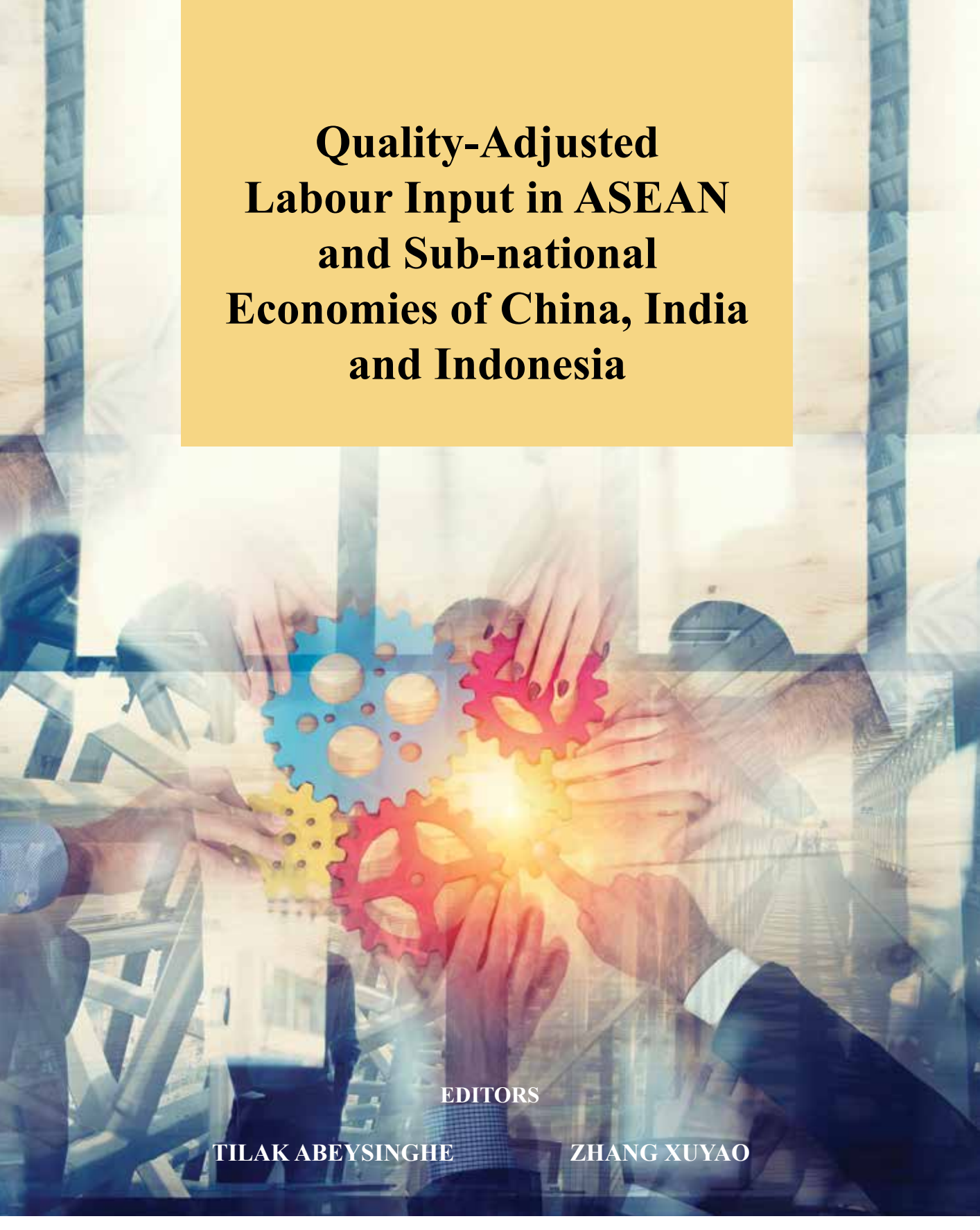
Quality-Adjusted Labour Input in ASEAN and Sub-national Economies of China, India and Indonesia



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Asia Competitiveness Institute

About ACI

The Asia Competitiveness Institute (ACI) was established in August 2006 as a Research Centre at the Lee Kuan Yew School of Public Policy (LKYSPP), National University of Singapore (NUS). It aims to build the intellectual leadership and network for understanding and developing competitiveness in the Asia region. ACI seeks to contribute to the enhancement of inclusive growth, living standards, and institutional governance through competitiveness research on sub-national economies in Asia. It identifies mitigating issues and challenges for potential public policy interventions through close collaboration with regional governments, business corporations, policy think-tanks, and academics. ACI's three key research pillars include (I) Sub-national economies level competitiveness analysis; (II) The development of digital economy and its implications in 16 Asia economies; and (III) Singapore's long-term growth strategies and public policy analysis.

ACI's value propositions may be encapsulated in its acronym:

Analytical inputs to initiate policies for policy-makers and business leaders in Asia

Capacity building to enable others through improvement in productivity and efficiency

Intellectual leadership to create pragmatic models of competitiveness and inclusive growth

Vision and Mission

- ACI's over-arching vision is to build up its research credibility with policy impact, contributing as a professional, world-class think-tank.
- ACI's mission is to establish our niche as a leading policy think-tank by identifying development trends, opportunities, and challenges among Asian economies and business corporations.
- ACI endeavours to articulate sound recommendations, promote discussion, and shape research agenda in the arena of public policy amongst Asian governments.
- ACI undertakes evidence-based analysis of public policy issues and decisions, in order to provide assessment of their effectiveness as well as economic and societal impact.

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Preface

The labour force, as a heterogeneous population with varying attributes, is continuously evolving. Over the past few decades, more women are joining the labour force. With the delay in retirement, more older workers are staying employed. Rapidly changing technology has changed the skill set and skill requirements of the workers. These changes would have a definite impact on the overall labour productivity of an economy. The traditional measure of labour productivity, calculated by GDP over total employment, has been criticised for failing to capture the subtle changes in the labour force, especially the varying capability of different types of labour in total employment.

In this context, Asia Competitiveness Institute (ACI) at Lee Kuan Yew School of Public Policy (LKYSPP), National University of Singapore (NUS) conducted this study to analyse the quality of labour inputs and its contribution to GDP growth. The heterogeneity of labour is considered through different industrial classifications. Following a well-established methodology, wages are used to capture labour productivity differences across industries. The wage-share weighted labour input provides quality-adjusted labour input. Naturally, the higher the growth of labour quality, the higher its contribution to GDP growth.

A notable feature of this book is its coverage of both the national (ASEAN countries) and sub-national levels (China, India and Indonesia). The ASEAN countries, including the provinces of Indonesia, have experienced a transition of the labour force, reflecting the shift from agricultural industries to manufacturing industries, due to increasing education levels. However, this does not seem to be the case in the provinces of China and the states of India. Labour mobility across industries at the sub-national level in these countries seems to be very low. This raises the question of whether increasing education levels translate into higher labour productivity growth.

In the midst of the COVID-19 pandemic, more workers have been retrenched from their current jobs. It is important to understand the quality of labour, as well as its ability to shift to other industries. This publication hopes to provide readers with a better understanding of the quality-adjusted labour input for ASEAN countries, and the sub-national economies of China, India and Indonesia. We look forward to the continued discussion on this important topic.

Paul Cheung
Director, Asia Competitiveness Institute
Lee Kuan Yew School of Public Policy
National Univerisity of Singapore

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This book has benefitted immensely from two of our annual flagship events: (a) the 2019 Asia Economic Forum on 'Economic Competitiveness and Quality-Adjusted Labour Productivity for ASEAN Economies, Greater China and India' held on 29th and 30th August 2019, and (b) the 2019 World Bank- Asia Competitiveness Institute Annual Conference on 'Urbanization Drive and Quality-Adjusted Labour Contributions to GDP' held on 18th and 19th November 2019. Throughout the project, we received tremendous support from various experts as well as regional policy think tanks. The effort and time taken by the reviewers in discussing our papers presented during these events are much appreciated. Their constructive comments have helped us improve our study significantly.

The reviewers' comments are included in this book as discussant notes. More specifically, our thanks are due to:

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Zhang Xuyao is a Research Fellow at the Asia Competitiveness Institute (ACI) at the Lee Kuan Yew School of Public Policy, National University of Singapore (NUS). Dr Zhang received his PhD in Economics from NUS in 2016 and obtained his Bachelor (Honours) degree in Applied Mathematics from NUS as well in 2012. During the PhD candidature, he worked as teaching assistant in conducting undergraduate tutorials, in subjects such as Microeconomics, Macroeconomics and Managerial Economics. His research focuses on Industrial Organizations, Applied Game Theory, and Public Economics. In particular, he is interested in technology transfers and anti-trust policies. He studies the optimal environmental taxation on the pollution problems in the presence of corruption. He also works on the beneficiary of research joint ventures with technology transfer. He also studies the Qualcomm's anti-trust case in China. At ACI, Dr. Zhang is supervising all the Competitiveness Projects (ASEAN, China, India and Indonesia). He is the coordinator for the Quality-Adjusted Labour Productivity Project, Welfare Spending and Budget Sustainability project and Shandong Urban Composite Development Index project. He is also the co-coordinator for the project studying the impact of exchange rate on trade at the provincial level in Mainland China. Dr Zhang is also working on the methodology of applying the concept of Shapley values to index ranking analysis. This method will subsequently serve as a robustness check to all the competitiveness ranking studies in ACI. Additional projects he is working on include the construction of the Special Economic Development Area index, the construction of Infrastructure index and the Independent Review and Efficiency Monitoring (IREM) of Real Time Outcome Monitoring System (ROMS) for the Government of Andhra Pradesh (GoAP), India.

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List of Abbreviations

ACI	Asia Competitiveness Institute
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
ASI	Annual Survey of Industries
Bali-Nusra	Bali and Nusa Tenggara
CLMV	Cambodia, Laos, Myanmar and Vietnam
CMIE	Centre for Monitoring Indian Economy
CPI	Consumer Price Index
CPO	Crude Palm Oil
EUS	Employment and Unemployment Survey
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GRDP	Gross Regional Domestic Product
GSDP	Gross State Domestic Product
GVA	Gross Value Added
ICT	Information and Communications Technology
IMF	International Monetary Fund
ILO	International Labour Organisation
ISIC	International Standard Industrial Classification
IT	Information Technology
KLEMS	Capital, Labour, Energy, Materials and Services
MNC	Multinational Corporation
MSME	Micro, Small and Medium Enterprise
OECD	Organization for Economic Cooperation and Development
PIB	Press Information Bureau
PPP	Purchasing Power Parity
QAI	Quality-Adjusted Index
QALI	Quality-Adjusted Labour Input
RBI	Reserve Bank of India
RMB	Renminbi
SME	Small and Medium-sized Enterprise
TFP	Total Factor Productivity
UI	Unadjusted Index
US	United States
WDI	World Development Indicators

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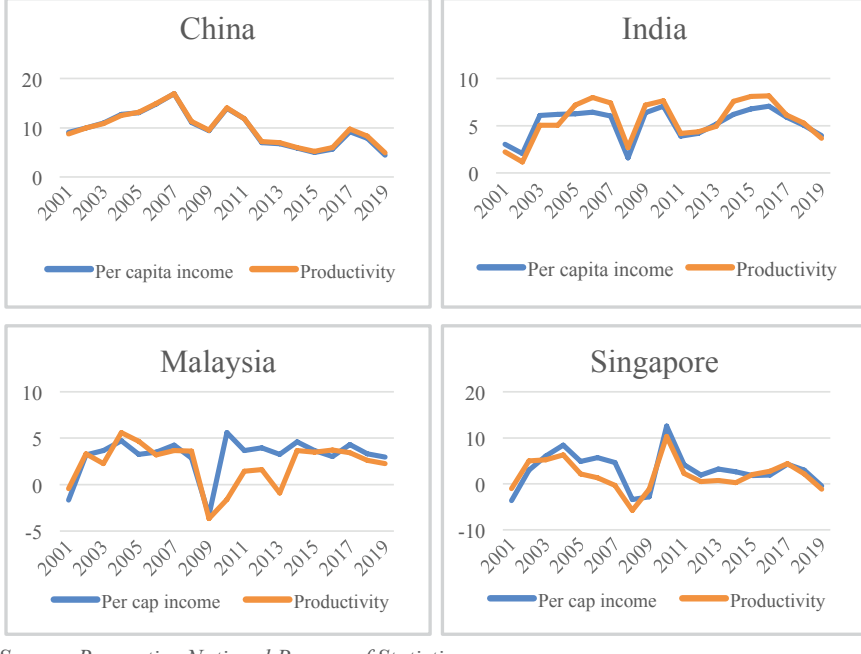
Chapter 1
Introduction

Tilak Abeysinghe

1.1 Labour Productivity and Per Capita Income

Among productivity measures, labour productivity takes a prominent place for a number of reasons. First, improving living standards requires sustained growth in labour productivity. Second, from time immemorial man has used tools and knowhow to improve his productivity. Therefore, other factors of production (physical capital, human capital, innovation) play complementary roles in the task of improving labour productivity. Third, the competitiveness of modern economies depends on the extent to which improvements in labour productivity can counter rising labour costs.

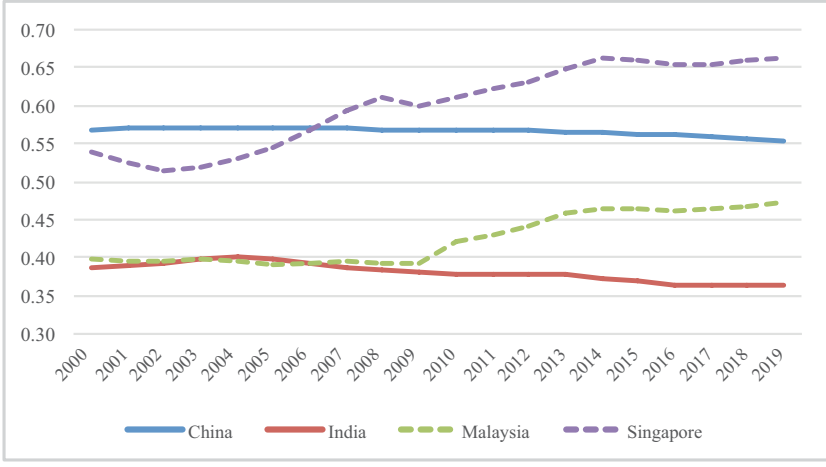
Figure 1.1 Growth of Per Capita GDP (Percent) and Labour Productivity (GDP/employment)



Source: Respective National Bureau of Statistics

With regard to the first point, if labour productivity is measured as output per worker (even as per work hour) as is traditionally done, it parallels per capita income; therefore, as a measure of standard of living it is redundant. Figure 1.1 shows the growth rate of per capita income (real GDP/population) and output per worker (real GDP/employment) for two primarily labour-exporting countries (China, India) and two primarily labour-importing countries (Malaysia, Singapore). Despite being growth rates, the close co-movement of the two measures is evident.

Figure 1.2 Employment/Population Ratio



Source: Respective National Bureau of Statistics

The key variable that can create a wedge between per capita income and output per worker is the shrinkage of the working-age population and thereby of employment across many countries. However, if both the numerator and the denominator of the labour productivity measure change by the same proportion, output per worker remains unaffected. Figure 1.2 shows the employment/population ratio for the countries shown in Figure 1.1. All four countries face the problem of a shrinking working-age population. This is well reflected in the employment/population ratio in China and India. The downward trend is also probably aided by labour export. Malaysia and Singapore are, on a net basis, labour-importing countries. As a result, their employment to population ratio has fluctuated and trended upward most of the time in the sample period. All these differences roughly cancel out in the GDP/employment ratio. Therefore, Figure 1 clearly shows that the information content in per capita income and the traditional measure of labour productivity is roughly the same.

1.2 Labour Productivity in the Digital Economy

Although the world economy has evolved substantially over the last few decades, some economic measures have not kept up with the change. The labour productivity measure is one of them.[1] The current measure of labour productivity must have originated in traditional agriculture when the vast majority of people engaged in food production in small landholdings. The farming tools, techniques and farmer skills were very similar for all the farmers. If land fertility and water availability were roughly the same in a given area, then it was very sensible to measure farmer productivity by the average measure, output per farmer. There was great simplicity in this measure. With the industrial revolution, however, all these parameters have changed. Both output and factor inputs are now highly differentiated, and measurement issues keep mounting.

Despite substantial improvements that have taken place over the years, there are serious measurement issues regarding both the numerator and the denominator of the labour productivity measure. The World Bank recently released a large-scale study on labour productivity measured as

[1] Another such measure is the old age dependency ratio which is measured simply by the demographic ratio of old population to working age population. Using data from Japan and Singapore Abeysinghe (2019) shows that savings adjusted old-age dependency does not look as alarming as what the demographic ratio suggests in aging societies.

real GDP per worker (Dieppe, 2020). This study corroborates the already noted slowing of labour productivity growth in many countries, especially after the global financial crisis (GFC). The study attributes this slowing to declaration of the growth of (1) working-age population, (2) educational attainments, (3) global value chain, and (4) reallocation of labour across different sectors. What is missing here is the under-measurement of GDP in the fast-expanding digital space.

Inadequacy of GDP as a measure of the well-being of a country is well documented; when the crime rate goes up, GDP also goes up, when outdoor pollution goes up, demand for indoor air purifiers goes up and so does GDP. Setting this point aside, Brynjolfsson et al. (2019) discuss in detail the under-measurement problem of GDP and suggest a way to assess consumer surplus generated by digital goods and services.

Nearly zero-priced online services have replaced physical goods and services that were sold at certain prices. Such items with a price get counted towards GDP whereas zero-priced items do not unless some imputing is done. Brynjolfsson et al. (2017) note that in the U.S. the music recording industry lost about 40 percent revenue between 2004 and 2008 because people have stopped buying physical items like CDs and switched to online music. Free Wikipedia killed the business of the printed encyclopaedia. After 244 years Encyclopaedia Britannica had to succumb to this fate in 2012. Similar transformations are occurring in many fields. The usage of these nearly free online services is spreading rapidly.

How to address the issue of under-measurement of GDP is this information age is an open research agenda with no satisfactory solution at this stage. The cost of producing physical goods that provide digital services such as smartphones is counted in GDP calculations. Does this cost fully account for the additional consumer surplus that these services generate? How about environmental costs and benefits? Given these intricate issues and until satisfactory imputation methods are figured out, we have to work with currently available GDP and sectoral value-added figures.

1.3 Labour Productivity and Labour Quality

The other problematic issue is the denominator of the labour productivity measure. Total employment or total work hours do not account for labour heterogeneity. Even in casual conversations, it is common to hear statements like ‘so and so is very productive and so and so is not’ or ‘do something productive.’ This intuitive meaning of productivity is not contained in the standard measure. It simply assumes that the productivity of a structural engineer is the same as that of a mason or a mechanic.

The labour quality assessment, however, has been well addressed. Under certain assumptions, the real wage of a worker is equal to his/her marginal productivity. Although this may not hold exactly at an individual level, it is likely to hold as a group average. The basic approach Jorgenson and his co-researchers (Jorgenson, Gallop and Fraumeni, 1987; Jorgenson, Ho and Stiroh, 2005) have adopted is to attach a weight to each labour category based on the wage share of that category. This weighted average of labour input is known as the quality-adjusted labour input (QALI). Maddison (1987) provides an extensive literature survey of the studies that pioneered the idea of accounting for quality of labour and capital inputs for the computation of total factor productivity.

Jorgenson and his co-researchers classified labour into five categories (gender, age, education, class, and industry). They compiled the U.S. data on hours worked and hourly wage rates and carried out extensive computations to derive QALI both at the category and aggregated levels. The Bureau of Labor Statistics (BLS, 1993), on the other hand, invoking theory of human capital, points out what matters for wage differentials is education and experience (on the job training) by gender and carried out computations in a simplified framework. Subsequent research on other countries has adapted some variation of these methodologies depending on data availability.

1.4 Contribution of Quality Labour to Growth

Although we could compute QALI we still do not have a corresponding measure of quality-adjusted labour productivity. What Jorgenson and co-researchers have done is to compute both quality-adjusted labour and capital inputs and then work out total factor productivity. It would be of great interest to develop a quality-adjusted labour productivity measure. We will leave this to future research. An indirect measure of quality-adjusted labour productivity is the contribution of QALI to GDP growth. This can easily be obtained in a growth accounting framework as is done in this exercise. However, this approach has its limitations.

1.5 Chapter Summary

The analysis in this exercise was carried out before the onset of the COVID-19 pandemic. The pandemic is going to create major structural shifts in the global economy. Understanding the trends of labour quality before the pandemic is invariably helpful in formulating structural changes that would enhance labour productivity in the post-pandemic world.

In Chapter 2, Tilak Abeysinghe, Aishwarya Narayan and Zhang Xuyao provide a summary of some key studies on QALI methodologies and the adapted methodology for this study. As stated above (Section 1.2) the major obstacle was the data scarcity; data was not available in a comparable manner across the countries and sub-national economies covered in the study. The adapted methodology was governed by this constraint.

In essence, the QALI is computed in this exercise using only the industry classification. By no means is this a serious weakness of the study. Labour reallocation from low-productivity sectors to high-productivity sectors has been a powerful mechanism for productivity growth (Baumol, 1967). The World Bank study cited above (Dieppe, 2020) estimates that about two-fifths of productivity gains in developing economies have come from labour reallocation. Therefore, if cross-sector labour movements are flexible, industry classification captures a reasonable amount of labour quality improvements. Nevertheless, this method does not capture labour quality improvements within an industry.

Again, constrained by data, this study uses total employment instead of hours worked. Some researchers have used full-time equivalent employment, i.e. total hours worked divided by annual average hours worked in full-time jobs. Systematic data on hours worked is not available for the countries in this study. One issue with hours worked, however, is that the marginal productivity approach does not account for labour intensity in production. To produce a given output, one person may take a longer time than the other person. Nevertheless, as companies shift towards deliverables within a given time frame, the number of hours spent on the work becomes less relevant. In this sense, the more appropriate indicator of labour input would be the number of workers, not hours.

In Chapter 3, Tan Kway Guan provides a trend analysis of value-added, employment and earnings by major sector for the ASEAN economies of Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Constrained by data, he carries out the QALI computations only for Indonesia, Malaysia, the Philippines, Singapore and Thailand (ASEAN-5).

A survey of the literature on ASEAN economies finds a divergence between agricultural and non-agricultural labour productivity. Some studies indicate that the share of agriculture in GDP has a negative impact on labour productivity of several ASEAN economies and that the shift in labour from agriculture to services has generated high rates of labour productivity growth. The most common factors shaping labour productivity growth include investments in ICT, institutional infrastructure and human capital.

In analysing the trends and patterns in output and employment for the period 2000 – 2017 in ASEAN, it is observed that output has transitioned from agriculture and industry to largely service sectors. This transition is reflected in the growing share of employment in services. It should be noted, however, that a high share of employment still remains in agriculture in many ASEAN economies. As the composition of the ASEAN economies continues to further transition away from agriculture, the ability of the labour force also to make that transition becomes an issue, potentially raising unemployment and income inequalities.

The calculations of QALI for the ASEAN-5 economies lead to the following observations: (i) the labour quality in these economies has been on the rise in general. (ii) Rising QALI, computed based on industry classifications, indicates that workers move from low-productivity industries to high- productivity industries. (iii) Rising labour quality clearly indicates that quality-adjusted labour productivity (if properly measured) has improved though the labour productivity based on the traditional measure appears to be falling in countries like Singapore. (iv) labour share of GDP in ASEAN-5 is much lower than that of the OECD economies, typically no higher than 45 percent. When measured by low labour share, the contribution to GDP growth from both quality-adjusted and unadjusted labour is low though the former picks up a higher contribution.

In Chapter 4, Mao Ke and Zhang Xuyao investigate the development of China's labour quality at the provincial level from 2008 to 2017. Because of the data constraint, the study compiles provincial employment and wage data for non-private enterprises across 19 industries and private ones across seven industries. All Mainland China provinces except Ningxia and Tibet are covered in the study (29 provinces). One caveat is that the research scope is restricted to only the urban economy as rural employment and wage data are virtually non-existent. However, this restriction does not undermine the significance of this exercise; it delivers insights into China's urban economy, which has seen rapid and drastic changes in the labour market since the country's reforms after 1978.

China's urban employment has trended upward over the sample period since 2008. However, employment growth in many industries has dropped sharply after 2013. These drops could be ascribed to an economic policy of that year, a policy which promoted competition between private firms and unproductive state-owned enterprises. Since then, employment in private enterprises has surpassed its non-private counterpart.

The calculations of QALI for urban provincial economies of China lead to the following observations: (i) China's labour quality in private and non-private enterprises has experienced distinct paths. The labour quality index has fluctuated more for non-private enterprises than for private ones in most provinces, although both show a similar pattern of slow upward momentum. (ii) The quality-adjusted and unadjusted labour input indices demonstrate almost identical trends

over the period of analysis. This indicates that labour mobility across industries has been low. The lack of transfer of human capital from low-productivity to high-productivity industries may lead to rising unemployment levels and increasing regional inequalities. (iii) The labour share of gross regional domestic product (GRDP) has been very low. With the exception of a few areas such as Beijing, the highest rates observed are below 20 percent for non-private enterprises and below 15 percent for private enterprises. This translates into very low contributions to GRDP growth from both quality-adjusted and unadjusted labour, mostly less than one percentage point although GRDP has grown by about 10 percent to 20 percent. (iv) This further corroborates China's capital-intensive growth strategy over the past decade.

In Chapter 5, Sumedha Gupta has examined how labour quality has evolved at the state level in India. Severely constrained by data, Sumedha confines the study to the manufacturing sector that covers about 10 percent of the economy. Although this is a small percentage of the economy, insights the analysis generates are useful for other sectors of the states. The study, which encompasses 29 industries, covers 30 states over the time period 2008/09 – 2016/17.

At the national level between 2011/12 and 2015/16, the worker population ratio of India decreased from 50.8 to 47.8 percent while the unemployment rate increased from 3.8 to 5 percent. This indicates that there was a lack of job creation in the country, coinciding with a time when the country was experiencing a demographic dividend. At the sub-national level, there was a huge variation in employment trends across the different regions with some states doing well while others fell behind by wide margins

The labour quality index at the national level shows no trend from 2008 to 2013 but declined slightly between 2013 and 2016. The decline can be attributed to several factors such as a lack of creation of quality jobs for the increasing workforce, complex labour laws and strict laws for large firms which hire more workers. The quality-adjusted and unadjusted labour contributed only about one to two percentage points to the gross value added growth signifying that most of the contribution is by physical capital and total factor productivity; the workers get the short end of the stick since their wages are very low.

At the sub-national level, the chapter presents results in detail for five sub-national economies – Gujarat, Delhi, Rajasthan, Sikkim, and Bihar – which showcase the varied nature of labour quality, quality-adjusted and unadjusted labour input indices, depending on the type of industries they support, the sub-national level labour laws and the quality of the labour force.

The analysis leads to the following observations: (i) Sikkim and Rajasthan highlight the states where labour quality has improved over the years though the unemployment rate also has increased. Creation of more high-quality jobs could be the reason for the crowding out of low-quality jobs. (ii) Delhi and Gujarat highlight states where both quality-adjusted and unadjusted indices mostly coincide, without much improvement in labour quality. (iii) Bihar highlights the case where the quality unadjusted labour index is moving above the adjusted index, indicating a lack of quality jobs in the sub-national economy. (iv) As a result of low labour share, the contribution of quality-adjusted and unadjusted labour to the growth of gross value added of manufacturing of the states has been very low, below two percentage points.

In Chapter 6, Doris Liew Wan Yin examines labour quality for the sub-national economies of Indonesia. Using the industrial classification as delineated in the Indonesia Standard Industrial Classification 2009, the study covers nine broad sectors of Indonesia, including agriculture, mining, manufacturing, construction and services. The study comprehensively covers all six

regions (Java, Sumatra, Bali and Nusa Tenggara, Kalimantan, Sulawesi and Maluku and Papua) and 34 provinces of Indonesia from 2008 to 2017. The national-level results are covered in Chapter 3.

The labour quality adjustment is done in two ways, one using total compensation and the other using average wages. The results show: (i) Labour quality in Java, Sumatra, Bali and Nusa Tenggara, Kalimantan and Sulawesi regions has been increasing over the years. This is attributable to a general increase in wages and employment in more productive sectors such as mining, manufacturing, finance and energy. (ii) While QALI based on total compensation has been increasing in the Maluku and Papua region, QALI using average wages shows fluctuations. (iii) At the provincial level, most of the provinces in Indonesia experienced a rise in QALI. In South Sulawesi, for example, QALI has increased due to its big and fast-growing mining industry. In North Maluku, it is due to the government's focus on job creation and worker training. On the other hand, Riau Islands shows worsening QALI due to stagnant growth in two of its largest industries, manufacturing and mining. (iv) The contribution to GRDP growth from both quality-adjusted and unadjusted labour has been low for almost all the provinces, suggesting that GRDP growth in Indonesia is driven mostly by capital or total factor productivity. (v) The positive growth in QALI reflects the shift in the country's focus from agriculture to the secondary and tertiary sectors. However, Indonesia's labour force today is still low-skilled.

Policy implications: The overall exercise elicits some useful policy implications. Three key highlights are:

(i) Typically, rising education levels are used as an indicator of human capital accumulation. The potential labour quality signified by the education level must translate into realised labour quality. The QALI computations in the exercise capture the realised labour quality improvements. The ASEAN-5 economies in general show an improvement in labour quality over the years as a result of workers moving from low-productivity industries to high-productivity industries. This is also the case in general at the sub-national level in Indonesia. This has happened in tandem with increasing education levels. If within industry labour quality improvements are captured, we could expect a further increase in the labour quality measure.

(ii) The situation at the sub-national level in China and India seems to be very different. The limited data used at the sub-national level indicates a lack of labour quality improvement in most of the sub-national economies. This indicates a lack of labour mobility across industries. If rising education levels do not translate into realised labour quality improvements, a deadweight loss is generated. This includes the dissatisfaction of workers in mismatched occupations.

(iii) The low labour share (wage share) in GDP seems to be a persistent problem in all the countries and sub-national economies covered in the study. This seems to be more acute in China and India. The problem is closely connected to rising income inequality despite high growth rates observed in these countries before the pandemic. Implications of rising income inequality are well discussed in academic and policy circles.

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