = \frac{Z^2 P(1-P)}{d^2} \] (Daniel and Cross, 2013).

In which, \( n \) is the sample size; \( Z \) is Z-Score (with a 95 per cent confident interval, \( Z \) is equal 1.96); \( P \) is expected prevalence or proportion (\( P = 0.5 \) is large enough for the sample); and \( d \) is precision (\( d = 5 \) per cent can be accepted for this research).
Based on the above formula, the calculated sample size is 385 farm households \((n = 385)\). However, because of some of the households were in remote areas, and could not be interviewed, data were attained and entered and analysed for this research in only 358 households.

Table 5. The sample of households interviewed in Phu Tho province

<table>
<thead>
<tr>
<th>Items</th>
<th>Thanh Ba district</th>
<th>Ha Hoa district</th>
<th>Tan Son district</th>
<th>Thanh Son district</th>
<th>Yen Lap district</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracted farmers</td>
<td>1</td>
<td>0</td>
<td>86</td>
<td>36</td>
<td>41</td>
<td>164</td>
</tr>
<tr>
<td>Independent farmers</td>
<td>87</td>
<td>5</td>
<td>97</td>
<td>5</td>
<td>0</td>
<td>194</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>5</td>
<td>183</td>
<td>41</td>
<td>41</td>
<td>358</td>
</tr>
</tbody>
</table>

Source: Author’s calculation.

Households that had cultivated or are cultivating tea in the districts of Phu Tho province were selected for the interview. Of the 358 households interviewed, 164 were contracted farmers and 194 were independent farmers. Contracted farmers, on average, had signed contracts for a duration of one to five years. Independent farmers had no contracts with firms and often grow tea on their own land and sell their production in the open markets. The list of independent households was provided by commune authorities and leaders of villages while the list of contracted producers was provided by managers of enterprises (table 5).

Surveys

The purpose of the surveys was to gather detailed information on the effects of contract farming on productivity and income of farm households in tea production in Phu Tho province. Interviewers included a Higher Degree Research student and six undergraduate students who were studying business administration or accounting at the Viet Nam National University of Agriculture. The questionnaires comprised 62 questions. Prior to conducting the interviews, the questionnaires were translated into Vietnamese. All of the interviewers were trained by the Higher Degree Research student to obtain a full understanding of the survey.

The face-to-face method of survey was selected to minimize the non-response rate. Specifically, the interviewers asked the respondents for information based on questionnaires and the answers were recorded on answer sheets. Each interview took, on average, one hour and was conducted in the respondents’ homes, fields or village offices. Respondents had expressed their willingness to participate in the interview by signing a consent form.
Data analysis

The primary data were managed through Microsoft Excel software and then analysed using Stata MP 14.2 software.

Stochastic frontier model

In economics, productivity and efficiency terms are used interchangeably (Coelli and others, 2005). This is also the case for this study. Productivity can be measured by the ratio of the amount of output produced to the amount of resource used (Henningsen and others, 2015). Tea productivity is computed by the volume of leaf tea harvested by households for a year.

In this research, the stochastic frontier model was chosen because of the following: it presents a disturbance term denoting statistical noise, measurement error and exogenous effects out of the control of production units, and it allows performing statistical tests of hypotheses regarding the production structure and the degree of inefficiency (Hassan and Ahmad, 2005). To estimate the impact of contract farming on tea productivity, three stages were carried out: (1) employing stochastic frontier models to estimate factors affecting tea productivity; (2) demonstrating the efficient levels of tea production; and (3) employing a propensity score matching to investigate the effects of contract farming on tea productivity. In this research, the propensity scoring matching was used to match individuals in the contracted farmer group to members in the independent farmer group with a set of observed characteristics in the form of a propensity score.

To estimate influences of determinants on tea productivity, the framework carried out by Bravo-Ureta and others (2012) was applied, which entailed designing two stochastic frontier models, one for contracted farmers and one for independent farmers. However, the issue of unobserved differences among contracted farmers and independent farmers needed to be dealt with. The stochastic frontier model proposed by Greene (2010) was used to solve this problem.
The specification of this model can be represented as follows:

\[ Y_i = \beta^c' X_i + \varepsilon_i \text{ for } D_i = 1 \]  
\[ Y_i = \beta^n' X_i + \varepsilon_i \text{ for } D_i = 0 \]  
\[ D_i = 1[\alpha' Z_i + W_i > 0] \]  
\[ \varepsilon_i = V_i - U_i \]  
\[ U_i \sim N^+ (0, \delta_c) \text{ for } D_i = 1 \]  
\[ U_i \sim N^+ (0, \delta_u) \text{ for } D_i = 0 \]  
\[ W_i, V_i \sim N^2 [0, 0], (1, \lambda_c, \delta_{cv}, \delta_{c2v}) \text{ for } D_i = 1 \]  
\[ W_i, V_i \sim N^2 [0, 0], (1, \lambda_n, \delta_{nv}, \delta_{n2v}) \text{ for } D_i = 0 \]

Where: \( Y_i \) represents the logarithmic output quantity of tea of producer \( i = 1, ..., N \); \( X \) denotes a vector of logarithmic input quantity (planted area, family labourers, capital, fertilizers, chemical, etc.); \( D_i \) is a dummy variable (1 for contracted farmers and 0 for independent farmers); \( Z_i \) is a vector of covariates in the sample selection equation; \( \varepsilon_i \) denotes the error term of the stochastic frontier model; \( V_i \) represents noise (managerial ability, etc.); \( U_i \) is inefficiency; \( W_i \) denotes the error term of the selection equation; \( \alpha, \beta^c \) and \( \beta^n \) are parameters to be estimated.

Assumptions for this model: \( U_i \) follows a half-normal distribution with dispersion parameter \( \delta_u \) and \( \delta_n \); \( W_i \) and \( V_i \) follow a bivariate normal distribution with variances 1 and \( \delta_{cv} \) and \( \delta_{nv} \); \( \lambda_c \) is correlation coefficient of contracted farmers; \( \lambda_n \) is correlation coefficient of independent farmers; and non-zero values of \( \lambda_c \) and \( \lambda_n \) expresses self-selection.

Based on a two-stage estimation procedure proposed by Greene (2010), technical efficiency in tea production of contracted farmers and independent farmers can be estimated \([TE_i = E(e^{-U_i})]\).
Table 6. Description of covariates in the stochastic frontier model

<table>
<thead>
<tr>
<th>Variable definitions</th>
<th>Labels</th>
<th>Unit</th>
<th>Expected signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Stochastic model</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dependent variable:</em> Productivity (total volume of leaf tea harvested by a household in a year)</td>
<td>Y</td>
<td>kilogram (kg)</td>
<td></td>
</tr>
<tr>
<td><strong>Independent variables:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family labourers</td>
<td>$X_1$</td>
<td>person</td>
<td>+/-</td>
</tr>
<tr>
<td>Land size for tea plantation</td>
<td>$X_2$</td>
<td>sao</td>
<td>+</td>
</tr>
<tr>
<td>Capital for tea production</td>
<td>$X_3$</td>
<td>¥1,000</td>
<td>+</td>
</tr>
<tr>
<td>Quantity of mixed fertilizer (NPK)</td>
<td>$X_4$</td>
<td>kg/sao/year</td>
<td>+</td>
</tr>
<tr>
<td>Pesticide costs for tea</td>
<td>$X_5$</td>
<td>¥1,000/sao</td>
<td>+/-</td>
</tr>
<tr>
<td>Density: the average number of tea trees grown in an area</td>
<td>$X_6$</td>
<td>tree/sao</td>
<td>+/-</td>
</tr>
<tr>
<td><strong>2. Inefficiency model</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dependent variable:</em> the level of inefficiency</td>
<td>$U_i$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Independent variables:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of household heads</td>
<td>$X_7$</td>
<td>years</td>
<td>+/-</td>
</tr>
<tr>
<td>Gender (1=Male and 0=Female)</td>
<td>$D_1$</td>
<td></td>
<td>+/-</td>
</tr>
<tr>
<td>Education level of household heads</td>
<td>$X_8$</td>
<td>years</td>
<td>-</td>
</tr>
<tr>
<td>Household categories (1=Poor households and 0=Otherwise)</td>
<td>$D^2$</td>
<td></td>
<td>+/-</td>
</tr>
<tr>
<td>Harvested times: number of harvested times in a year</td>
<td>$X^a$</td>
<td>times</td>
<td>+/-</td>
</tr>
<tr>
<td>Harvested methods (1=Machine and 0=Otherwise)</td>
<td>$D^3$</td>
<td></td>
<td>+/-</td>
</tr>
</tbody>
</table>

*Note:* Sao is an area unit (1 sao is equal to 360 square meters).

**Propensity score matching**

Regression analysis may be used to investigate the influence of contract farming on tea productivity, sales and income of farmers. The specification of the model can be represented as follows (Heckman, 1979):

$$Y = \beta X_i + \alpha A_i + \varepsilon_i$$ (9)
Where: Y represents tea productivity of households; X, denotes explanatory variables; β and α are coefficients to be estimated; A is dummy variable (1 for contracted farmers and 0 for independent ones); and ε is the error term.

However, participation of farmers in the contract is non-random as contract participation depends on either the selection of contractors or the situation of farm households. Hence, the decision of farmers on whether to participate in a contract is unobservable. As a result, the correlation between A and ε violates one of the key assumptions of ordinary least square (OLS), which generates a bias estimation. Different methods have been proposed to deal with that issue. Some scholars have employed the Heckman two-step method, while others have used an instrumental variable (IV) to fix selection bias (Meshesha, 2011; Bellemare, 2012; Key, 2013; Kumar and others, 2016). The Heckman two-step model depends heavily on the assumption of normal distribution in error terms. IV is strict because it is very difficult to specify appropriate instruments in the estimation (Wainaina and others, 2012). To overcome those challenges, propensity score matching is employed in this study to assess the impacts of contract farming on tea productivity of farmers.

Propensity scoring matching is used to match individuals in the comparison group to members in the treatment group with a set of observed characteristics in the form of a propensity score. The propensity is used to predict probability of participation in an intervention (Baker, 2000). Propensity score matching is a non-experimental method developed to estimate the average effect of social programmes (Rosenbaum and Rubin, 1983; Heckman and others, 1998). In propensity scoring matching, average outcomes of participants and non-participants are compared under the condition of the propensity score value. Consequently, the match is good if the treatment group is matched to the control group with a closer propensity score (Baker, 2000).

Propensity scoring matching was applied in this research because it can correct the potential selection biasedness, which tends to increase because of systematic differences between the participants and non-participants (Ali and others, 2013). For example, contracted farmers can obtain greater tea productivity compared to other types of tea farmers because of technical assistance offered by the enterprises contracting the tea production. Moreover, contracted farmers may sell a larger volume of leaf tea compared to independent ones because businesses often agree to purchase the leaf tea after harvesting based on terms of the contract.

The procedures for propensity scoring matching are comprised of six steps. In the first step, the determinants affecting contract participation are estimated by running a binary logistic model. The objective of that assignment is to estimate propensity scores of covariates in the sample of both contracted and independent farmers. The second step is the demonstration of the distribution of households with respect to
the estimated propensity scores of both contracted and independent farmers. The next step is selection of a matching algorithm. In that step, a matching algorithm is used to balance comparison groups by matching treatment group individuals with suitable controls. There are various matching algorithms, such as the nearest-neighbor matching (NNM), caliper matching, radius matching, Kernel matching (KM), and Mahalanobis metric matching (Ali and others, 2013). The fourth step is assessment on the match quality. That step may be implemented by the psmatch2 routine proposed by Leuven and Sianesi (2003). Outputs of the step include the estimated treatment effect with its standard errors and confidence interval, in addition to a number of diagnostics used to examine the match quality. In addition, covariate distributions before and after matching are compared. The matching is successful if the distribution of all covariates in treatment and control groups is balanced (Gemici and others, 2012). The fifth step is estimation of average treatment effects on the treated (ATT). The objective of that step is to assess impacts of contract participation on tea productivity, revenue, and income of farmers. The final step is implementation of sensitivity analysis. The purpose of it is to examine the possibility of hidden bias from unobserved covariates.

To evaluate the impact of contract participation on tea productivity, the observable characteristics need to be homogeneous between contracted farmers (the treatment group) and independent farmers (the control group). The expected treatment effect of contract participation or ATT can be measured by the difference between the actual tea productivity and tea productivity if farmers did not participate in the contract. ATT can be specified as follows:

\[
ATT = E(T_{1i} - T_{0i} / Z_i = 1)
\]

Where ATT denotes average treatment effect on the treated for tea productivity; \( T_{1i} \) represents tea productivity when the farmer participates in the contract; \( T_{0i} \) represents tea productivity when the farmer did not participate in the contract; and \( Z_i \) denotes the contract participation (1 for contract participation and 0 for otherwise).

Covariates in the treatment effect model for tea productivity are presented in table 7.
Table 7. Description of covariates in the treatment effect model for tea productivity

<table>
<thead>
<tr>
<th>Variable definitions</th>
<th>Labels</th>
<th>Unit</th>
<th>Expected signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Treatment variable:</strong> contract participation (Z=1 for contract participation and Z=0 for otherwise)</td>
<td>Z</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Covariates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of household heads</td>
<td>$X_1$</td>
<td>years</td>
<td>+/-</td>
</tr>
<tr>
<td>Gender (1=Male and 0=Female)</td>
<td>$D_1$</td>
<td></td>
<td>+/-</td>
</tr>
<tr>
<td>Household categories (1=Poor households and 0=Otherwise)</td>
<td>$D_2$</td>
<td></td>
<td>+/-</td>
</tr>
<tr>
<td>Family labourers</td>
<td>$X_2$</td>
<td>person</td>
<td>+/-</td>
</tr>
<tr>
<td>Land size for tea plantation</td>
<td>$X_3$</td>
<td>sao</td>
<td></td>
</tr>
<tr>
<td>Tea age</td>
<td>$X_4$</td>
<td>years</td>
<td>+</td>
</tr>
<tr>
<td>Density: number of tea trees grown in an area</td>
<td>$X_5$</td>
<td>tree/sao</td>
<td>+</td>
</tr>
<tr>
<td>Harvested times</td>
<td>$X_6$</td>
<td>times</td>
<td>+/-</td>
</tr>
<tr>
<td>Harvested methods (1=Machine and 0=Otherwise)</td>
<td>$D_3$</td>
<td></td>
<td>+/-</td>
</tr>
<tr>
<td><strong>3. Outcome variable:</strong> tea productivity (total volume of leaf tea harvested by a household)</td>
<td>T</td>
<td>kg/year</td>
<td></td>
</tr>
</tbody>
</table>

V. RESULTS

Characteristics of tea households in Phu Tho province

The average age of the heads of tea households is 48.7 and age of contracted and independent farmers is about the same. The average number of school years implies that most household heads have just graduated from secondary school. The average number of members and labourers in a family are 5 and 2.7, respectively; the families of contracted farmers have slightly more members and labourers than independent ones. On average, independent contractors have more land and allocate more land to grow tea than contracted households by more than eight sao and six sao, respectively. The asset value of tea households is about 53 million Viet Nam dong (₫) ($2,311). Capital for tea production of contracted farmers is higher than that of their counterparts by about ₫3 million. Similarly, tree density of contracted households is higher than that of independent ones by nearly 100 trees per sao. However, the experience in tea production and the age of independent farmers are higher than those of contracted households. Tea is harvested more than five times a year by independent farmers and contracted farmers. The price of tea produced by contracted households is higher than the price of tea produced by independent farmers by about ₫1,000 per kilogram (table 8).
Table 8. Characteristics of tea households in Phu Tho province

<table>
<thead>
<tr>
<th>Items</th>
<th>Unit</th>
<th>Contracted households (n = 164)</th>
<th>Independent households (n = 194)</th>
<th>Overall (n = 358)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Min</td>
</tr>
<tr>
<td>1. Demographic characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>years</td>
<td>48.44</td>
<td>8.34</td>
<td>30</td>
</tr>
<tr>
<td>Gender (1=Male and 0=Female)</td>
<td></td>
<td>0.95</td>
<td>0.79</td>
<td>0.79</td>
</tr>
<tr>
<td>Ethnicity (1=Kinh and 0=Otherwise)</td>
<td></td>
<td>0.26</td>
<td>0.78</td>
<td>0.78</td>
</tr>
<tr>
<td>Education</td>
<td>school years</td>
<td>7.62</td>
<td>2.24</td>
<td>2</td>
</tr>
<tr>
<td>Household categories (1=Poor household and 0=Otherwise)</td>
<td></td>
<td>0.04</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>2. Socio-economic characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household members</td>
<td>person</td>
<td>4.53</td>
<td>1.08</td>
<td>2</td>
</tr>
<tr>
<td>Family labourers</td>
<td>person</td>
<td>3.01</td>
<td>0.97</td>
<td>1</td>
</tr>
<tr>
<td>Total land size</td>
<td>sao</td>
<td>27.49</td>
<td>17.61</td>
<td>5</td>
</tr>
<tr>
<td>Land size for tea plantation</td>
<td>sao</td>
<td>22.60</td>
<td>17.00</td>
<td>2</td>
</tr>
<tr>
<td>Hired land (1=Yes and 0=Otherwise)</td>
<td></td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Asset value</td>
<td>VND1 000</td>
<td>53 202.9</td>
<td>33 889</td>
<td>0</td>
</tr>
<tr>
<td>Capital</td>
<td>VND1 000</td>
<td>13 682.93</td>
<td>11 194.33</td>
<td>0</td>
</tr>
<tr>
<td>Credit (1=Yes and 0=Otherwise)</td>
<td></td>
<td>0.17</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>Items</td>
<td>Unit</td>
<td>Contracted households (n = 164)</td>
<td>Independent households (n = 194)</td>
<td>Overall (n = 358)</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>Experience years</td>
<td>15.26</td>
<td>7.17</td>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td>Tea age years</td>
<td>17.90</td>
<td>9.19</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td>Density trees/sao</td>
<td>603.10</td>
<td>91.01</td>
<td>400</td>
<td>800</td>
</tr>
<tr>
<td>Harvested times times/ year</td>
<td>5.47</td>
<td>0.65</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Prices of leaf tea</td>
<td>4.11</td>
<td>1.71</td>
<td>2.8</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Author's calculation.

Note: SD, standard deviation; VND, Vietnamese dong; kg, kilogram.
Estimation of tea productivity and technical efficiency of tea production

Tea productivity and technical efficiency of contracted farmers

Maximum likelihood estimates of the stochastic frontier model and the inefficiency model for tea production of contracted farmers are presented in table 9.

Table 9. Maximum estimates of the stochastic frontier model and inefficiency model for contracted farmers

| Variables                  | Coefficient | Standard error | Z    | P>|z| |
|---------------------------|-------------|----------------|------|-----|
| **Stochastic model**      |             |                |      |     |
| LnLabourers               | 0.063       | 0.104          | 0.60 | 0.545|
| LnLand size for tea       | 0.809***    | 0.051          | 15.78| 0.000|
| Ln2Capital                | 0.007       | 0.027          | 0.26 | 0.798|
| LnNPK                     | 0.024       | 0.046          | 0.52 | 0.605|
| LnPesticide               | 0.062*      | 0.037          | 1.66 | 0.097|
| LnDensity                 | -0.699***   | 0.241          | -2.90| 0.004|
| Constant                  | 11.065***   | 1.429          | 7.74 | 0.000|
| **Inefficiency model**    |             |                |      |     |
| Age                       | 0.028*      | 0.016          | 1.74 | 0.083|
| Gender                    | 1.756***    | 0.671          | 2.62 | 0.009|
| Education                 | -0.195***   | 0.065          | -2.99| 0.003|
| Household categories      | 0.357       | 0.606          | 0.59 | 0.556|
| Harvested times           | -0.110      | 0.171          | -0.64| 0.521|
| Harvested methods         | -0.081      | 0.240          | -0.34| 0.735|
| Constant                  | -1.537      | 1.262          | -1.22| 0.223|

Noise variation ($\delta_v$) 0.150
Inefficiency variation ($\delta_u$) 0.830
Total error variance ($\delta^2 = \delta_v^2 + \delta_u^2$) 0.712
Signal-to-noise ratio ($\lambda = \delta_v/\delta_u$) 5.499
Observations 164
LogLikelihood -101.35
Prob > chi2 0.00
LR test of $\delta_u = 0$ chi2(01) = 33.93 Prob >= chi2 = 0.00

Source: Author's calculation.
Note: ***Significance at the 0.01; *significance at the 0.1.
Values of loglikelihood and prob>chi2 account for -112.14 and 0.00, respectively; they imply the fitness of the half-normal model. Noise variation and inefficiency variation are equal to 0.15 and 0.83, respectively. Value of lambda is greater than 1 ($\lambda = 5.499$); this suggests that the most of the variation in tea productivity is outweighed by inefficiency effects (table 9).

To test technical inefficiency in the model, hypotheses are designed as follows:

- Null hypothesis (Ho): There is no technical inefficiency in the model ($\delta_u = 0$)
- Alternative hypothesis (Ha): There is technical inefficiency in the model ($\delta_u > 0$)

Null hypothesis is rejected if the p-value is either less than or equal to the predetermined value (0.05) while null hypothesis is accepted if the p-value is greater than the predetermined value (0.05). In that case, the p-value is less than the predetermined value (0.00 < 0.05). As a result, it can be concluded that technical inefficiency exists in the model (table 9).

In the stochastic model, land size, pesticide cost, and density are statistically significant, while the other variables (labourers, capital and quantity of mixed fertilizer) are not significant. Land size and pesticide cost present a positive relationship with tea productivity, which implies that an increase in land size and pesticide cost leads to a rise of tea productivity. Land is a key input for tea production; consequently, tea productivity may be enhanced if farm households have more land area. In fact, according to estimates for this study, expenditure for tea production of farmers in Phu Tho province varies from $700,000 loglikelihood to $1 million per sao a year ($31-44/sao/year). Of total cost of tea production, labour cost accounts for 47.2 per cent, input cost (fertilizers, pesticides and materials) accounts for 52.4 per cent, and other cost account for 0.4 per cent. Accordingly, the majority of the total cost is dominated by costs for fertilizers, pesticides, and materials. In recent years, extensive use of pesticides and chemicals has become an issue for the tea sector in Viet Nam as tea producers can more easily purchase them in the open market. This is because, those inputs are more readily available, have come down in price and market surveillance agencies are not in a position to effectively control the distribution of them. Specifically, purchasing inputs in open markets is convenient because those markets are near residential communities or within villages, and prices can be negotiated between buyers and sellers. Ineffective control of the inputs by market surveillance agencies has occurred because of lack of professional staff and unclear responsibilities among surveillance, policemen, health, and agricultural agencies. By contrast, density adversely affects tea productivity, which suggests that if farmers grow more tea trees in an area, tea productivity tends to decline. The average number of tea trees planted by contracted farmers is 603 trees per sao.
According to experts, the most suitable density level for tea trees in Phu Tho province varies from 470 trees to 500 trees a sao. Consequently, a rise in density of tea trees leads to lower productivity (table 9).

For the inefficiency model, age, gender and education are statistically significant, while the other variables (household categories, harvested times and harvested methods) are not significant. The positive coefficient of age implies that older producers obtain higher technical inefficiency, which indicates that the technical efficiency of tea production depends on technological advances rather than the experience of the producers. Specifically, if the age of the producers increases by a year, then the technical inefficiency of tea production rises by 2.8 per cent, with other factors staying the same. The coefficient of gender is positive, which implies that technical efficiency of female-head households is higher than that of male-head households. This result may be explained by carefulness and sensitivity of females with regard to tea production. In contrast, education presents a negative relationship with technical inefficiency of tea production. This suggests that households with higher education levels gain higher technical efficiency compared to their counterparts. This signifies the importance of knowledge in employing and adopting technological advances in tea production. Most contracted farmers have only graduated from secondary school. So, boosting their education levels is necessary to enhance technical efficiency of tea farmers in Phu Tho province (table 9).

Levels of technical efficiency of tea production of contracted farmers are presented in table 10. The average technical efficiency level is 0.599, which implies that the technical inefficiency of tea production of contracted households is 40.1 per cent. The maximum and minimum technical efficiency rates are 94.7 per cent and 10.9 per cent. The largest number of households, 55, or 33.5 per cent of the sample households, had low technical efficiency (below 50 per cent) with regard to tea production. The next largest number of households, 20.1 per cent of them, have a technical efficiency of 80-90 per cent, followed of 17 per cent of them having technical efficiency of 70-80 per cent, 14.6 per cent of them having technical efficiency of 60-70 per cent level, 10.3 per cent having technical efficiency of 50-60 per cent level, and seven households with technical efficiency that exceeds 90 per cent (table 10).
Table 10. Technical efficiency of tea production of contracted farmers

<table>
<thead>
<tr>
<th>Levels of technical efficiency</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50%</td>
<td>55</td>
<td>33.54</td>
</tr>
<tr>
<td>50-60%</td>
<td>17</td>
<td>10.37</td>
</tr>
<tr>
<td>60-70%</td>
<td>24</td>
<td>14.63</td>
</tr>
<tr>
<td>70-80%</td>
<td>28</td>
<td>17.07</td>
</tr>
<tr>
<td>80-90%</td>
<td>33</td>
<td>20.12</td>
</tr>
<tr>
<td>&gt;90%</td>
<td>7</td>
<td>4.27</td>
</tr>
<tr>
<td>TOTAL</td>
<td>164</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Average TE 0.599
Min TE 0.109
Max TE 0.947

Source: Author’s calculation.

Tea productivity and technical efficiency of independent farmers

Maximum likelihood estimates of the stochastic frontier model and the inefficiency model for tea production of independent farmers are presented in table 11.

Loglikelihood and p-value account for -179.94 and 0.00, respectively, implying the fitness of the half-normal model. Noise variation and inefficiency variation account for 0.337 and 0.92, respectively. Value of lambda is greater than 1 ($\lambda = 2.731$), which indicates that the majority of the variation in tea productivity is dominated by inefficiency effects (table 11).

To test technical inefficiency in the model, the design of the hypotheses is as follows:

Null hypothesis (Ho): There is no technical inefficiency in the model ($\delta u = 0$)

Alternative hypothesis (Ha): There is technical inefficiency in the model ($\delta u > 0$)

Null hypothesis will be rejected if the p-value is either less than or equal to predetermined value (0.05) and by contrast, null hypothesis is accepted if the p-value is greater than the predetermined value (0.05). In this case, p-value is less than the predetermined value (0.00 < 0.05). Accordingly, it can be concluded that technical inefficiency exists in the model (table 11).
In the stochastic model, land size, capital, and density are statistically significant, while the rest variables (laborers, NPK, and pesticide) are not significant. Similar to contracted households, land is a key input for tea production. Consequently, tea productivity may be increased if independent farmers gain land area. Capital also positively influences tea productivity, which implies that an increase in capital leads to greater tea productivity. The average amount of capital for tea production owned by independent households is 11 million. So, the households need to borrow more capital from credit organizations. Density has a negative relationship with tea productivity, which implies that if producers grow more tea trees in an area, then tea productivity tends to decrease. The average number of tea trees planted by independent farmers is 513 trees per sao, which is slightly higher than the density recommended by experts (470-500 trees/sao). Accordingly, an increase in tea density results in lower productivity (table 11).
Table 11. Maximum likelihood estimates of the stochastic frontier model and inefficiency model for independent farmers

| Variables               | Coefficient | Standard error | Z   | P>|z|   |
|-------------------------|-------------|----------------|-----|-------|
| **Stochastic model**    |             |                |     |       |
| LnLabourers             | 0.054       | 0.127          | 0.43| 0.668 |
| LnLand size for tea     | 0.715***    | 0.063          | 11.22| 0.000|
| Ln2Capital              | 0.133***    | 0.031          | 4.26| 0.000 |
| LnNPK                   | 0.047       | 0.044          | 1.06| 0.291 |
| LnPesticide             | 0.003       | 0.036          | 0.10| 0.920 |
| LnDensity               | -0.388*     | 0.206          | -1.88| 0.061|
| Constant                | 8.316***    | 1.280          | 6.49| 0.000 |
| **Inefficiency model**  |             |                |     |       |
| Age                     | 0.025*      | 0.013          | 1.94| 0.052 |
| Gender                  | 0.478       | 0.312          | 1.53| 0.125 |
| Education               | -0.029      | 0.055          | -0.54| 0.591|
| Household categories    | 0.278       | 0.283          | 0.98| 0.325 |
| Harvested times         | -0.260*     | 0.149          | -1.75| 0.081|
| Harvested methods       | -0.224      | 0.734          | -0.31| 0.759|
| Constant                | -0.080      | 1.247          | -0.06| 0.949|
| Noise variation (δ_v)   | 0.337       |                |     |       |
| Inefficiency variation (δ_u) | 0.920    |                |     |       |
| Total error variance (δ^2 = δ_v^2 + δ_u^2) | 0.961     |                |     |       |
| Signal-to-noise ratio (λ = δ_u / δ_v) | 2.731     |                |     |       |
| Observations            | 194         |                |     |       |
| LogLikelihood           | -179.94     |                |     |       |
| Prob > chi2             | 0.00        |                |     |       |
| LR test of δ_u = 0 chibar2(01) = 33.93 Prob >= chibar2 = 0.00 | |

Source: Author’s calculation.

Note: ***Significance at the 0.01; *significance at the 0.1.

For the inefficiency model, age and harvested times are statistically significant, while the other variables (gender, education, household categories, and harvested methods) are not significant. The positive coefficient of age suggests that older producers obtain a lower technical efficiency, which implies that technical efficiency of tea production depends on technological advances and not on the experience of
producers. Specifically, if the age of producers increases by a year, then the technical inefficiency of tea production rises by 2.5 per cent, with all other factors remaining the same. In contrast, harvested time negatively affects technical inefficiency, which indicates that if harvested time increases, then technical efficiency also goes up. The average number of harvested times carried out by independent farmers is 5.3. Experts recommend that growers harvest leaf tea nine or ten times a year and that the gap between two harvests should be from seven to ten days. Technical efficiency of tea production can be increased if farmers harvest leaf tea more frequently (table 11).

The levels of technical efficiency of tea production of independent farmers are presented in table 12.

Table 12. Technical efficiency of tea production of independent farmers

<table>
<thead>
<tr>
<th>Levels of technical efficiency</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50%</td>
<td>74</td>
<td>38.14</td>
</tr>
<tr>
<td>50-60%</td>
<td>30</td>
<td>15.46</td>
</tr>
<tr>
<td>60-70%</td>
<td>22</td>
<td>11.34</td>
</tr>
<tr>
<td>70-80%</td>
<td>49</td>
<td>25.26</td>
</tr>
<tr>
<td>80-90%</td>
<td>18</td>
<td>9.28</td>
</tr>
<tr>
<td>&gt;90%</td>
<td>1</td>
<td>0.52</td>
</tr>
<tr>
<td>TOTAL</td>
<td>194</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Average TE 0.551  
Min TE 0.127  
Max TE 0.914  

Source: Author’s calculation.

Average technical efficiency is equal to 0.551, which implies that technical inefficiency of tea production of contracted households accounts for 44.9 per cent. The maximum and minimum levels of technical efficiency are 91.4 per cent and 12.7 per cent, respectively. The largest number of households in the sample group, 74, or 38.1 per cent, have low technical efficiency (below 50 per cent), followed by 25.2 per cent with technical efficiency of 70-80 per cent, 15.4 per cent with technical efficiency of 50-60 per cent level of 11.3 per cent with technical efficiency of 60-70 per cent level, 9.2 per cent with technical efficiency of 80-90 per cent level, and only one household with technical efficiency of more than 90 per cent (table 12).
Impacts of contract farming on tea productivity

Estimation of determinants affecting contract participation (propensity scores estimation)

Table 13. Characteristics of contracted and independent farmers

<table>
<thead>
<tr>
<th>Variables</th>
<th>Contracted farmers (Mean)</th>
<th>Independent farmers (Mean)</th>
<th>T-test (Difference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of observations</td>
<td>164</td>
<td>194</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>48.44</td>
<td>48.92</td>
<td>0.48</td>
</tr>
<tr>
<td>Gender</td>
<td>0.95</td>
<td>0.79</td>
<td>-0.16***</td>
</tr>
<tr>
<td>Household categories</td>
<td>0.04</td>
<td>0.12</td>
<td>0.18***</td>
</tr>
<tr>
<td>Family labourers</td>
<td>3.01</td>
<td>2.55</td>
<td>-0.45***</td>
</tr>
<tr>
<td>Land size for tea</td>
<td>22.60</td>
<td>16.49</td>
<td>-6.10***</td>
</tr>
<tr>
<td>Tea age</td>
<td>17.90</td>
<td>22.79</td>
<td>4.88***</td>
</tr>
<tr>
<td>Density</td>
<td>603.10</td>
<td>513.91</td>
<td>-89.19***</td>
</tr>
</tbody>
</table>

Source: Author’s calculation.
Note: ***Significance at the 0.01

Seven covariates, consisting of age, gender, household categories, family labors, land size for tea, tea age, and density, are chosen to include the propensity score because these variables present potential impacts on tea productivity. Next, t-test is used to check the difference in means of covariates between contracted and independent farmers. The results show that the difference in means of all variables, except age, is statistically significant at 1 per cent (table 13).

The logistic model is employed to estimate determinants affecting contract participation.
Table 14. Logistic model of factors determining contract participation

| Variables                        | Coefficient | Standard error | z    | P>|z|   | Marginal effect |
|----------------------------------|-------------|----------------|------|-------|-----------------|
| Age                              | 0.014       | 0.013          | 1.05 | 0.293 | 0.002           |
| Gender                           | 1.655***    | 0.465          | 3.56 | 0.000 | 0.290***        |
| Household categories             | -1.614***   | 0.453          | -3.56| 0.000 | -0.283***       |
| Family labourers                 | 0.245*      | 0.126          | 1.93 | 0.053 | 0.043**         |
| Land size for tea                | 0.018**     | 0.008          | 2.13 | 0.033 | 0.003**         |
| Tea age                          | -0.039***   | 0.014          | -2.69| 0.007 | -0.007***       |
| Density                          | 0.006***    | 0.001          | 5.17 | 0.000 | 0.001***        |
| Constant                         | -6.013***   | 1.173          | -5.12| 0.000 |                 |

Number of observations 358
LR chi2(7) 118.32
Prob > chi2 0.000
Pseudo R2 0.239
Log likelihood -187.72

Source: Author’s calculation.
Note: ***Significance at the 0.01; significance at the 0.05; significance at the 0.1.

Value of Pseudo R squared is equal to 0.239 implies that 23.9 per cent of variation in contract participation is explained by independent variables in the model. P-value and log likelihood account for 0.000 and -187.72, respectively reflect the fitness of the model (table 14).

All independent variables are statistically significant, except age. Gender, family labourers, land size for tea, and density present positive relationships with contract participation, while household categories and tea age negatively influence contract participation. Specifically, the probability that male-headed households will participate in contracted is higher than that of female-headed households by 29 per cent, with all other factors remaining the same. Major decisions are often implemented by the men in farm households in the rural area of Viet Nam. Moreover, male-headed households tend to accept risks rather than female-headed households (table 14).

Family labour and land size are key resources for tea production. Hence, if the labourers and land size of households increase by one person and a sao, then
probability of contract participation rises by 4.3 per cent and 0.3 per cent, respectively, with all other factors remaining the same. If tea density rises by a tree/sao, then the probability of contract participation increases by 0.1 per cent, with all other factors remaining the same. This implies that households, who grow more tea trees in an area, prefer to participate in the contract rather than their counterparts (table 14).

Probability in contract participation of non-poor households is higher than that of poor households by 28.3 per cent, with all other factors remaining the same. Non-poor households tend to participate in the contract rather than poor households, as the number of labourers and amount of land and capital of non-poor households are larger than those of their counterparts. If the average age of tea trees increases by a year, then the probability of contract participation decreases by 0.7 per cent. Currently, the average age of tea trees in the survey sample is 21 years. The age of the tea tree has a negative relationship with contract participation because growers believe that old tea trees often produce a lower yield (table 14).

**Demonstration of the common support region**

The purpose of this step is demonstration of the common support region.

**Table 15. Distribution of estimated propensity scores**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Observations</th>
<th>Min</th>
<th>Mean</th>
<th>Max</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracted farmers</td>
<td>164</td>
<td>0.062</td>
<td>0.630</td>
<td>0.948</td>
<td>0.229</td>
</tr>
<tr>
<td>Independent farmers</td>
<td>194</td>
<td>0.006</td>
<td>0.312</td>
<td>0.950</td>
<td>0.234</td>
</tr>
<tr>
<td>Overall</td>
<td>358</td>
<td>0.005</td>
<td>0.450</td>
<td>0.950</td>
<td>0.280</td>
</tr>
</tbody>
</table>

*Source:* Author’s calculation.

*Note:* SD denotes standard deviation.

The overall estimated propensity scores are between 0.005 and 0.950. Among contracted farmers, the propensity scores vary between 0.062 and 0.948, while the propensity scores range between 0.006 and 0.950 for independent households. This implies that the region of common support would be between 0.062 and 0.950. Accordingly, outliers that are below and above this range need to be dropped. Out of 358 households, 24 observations (1 from contracted farmers and 23 from independent farmers) are dropped from the analysis as their propensity scores are outside the region of common support. Accordingly, only 334 observations are sufficient to predict the impact of contract participation on tea productivity for this study (table 15).
Selection of a matching algorithm

Several criteria, such as number of explanatory variables with insignificant mean difference between the match groups of contracted and independent farmers, pseudo $R^2$, and matched sample size, are tested to choose appropriate matching algorithms. The nearest neighbour matching (NNM) with replacement and Kernel matching (KM) are employed to select the most appropriate matching method.

Table 16. Matching performance of matching methods

<table>
<thead>
<tr>
<th>Matching methods</th>
<th>Number of explanatory variables with insignificant mean between the match of contracted and independent farmers</th>
<th>Pseudo $R^2$</th>
<th>Matched sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>NNM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NNM(1)</td>
<td>5</td>
<td>0.033</td>
<td>334</td>
</tr>
<tr>
<td>NNM(2)</td>
<td>5</td>
<td>0.029</td>
<td>334</td>
</tr>
<tr>
<td>NNM(3)</td>
<td>7</td>
<td>0.018</td>
<td>334</td>
</tr>
<tr>
<td>NNM(4)</td>
<td>7</td>
<td>0.011</td>
<td>334</td>
</tr>
<tr>
<td>NNM(5)</td>
<td>7</td>
<td>0.007</td>
<td>334</td>
</tr>
<tr>
<td>KM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM(0.1)</td>
<td>6</td>
<td>0.011</td>
<td>334</td>
</tr>
<tr>
<td>KM(0.25)</td>
<td>6</td>
<td>0.017</td>
<td>334</td>
</tr>
<tr>
<td>KM(0.5)</td>
<td>1</td>
<td>0.067</td>
<td>334</td>
</tr>
</tbody>
</table>

Source: Author's calculation.

Note: Numbers in parentheses denote the number of neighbor estimators in the NNM and bandwidth in the KM.

Matching methods are chosen if they have all the explanatory variables with insignificant mean between the match of contracted and independent farmers, the lowest pseudo $R^2$, and the largest matched sample size (Tsadik and others, 2015; Mulatu and others, 2017). In that case, the most appropriate matching method is the NNM(5) because it has all the insignificant explanatory variables, the lowest pseudo $R^2$ (0.007), and the largest matched sample size. Thus, only the NNM(5) is selected to estimate impacts of contract farming on tea productivity in this research (table 16).
Assessment on the match quality

To examine the match quality of the NNM(5), means of the propensity score and explanatory variables are estimated and compared before and after matching. Results of testing the propensity score and explanatory variables for the NNM(5) are presented in table 17.

Table 17. Propensity scores and covariate balancing for the NNM(5)

| Variables            | Sample   | Mean Treated | Mean Control | Per cent bias | |bias| T-test | p-value |
|----------------------|----------|--------------|--------------|---------------|---------|--------|---------|
| Pscore               | Unmatched| 0.631        | 0.351        | 125.3         | 11.45   | 0.000  |
|                      | Matched  | 0.631        | 0.623        | 3.7           | 97.0    | 0.35   | 0.729   |
| Age                  | Unmatched| 48.399       | 48.754       | -3.7          | -0.33   | 0.739  |
|                      | Matched  | 48.399       | 47.666       | 7.5           | -106.0  | 0.65   | 0.518   |
| Gender               | Unmatched| 0.957        | 0.847        | 37.3          | 3.39    | 0.001  |
|                      | Matched  | 0.957        | 0.938        | 6.3           | 83.1    | 0.75   | 0.456   |
| Household categories | Unmatched| 0.036        | 0.169        | -44.6         | -4.04   | 0.000  |
|                      | Matched  | 0.036        | 0.039        | -0.8          | 98.2    | -0.12  | 0.908   |
| Family labourers     | Unmatched| 3.018        | 2.526        | 47.1          | 4.30    | 0.000  |
|                      | Matched  | 3.018        | 3.078        | -5.8          | 87.8    | -0.46  | 0.642   |
| Land size for tea    | Unmatched| 22.715       | 17.139       | 36.1          | 3.31    | 0.001  |
|                      | Matched  | 22.715       | 22.28        | 2.8           | 92.2    | 0.24   | 0.807   |
| Tea age              | Unmatched| 17.791       | 22.257       | -47.8         | -4.37   | 0.000  |
|                      | Matched  | 17.791       | 18.622       | -8.9          | 81.4    | -0.86  | 0.390   |
| Density              | Unmatched| 604.36       | 516.9        | 83.8          | 7.63    | 0.000  |
|                      | Matched  | 604.36       | 606.64       | -2.2          | 97.4    | -0.18  | 0.858   |

Source: Author’s calculation.

Before matching, all covariates exhibit statistically significant differences, except age. However, after matching, covariates are balanced. The insignificant likelihood ratio tests of all covariates imply that the matching procedure is able to balance the characteristics in the treated group (contracted farmers) and the control group (independent farmers) (table 17).

Quality of matching methods is presented in table 18.
Table 18. Quality of matching methods before and after matching

<table>
<thead>
<tr>
<th>Matching methods</th>
<th>Before matching</th>
<th>After matching</th>
<th>Total bias reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pseudo R²</td>
<td>LRchi²</td>
<td>Mean bias (p-value)</td>
</tr>
<tr>
<td>NNM(5)</td>
<td>0.227</td>
<td>105.00</td>
<td>53.2</td>
</tr>
</tbody>
</table>

Source: Author’s calculation.

Low pseudo $R^2$ and the insignificant likelihood ratio tests reflect that treatment and control groups have the same distribution in covariates after matching and that matching methods can balance characteristics of the treated and control groups (Wainaina and others, 2012; Chege and others, 2015; and Huluka and Negatu, 2016). After matching, pseudo $R^2$ dropped from 0.227 to 0.008, the likelihood ratio is insignificant (0.887), and total bias decreased by 50 per cent. Accordingly, the NNM(5) can be employed to estimate the influence of contract participation on tea productivity (table 18).

Estimation of average treatment effects on the treated (ATT) for tea productivity

Results of ATT estimation are presented in table 19.

Table 19. Estimation of ATT for tea productivity

<table>
<thead>
<tr>
<th>Matching methods</th>
<th>Unmatched and ATT</th>
<th>Difference</th>
<th>Standard Error</th>
<th>T-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>NNM(5)</td>
<td>Unmatched</td>
<td>4 781.76</td>
<td>902.66</td>
<td>5.30</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>3 996.92</td>
<td>1 272.38</td>
<td>3.14</td>
</tr>
</tbody>
</table>

Source: Author’s calculation.

The ATT value accounts for 3,997; this implies that tea productivity of contracted households is higher than that of independent ones by 3,997 kg/year (or 3.99 tons/year).

Implementation of sensitivity analysis

The Rosenbaum bounds (rbounds test) is used to test the presence of hidden bias due to unobserved covariates for the NNM(5).
Table 20. Results of the sensitivity analysis for the hidden bias

<table>
<thead>
<tr>
<th>Gamma</th>
<th>Sig+</th>
<th>Sig-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>1.2e-15</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>7.0e-13</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>5.0e-11</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>1.1e-09</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>1.1e-08</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>6.5e-08</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>2.7e-07</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Author’s calculation.

Note: Gamma presents log odds of differential assignment due to unobserved factors
Sig+ means upper bound significance level
Sig- means lower bound significance level

The results show that the p-critical values of all outcome variables estimated at various level of critical values of gamma are significant, which implies that important covariates affecting the participation and outcome variables have been considered. The ATT is insensitive to unobserved selection bias and accordingly, it can be conclude that there is a pure effect of the participation on contract farming of tea production (table 20).

VI. CONCLUSION AND POLICY IMPLICATIONS

The objective of the present paper is to estimate determinants affecting tea productivity and investigate the impacts of contract participation on tea productivity in the rural area of Viet Nam, such as Phu Tho province. The results show that the influence of determinants on tea productivity varies in different models. It can be concluded that land size is statistically significant and positively affects tea productivity of both contract and independent farmers. It also indicates that pesticide costs present a positive relationship with the tea productivity of contracted households, capital is statistically significant and has a positive impact on tea productivity of independent households and that density has a negative influence on tea productivity of both contracted and independent farmers.
Based on the estimation from the study, the technical efficiency of tea production for contracted farmers is 59.9 per cent, while for independent households, it is 55.1 per cent. The results indicate that technical efficiency of contracted farmers is higher than that of their counterparts by 4.8 per cent. This outcome is derived from the more favourable conditions extended to contracted farmers to participate in the contract. For example, contracted producers purchase fertilizers and pesticides with adequate quality and at reasonable prices in addition to receiving technical assistance provided by contractors.

The results show that the difference in tea productivity between contracted and independent households is 3.9 tons a year. Those outcomes reflect the positive influence of contract farming on tea productivity in Phu Tho province.

Some recommendations for Government and Phu Tho province to enhance tea productivity and reduce poverty for farm households are the following. First, policies set by Government and Phu Tho province should be consistent with the factors that either positively or negatively influence tea productivity. For example, land size positively affects tea productivity. Based on that, the policies should focus on solving constraints related to increasing land area. The average planted area for tea of a household in Phu Tho province ranges from 0.6 hectares to 0.8 hectares, areas that are too small for tea cultivation. This can be overcome if the Government and Phu Tho province were to establish production zones for tea plantation and facilitate land concentration by expanding the land quota to 30 hectares for tea producers in the midlands and mountainous areas based on the regulation of the Land Law issued in 2013. In contrast, tea density presents a negative effect on tea productivity, which suggests that tea productivity may decline if farmers plant more tea trees in an area. Currently, producers plant about 555 trees a sao; this density level should be retained to avoid a decline in tea productivity. Second, technical innovations in tea production should be researched and adopted to reduce technical inefficiency of tea production. Specifically, technical inefficiency of contracted and independent farmers is 40 per cent and 45 per cent, respectively. Advanced technologies in varieties, fertilizer and chemical applications, harvested techniques, and irrigation should be considered by agricultural scientists and extension experts. For example, old tea varieties should be substituted by new and better quality varieties, such as LDP1, LDP2, Kim Tuyen, and PH1. Also, in addition to setting new procedures for producing and processing tea, building sustainable relationships between tea producers and contractors through contract farming should be encouraged. Finally, contract participation positively affects tea productivity. However, the increase in tea productivity should take into account the volatility associated with production inputs, such as fertilizers and pesticides, because a rise in tea productivity would not improve income and the livelihood of tea growers if output prices are low and the profits do not compensate the increase expenditure for production inputs.
The major limitation of the study is that the sample is not nationally representative. Because of differences in climatic condition in Viet Nam, the results from this study are not generalizable across the country. The findings can, however, be applied in the Northern midlands and mountainous areas, which have similar climate, land characteristics and production patterns. As the data gathered for this study are cross-sectional, they do not show causality and association of tea yield. Further studies should, therefore, be conducted to reduce the limitations of this research, which are as follows. This study only focuses on assessing impacts of contract farming on tea productivity, and ignores the effects of contract farming on social and cultural aspects, such as employment, production habits and family relationships. In addition, it is very difficult to estimate accurately the influence of contract farming on tea productivity because of the effects of unobservable determinants, such as weather and managerial ability of farmers. Finally, in addition to estimation of tea productivity, the volatility of input prices, such as fertilizers and chemicals, should be considered to ensure profitability of farmers in the long term.
REFERENCES


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