GENEVA GRADUATE INSTITUTE

INSTITUT DE HAUTES ÉTUDES INTERNATIONALES ET DU DÉVELOPPEMENT

GRADUATE INSTITUTE OF INTERNATIONAL AND DEVELOPMENT STUDIES

Three Essays on the Political Economy of Global Value Chains and Skills Governance

THESIS
submitted at the Graduate Institute
of International and Development Studies
in fulfilment of the requirements of the
PhD degree in International Relations and Political Science

by

Jaewon KIM

Thesis N° 1584

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Sur le préavis de Liliana ANDONOVA, professeure à l'Institut et co-directrice de thèse, de Sungmin RHO, professeure adjointe à l'Institut et co-directrice de thèse, de Chanwoong BAEK, professeur assistant à l'Institut et membre interne du jury, et de Gita STEINER-KHAMSI, Professor, Teachers College, Colombia University, New-York, USA et experte externe, la directrice de l'Institut de hautes études internationales et du développement autorise l'impression de la présente thèse sans exprimer par là d'opinion sur son contenu.

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RESUME / ABSTRACT
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Titre de la thèse / Title of thesis : Three Essays on the Political Economy of Global Value Chains and Skills Governance

Résumé en français: Dans ma thèse, j'examine trois sujets interconnectés sur l'économie politique des chaînes de valeur mondiales (CVM) et la gouvernance des compétences. Le premier article analyse comment la participation aux CVM technologiquement avancées expose la main-d'œuvre manufacturière en Thaïlande à des risques en matière de compétences. Il se concentre sur la perception des travailleurs de l'automobile concernant l'écart entre leurs compétences et celles requises. Le deuxième article explore le lien empirique entre l'intégration d'un État dans les CVM et ses dépenses publiques en éducation. Il propose une analyse statistique détaillée en fonction du type de participation aux CVM et du niveau d'éducation, et examine cette relation à travers des régressions où la participation aux CVM interagit avec les dépenses éducatives. Le troisième article étudie les conditions sous lesquelles les États privatisent l'éducation primaire. À partir de données issues de 117 pays, il examine l'influence des régimes politiques, de la corruption, des contraintes budgétaires et de la mondialisation sur cette décision. Une comparaison de la gouvernance de l'éducation primaire au Cambodge, en Thaïlande et à Singapour permet de comparer les résultats statistiques à des cas concrets et d'examiner les interactions entre facteurs politiques, économiques et historiques dans la privatisation de l'éducation.

English Summary: : In my thesis, each free-standing but interrelated topic on the political economy of global value chains and skills governance will be examined in the three individual papers. The first paper examines how participation in technologically advancing GVCs induces risks related to the skills of manufacturing labor in Thailand. It focuses on the perception of workers along the automotive value chain on the gap between the skills they possess and the skills required. It will be followed by the second paper that examines whether there is an empirically robust association between a state's integration into GVCs and government expenditure on education. It provides detailed statistical analysis by types of GVC participation and levels of education. It also seeks to provide a plausible explanation for the observed association using regressions in which GVC participation interacts with education expenditure. Finally, the third paper explores the conditions under which states transfer the ownership of primary education services to the private sector. Using cross-sectional data from 117 countries, it investigates whether and how political regimes, institutional capacity to control corruption, budgetary constraints, and economic globalization are associated with the state's decision to privatize primary education. It then provides a brief comparative analysis of primary education governance in Cambodia, Thailand, and Singapore – to examine if the results obtained from the statistical model fit individual cases and to further examine the dynamic interplay between political, economic, demographic, and historical factors throughout the process of primary education privatization.

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Overview

The causal association between economic globalization and the size of governments has been one of the major issues in the political economy literature. Since a seminal paper by Rodrik (1998) that thoroughly examined their theoretical link and established the compensation theory, which is traceable back to Cameron (1978), whether there is any empirical regularity that shows a robust association between trade openness and government expenditure has been investigated by many scholars. External risks induced by a state's exposure to international trade as Rodrik's core baseline assumption to such association have been also widely discussed and stimulated the development of a wide and influential body of research by political economists. Many find that the opening of a state's economy to international trade leads to an increase in public spending and the growth of public sectors. The major explanation put forward generally in the literature is that the integration of a state's economy into global markets is likely to expose a state to external risks, thus informing the greater role of a government as a provider of social insurance or welfare programs.

The literature has received a stimulus with the rapid integration of developing countries into global markets through global value chains (GVCs). Since the 1990s and early 2000s, GVCs have expanded significantly, and many developing countries have realized rapid economic liberalization through the lowered threshold for trade and investment. While the literature has broadened its focus to include analyses of the political economy of trade openness and government expenditure particularly of developing countries, the empirical results are mixed and not fully understood yet. The majority of existing studies also do not address the issues within the specific context of GVCs that have their distinctive characteristics that can hardly be generalized simply as the "opening of an economy to international trade." The distinctive characteristics of

GVCs include complex multi-tier structures and lead firm-supplier networks, intense competition particularly among the lower-tier subcontractors (countries), and the rapid diffusion of digital technologies and pressure on domestic suppliers to upgrade. It is not established whether openness to GVCs and government expenditure are associated, and how an increase or decrease in government expenditure as a reaction to the integration into GVCs affects domestic elements of external risks. More fundamentally, there is a lack of understanding of the underlying motivations of changes in fiscal policy actions in countries with a high level of GVC involvement.

Among others, the central focus of my dissertation research is on innate GVC-induced risks particularly related to *labor* and *skills* and the role of government expenditure on *education* as a stabilizer against shocks to the domestic labor market. GVCs provide many countries with not only increased access to the global market but also opportunities for technology transfer from outsourcing firms (which are often multinational enterprises) for the efficient production of inputs. In many cases, firms participating in GVCs rigorously invest in the deployment of new technology in an attempt to overcome the increased pressure exerted by outsourcing firms to lower production costs while upgrading the quality of inputs. Both academia and practitioners have shared the idea that, while such intense competition among suppliers at each tier may contribute to building firms' capacity to achieve technological upgrading and sustain competitive advantage, the potentially negative effects on domestic labor such as lack of skilled workers, unemployment, and deterioration of working condition should be fully addressed. The literature on GVCs and labor has recently become increasingly concerned with the impact of the extensive deployment of digital technology, e.g. automation, robotics, and artificial intelligence (AI), in the production process. Drawing on the literature that examines risks stemming from the global

diffusion of technology and changing labor market requirements, this research will further scrutinize workers' perceptions of new technology, skills-related risks, and the impact of education. Based on the empirical analysis of the government's mitigator role through education expenditure against GVC-induced labor risks and the growing importance of secondary and tertiary-level education (including vocational education and training) as a key source of skills development, this research will then explore the political-economic aspects of the production and delivery of primary education. Primary education has been relatively neglected in the discourse of economic globalization and skills of labor for its basic and general nature and purpose. This research aims to shed light on the dynamics of the public- and private-sector role in the governance of primary education, with a specific focus on the transfer of the ownership of primary education services from states to non-state actors.

Against this backdrop, each free-standing but interrelated topic will be examined in the three individual papers. The first paper of the dissertation will examine how participation in technologically advancing GVCs induces risks related to the skills of manufacturing labor in Thailand. It focuses on the perception of workers along the automotive value chain on the gap between the skills they possess and the skills required by the industry. It will be followed by the second paper that examines whether there is an empirically robust association between a state's integration into GVCs and government expenditure on education. It provides detailed statistical analysis by types of GVC participation – backward and forward – and levels of education – primary, secondary, and tertiary. It also seeks to provide a plausible explanation for the observed association using regressions in which GVC participation interacts with education expenditure. The models exhibiting the association between the interaction terms and labor skills are expected to help us understand how government expenditure on education contributes to boosting

opportunities or alleviating exposure to risks in states integrated into GVCs. Finally, the third paper explores the conditions under which states transfer the ownership of primary education services to the private sector. Using cross-sectional data from 117 countries, the paper investigates whether and how political regimes, institutional capacity to control corruption, budgetary constraints, and economic globalization are associated with the state's decision to engage the private sector in primary education governance and, ultimately, to privatize the service. It then provides a brief comparative analysis of primary education governance in three neighboring countries in Southeast Asia – Cambodia, Thailand, and Singapore – to examine if the results obtained from the statistical model fit individual cases and to further examine the dynamic interplay between political, economic, demographic, and historical factors throughout the process of primary education privatization.

The justification for choosing the case of Thailand is largely because its in-depth analysis will help illuminate the trends regarding the response of developing countries to labor risks created by the rapid opening of an economy to GVCs and technological upgrading along the production chains. The Thai economy has become increasingly interconnected with global markets by participating in GVCs as a producer of intermediary goods such as automotive and electronics. Competition among suppliers has led local manufacturers in Thailand to upgrade their production capacity by deploying new technologies. On the other hand, the issue of lack of skilled workers or skills mismatch has been a chronic problem prevalent in the manufacturing sector in Thailand. However, Thailand, a developing country with relatively limited administrative or financing capacity, may not be able to simply increase government spending on education or training to compensate people under specific (skills) risks. In fact, Thailand has a history of engaging the private sector in the provision of different levels of education to reduce

financial burden. Therefore, it is expected that the case of Thailand, or more specifically of the automotive manufacturing sector and domestic institutional arrangements for skill formation and education in Thailand, will be appropriate as an empirical ground to explore the core research questions and reveal some important implications for practice.

Chapter 1

Job Polarization within the Middle-Skill Group and Its Impact on Skills Mismatch

Jaewon Kim

Abstract

The unprecedentedly dynamic wave of technological changes, particularly driven by the advancement of digital technologies, is reshaping the manufacturing system and global value chains (GVCs). It also brings about a fundamental restructuring of the domestic labor market, and firms that are either tightly or loosely integrated into GVCs are faced with emerging opportunities and risks of technology-driven displacement of routine tasks. The hollowing out of middle-skilled jobs for routine-intensive manufacturing tasks and a lack of high-skilled workers have become a widely observed phenomenon in developed countries, and many anticipate that it is just a matter of time in developing countries as well. However, the findings from our survey and interviews show that manufacturing jobs for highly repetitive and dull tasks tend to remain in Thailand as firms in the low tier of supply chains effectively manage to keep low production costs by utilizing an abundance of moderately educated low-wage workers. On the other hand, our findings also suggest that education institutions are generally highly responsive to the expected changes in employment structure and skills requirements, which consequently creates over-skilling issues among Thai manufacturing workers.

Key words: GVCs, manufacturing sector, skills mismatch, job polarization, Thailand

JEL classification: F15, F16, Q14, J23, J24.

1. Introduction

Unprecedentedly rapid and profound changes in computer science and information technology have driven firms to robustly adopt electronic devices, systems, and resources that generate, process, store, and transmit data in the supply chain. Digital technologies, for instance, bring all stages of the value chain on a real-time engagement, making disruptive changes particularly in the manufacturing process through automation, artificial intelligence (AI), robotics, etc. (Zangiacomi et al., 2020; Lasi et al., 2014). They enable not only the automatized operation of production and assembly activity itself but overall automatized decision-making by digital technologies autonomously controlling and exchanging information based on real-time data throughout the manufacturing process. For example, a "smart" factory is expected to know the optimal manufacturing process or variations needed for a certain product and adjust the process accordingly (Alcácer and Cruz-Machado, 2019; Tjahjono et al., 2017). Glas and Kleeman (2016, p.61) describe this trend of the full digitalization of the supply chain as "where the digital system is not supporting the supply chain managers, but supply chain managers are supporting the system to automatically perform."

This is, however, where the concerns over a direct threat to job security come into play. The relationship between labor and technology has long been the topic that captured scholars' attention. For example, Keynes (1930) saw it as rather mutually beneficial, arguing that technology would complement and empower workers of tomorrow, while also mentioning that an increase in efficiency throughout the production processes would eventually cause so-called 'technological unemployment' to a certain extent. Similar discussions were held during the Second Industrial Revolution when machines started to replace jobs. The point is that even those

who are optimistic about the impact of technology on jobs admit that a great portion of currently existing jobs will vanish due to their replacement by machines. Their positive estimations are often based on the expectations of the creation of new jobs to handle or control new technologies, or on the improvement of labor productivity that is thought to be translated into the overall changes of economic structure at the macro-levels (Acemoglu and Restrepo, 2018; Zeira, 1998). Based on historical experience, scholars argue that new and even better-quality jobs can be created as an immediate reaction to job destruction due to disruptive technological change (Mokyr et al., 2015). In the case of the manufacturing sector, new and better jobs would be, among others, those related to machine operation and engineering, smart factory management, and data analysis, or those in IoT solutions and platform businesses.

This is why the issues of skills mismatch arising from the technological upgrading of suppliers in global value chains (GVCs) hold the attention of scholars and practitioners alike. The challenge facing developing countries, or more specifically countries that have been actively participating in the GVCs as intermediary goods producers, is how to adjust to and take advantage of such inevitable changes in the structure of the supply chains and of the labor market. The advancement of disruptive technology has rapidly replaced labor-intensive manufacturing jobs in these countries, and firms' demand for higher-skilled workers for more technologically sophisticated tasks that are often limited in the domestic labor market has increased significantly (Hamzeh et al., 2018; Nooriah and Zakiyah, 2015). It creates a vertical skills mismatch at the individual level – *under-skilling* (Miller, 2007; Sloane et al., 1999). Adversely, it may encourage students to increasingly prefer majoring in subjects related to digital or highly sophisticated skills considering future employment opportunities while the domestic

labor market cannot accommodate their huge inflow, thus leaving them with more skills than their actual jobs require – *over-skilling* (Leuven and Oosterbeek, 2011; McGuinness, 2006).

Thailand, the geographical focus of this paper, has made great strides toward social and economic growth over a few decades and rapidly turned from a low-income to an upper-middle-income economy. One of the main drivers of the country's remarkable growth is its positioning as an emerging global manufacturing hub by aggressively expanding supply chain linkages with multinationals or foreign firms. Thailand's integration into the global automotive and auto parts value chain has particularly served as a strong impetus for rapid economic growth. Effectively accommodating the burgeoning young workforce moving away from agriculture to labor-intensive automotive manufacturing, Thailand has enjoyed the growth of this so-called 'job creation machine' sector. Over the coming decades, however, this sector is considered both by academia and policy circles to be where the biggest fear of massive job loss would originate from. The automotive and auto parts industry has one of the highest robotics and automation technology adoption rates in the global economy. Moreover, Thailand is known to be one of the manufacturing economies where such disruptive technologies are most aggressively deployed, alongside Indonesia, South Korea, and Taiwan. ILO (2016) estimates that around 70 percent of Thai manufacturing workers in automotive, garment, computers, and electronics face a high risk of automation, and these shares are even higher than those of its neighboring value chain competitors such as Indonesia and the Philippines. Given that a large portion of wage workers in this sector work on repetitive and manual tasks, the estimated possibility is not surprising.

Such accelerating structural changes in the manufacturing sector put pressure on value chain workers in Thailand to learn new skills to secure their jobs. The average educational attainment of manufacturing workers has gradually increased over time, and schools provide

curricula that deliver advanced skill sets. Also, on-the-job training and apprenticeship schemes have increasingly become an important part of vocational education and training. Across all industries, however, Thailand has experienced a chronic shortage of skilled workers, and it has been continuously more severe in the automotive sectors. The national-level surveys on manufacturing firms have indicated a lack of skilled workforce as one of the biggest obstacles to running a business, and it appears that it is especially the case for those in the automotive and auto parts industry. Interestingly, however, Thailand is also one of the countries where the over-skilling issue is conspicuously severe. Comparative studies done by the OECD (2021) and the World Bank (2016) show that Thailand exhibits distinctive patterns of skills mismatch as a share of over-qualified workers is notably higher than that of under-qualified workers. They point out that it is largely attributable to Thailand's industrial growth pattern where employment is still concentrated in low-skilled jobs while the labor market has failed to accommodate a burgeoning pool of highly qualified and educated workers.

It leads us to further examine where these mixed perspectives on skills mismatch come from and more importantly how individual workers, not employers, assess the gap between skills they possess and skills required for their current and future jobs. For doing so, this research measures the individual-level skills mismatch of auto parts manufacturing workers in Thailand and compares the result with the existing national-level skills survey data that mainly reflects employers' perspectives. By documenting the micro-level dynamics between the recent advancement of technology including digital tools and supply and demand of skills of labor, it is expected to speak to the broader literature on the political economy of technology and occupation, or more specifically to the routine-biased technological change (RBTC) hypothesis and job polarization theory. The structure of this paper is as follows. The next section reviews

how the literature demonstrates the impact of technological progress on the labor market and occupational structure of a state. Section 3 presents the theoretical framework that defines the main ideas and approaches adopted in this research. Section 4 introduces two different possibilities of skills mismatch specifically in Thailand. It is then followed by Section 5 which describes and justifies the methodological approaches used to test the hypotheses, and Section 6 and Section 7 where an in-depth quantitative and qualitative analysis of the survey results complemented by interviews is discussed. Section 8 synthesizes policy implications and Section 9 concludes.

2. Literature Review

2.1 The political economy of technology and occupation

Among many risks that GVC participation may create, those induced by rapid technological progress and transfer of such technology along GVCs entail major challenges for both developed and developing countries not only at a firm level but at a state level in terms of industrial policy, labor, and education and training. This section explores how the literature has examined the impact of technological development on national economic growth and the occupational structure of a state.

The routine-biased technological change (RBTC)

Since the 2000s, some scholars have looked for the hypothesis that explains the recent labor market pattern of jobs polarizing into highest-skilled and lowest-skilled jobs at the expense of employment in the middle-skilled ones observed across developed countries since the beginning of the 1990s. Autor et al. (2006), Goos and Manning (2003), and Spitz-Oener (2006), for example, uncovered the polarization of the labor market in the United States, United Kingdom, and Germany, respectively. Additionally, Goos et al. (2009) and Michaels et al. (2010) further

suggested that it is a general phenomenon across almost all European countries. These advanced economies have typically seen growth in professional and managerial jobs that require highly skilled and educated workers and jobs in personal services that require a minimum level of skills at the same time while seeing a decline in manufacturing or routine cognitive manual jobs that are in the middle of the occupational distribution. A hypothesis put forward by these scholars to explain the phenomenon of job polarization is the *routine-biased technological change (RBTC)*, or *routinization theory* in short.

RBTC theory has effectively provided explanations for recent technological change that has become biased toward replacing routine occupations. The RBTC theory is particularly pertinent to this study as it puts significant emphasis on the labor dynamics around information and communication technology (ICT), which is closely related to automation technology increasingly adopted along the GVCs, and on its impact on low- and middle-skilled (routine cognitive and manual) manufacturing workers. More importantly, the RBTC hypothesis provides a clue to understanding the interconnectedness of structural changes in employment in developed countries and those in developing countries. Therefore, it is important to identify and evaluate some core debates and findings in the literature and synthesize a variety of sub-topics to come to a more comprehensive understanding of the political economy of technological progress and changes in employment structure within the context of GVCs.

The routinization hypothesis was first proposed by Autor et al. (2003) who were among the first who formalized and tested an intuitive and informal articulation of how computers complement or displace human labor inputs that are either "routine" or "non-routine" in workplace settings. They conclude that computers drastically reshape the labor task composition and hence affect the dynamics of labor demand. In detail, they find that computer technology displaces workers who perform routine cognitive and manual tasks that can be mimicked by

programmed rules, while it complements workers who conduct tasks that require various non-routine cognitive skills such as creativity and flexibility. They highlight the causal force by which computerization affects the structure of skills demand— the steep decline in the price of computer capital. Using a simple model, they examined how the decline in the price of computer technology affects task demand within industries and jobs. They predict that "industries that were intensive in labor input of routine tasks in the pre-computer era would make relatively larger investments in computer capital. Simultaneously, they would reduce labor input of routine tasks, for which computer capital substitutes, and increase demand for nonroutine task input, which computer capital complements (Autor et al., 2003; p.1322)."

While Autor et al. (2003) effectively introduced the theory of routinization of tasks, those who first focused in full scale on how it affects employment in high- and low-wage jobs and how the world of work is polarizing are Goos and Manning (2007) and Autor et al. (2006). Goos and Manning (2007) present evidence of increasing job polarization into "lovely jobs" (e.g. those in specialized and professional occupations in finance and business service industries) and "lousy jobs" (e.g. those in low-paying service industries) in the U.K. and claim that a plausible explanation for this phenomenon is the routinization hypothesis. They postulate that occupations for routine tasks that can be easily displaced by technology are not uniformly distributed across the entire wage distribution. While non-routine cognitive jobs are distributed around the top end of the wage range and jobs for non-routine manual tasks are concentrated at the bottom of the wage distribution, routine manual jobs tend to be in the middle. Using the New Earnings Survey (NES) and the Labor Force Survey (LFS) of the U.K., they find that technological progress is likely to raise demand in high-wage jobs that require non-routine cognitive skills and low-wage jobs that require non-routine manual skills while lowering relative demand in the middling jobs

that are manual and repetitive such as clerical or production tasks, which consequently creates job polarization.

Combining these two studies, Autor et al. (2006) explore whether job polarization is associated with the steep decline in the price of computer capital in recent decades. They find that the declining real price of computing power leads to the easier displacement of routine tasks and lowering of the wage of middle-skill tasks. On the other hand, it complements non-routine cognitive tasks like those that require skills related to abstract reasoning, e.g. problem solving and coordination, and raises their wage, while having little impact on non-routine manual tasks in terms of both employment and wage. They famously called this phenomenon the *polarization of earnings*. Another contribution of this study is that they observed a notable correlation between education and workers' ability to engage in cognitive or manual, or routine or non-routine, tasks. In addition to wages, they explored whether the employment growth of the United States by occupation is associated with skill proxied by education level. Their model shows, while being sketchy, that workers' ability to conduct certain tasks is contingent upon whether they are college graduates or high school graduates.

2.2 The political economy of globalization, offshoring, and occupation

Another leading explanation for changes in the structure of skills and jobs is globalization and offshoring. A fairly large body of literature has focused on trade globalization and offshoring practices to understand routine exposures and the sectoral employment shifts of a state (Blinder and Krueger, 2013; Das and Hilgenstock, 2018; Goos et al. 2009; Koopman et al., 2014). They find that ever increasing complexity of trade networks and a steep decline in trade cost promote firms' dislocation of certain tasks, which results in the offshoring of routine-intensive jobs such as manufacturing of intermediate inputs (Blinder and Krueger, 2013). Goos et al. (2009) add

firms' offshoring of some parts of their production process as another potential cause of job polarization. First, by modelling the change in the structure of employment by occupation between 1993 and 2006, they establish the phenomenon of polarizing employment with rising demand for high-wage professionals and low-wage services workers and declining demand for workforce in manufacturing and office workers performing simple routine tasks as a prevalent characteristic across Europe. Then by building an index that shows the "offshorability" of different occupations, they identify that some specific occupations with a high level of routineness such as machine operators, assemblers, or metal, machinery, and related trade workers are offshored most often. The results lead them to confirm that offshoring intensifies job polarization. A growing empirical literature has provided evidence of the impact of offshoring on labor market polarization. For example, Oldenski (2014) and Cavenile (2021) on the U.S. job market, Egger et al. (2016) on firms in Germany, and Heyman (2016) on the offshorability of occupations in Sweden all confirm the significant correlation between offshoring of low- to middle-skilled routine manual jobs to lower-wage countries and the observed pattern of job polarization.

While Goos et al. (2009) only provide evidence on the impact of technological advancement and offshoring separately on job polarization and do not specifically discuss the interaction between these two factors, it naturally helps us to move our focal point of interest to the relationship between technological progress and offshoring and their compound impact on the supply and demand of skills. Some scholars find that technological advancement and offshoring are mutually reinforcing. They emphasize that both the rising ability of firms to achieve rapid technological advancement and offshore jobs are the core reasons for the decline in routine exposures, and they together contribute to the hollowing out of the demand for routine manual jobs that require mid-level skills in developed countries (Das and Hilgenstock, 2018). Acemoglu

and Autor (2010) claims that new information technology is a key driver for the expansion of offshoring practices as it allows firms to effectively coordinate production, assembly, and distribution of goods and services across borders. Blinder and Krueger (2013) also support this argument by stating that the development of new technology not only enables the automation of domestic routine tasks but also makes offshoring practices more feasible, both of which contribute to the drastic reduction of middling jobs.

In summary, the RBTC hypothesis and the framework of technological progress-induced offshoring provide clues to understanding the interconnectedness of changes in skills and occupational structure. Thus far, however, the majority of studies tend to be exclusively grounded on the developed countries' perspective, while what implications the job polarization literature or more substantially the skill- and routine-biased theory have on the developing world have not been explored extensively. In addition, some recent studies that shed light on the impact of progress in digital and automation technology on developing countries integrated into GVCs hardly frame these countries as the *hosts* of offshorable *middle-skilled* jobs but rather tend to sketchily highlight the opportunities and challenges of technological progress in their labor market. Thus this approach makes it difficult to connect the complex dynamics of outsourcing relationships and competition among the hosts of offshored jobs within GVCs and the motivations, forms, and levels of technological advancement of developing countries.

It is particularly pertinent as technological progress and more specifically the deployment of automation and digital technologies are widely observed phenomena in the developing world as well. Intense competition among suppliers (subcontractors) who invite offshored jobs through GVCs often leads them to more extensively utilize advanced technology to lower production costs and increase productivity. It might be also the case that firms in developing countries choose to relocate certain simple and repetitive manufacturing tasks to countries with even lower

wages. What will happen to the large pool of middle-skilled manufacturing jobs that have been offshored to these countries then? Will firms' demand for labor with more sophisticated skills increase and will they follow the pattern of job polarizing to the two extremes? Are technological changes in the production practice widely observed in both the lower-tier and the upper-tier manufacturing firms? If so, how would such changes in the structure of skills of labor affect workers' perception of skills possessed and skills required, and ultimately on skills readiness and job satisfaction now and soon?

Weaving together the routine-biased theory and the literature on offshoring and job polarization, this research interrogates whether such a framework applies to the analysis of skills and occupational structure in developing countries with abundant middle-skilled workers. The primary focus will be on the micro- or individual-level skills of workers with stereotypical middling jobs. While being micro in scale, the potential contribution of this research to the existing literature shall be its attempt to examine the adaptability of the RBTC and job polarization theory to the case of developing countries or the hosts of offshorable middle-skilled jobs who follow the developed countries' pattern of technological advancement, within the specific context of GVCs.

3. Theoretical Framework

3.1 GVCs and process upgrading

This research frames the technological advancement of manufacturing firms in the host countries of offshored jobs mainly as part of their effort for upgrading within GVCs. Upgrading within GVCs is a strategic move by firms to climb up the chain to capture a larger share of the value-added or to perform more efficient activities to maximize profit. It often refers to suppliers in developing countries responding to growing competition challenges both in domestic and

international trade networks (Gereffi, 1999; Gibbon and Ponte, 2005). Gereffi (1999, p.39) highlights the concept of organizational learning throughout the process of upgrading of firms' or states' position within international trade networks and emphasizes that "[p]articipation in global commodity chains is a necessary step for industrial upgrading because it puts firms and economies on potentially dynamic learning curves."

A highly cited framework developed by Humphrey and Schmitz (2002) specifically conceptualizes four types of upgrading within GVCs: (i) *product upgrading*, or moving into more sophisticated or more highly value-added product lines; (ii) *process upgrading*, or transforming inputs into outputs more efficiently by adopting a better organization of the production system or introducing superior technology; (iii) *functional upgrading*, or acquiring new functions or abandoning existing functions so that the overall skill content of the activities can be increased; and (iv) *inter-sectoral upgrading*, or applying the competence acquired in a particular function of a chain to move into a new but often related industry. Taglioni and Winkler (2016, p.182) elaborate on the concept of process upgrading as "total factor productivity growth in existing activities in the value chain that cannot be directly attributed to the production factors of labor or capital." Building on this, Szalavetz (2020) connects process upgrading and digital technology, one of the recently highlighted production factors other than labor and capital, and claims that the most prominent benefit of adopting digital technologies for manufacturing firms is its contribution to process upgrading as its major advantage is a highly efficient transformation of inputs into outputs. Process upgrading through the deployment of advanced technologies is sometimes initiated by lead firms for the overall productivity improvement throughout the whole chain, but in most cases, suppliers voluntarily adopt digital technologies to respond to "pressure

to cut costs, increase efficiency, reduce cycle time and improve both the flexibility and the excellence of operations (Szalavetz, 2020; p.9)."

Based on this conceptual background, this research focuses on the technological side of process upgrading and considers the deployment of advanced technologies that make disruptive changes in the manufacturing process as a driver of process upgrading of firms in GVCs. We examine the pace of process upgrading utilizing new digital technologies particularly in lower-tier auto parts manufacturing firms that are in most cases small- and medium-sized, and whether it leads to their lower demand for middle-skilled workers that are replaceable by automation and other digital technologies.

3.2 Job polarization and skills mismatch

All in all, literature tends to focus on either job polarization or skills mismatch separately and only a few have investigated possible relationships between the two factors (Sparreboom and Tarvid, 2016). Goos and Manning (2007), who identified job polarization into lovely and lousy jobs, further claimed that the hollowing out of middle-skilled jobs may create skills mismatch by leaving educated workers with low-skilled jobs. Some country-specific empirical studies also support this claim. For instance, Rohrbach-Schmidt and Tiemann (2011) confirm the rising trend of overqualification driven by job polarization between the mid-1980s and the mid-2000s in Germany. Zago (2020), on the other hand, provides a more subdivided analysis of the association between job polarization and skills mismatch by distinguishing skill groups, particularly during the economic downturn in the United States. In the polarized labor market, it is only temporary for high-skilled workers during the recession to be moved from abstract to routine occupations and thus mismatched. On the contrary, low-skilled workers tend to move from routine to manual

occupations and remain mismatched for a longer period as routine jobs keep being replaced by technology.

Seeing the relationship between the two factors as an empirical matter, Sparreboom and Tarvid (2016, p.32) argue that their potential relationship depends to a large extent on "the pace of imbalanced job polarization – the extent to which the share of high-skill jobs and low-skill jobs grow relatively to each other at the expense of medium skill jobs." In their research, skills mismatch is proxied by the level of educational attainment – *overeducation* and *undereducation*. The empirical test is particularly relevant to this research in that it provides both the macroeconomic and the microeconomic level analysis. Their empirical results particularly at the microeconomic level indicate that imbalanced job polarization has no overall impact on undereducation (the proxy of under-skilling) but is positively associated with overeducation (the proxy of over-skilling). The authors assume that it is due to the high responsiveness of education systems to labor market trends and thus the prompt supply of highly educated workers as the share of high-skilled jobs increases. It suggests that the association between job polarization and skills mismatch is highly influenced by various institutional factors of individual states such as education or industry-academia linkages.

It is clear that the routine task intensity has declined and the pool of middle-skilled jobs has started to be affected accordingly in many developing countries including Thailand in recent years. Industrial robots and automation technologies are rigorously replacing routine manufacturing tasks in Thailand, and, at the same time, the country has seen a surge in the number of graduates trained in related technologies. However, it is difficult to grasp the overall trend of technology- or trade globalization-induced job polarization as technological advancement or process upgrading in developing economies is not at the mature stage nor is their

offshoring to even lower-waged countries as widely observed as in developed economies. Therefore, instead of emphasizing the impact of technology, offshoring, or routinization on the structure of jobs itself that requires macroeconomic-level analysis, we place our analysis on the microeconomic- and individual-level job polarization and skills mismatch of workers. Bringing our focus on the perception of workers who face (potential) shifts in labor market structure and skills requirements, we expect to identify the trend of middle-skilled job replacement and consequent job polarization, particularly within lower-tier manufacturing firms in a GVC network. While manufacturing tasks in general require typical middle-skilled workers, the complexity and intensity of routineness of middle-skilled jobs differ by to which tier a supplier belongs. Low-tier suppliers tend to conduct lower value-added and technologically less sophisticated manufacturing tasks. As the majority of auto parts suppliers in Thailand are positioned in the second, third, or even lower tier of GVC networks, examining the trend in skills requirements and its impact on middle-skilled workers in these segments of GVCs is expected to provide important insights into job polarization and consequent skills mismatch.

4. Either Under-Skilling or Over-Skilling? or Both?

The automotive industry has served as one of the main drivers of the Thai economy, with domestic firms successfully integrating into GVCs as focal production points of auto parts and components. The growth of the industry has offered job opportunities for relatively low-skilled workers in labor-intensive operations. However, rapid automation and digital sophistication of the manufacturing process, and their potential depriving of current manual jobs of human workers have become more than a vague future concern of the country. Technological advancement of the production process in developing economies often takes place through value chains, where multinational firms (or lead firms) disseminate new technologies to their suppliers

for more expedited and cost-effective operations (Rodrik, 2018). Thailand's overall adoption rate of robotics and digital technologies for industrial use is higher than other developing countries. It was ranked as the 2nd largest market in ASEAN and the 13th largest market worldwide for the installation of industrial robots in 2019 (UNIDO, 2019; Thailand Board of Investment, 2020). Another latest international comparison by OECD (2021) shows in detail that Thailand is closely following international trends of automation, with the annual supply of industrial robots marking more than a three-fold increase between the 2000s (around 900 units) and the 2010s (around 3,000 units). Also noteworthy is that Thailand particularly stands out for its incomparably high concentration of robotics in automotive manufacturing. While the structure of industrial robots and automation technology expansion by industry follows the global trend where the automotive and electronics sectors remain the main users, the share for the automotive industry is exceptionally high in Thailand at 50 percent compared to the global trend of 35 percent. Its share is higher than that of the United States and its regional competitor Indonesia (Thailand Board of Investment, 2020). In line with this trend, many scholars and practitioners generally anticipate the deepening of under-skilling. They expect that the adoption of robotics and their manufacturing job replacement will be accelerated, and Thailand is at the crossroads of maximizing employment opportunities through the process upgrading of firms. While being exceptional yet, multinational automotive firms such as Toyota and Honda have already changed the investment targets in some of their Thai suppliers with technological capacity from production and assembly to even more technology-intensive digital production management or R&D by establishing technical centers. The Government of Thailand has also predicted somewhat ambitiously that the Thai automotive industry will invite up to 700,000 skilled workers to serve these evolving tasks by 2022.[1]

[1] Prediction figures about new job opportunities in the automotive industry in certain countries, however, do not

However, another plausible projection is that the majority of Thai automotive firms without a certain level of capacity for process upgrading may remain reluctant to utilize new technologies in the production process due to high initial costs, administrative burdens, or difficulties in employing skilled workers. The fact that share of manufacturers who adopted automation technology remained marginal at around 30 percent in 2018 and the majority of small- and medium-sized enterprises (SMEs) are expected to be ready for technological transformation in the manufacturing process in later than five years (Thailand Board of Investment, 2020) lead us to assume that such disruptive process upgrading may be confined to a few large manufacturers. It is also possible that lead firms may easily choose to relocate their production site to countries with better infrastructure, regulations, or labor for digital manufacturing of auto parts and components for the industry's highly competitive nature. From the education perspective, on the other hand, there clearly is a trend of a surge in the number of future workers trained in advanced digital technologies. According to the Thailand Board of Investment (2020), around 80,000 graduates are produced in automation- and robotics-related fields such as advanced engineering and computer science every year, which is more than 20 percent of all graduates in the country. Producing vast numbers of future workforce trained in disciplines related directly to digital manufacturing technologies is a main part of the extensive government-led programs that aim at scaling up its manufacturing capacity.

This trend presents both possibilities to the labor market in Thailand. Firstly, Thai manufacturing firms with the capacity for process upgrading (or technological upgrading) would extensively adopt digital and automation technologies throughout the production process while the majority of their workers lack relevant skills and education qualifications, which results in

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often clearly present the methodologies they used, and therefore the reliability of numbers is not certain.

under-skilling. Secondly, firms without the capacity for process upgrading would remain with traditional production operations while a pool of graduates with higher skills and education qualifications that are not fully utilized rapidly expands, which results in *over-skilling*.

In Thailand, under-skilling and undereducation have been chronic issues across the manufacturing sector. The annual R&D and Community Innovation Surveys on more than 3,000 manufacturing firms in Thailand reveal that a lack of skilled or qualified workers has continuously been among the top business concerns together with a lack of technological information, even surpassing the share of respondents who chose issues related to business costs. The estimation by Matsumoto and Bhula-or (2018) also suggests that the period-average share of undereducated workers in the middle-skilled occupation group in Thailand is close to 60 percent, which is much higher than that of its regional peers such as Viet Nam (32.9 percent), Indonesia (55 percent), and the Philippines (32.5 percent). On the other hand, a study by the OECD (2021) presents an interesting trend of over-skilling and overeducation in Thailand. While the share of under-qualified workers was at 7.8 percent, that of over-qualified workers marked 34 percent in 2018, which is starkly different from the general qualification mismatch pattern observed in OECD countries with on average 18.6 percent of under-qualified workers and 17.1 percent of over-qualified workers. Matsumoto and Bhula-or (2018), again, support this analysis as well. While their estimation features an evident undereducation trend among workers in the middle-skilled occupation group, it also shows a relatively high percentage of overeducated workers (9.7 percent) compared to Indonesia (3.2 percent) and Viet Nam (4.6 percent). The high share of overeducated workers is also present for a relatively high-skilled occupation group. The share of overeducated workers in this group in Thailand is double and quadruple the share of overeducated workers in Indonesia and Viet Nam, respectively. These results are in line with a

study carried out by the Bank of Thailand (2018) that confirms a similar labor market phenomenon in Thailand. Their analysis points out that the industries still look for workers with relatively lower vocational certificates or lower-level degrees of education, while the actual supply is highest for graduates with a tertiary education degree. World Bank (2016) analyses that this uniquely large share of over-qualified workers in the Thai labor market is because the employment growth in the country has been concentrated in occupations that require low skills.

In sum, there exists a highly mixed statistical analysis and outlook for the trends of technological progress of the manufacturing process and the consequent discrepancy between skills demanded and skills possessed by workers in Thailand. Thai automotive firms' rigorous adoption of digital and automation technologies in manufacturing in response to pressure from intense competition in GVCs leads us to assume that the use of such new technologies for small- and medium-sized suppliers, which take up the majority of auto parts and components businesses in Thailand, would also grow rapidly. In this case, it is expected that Thailand would follow the pattern of hollowing out of middle-skilled jobs, which helps us reconfirm the routinization theory. However, whether a similar trend is observed in the case of small- to medium-sized producers typically positioned in the lower tier of GVCs is in question. The initial cost to deploy new technologies or additional managerial efforts directed toward placing and managing workers with high-level skills might be too much burden, or it might be simply because they do not have a strong motivation to upgrade as they face less keen competition. Having such polarized arguments on technological upgrading of local firms and skills of labor of Thailand in mind, this research attempts to identify whether and how technological upgrading occurs among small- and medium-sized suppliers who produce lower-tier parts and components or conduct the final

assembly of products, and how it affects under-skilling and over-skilling of middle-skilled workers.

5. Methodology

5.1 Questionnaire surveys

Measuring skills, not to mention skills mismatch, is highly subjective and abstract, and thus getting access to objective macro-level data is difficult. Hence, this research utilizes micro- and individual-level data on skills mismatch through self-assessment. It uses both qualitative and quantitative survey methods including both paper and web-based electronic questionnaires and semi-structured interviews. As Kelley et al. (2003, p.261) state, the survey is an effective tool to capture a "snapshot of how things are at a specific time," as conditions or variables are not controlled or manipulated nor do participants receive different treatment. Surveys are frequently used for descriptive research that seeks explanations for certain phenomena that occur in the real world or empirical data collection to test hypotheses (Finkel et al., 2015; Kelley et al., 2003). Some key advantages of a questionnaire survey include relatively low cost to administer and the ability to collect information from a large population that gives a better statistical significance and representativeness (De Vaus, 1991; Jones et al., 2013). In particular, web-based electronic surveys are useful to reach larger targets and compile responses quickly (Jones et al., 2013). On the other hand, an inherent issue of questionnaire surveys lies in the accuracy of the self-assessed thoughts or beliefs of the respondents. It is often difficult to elicit honest answers not only on sensitive topics such as religion or racial issues but also on seemingly less sensitive ones, as the respondents may feel pressure to conform to social norms or worried about any possible penalties their responses may bring especially in the case of internal surveys (Blair and Imai, 2012). Many respondents also tend to routinely answer questions carelessly or to adapt their reality to the

potentially desired way that the survey (they assume) wants to get (Einola et al., 2020). In this research, a major concern while conducting a questionnaire survey on workers is that there is a possibility of their exaggeration of skills possessed or skills required for a specific task or employment. It might be simply because they are not encouraged to provide careful and honest answers or because they are worried about the survey results bringing any disadvantages to their job security. Using the self-assessment method, however, is still relevant for small-scale research that aims at examining skills or skills mismatch within specific industrial sectors or occupations (Senkrua, 2021). The self-assessment method has been used over decades for many studies such as Duncan and Hoffman (1981), Allen and van der Velden (2001), and Cultrera et al. (2022) to examine skills mismatch.

It is of utmost importance that the survey is well-constructed as it determines the successful collection of accurate data that helps this research draw interpretable and reliable results (Jenn, 2006). This research follows Groves et al. (2009) who list essential questions to be considered throughout the first stage of designing a new questionnaire survey. The table below illustrates the target population, sampling frame, sample design, and the mode of data collection.

Table 1. Survey design

Design features (Groves et al., 2009)	**Survey design features of this research**
Target population: Whom is it studying?	Manufacturing workers from small- and medium-sized suppliers who produce lower-tier auto parts and components such as automotive rubber and plastics, high-precision screws, and pin piston in Thailand.
Sampling frame: How do we identify the people who have a chance to be included in the survey?	1. Manufacturing workers of auto parts firms that are registered as members of the Thai Auto Parts Manufacturers Association (TAPMA). 2. Manufacturing workers of other firms registered as manufacturers who produce both auto parts and other multipurpose parts.
Sample design: How do we select	As it is difficult to directly contact individual workers,

the respondents?	the researcher first sent out survey request emails to HR or managerial-level personnel of each firm. Respondents were chosen through simple random sampling as firms who agreed to participate in the survey distributed the questionnaire to all manufacturing workers without any filtering of age, gender, level of education, position, department, etc. Survey forms were accessed and completed voluntarily.
Mode of data collection: How do we collect data?	1. The first round of the survey was conducted by sending invitation letters to individual firms to request their workers' participation. The invitation letter included a brief overview of the research, sample survey questionnaires, and an official request letter. They were sent to them by both post-mail and email. The researcher suggested paper and web-based electronic survey options, and firms could choose either way based on their availability. • For the firms who chose a paper survey method, survey forms were sent to the firms by post and each form was distributed to its workers by responsible HR or managerial-level personnel. Completed forms were sent back to the researcher, and they were manually recorded in an Excel spreadsheet. • For the firms who chose a web-based electronic survey method, a QR code that is connected to the Google survey form (the electronic version of the paper survey form) was sent to the firms by email. Workers scanned the QR code and completed the online form, and the results were automatically saved online. 2. The second round of the survey was conducted through field research in Thailand. The researcher and two assistants visited Samut Prakan, Chacheongsao, and Samut Sakorn provinces, all of which are located between Bangkok and the country's strategic economic corridor. The three provinces are the main industrial and economic regions that specialize in the automotive and auto parts industry. There is a cluster of small- and medium-sized manufacturing firms that are suppliers to multinational enterprises (MNEs) such as Toyota, Honda, and Mercedes-Benz.

	The survey team visited lower-tier auto parts manufacturers and assemblers and explained the purpose of this survey to the HR managers and/or production managers. For those who confirmed their participation, we distributed both a QR code and paper questionnaires. The completed papers were collected during the second visit. We also distributed survey papers to the manufacturing workers randomly during their lunchtime and breaks. The results obtained through the two rounds of the survey were combined and recorded in an Excel spreadsheet.

The survey is composed of two sections: the first on demographic information including the name of a firm, gender, and education level of a respondent; and the second on the main questions regarding technology, education, and skills. The second section has a total of 21 questions categorized into three broad topics: use of technology; vocational education and training; and personal perception over skills match/mismatch. To specify the negative-to-positive strength of respondents' perception regarding each question and to standardize the results, the five-point Likert scale that provides 'strongly disagree (-2)', 'disagree (-1)', 'neither (0)', 'agree (1)' and 'strongly agree (2)' was used. All questions and scales were prepared in Thai language with English attached in parentheses. The full survey form is attached in Appendix I.

5.2 Semi-structured interviews

This research employs mixed methods that include both quantitative and qualitative approaches. The results of the questionnaire survey have been further addressed in detail through semi-structured interviews with various stakeholders in the auto parts industry and the field of skills and manpower planning. Interviews have been a widely utilized research methodology as they are useful for the in-depth analysis of complex thoughts or behavior and for bridging a

knowledge gap (Minichiello et al.,1995). It is a particularly pertinent method for this research as interviews are often used as an effective follow-up tool that provides context to existing data such as certain responses to questionnaires (McNamara, 1999; Boyce and Neale, 2006). The researcher conducted semi-structured interviews with both closed- and open-ended questions. On one hand, the semi-structured interview offers flexibility and adaptability not only to the researcher but to the participant as it "allows for the unexpected and the unforeseen to be incorporated into the scope of the research (Knott et al., 2022; p.11)." On the other hand, it can be a useful tool as "an adjunct to supplement and add depth to other approaches…[i]f you want to explore "puzzles" that emerge (or remain) after you have analyzed survey or even focus group findings (Adams, 2015; p.494)."

The sampling of participants was purposive as the main objective of conducting interviews was to identify different approaches to understanding the root causes and consequences of skills mismatch. Therefore, the researcher carefully chose the range of interviewees from policy makers and researchers from international organizations and local research institutes to employers and employees of auto parts firms who participated in the questionnaire survey. The interviewees were asked questions on their views on technological upgrading of the auto parts industry, local SMEs and lower-tier suppliers, and skills and employment. Interviews were conducted either face-to-face or online according to the interviewee's availability. They were conducted under verbal informed consent and recorded electronically using voice recorders with the permission of the interviewees. For interviews with workers, the researcher randomly approached them and asked for their participation during the field visits. These interviews were recorded manually without electronic devices as the

participants did not wish their voices to be captured. The list of interviews is attached in Appendix II.

5.3 Ethical considerations

As this research depends extensively on questionnaires and semi-structured interviews with various groups of actors, it is imperative to consider some points regarding ethical concerns. It is fundamental to consider various ethical issues that may arise in each stage of the survey experiment including consent, confidentiality, fear of disadvantage or harm, and cultural awareness. For instance, one of the major concerns with encouraging manufacturing workers to participate in this survey is that the participants may feel uncomfortable or anxious about any negative effect on job security. The employers may also feel uncomfortable with the possibility of their firm getting a negative reputation according to the survey results. Therefore, it is important that the responding and evaluating process would not harm survey participants in any way. To do so, the researcher clearly stated in the cover letter and the Participant Information Sheet that the identity of a survey participant is not asked and thus remains completely unknown to anyone including the researcher, and the name of the firm is not specified in any publicly accessible documents. The interview participants were informed that strict confidentiality is ensured and any personal information that could identify the interviewee would not be accessed by anyone but the researcher, and such personal information would be strictly excluded from any published documents.

It is also important for the workers to be informed about who the main organizer of the questionnaire survey is. Therefore, it was stated in the Participant Information Sheet that the survey is organized by an external researcher, not by the firm, and the results are viewed and processed only by the researcher for academic purposes without any intervention of the firm. It

was also informed by the firm before distributing the survey form. The workers were also notified that participating in the questionnaire survey is completely voluntary. The researcher deliberately did so in order to prevent any possible distortion of response resulting from the power relations between employers and employees.

6. Data Analysis and Research Findings

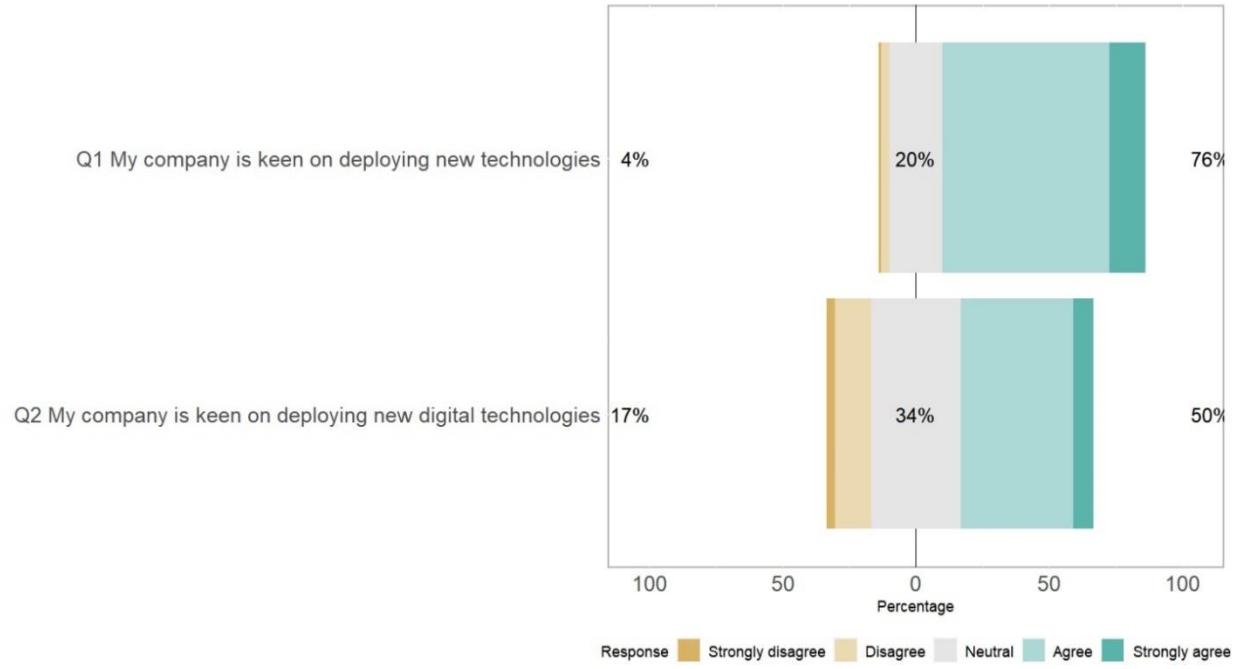
This chapter focuses on the detailed analysis of the questionnaire survey and follow-up interviews. A total of 405 responses were collected from 10 firms. However, the responses had to be filtered as four of them were not completed in full. Consequently, our analysis is based on the 401 survey responses from 10 different firms engaging in global automotive GVC networks as lower-tier suppliers. The survey results reveal three overarching trends and patterns of technological upgrading and skills mismatch of workers: Firstly, the deployment of digital technology that underpins firms' process upgrading is taking place at a rather slight and moderate pace; secondly, education and training institutions are relatively rapidly responding to expected technological advancement, and thirdly, workers tend to find themselves over-skilled but remain insecure and diffident about future technological advancement and changing requirement for skills. Finally, explanations for these trends are discussed based on follow-up interviews.

6.1 Moderate technological upgrading of firms

First, survey participants were asked to indicate their perception of the level of firms' technological upgrading. The first question asked if the firm they work for is keen on deploying any types of new technology while the second specifically asked the intensity of the utilization of 'digital' technology such as robotics or automation technology (refer to Appendix I). Of the 401 respondents, 76% chose either "Agree" or "Strongly Agree" to the first question while those who chose "Disagree" or "Strongly Disagree" remained at only 4% (see Figure 1). The mean is 0.8454

with a standard deviation of 0.7218. The mean, on the other hand, decreases to 0.3716 with a standard deviation of 0.9215 when it comes to the question on the deployment of 'digital' technology[2] described in the second statement. Looking at percentages, the share of respondents who chose either "Disagree" or "Strongly Disagree" increases to 17%, and who chose "Neutral" increases from 20% to 34%. In other words, slightly more than half of the workers who participated in the survey find the intensity of the utilization of digital technology in their firm rather moderate or low.

Figure 1. Firms' deployment of new technologies

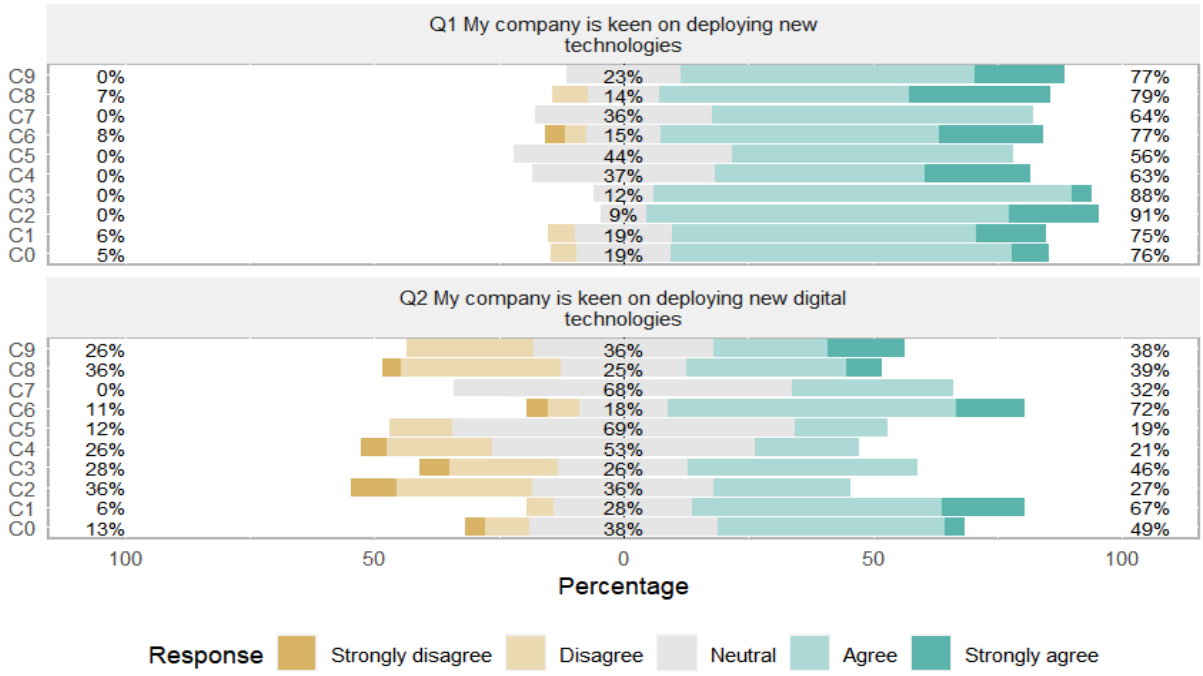


Analysis of the response distribution by firm further presents some interesting trends. Figure 2 illustrates how individual firms engage with general or digital technology. First, all firms appear to be highly active in introducing new technology in the manufacturing process. In seven out of ten firms, the share of respondents who chose either "Agree" or "Strongly Agree" remained

[2] We specified in the survey questionnaire that digital technologies include A.I., robotics, and automation technologies.

at above 75%. When demarcated by firms, responses to the second statement reveal that there exists a wide gap among firms. First, there are only two firms whose share of respondents choosing either "Agree" or "Strongly Agree" is above 50% (C1 and C6). Among the remaining eight firms, the share of positive responses (either “Agree” or “Strongly Agree”) remains at around 20% in the two firms (C4 and C5), and there is not a single respondent who chose “Strongly Agree” in the five firms (C2, C3, C4, C5 and C7). In these eight firms, the average share of 25.7% disagreed or strongly disagreed that their firm is keen on deploying digital technology, and it increases to 76% when those who chose “Neutral” are included.

Figure 2. Firms’ deployment of new technologies: response distribution by firm



The comparison of means below further highlights a notable gap between firms, with the highest mean of 0.78 (C1) and the lowest of -0.18 (C2) (Table 2). An Analysis of Variance (ANOVA) test for the comparison of the difference between the means of each firm allows us to confirm that there is a statistically significant difference in the response distribution between

firms.[3] While it is difficult to conduct a full-scale firm-level analysis as the number of firms in this research is limited, the comparison points to some interesting insights. First, analysis by ownership indicates that both firms with the high means above 0.7 are foreign-owned. On the other hand, the means of 100% Thai-owned companies and joint ventures remain much lower, ranging from -0.18 to 0.37. In the literature, the evidence on the relationship between ownership structures and firms' innovation or technological upgrading is mixed. It has been generally argued that MNEs with high technological capacity tend to transfer superior technologies or practices through either product or process innovation to the subsidiaries, and it often leads them to outperform domestic firms (Blomstrom and Persson, 1983; Falk, 2008; Guadalupe et al., 2012). Many country-specific empirical studies, however, find little evidence of the relationship between the two factors (Bishop and Wiseman, 1999; Díaz-Diaz et. al., 2008). Our survey suggests the possibility that foreign ownership might have a positive influence on the process upgrading of manufacturing subsidiaries through digital technology spillover. However, one must note that there is also a possibility of the higher level of foreign-owned firms' capacity to deploy digital technologies being simply due to multinationals' cherry-picking of domestic firms with little need for further investment for technological upgrading.

A firm-level analysis leads to a mixed interpretation in terms of the impact of location on firms' digital transition. While both firms with high means are located in the country's major clusters for the automotive and auto parts sectors (Ayutthaya and Samut Prakan), we can identify that significant variation across firms within the cluster exists. For instance, five out of ten firms are in Samut Prakan, a specialized cluster in which global automotive multinationals such as Toyota and Mercedes-Benz and their subsidiaries and suppliers are located, and the lowest mean

[3] The result of an ANOVA test shows that the p-value is much less than the significance level of 0.05 (F-value= 4.489, $p < 0.0000126$).

is at -0.18 (C2) while the highest is at 0.71 (C6). While a few empirical studies are confirming the technology- and knowledge-spillover effect among firms in industrial agglomerations (Ellison et al., 2010; Greenstone et al., 2010), we can infer from our survey that proximity does not necessarily result in the sharing of knowledge or information that contributes to extensive technology adoption for process upgrading. We can assume that such spillover effects may be confined to innovation in products, not process, or to mid- to large-sized firms with the capacity to absorb spillovers.

Table 2. Firms' deployment of digital technologies: mean and standard deviation by firm

Firm	Ownership	Location	# of observations	Mean	SD
C0	Domestic	Samut Prakan	79	0.36708861	0.8499957
C1	Foreign	Ayutthaya	36	0.77777778	0.7968191
C2	Domestic	Samut Prakan	11	-0.18181818	0.9816498
C3	Joint venture	Samut Prakan	50	0.12000000	0.9612916
C4	Joint venture	Chacheonsao	19	-0.10526316	0.8093026
C5	Domestic	Saraburi	16	0.06250000	0.5737305
C6	Foreign	Samut Prakan	95	0.70526316	0.9325518
C7	Foreign	Lamphun	28	0.32142857	0.4755949
C8	Foreign	Samut Prakan	28	0.07142857	1.0515798
C9	Foreign	Samut Sakhon	39	0.28205128	1.0246622

The analysis of the first set of survey responses implies that, from workers' point of view, small- and medium-sized auto parts suppliers in Thailand are considered to actively pursue a broad range of new technology to optimize manufacturing operations, but highly disruptive transformation driven by robotics or automation technologies is happening at a notably slow pace. The result corresponds to the analysis of the pattern of technological advancement and skill formation in hierarchical market economies (HMEs) in the extended varieties of capitalism (VoC) literature. Some of the core features of HMEs that structure firms' access to technology and labor

inputs include the dominant influence of MNEs and family conglomerates, low-skilled labor, and atomistic labor and employee relations (Schneider, 2009). In this type of market economy, MNEs, their large subsidiaries, and foreign suppliers tend to dominate higher-technology manufacturing while domestic firms are concentrated in the production of lower-technology inputs and commodities. Due to the dominance of MNEs concentrated in higher-technology manufacturing, local manufacturers are less likely to be motivated to hire high-skilled technicians or engineers or invest in training workers. In turn, returns for these firms to invest in production processes that require high-skilled workers are very low (Schneider, 2009; Almeida and Aterido 2010). In line with this, Interviewee 2 and Interviewee 3 argue that relatively sophisticated and complex manufacturing tasks tend to be conducted by some upper-tier suppliers that are close to MNEs, while the third or fourth-tier local firms have conventionally engaged in "not that difficult" but rather "very simple" and "boring" manufacturing tasks. Therefore these firms can easily get access to a large pool of low-wage workers including immigrants. In addition, the majority of lower-tier suppliers are SMEs who depend heavily on bank loans to finance the high initial cost of deploying digital technology and other costs arising from administrative or personnel rearrangement. Many of them, therefore, do not find a favorable balance of expected cost and benefits, and thus choose to stick to the current mode of production. On the other hand, both interviewees also point out that the intensity of digital technology deployment in the lower tier of the automotive supply chain is still higher compared to the lower-tier suppliers in other sectors. According to them, some of the low-tier suppliers are as active as upper-tier automotive manufacturers in investing in the replacement of manufacturing jobs with robotics and automation technology to stay efficient and comply with stringent quality requirements, due to the particularly intensive competition within the automotive value chain.

The result allows us to assume that the framework of job polarization theory might apply to the analysis of technological upgrading and jobs not only *between* skill groups but *within* a specific skill group. While the manufacturing taking place in the middle of GVCs is considered to undertake tasks that require mid-level skills in general, the degree of sophistication, routineness, and repetitiveness vary by tier or produced input. Typically, lower-tier local suppliers produce or assemble inputs using mid-level skills particularly of a more repetitive and dull nature, which can be often supplemented by lower-wage labor such as less-educated or immigrant workers. Having access to a large pool of such workers to maintain competitive production costs, firms may find fewer incentives to upgrade the existing production system. On the other hand, manufacturing tasks that require mid-level skills of a rather 'less repetitive' or 'sophisticated' nature might be the ones rapidly replaced by robots or automation technology in the first place.

Another plausible explanation for the technological inertness of firms may be firm-wide culture. Helper et al. (2021, p.7) claim that many firms face organization-level barriers to technological change, and that "[a]cquisition and deployment can be stunted by a deeply ingrained hesitancy toward new technologies on the part of firms' employees." In this regard, Interviewee 1 and Interviewee 2 argue that the leadership of Thai SMEs matters significantly. Both highlight that whether a firm decides to transform the conventional way of production to a digital one regardless of financial and organizational burdens or small short-term incentives depends to a large extent on the leadership to align the system and company-wide culture with the radically changing reality. Interviewee 1 further emphasizes that the slow pace at which frontier technology in manufacturing spreads shall be attributed to the scarcity of workers with 'soft skills' such as managerial or communication skills. Technological upgrading, especially when it involves the adoption of highly disruptive technologies, requires not only technological

rearrangement but also organizational and cultural restructuring. In turn, the successful uptake of technologies essentially requires workers with managerial and social competencies such as entrepreneurial thinking, conflict solving, human resource management, analytical skills, language, or intercultural skills (Bloom et al., 2012; Grzybowska and Łupicka, 2017). However, SMEs in the manufacturing sector tend to find it difficult to attract workers with soft skills from external labor markets or utilize internal resources for skills training, as Interviewee 1 points out.

To sum up, while being micro in scale, this questionnaire survey reveals that most small- and medium-sized auto parts manufacturing firms that are positioned in the low tier of GVCs tend to remain passive and uncommitted to the extensive deployment of digital technologies. However, we can also find that a few firms with foreign ownership are keen on digital transformation throughout the manufacturing process and that it may create a divergence between firms in the lower tier of GVCs in terms of their adaptiveness to disruptive technological changes. The following discusses the responsiveness of educational institutions to such changes.

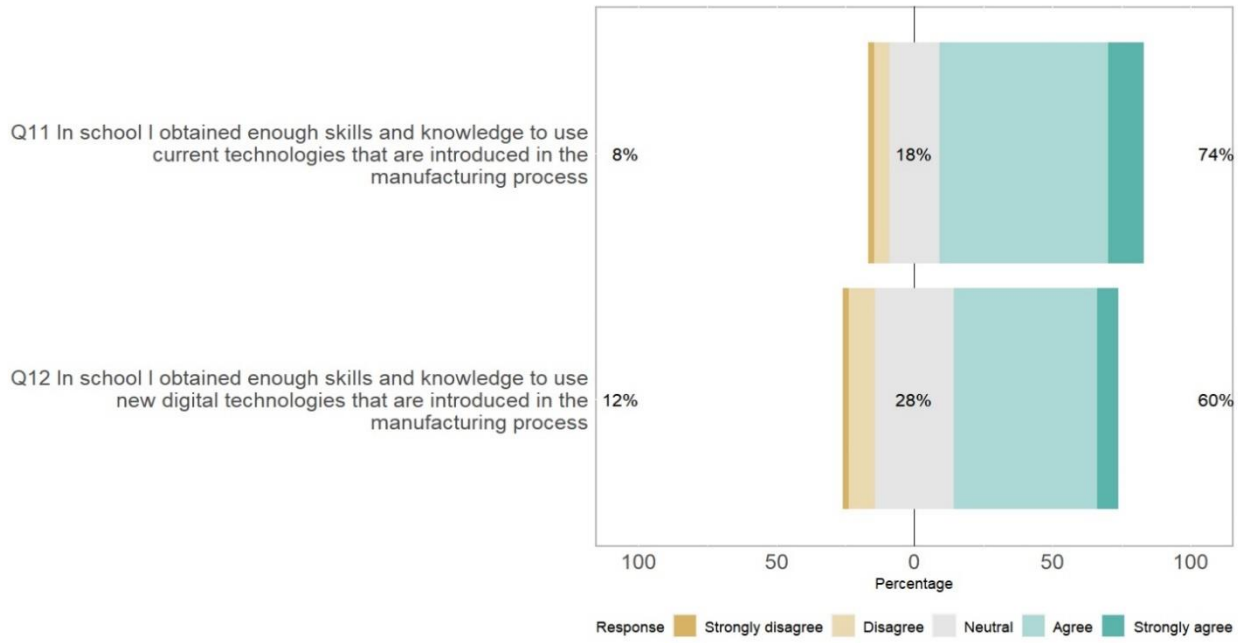
6.2 Relatively high responsiveness of education to technological advancement

Addressing the question of skills mismatch inherently engages the discussion of the level and field of education and the quality of educational programs. In recognition of the demand for new skills requirements and qualifications as well as the high risks of widespread replacement of currently existing jobs due to accelerating technological changes, educational institutions have been under unprecedently high pressure to pay increased attention to curriculum updates, quality improvement, or stronger linkages with the labor market (Scheid, 2018). Many vocational schools, for instance, provide advanced vocational education and training curricula for students to enhance their analytical skills and become accustomed to sophisticated digital devices (Roll and Ifenthaler, 2020). They also develop a dual training model that connects school with workplace-

based learning. General education institutions also increasingly put emphasis on science, technology, engineering, and mathematics (STEM)-focused programs (Ritz and Fan, 2015; Stehle and Peters-Burton, 2019).

Against this backdrop, we investigate the adaptiveness of education institutions in Thailand to technological innovation and the changing skills demand. The researcher asked participants to select the degree to which they think the education institution they graduated from was responsive to a growing demand for higher technical skills and knowledge. First, the respondents were asked whether they obtained enough skills and knowledge to use existing technology in the secondary education institution they graduated from. The frequency distribution of survey responses shows that the vast majority of respondents (74%) agree or strongly agree with the statement (see Figure 3). The share of respondents who selected disagree or strongly disagree, on the other hand, remained at 8%. The mean for the first statement is at 0.7706 with a standard deviation of 0.826. The result for the second statement on learning about new digital technologies also shows a similar trend but with a smaller mean (0.5387) and a slightly broader range with a standard deviation (0.8568). The pattern of response distribution shows that around 60% of the respondents agreed or strongly agreed with their obtaining enough skills and knowledge in school to use digital technology introduced in the manufacturing process, while 12% disagreed or strongly disagreed.

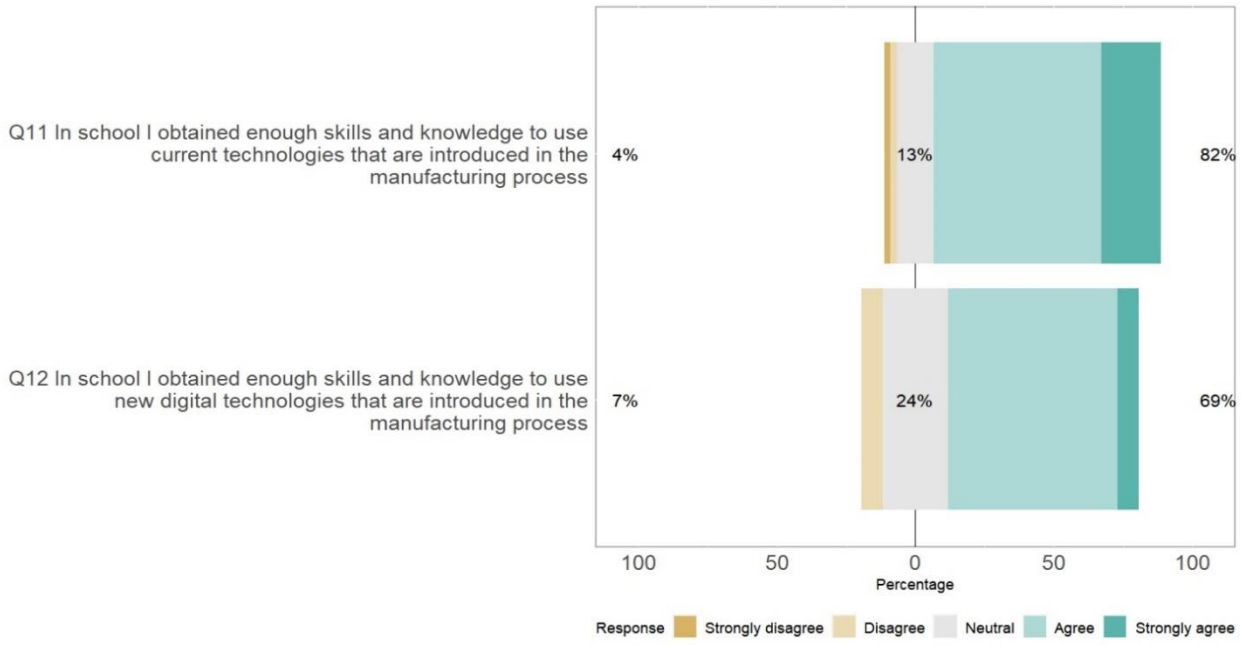
Figure 3. Responsiveness of education to technological advancement



Middle-skilled manufacturing jobs are typically careers that require vocational education and training (Spöttl and Windelband, 2020), and many of the participants in this survey indeed appear to have strong vocational backgrounds (134 out of 401). Therefore, we further break the responses by type of education to investigate whether vocational education institutions, in particular, are responsive to technological changes and labor market needs. The following figures present the survey results of the respondents with either vocational or higher vocational certificates. Figure 4 shows that, for both statements, the shares of the respondents with vocational backgrounds who chose 'Agree' or 'Strongly agree' are higher than those of the total respondents with either vocational or non-vocational backgrounds. For the first statement on the learning of skills and knowledge to use currently introduced technology at the workplace, more than four-fifths either agreed or strongly agreed while only 4% disagreed. A similar pattern is shown for the second statement on the learning of digital skills while a relatively smaller share of

respondents chose positive answers compared to the first statement, which is similar to the overall trend. While around 70% agreed or strongly agreed that they obtained enough skills and knowledge to use newly introduced digital technology in the manufacturing process, only 7% disagreed or strongly disagreed. The findings can be further examined by comparing the means. The mean for the first statement among the respondents with vocational background is at 0.9701 with a standard deviation of 0.8036. The mean is higher by 0.22 compared to the mean for the overall respondents. The mean for the second statement specifically indicating 'digital' technology is at 0.6866 with a standard deviation of 0.7194, which is also higher by around 0.15 compared to the mean for the overall respondents.

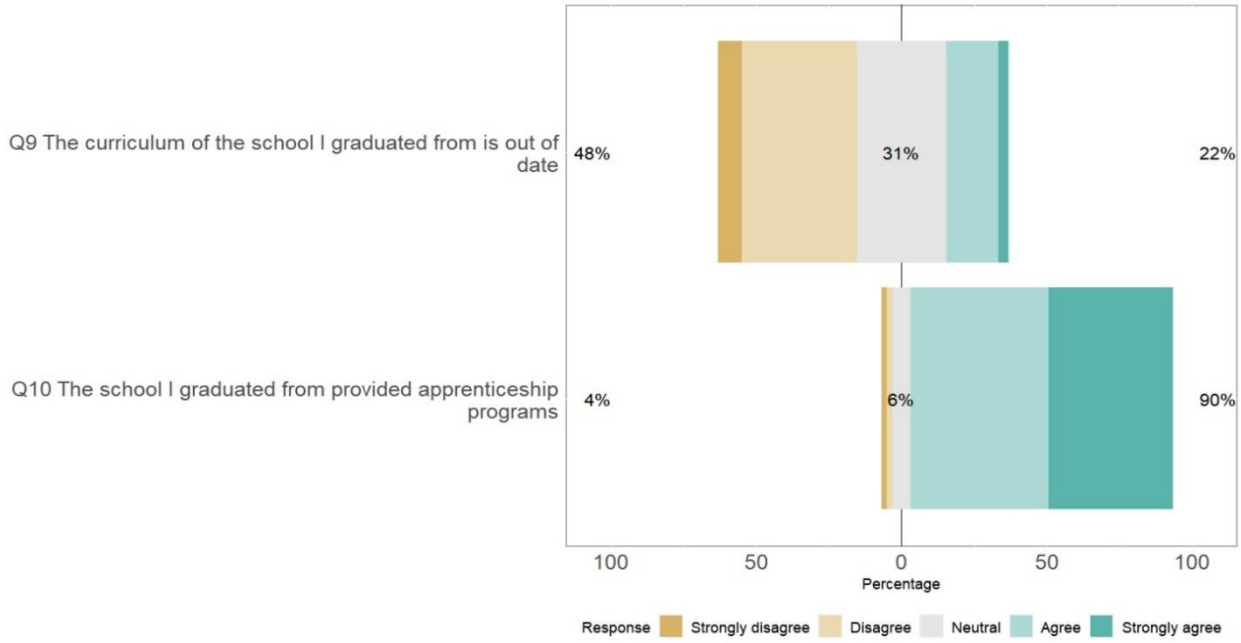
Figure 4. Responsiveness of education to technological advancement: response distribution of survey participants with vocational background



Further examination of other aspects of the preparedness of vocational education institutions also provides support to this trend. Two other related survey questions are: i) whether the respondents find the school curriculum out-of-date, and ii) whether the school provided

apprenticeship programs. To the first statement on the outdatedness of school curriculum, nearly half of the respondents selected either 'Disagree' or 'Strongly disagree' while those who selected 'Agree' or 'Strongly agree' remained at 22% (see Figure 5). The mean is at -0.306 with a standard deviation of 0.9827. It further shows that 90% of the respondents with vocational backgrounds were provided with apprenticeship programs. We find no notable difference in the pattern of response distribution between the respondents with vocational certificates and higher vocational certificates.

Figure 5. Up-to-date school curriculum and apprenticeship programs of vocational schools



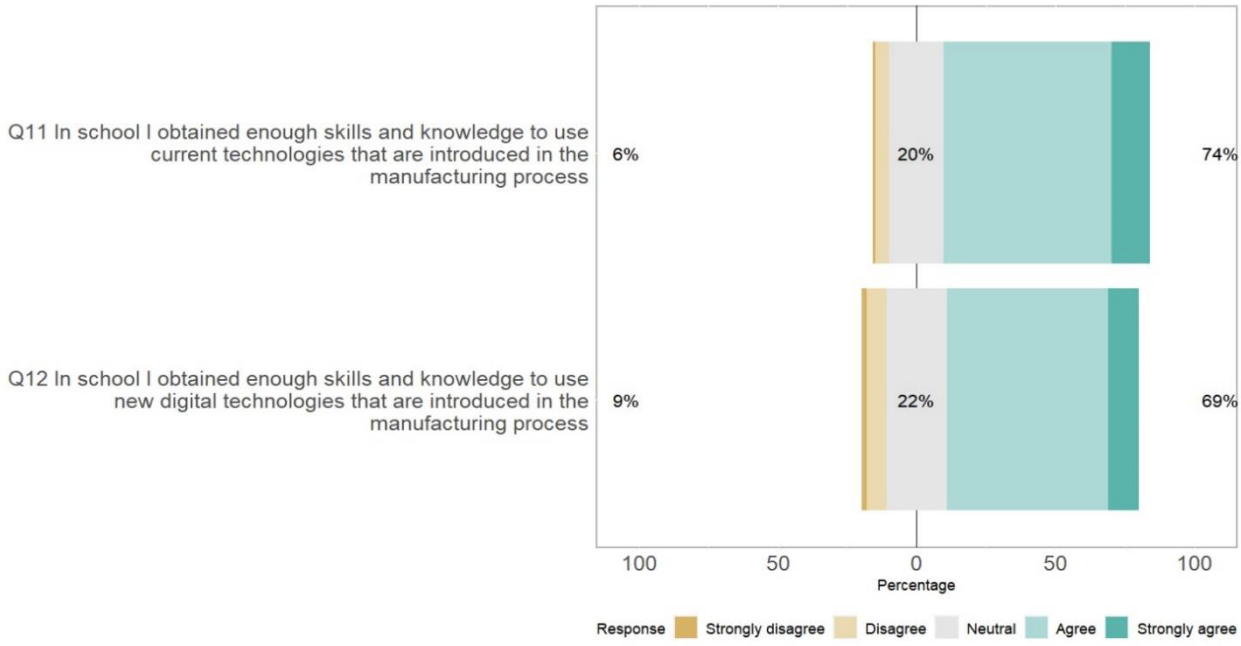
The analysis of the overall survey results and those exclusively of the respondents with vocational backgrounds, ostensibly, reveals that educational institutions in Thailand are relatively responsive to technological changes in the industry and expected demand for higher-skilled manufacturing workers. The vast majority of workers who participated in the survey think that they obtained enough skills and knowledge required to utilize newly deployed (digital) technologies throughout the manufacturing process either from general or vocational institutions.

Many vocational institutions appear to develop up-to-date curricula and provide apprenticeship programs to align education and training with labor market demand. The results, however, do not necessarily imply that either general or vocational education institutions provide high-quality curricula relevant to digital technology competencies. One might argue that the plausible reason why a significantly larger share of respondents agreed to the statement on whether they obtained enough skills and knowledge to use current or new digital skills in school is due to firms' inertness to deploy new technologies, which is closely related to the first sets of survey questions introduced earlier. That is, workers may believe that they have learned enough (digital) skills and knowledge not because schools provided highly specialized STEM or vocational skills programs but rather because their firms remain passive in digital transformation in manufacturing, and thus workers are not under high pressure to conduct highly technology-intensive tasks. Therefore there is a need to give a closer look at the responses of workers from firms who leverage digital technologies throughout the manufacturing process.

Figure 6 below shows how the respondents who find their firm as an active digital technology adopter perceive the responsiveness of educational institutions. As Figure 1 in the earlier section shows, approximately 50% of total respondents (199 out of 401) indicated that their firm is keen on deploying new digital technologies such as robotics or AI. The analysis of this group reveals that the response distribution is nearly identical to the overall pattern of responses presented in Figure 3. The same 74% of the respondents chose either 'Agree' or 'Strongly agree' to the first statement while the percentage of positive responses to the second statement is even higher than that of the entire group. The mean for the first statement is at 0.8141 with a standard deviation of 0.7724 and the mean for the second statement is at 0.6935 with a standard deviation of 0.8358, both of which are higher than those for the entire

respondents. The result on the workers whose firm is an active technology user lends credence to the finding that educational institutions tend to be highly responsive to technological changes and expected demand for new skills of manufacturing workers.

Figure 6. Responsiveness of education to technological advancement: response distribution of survey participants whose firm is an active technology user



However, it is still too early to conclude that the quality of general and vocational education and training is generally high across the institutions. The interviews with seven manufacturing workers (three with vocational backgrounds and four with general education backgrounds) and the national manpower planning officer imply that there are significant challenges facing many education institutions in terms of the quality of teachers, pedagogical practices, apprenticeship management, and learning materials for practical training. Two interviewees with high vocational certificates (Worker 1 and 2) pointed out that the schools they attended were relatively agile and flexible with the update of curricula and training regulations to

integrate various digital technologies in learning, but pedagogical practices were rather superficial. They also mentioned that, while the apprenticeship opportunities increased, they were often provided with short and irregular programs that hardly helped them accumulate substantial experience or develop a comprehensive understanding of the use of new technology. On the other hand, three interviewees with general education backgrounds (Workers 3, 4, and 6) stated that their schools provided advanced science and math classes as well as technical programs such as basic coding or programming courses, but two of them pointed out that there was a huge gap in the competencies among teachers. Worker 6, for instance, described that the senior school he graduated from provided various practical training courses for basic coding, but the quality depended heavily on teachers' capacity and many courses were not useful.

While the quality of education and training is subject to further discussion, the multi-level analysis of the survey responses and follow-up interviews allow us to confirm that educational institutions in general strive to correspond swiftly to the changing landscape of technologies. The next section further examines the dynamics of technological upgrading among lower-tier suppliers and the readiness of education in preparing for disruptive technological progress within the framework of skills mismatch.

6.3 Over-skilled but insecure workers

Measuring skills mismatch inherently entails subjective bias as it depends to a large extent on the perception of individual workers. As a result, their responses are often irrespective of specific work-related skill requirements or skills and knowledge they obtained in school for current tasks that the research aims to investigate (ILO, 2017). Therefore how the survey questions are phrased is critical to minimize the risks of biased estimates as well as to examine the dynamics between the readiness of education and firms' technological upgrading that constitute skills mismatch.

First, the participants were asked whether they think skills and knowledge about new technologies he or she obtained in school are not used enough at work, as a proxy for workers' perception of over-skilling (Q13). The result reports that over half of the respondents indicated either 'Agree' or 'Strongly agree,' while those who chose either 'Disagree' or 'Strongly disagree' remained at 16%. The mean of the responses is 0.4289 with a standard deviation of 0.9568 (Figure 7). We then further grouped them by the level of education (Figure 8). The respondents with vocational backgrounds appear to be more likely to feel that skills and knowledge obtained in school are not maximized at work – that is, over-skilled. 72% of the respondents with vocational certificates (mean: 0.7206, standard deviation: 0.9279) and 62% of the respondents with high vocational certificates (mean: 0.5606, standard deviation: 0.9787) chose either 'Agree' or 'Strongly agree', while its share ranged between 43-46% for those who graduated from general education institutions. The multiple pairwise comparison between the means of education groups through the ANOVA test reveals that a statistically significant difference exists particularly between the mean for vocational certificate and the mean for senior high education.[4]

[4] The adjusted p-value is 0.047.

Figure 7. Workers' perception of skills mismatch I

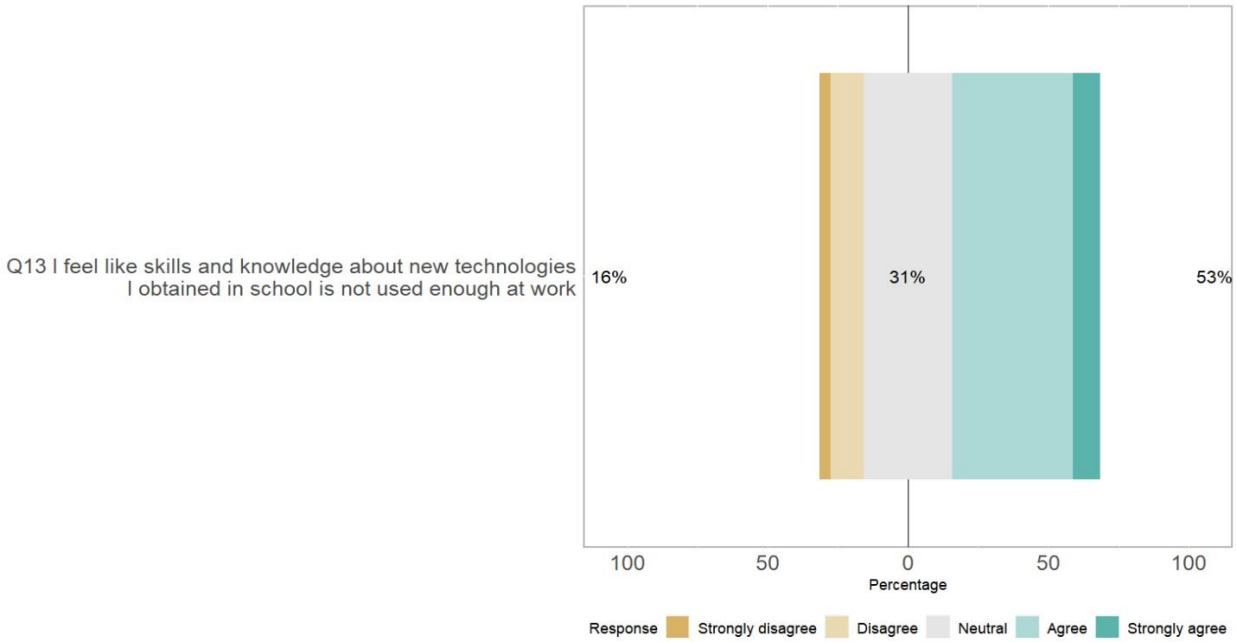
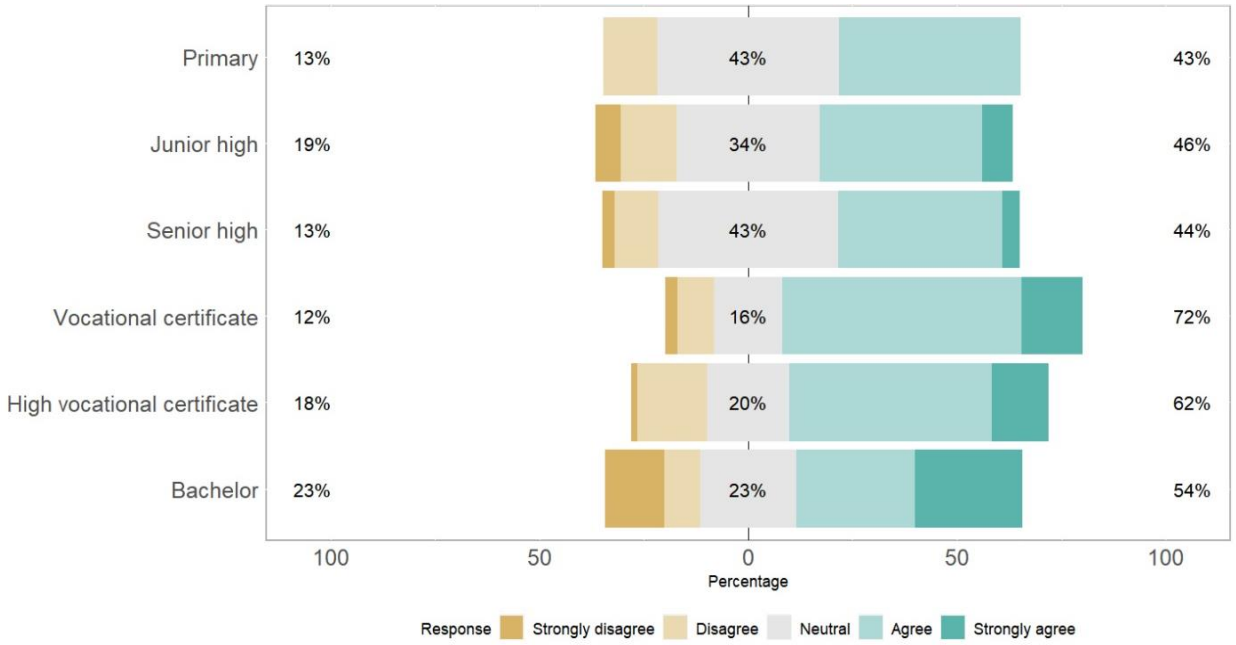


Figure 8. Workers' perception of skills mismatch I: response distribution by education level



The next set of questions asks the participants a little more directly about over-skilling and under-skilling (Figure 9). We asked two similar questions on the same scale to check the consistency of answers and to analyze the responses more concisely. For instance, selecting 'Disagree' or 'Strongly disagree' to the question on the perception of over-skilling does not necessarily mean that the respondent thinks they are under-skilled. Therefore, the respondents were first asked whether they think that the level of skills or knowledge taught in school is higher than the level of skills or knowledge required for his/her job to measure *over-skilling* (Q14), and next, they were asked whether they find it lower than what is required at work to measure *under-skilling* (Q15). For Q14, 45% of the respondents chose either 'Agree' or 'Strongly agree' while those who chose either 'Disagree' or 'Strongly disagree' remained at 15%. The response distribution for Q15 is the near reverse of the previous question. The mean for Q14 is at 0.3317 with a standard deviation of 0.8788 and for Q15 is at -0.2918 with a standard deviation of 0.9577. An analysis by the level of education shows that the highest mean for Q14 goes to the respondents with vocational certificates while the lowest mean for Q15 goes to those with higher vocational certificates (Table 3).

Figure 9. Workers' perception of skills mismatch II

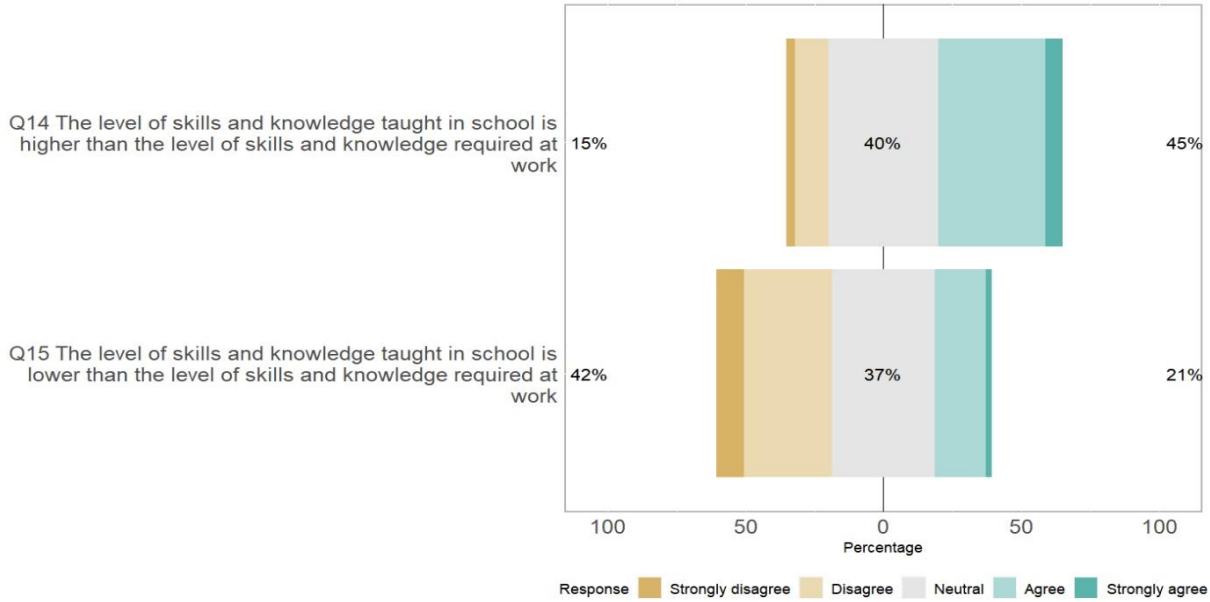


Table 3. Workers' perception of skills mismatch II: mean and standard by education level

	Q14		Q15	
	Mean	Standard deviation	Mean	Standard deviation
Primary	0.1739130	0.9367339	0.2173913	0.8504823
Junior high	0.2388060	0.9388832	-0.1194030	0.8794349
Senior high	0.2464789	0.7826725	-0.2816901	0.9098842
Bachelor	0.4571429	1.0939098	-0.2000000	1.1832160
Vocational certificate	0.5588235	0.8354524	-0.4705882	0.9845158
High vocational certificate	0.3636364	0.8881504	-0.5303030	0.9318253

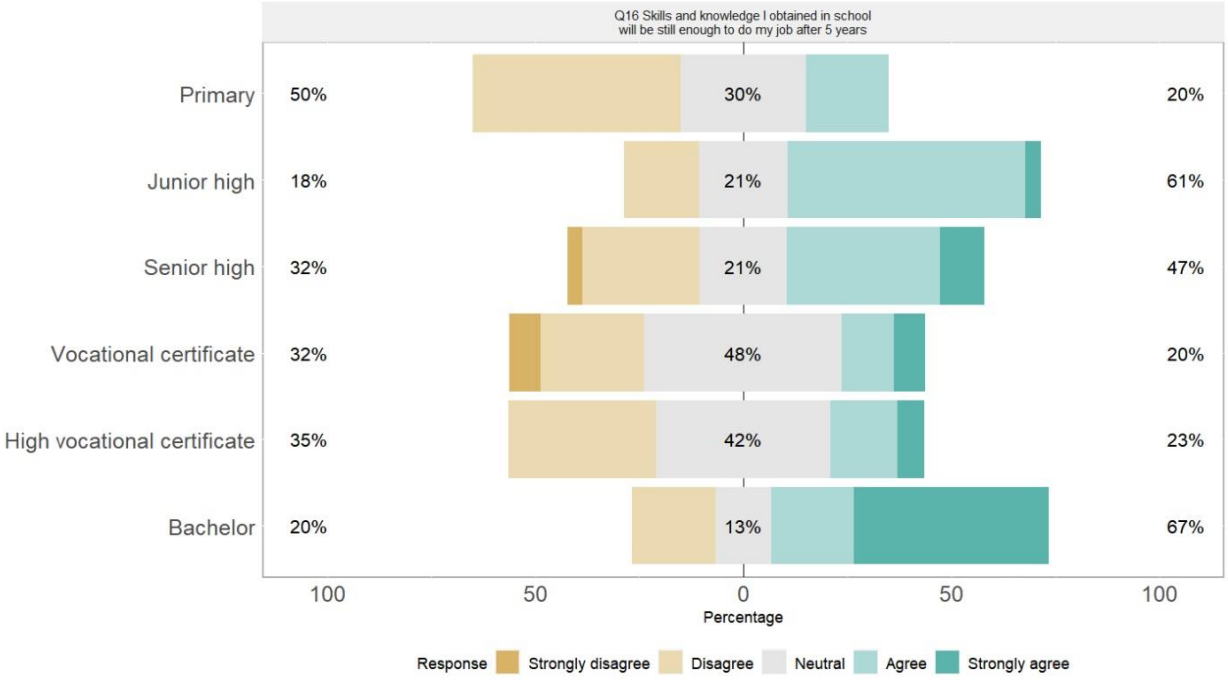
The overall findings from the analysis of the response distribution for Q13, Q14, and Q15 suggest that the manufacturing line workers from auto parts firms operating in the lower tier of GVCs tend to perceive themselves as having a higher level of skills and abilities than the job requires and not making full use of skills obtained in school. Interviews with workers further support the findings. Six out of seven workers who participated in both the survey and interview (Workers 1, 2, 3, 5, 6, and 7) argued that they obtained up-to-date skills to utilize various new

technologies, but they are severely underused in reality. The researcher found some similarities in their expectations and disappointment related to skills utilization. One such similarity is how they link the intensity of exposure to advanced technologies or computer skills experienced in school and their expectation concerning employment and job tasks. Workers 3 and 6 with general education background stated that the more they got accustomed to advanced computer skills and learned about disruptive technological changes in the future world of work in school, the higher the expectation of getting better jobs and conducting sophisticated tasks no matter what industry it is. They expected that having a job in the manufacturing sector would mean "working in the plant full of fancy robots and automated machines like we see in the movies" (Worker 3)." Worker 2 with a vocational education background was more specific with their expectations about employment and tasks as a manufacturing worker after graduation. He stated that he expected his skills in managing automation technologies to be further elaborated by working at the digitalized plant. Similarly, Worker 7 with a vocational education background also expressed her disappointment, mentioning that the tasks now are so simple and repetitive that they could be done by basic-level robots and her job should be controlling those robots.

From the findings so far, we can conclude that the majority of manufacturing workers at SMEs in the lower tier of global automotive and auto parts value chains tend to perceive themselves as being over-skilled and that such perception is affected significantly by the intensity of the firm's use of digital technology and school's provision of up-to-date curriculum. However, a closer look at the respondents' prospect of skills demand in the near future signifies a somewhat different story. Among a total of 181 respondents who agreed or strongly agreed that they acquired a higher level of skills in school than what is needed at work, 30% remain negative and another 30% remain neutral when they were asked whether skills they have will be still enough

after 5 years. Interestingly, grouping the respondents by level of education reveals a clearer gap in the distribution of responses between workers with vocational backgrounds and those with general education backgrounds. Figure 10 below presents that 80% of the respondents with vocational certificates who currently perceive themselves as being over-skilled remain either somewhat (neutral) or highly (either disagree or strongly disagree) insecure about their skills in the future. It is similarly 77% of the respondents with higher vocational certificates. It is in stark contrast to how the bachelor's degree holders predict, where nearly half of the respondents chose "Strongly agree." Including the respondents who chose "Agree," around two-thirds appear to remain confident with the skill sets they have even for the future. An ANOVA test further confirms that a statistically significant difference exists between the means for vocational and higher vocational certificates and the mean for bachelor.

Figure 10. Workers' perception of future skills: response distribution of over-skilled workers by educational level



The follow-up interviews further describe how and why manufacturing workers feel insecure about their skill level and future demand for skills. While recognizing themselves as being over-skilled at the moment, it appears that workers are quite well aware of rapidly evolving digital technologies and their threat to future factory jobs and employability. Of seven interviewees, five described themselves as 'over-skilled' but at the same time doubted whether their skills would be still valuable or even demanded. Worker 1, 2, and 5 with vocational backgrounds expressed their concern with the ambiguous level of skills they currently have. Worker 1 and 5 similarly described their skills as much higher than what is needed to do current tasks, but probably much lower than what would be needed to operate complicated digital machines without difficulty. They argued that they had learned in school and through media about how rapid technological transformation is in the manufacturing world and how it will replace their current jobs and that it would start happening in small local firms as well sooner or later. Worker 2 agreed with this and added a detailed explanation to her survey responses: *"I chose 'Strongly agree' to Q12*[5]*, but it's just because I don't know how much digital technologies in other big car factories are advanced."* Another interviewee with a general education background (Worker 6) commented similarly: *"I will see myself over-skilled maybe for another few years only until I actually see many robots in the plant."*

Finally, we asked the participants straightforwardly about their intuitive perception of over-skilling and under-skilling without attaching any condition of educational attainment or firm's upgrading, and the results appear to be similar (Figure 11). The purpose is to examine how workers intuitively compare their overall skills obtained either in school or the work environment with the actual skills demand. Half of the respondents either agreed or strongly agreed that they

[5] Q12: In school, I obtained enough skills and knowledge to use new digital technologies that are introduced in the manufacturing process.

have a higher level of skills than their job requires overall while only 13% disagreed or strongly disagreed. Regarding the following question on whether they think they have a lower level of skills, the response distribution appears to be nearly the exact opposite. However, among those who see themselves as over-skilled, less than half answered that they would remain over-skilled after five years (Figure 12). Instead, 38% of them were neutral and 20% agreed or strongly agreed that they would rather become under-skilled, meaning that they feel either moderately or highly insecure about their overall skills needed at work. The results again inform us that a much larger share of manufacturing workers estimates their overall skills obtained in or outside school as more advanced than the actual skills requirements of their current job, but at the same time, many workers who are seemingly over-skilled feel insecure about whether their skills will be enough in a near future.

Figure 11. Workers' perception of skills mismatch III

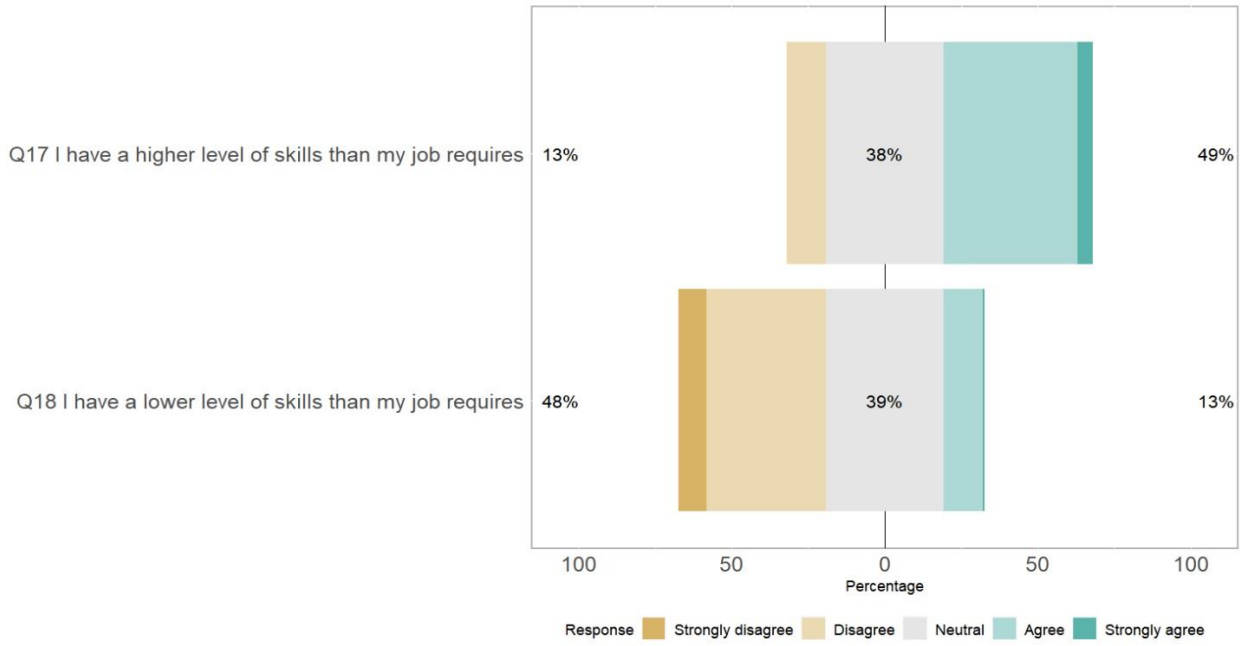
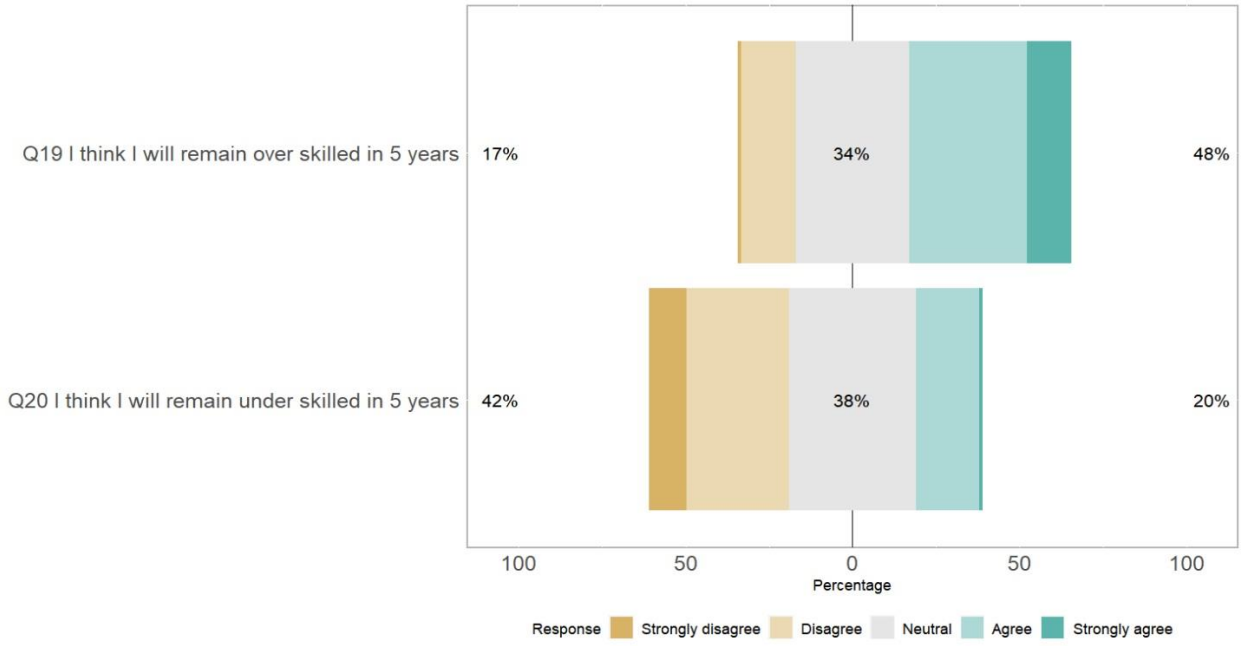
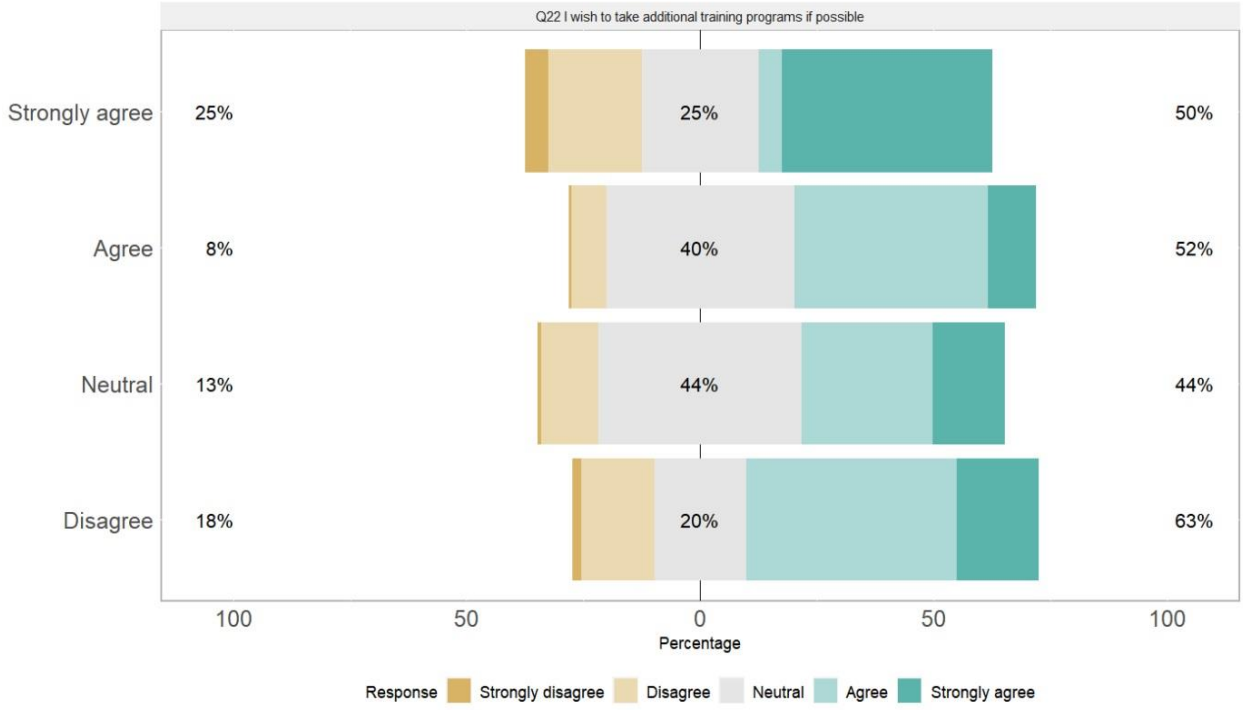


Figure 12. Workers' perception of future over-skilling and under-skilling: response distribution of over-skilled workers



This might explain to some extent why the over-skilled workers are likely to be more enthusiastic about further training opportunities. The final question of the survey is whether the respondents wish to take further training courses. Figure 13 below exhibits workers' interest in training demarcated by the perception of over-skilling. Interestingly, it appears that over half of the workers who perceive themselves as being over-skilled ('Agree' and 'Strongly agree' on the y-axis) are willing to take additional training opportunities. It is higher than the share of workers who are neutral to whether they are over-skilled and in need of further training. What is more outstanding is how the workers who strongly agree with being over-skilled consider additional skills training. It is shown that the percentage of the respondents who strongly agree with the necessity of additional training is incomparably higher at nearly 50% for the group who strongly believe he or she is over-skilled.

Figure 13. Workers' interest in additional training: by the perception of over-skilling



In sum, the more workers are confident or satisfied with their current skill sets, the more willing they are to upgrade their skills. The previous survey analysis leads us to assume that it is largely due to increasing skills- and job-insecurity among workers with higher learning opportunities and technological qualifications. They are likely to be better aware of technological changes and thus more sensitive to their potential threats even if it does not have a significant or direct impact on current employment.

7. Probing deeper

7.1 Job polarization within the middle-skill group and over-skilling in Thailand

The findings from this empirical research demonstrate that middle-skilled jobs, in general, are not significantly hollowed out due to rapid automation or digitalization. However, instead of job polarization into relatively higher- and lower-skilled groups at the expense of employment in

manufacturing, it suggests a pattern of job polarization *within* the middle-skilled group. While broadly categorized as a typical middle-skilled job, significant variations exist within manufacturing jobs, such as intensity and sophistication of knowledge and skills. Mid-to upper-tier firms that perform relatively more sophisticated manufacturing tasks tend to vigorously deploy automation and digital technologies for productivity and efficiency. On the other hand, low-tier suppliers performing 'dull' and 'repetitive' routine manufacturing tasks tend to be much less motivated to digitalize the production system, as they have easy access to a large pool of cheap middle-skilled labor. Therefore, they find little incentive to invest in the radical digital transformation of the production line and bear the high initial financial and managerial burden. Their lack of entrepreneurship and workers with soft skills also acts as a hindrance to process innovation. As a result, manufacturing jobs that require moderately sophisticated skills are increasingly hollowed out as they are replaced by robotics or automation technologies. On the contrary, engineers and technicians with highly sophisticated manufacturing skills are in high demand for managing and controlling automated processes, and jobs required for the least sophisticated manufacturing tasks in low-tier suppliers remain, creating job polarization within the middle-skill group. One of its consequences highlighted in this research is over-skilling. The readiness of education institutions for the changing job profiles and skills demand appears to be relatively high to serve moderately- and highly sophisticated middling jobs. The issue is that moderately sophisticated jobs are diminishing, and highly sophisticated jobs are limited. Consequently, there are limited employment opportunities for workers with advanced manufacturing skills, forcing many of them to be in employment where their skills and abilities are severely underutilized as a last resort. In short, educational curriculum adaptation outpacing actual technological upgrading in the low-tier manufacturing that still accommodates the majority of the workforce in the automotive value chain makes workers' skills attainment seemingly get

ahead of actual skills demand and consequently makes workers perceive themselves as over-skilled.

It is plausible to some extent to understand the underutilization of high-skilled workers and over-skilling issues within the framework of the varieties of capitalism or, more specifically, skill formation in HMEs. As briefly discussed earlier, the dominant presence of MNCs and large conglomerates (or diversified business groups) in HMEs leads to the common reliance of businesses on hierarchy. The design of the education and training system in this type of market economy tends to be heavily influenced by the requirements of such dominant firms (Colpan and Jones, 2016; Kiran, 2018). On the other hand, weak and fragmented labor unions and high turnover make SMEs concerned about the potential poaching behavior of employees. This results in SMEs' growing reluctance to invest in the training of workers, and their unwillingness and limited capacity to invest in firm-level training lead to heavy dependence on public institutions (Kiran, 2018). However, the hierarchical relationship that connects SMEs to MNCs and large conglomerates makes SMEs' specific requirements for education and training relatively neglected by the state. Therefore, requirements of lower-tier auto parts suppliers that are usually SMEs tend not to be thoroughly reflected in the state's skills-related policy-making process, which may contribute to their further inertness of technological upgrading and workers' deepening over-skilling. In Thailand, large-sized employers with sufficient internal capacity for technological upgrading are often the central focus of new development strategies in the country. For instance, Thailand 4.0, the newest economic model that runs in line with the fourth industrial revolution, aims to transform its economy based on disruptive technologies- and innovation-driven manufacturing and services. In turn, the government has emphasized extensive investment in workforce development to retain abundant skilled technicians and engineers to support advanced

manufacturing. On the other hand, promoting soft skills or entrepreneurship essential for lower-tier manufacturers to upgrade has often been neglected throughout the development agenda- and policy-making.

7.2 Over-skilling and middle-skill trap

Intertwined with widely recognized disadvantages of over-skilling in the literature such as a wage penalty or job dissatisfaction (Artes et al., 2014; Mavromaras et al., 2013; Cultrera et al., 2022), a passive reaction of firms to technological upgrading is likely to dampen workers' motivation and diminish their skillsets. While the survey suggests that over-skilled workers are highly motivated to take part in additional training programs, it is less likely that their current employment would invest in extensive training for more advanced skills that are not essential for the present due to low returns. With demotivated workers whose skills become obsolete, the chances are low for the firms to launch digital transformation or any other disruptive technological upgrading and to move up to higher value-added tiers of GVCs. Failure of small- and medium-sized suppliers that take up the majority of manufacturing jobs in Thailand to upgrade would further limit employment opportunities for workers with advanced digital or technological skills and continuously produce a large pool of over-skilled workers. There is also a possibility that many future workers would settle for attaining a moderate level of technical skills with proven job promise. As a result, the country would get limited access to the workforce required for innovative and higher value-added activities, which in short puts the country in the *middle-skill trap*.

It may be reasonable to understand the structural issues of skills mismatch in Thailand within the framework of *the middle-skill trap,* drawing on international experiences of the *middle-income trap*. The middle-income trap is a well-known concept that describes the situation

where a middle-income country that experienced rapid growth fails to further catch up to the countries in the high-income range and becomes unable to compete with either low-income countries with the low-wage advantage or skills- and technology-intensive high-income countries (Kharas and Kohli, 2011). It typically happens as a result of a decline in the country's export competitiveness in the manufacturing sector and a lack of capacity for innovation and higher value-added activities. Once recognized as one of the fastest-growing newly industrializing economies (NIEs) in Asia, Thailand is known to be undergoing severe structural issues of prolonged economic slowdowns resulting from the middle-income trap (Doner and Schneider, 2016; Intarakumnerd, 2019).

The common understanding is that a large pool of high-skilled workers can free the country from such a trap, and aggressive investment in vocational education and training is the key to their successful procurement (Doner and Schneider, 2019; Glawe and Wagner, 2020; Jitsuchon, 2012), and it is the logic behind the current development strategy of Thailand. As Agénor and Canuto (2015) and Hartwell (2018) put it, however, what is more critical might be producing a certain *mass* of high-skilled workers. Using an overlapping generations model, Agénor and Canuto (2015) find that a country must reach a level where there is a critical mass of high-skilled workers for them to be drawn into high-skilled manufacturing. Hartwell (2018, p.138) further argues that “a country might be caught in a trap where highly educated and skilled workers have talent going to waste because the critical mass hasn’t been reached yet,” and thus “with no incentive for workers to move into newer fields and/or utilize new technology that already might exist, the growth path of the country stagnates." That is, the longer it takes to reach the critical mass, the more over-skilled workers there could be, and as a result the slower it gets for a country to grow due to the outflow of over-skilled workers into the low-skilled labor market

or future workers' settling for less sophisticated skills for employment. Consequently, a country may fail to transition to an advanced economy with high-skill innovations. From the skills perspective, this is how a country in the middle-income trap gets caught in the middle-skill trap.

The pertinent questions, therefore, might be how to shorten the time it takes to reach the critical mass of high-skilled workers and how to minimize the shock arising from over-skilling during the process of achieving the critical mass. From our interviews, we can assume that reaching the critical mass does not simply mean artificially increasing the absolute number of high-skilled technicians and engineers. There must be a more thorough approach by the government to increase the overall capacity of small- and medium-sized suppliers for technological upgrading such as fostering entrepreneurship or producing workers with soft skills so that the labor market can achieve a stable equilibrium between demand and supply of skilled workers.

8. Conclusion

The unprecedentedly dynamic wave of technological changes particularly driven by the advancement of digital technologies is reshaping the manufacturing system and GVCs. It also brings about a fundamental restructuring of the domestic labor market, and firms that are either tightly or loosely integrated into GVCs are faced with emerging opportunities and risks of technology-driven displacement of routine tasks. The hollowing out of middle-skilled jobs for routine-intensive manufacturing tasks has become a widely observed phenomenon in developed countries, and many anticipate that it is just a matter of time in developing countries as well. However, the findings from our survey and interviews tell somewhat different stories. Manufacturing jobs that are required for highly repetitive and dull tasks tend to remain in Thailand as firms in the low tier of supply chains effectively manage to keep low production

costs by utilizing an abundance of moderately educated low-wage workers. High initial investment costs, lack of entrepreneurship, and limited access to workers with high managerial and communication skills also lead them to be less motivated to replace workers with new digital technologies. As the small- and medium-sized low-tier manufacturing firms hold a large majority in the automotive industry in Thailand, the radical technological innovation that destroys the middle-skilled segments of the labor market does not seem to be foreseen at least in the very near future. On the other hand, our findings also suggest that education institutions are generally highly responsive to the expected changes in employment structure and skills requirements. Both general and vocational schools strive to provide updated education and training curricula and strengthen linkages with the labor market. Working-age graduates, however, face difficulties in maximizing advanced knowledge and skills as the adaptation of educational curricula outpaces actual technological upgrading in the industry. The government's heavy focus on producing high-skilled engineers and technicians targeting major conglomerates and large firms without serious consideration of building the technological and managerial capacity of SMEs exacerbates over-skilling issues among manufacturing workers. In addition to a direct wage penalty and job dissatisfaction, chronic over-skilling problems dampen workers' motivation and diminish their skill sets. It may further lead future workers to settle for attaining a moderate level of technical skills with proven job promise instead of investing in advanced education and training, which would potentially become a major hindrance for the country to effectively accumulate a critical mass of high-skilled workers in the long run. Therefore this study points to the importance of multidimensional approaches to policy making in the face of the fourth industrial revolution. Investing in the broadening of a pool of high-skilled workers alone does not lead up naturally to a country's industrial upgrading. It is crucial at the same time to seek to create an environment where firms other than conglomerates or large firms with enough internal sources can be

motivated to realize technological upgrading and be ready to accommodate the flux of high-skilled workers. Implementing actionable macro- and micro-strategies to build innovative entrepreneurship and to foster workers with non-routine or soft skills that support the structural upgrading of firms shall be important parts of it.

Bibliography

Acemoglu, D, and Restrepo, P. (2018). The Race between Man and Machine: Implications of Technology for Growth, Factor Shares and Employment. American Economic Review, Vol. 108, pp.1488-1542.

Acemoglu, D. and Autor, D.H. (2010). Skills, Tasks and Technologies: Implications for Employment and Earnings, in Ashenfelter, O. and Card, D. (eds.). Handbook of Labor Economics, Vol. 4b, pp. 1043-1171. San Diego and Amsterdam.

Adams, W. C. (2015). Conducting Semi-Structured Interviews, in Wholey, J.S., Harty, H.P. and Newcomer, K.E. (eds.). Handbook of Practical Program Evaluation, Jossey-Bass, San Francisco. pp.492-505.

Agénor, P.R. and Canuto, O. (2015). Middle-Income Growth Traps." Research in Economics, Vol. 69, No. 4. pp.641–660.

Alcácer, V. and Cruz-Machado, V. (2019). Scanning the industry 4.0: a literature review on technologies for manufacturing systems. Engineering Science and Technology, an International Journal, Vol. 22, No. 3. pp.899–919.

Allen, J., and R. van der Velden. (2001). Educational Mismatches Versus Skill Mismatches: Effects on Wages, Job Satisfaction, and On-the-Job Search. Oxford Economic Papers 3. pp.434–452.

Almeida, R.K., and Reyes A. (2016). Investment in Job Training: Why Are SMEs Lagging so Much Behind? Policy Research Working Paper 5358, World Bank, Washington, DC.

Artes, J., Salinas-Jimenez, M. D. M. and Salinas-Jimenez, J. (2014). Small Fish in a Big Pond or Big Fish in a Small Pond? The Effects of Educational Mismatch on Subjective Wellbeing. Social Indicators Research 119. pp.771–789.

Autor, D. H., Katz, L. F. and Kearney, M. S. (2006). The Polarization of the U.S. Labor Market. American Economic Review, Vol. 96, No. 2. pp.189–194.

Autor, D. H., Levy, F. and Murnane, R. J. (2003). The Skill Content of Recent Technological Change: An Empirical Exploration." Quarterly Journal of Economics, Vol. 118, No. 4. pp.1279–1333.

Bank of Thailand (2018). กับดัก Skills Mismatch และความท้าทายสู่ Education 4.0. MPG Economic Review.

Benassi, C., Durazzi, N. and Fortwengel, J. (2020). Not All Firms Are Created Equal: SMEs and Vocational Training in the UK, Italy, and Germany. MPIfG Discussion Paper 20/4.

Bishop, P. and Wiseman, N. (1999). External Ownership and Innovation in the United Kingdom. Applied Economics, Vol. 31, No. 4, pp. 443-450.

Blair, G. and Imai, K. (2012). Statistical Analysis of List Experiments. Political Analysis. 20. pp.47−77.

Blinder, A. S., and A. B. Krueger (2013). Alternative Measures of Offshorability: A Survey Approach. Journal of Labor Economics, Vol. 31, No. S1. pp.97-128.

Blomstrom, M. and Wolff, E. (1994). Multinational Corporations and Productivity Convergence in Mexico, in: Baumol, W., Nelson, R. & Wolff, E. (eds). Convergence of Productivity: Cross-national studies and historical evidence. Oxford: Oxford University Press.

Bloom, N., R. Sadun and J. Van Reenen (2012). Americans Do IT Better: US Multinationals and the Productivity Miracle. American Economic Review, Vol. 102, No. 1. pp.167-201.

Board of Investment of Thailand (2019). Thailand Investment Review: Thailand Advanced Manufacturing. Vol. 29.

Boyce, C. and Neale, P. (2006). Conducting In-depth Interviews: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input. Pathfinder International Tool Series. Monitoring and Evaluation – 2. Pathfinder International.

Cavenile, L. (2021). Offshoring, Computerization, Labor Market Polarization and Top Income Inequality. Vol. 69, ISSN 0164-0704.

Colpan, A.M. and Jones, G. (2016). Business Groups, Entrepreneurship and the Growth of the Koç Group in Turkey Business History, Vol. 58, Nol. 1. pp. 69-88.

Cultrera, L., Mahy, B., Rycx, F. and Vermeylen, G. (2022). Educational and Skills Mismatches: Unravelling Their Effects on Wages Across Europe, Education Economics. DOI:10.1080/09645292.2022.2050995.

Das, M and Hilgenstock, B. (2018). The Exposure to Routinization: Labor Market Implications for Developed and Developing Economies. IMF Working Paper.

De Vaus, D. (1991). Surveys in Social Research, 3rd Edition. London: Routledge.

Díaz-Díaz N.L., Aguiar-Díazb I. and Saá-Pérezc P. (2008). The Effect of Technological Knowledge Assets on Performance: The Innovative Choice in Spanish Firms. Research Policy, Vol.37, Issue. 9, pp. 1515–1529.

Doner, R. and Schneider, B. (2016). The Middle Income Trap. More Politics Than Economics. World Politics, Vol. 68. pp.608–644.

Doner, R. and Schneider, B.R. (2019). Technical Education in the Middle-Income Trap: Building Coalitions for Skill Formation, The Journal of Development Studies, p.1-18.

Duncan, G. J., and S. D. Hoffman. (1981). The Incidence and Wage Effects of Overeducation. Economics of Education Review, Vol. 1. pp.75–86.

Egger, H., Kreickemeier U., Moser, C. and Wrona, J. (2016). Offshoring and Job Polarisation between Firms. CEPIE Working Paper No. 08/16. Center of Public and International Economics. Technische Universität Dresden.

Einola, K. and Alvesson, M. (2021). Behind the Numbers: Questioning Questionnaires. Journal of Management Inquiry, Vol. 30, No. 1. pp.102–114.

Ellison, G., E. Glaeser, and W. Kerr (2010). What Causes Industry Agglomeration? American Economic Review, Vol. 100, No. 3. pp.889–927

Falk, M. (2008). Effects of Foreign Ownership on Innovation Activities: Empirical Evidence for Twelve European Countries. National Institute Economic Review, Vol. 204, No. 85, pp. 85-97.

Fernandez-Stark, K., Bamber, P. and Gereffi., G. (2010). Workforce Development in Chile's Offshore Services Industry. Durham, N.C.: Duke University, Center on Globalization, Governance & Competitiveness.

Fernandez-Stark, K., P. Bamber, and G. Gereffi. (2011). The Offshore Services Global Value Chain: Economic Upgrading and Workforce Development. Durham, NC: Center on Globalization, Governance & Competitiveness, Duke University.

Finkel, E., Eastwick, P. and Reis, H. (2015). Best Research Practices in Psychology: Illustrating Epistemological and Pragmatic Considerations with the Case of Relationship Science. Journal of Personality and Social Psychology, Vol. 108, No. 2. pp.275-297.

Frey, C. B., and Osborne, M. (2013). The Future of Employment: How Susceptible are jobs to Computerisation? University of Oxford.

Gereffi, G. (1999). International Trade and Industrial Upgrading in the Apparel Commodity Chain. Journal of International Economics, Vol. 48, No. 1. pp. 37-70.

Gibbon, P. and Ponte, S. (2005). Africa, Value Chains and the Global Economy. Temple University Press: Philadelphia.

Glas, A. and Kleemann, F. (2016). The Impact of Industry 4.0 on Procurement and Supply Management: A Conceptual and Qualitative Analysis. International Journal of Business and Management Invention, Vol. 5, No. 6. pp. 55-66.

Glawe, L. and Wagner, H. (2020). The Middle-Income Trap 2.0: The Increasing Role of Human Capital in the Age of Automation and Implications for Developing Asia. Asian Economic Papers, Vol. 19, No. 3. pp.40–58.

Goos, M. and Manning, A. (2003). McJobs and MacJobs: The Growing Polarisation of Jobs in the UK, in: Dickens, R., Gregg, P. and Wadsworth, J. (eds.). The Labour Market Under New Labour. Palgrave Macmillan, London.

Goos, M. and Manning, A. (2007). Lousy and Lovely Jobs: The Rising Polarization of Work in Britain. Review of Economics and Statistics, Vol. 89. pp.118-133.

Goos, M., Manning, A. and Salomons, A. (2009). The Polarization of the European Labor Market. American Economic Review Papers and Proceedings, 99. pp.58-63.

Gray, J. (2013). The Company States Keep: International Economic Organizations and Investor Perceptions. Cambridge: Cambridge University Press.

Greenstone, M., Hornbeck, R. and Moretti, E. (2010). Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings. Journal of Political Economy, Vol. 118, No. 3. pp.536–598.

Groves, R. M., F. J. Fowler, M. P. Couper, J. M. Lepkowski, E. Singer, and R. Tourangeau. (2009). Survey methodology. 2nd edition. Hoboken, NJ: John Wiley.

Grzybowska, K. and Łupicka, A. (2017). Key Competencies for Industry 4.0. Economics & Management Innovations, Vol. 1, No. 1. pp.250–253.

Guadalupe, M., Kuzmina, O. and Thomas, C. (2012). Innovation and Foreign Ownership. American Economic Review, Vol. 102, No. 7. pp.3594-3627.

Hamzeh R. Zhong R. and Xu XW. (2018). A Survey Study on Industry 4.0 for New Zealand Manufacturing. Procedia Manufacturing, 26. pp.49-57.

Hartwell, C.A. (2018). Old Wine and New Bottles: A Critical Appraisal of the Middle-Income Trap in BRICS Countries. Russian Journal of Economics, ARPHA Platform, Vol. 4, No. 2. Pp.133-154.

Helper, S., E. Reynolds, D. Traficonte, and A. Singh. (2021). Factories of the Future: Technology, Skills, and Digital Innovation at Large Manufacturing Firms. MIT Work of the Future. Research Brief, 19.

Heyman, F. (2016). Job Polarization, Job Tasks and the Role of Firms. Working Paper Series, 1123, Research Institute of Industrial Economics.

Humphrey, J. and Schmitz, H. (2002). How Does Insertion in Global Value Chains Affect Upgrading in Industrial Clusters? Regional Studies, Vol.36, No. 9. pp.1017–1027.

ILO (2016). ASEAN in Transformation: The Future of Jobs at Risk of Automation. Bureau for Employers' Activities, Working Paper No 9. International Labour Office. Geneva: International Labour Organization (ILO).

ILO (2017). Purchasing Practices and Working Conditions in Global Supply Chains: Global Survey Results. INWORK Issue Brief No. 10. Geneva.

Intarakumnerd, P. (2019). Thailand's Middle-Income Trap: Firms' Technological Upgrading and Innovation and Government Policies. Seoul Journal of Economics 2019, Vol. 32, No. 1, pp.107-135.

Jenn N. (2006). Designing A Questionnaire. Malays Fam Physician, Vol. 1, No. 1. pp.32-35.

Jitsuchon, S. (2012). Thailand in a Middle-income Trap. TDRI Quarterly Review, Vol. 27 No. 2, p.13-20.

Jones T., Baxter M. and Khanduja V. (2013). A Quick Guide to Survey Research. Ann R Coll Surg Engl, Vol. 95, No. 1. pp.5-7.

Kelley, K., Clark, B. and Brown, V. and Sitzia, J. (2003). Good Practice in the Conduct and Reporting of Survey Research, International Journal for Quality in Health Care, Vol. 15, Issue 3, pp. 261–266.

Keynes, J M (1930). Economic Possibilities for our Grandchildren, in Essays in Persuasion, New York, W.W. Norton & Co., 1963, 358-373.

Kharas, H. and Kohli, H. (2011). What is the Middle Income Trap, Why Do Countries Fall into It, and How Can It Be Avoided? Global Journal of Emerging Market Economies. Vol. 3, No. 3. pp. 281–289.

Kiran, J. (2018). Expanding the Framework of the Varieties of Capitalism: Turkey as a Hierarchical Market Economy. Journal of Eurasian Studies, Vol. 9, Issue. 1. pp.42-51.

Knott, E., Rao, A.H., Summers, K. and Teeger, C. (2022). Interviews in the Social Sciences. Nat Rev Methods Primers 2, 73.

Koopman, R., Wang, Z. and Wei, S.J. (2014). Tracing Value-added and Double Counting in Gross Exports. American Economic Review, Vol. 104, No. 2. pp.459-494.

Lasi, H., Fettke, P., Kemper, H.G., Feld, T. and Hoffmann, M. (2014). Industry 4.0. Business & information systems engineering, Vol. 6, No. 4. pp.239-242.

Leuven, E. and Oosterbeek, H. (2011). Overeducation and Mismatch in the Labor Market. IZA DP No. 5523. Discussion Paper Series. Institute for the Study of Labor (IZA).

Matsumoto, M. and Bhula-or, R. (2018). Problem of Skills Mismatch in Asia and the Pacific: How Useful Are the Existing Measurement for Future Skills Strategies? in Skills and the Future of Work: Strategies for Inclusive Growth in Asia and the Pacific. pp. 338-363. Geneva: ILO.

Mavromaras, K., Mcguinness, S., O'Leary, N., Sloane, P. and Wei, Z. (2013). Job Mismatches and Labour Market Outcomes: Panel Evidence on University Graduates. Economic Record. 89.

McGuinness, S. (2006). Overeducation in the Labour Market. Journal of Economic Surveys, Vol. 20, No. 3. pp.387-418.

McNamara, C. (1999). General Guidelines for Conducting Interviews. University of Minnesota.

Michaels, G. and Natraj, A. and Van Reenen, J. (2010). Has ICT polarized Skill Demand?: Evidence from Eleven Countries Over 25 Years. Centre for Economic Performance Discussion Paper, No. 987.

Miller, P. W. (2007). Overeducation and Undereducation in Australia. Australian Economic Review, Vol. 40, No. 3. pp.292-299.

Minichiello, V., Aroni, R., Timewell, E. and Alexander, L. (1995). In-depth interviewing: Principles, Techniques, Analysis. Melbourne, Vic., Australia: Longman.

Mokyr, J., Vickers, C. and Ziebarth, N. L. (2015). The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different? Journal of Economic Perspectives, Vol. 29, No. 3. pp.31-50.

Nooriah Y. and Zakiyah J. (2015). Graduate Employability and Preparedness: A Case Study of University of Malaysia Perlis (UNIMAP), Malaysia GEOGRAFIA Online Malaysian Journal of Society and Space. Vol. 11. pp.129-43.

OECD (2021). Vocational Education and Training in Thailand. OECD Reviews of Vocational Education and Training. Paris: OECD Publishing.

Oldenski, L. (2014). Offshoring and the Polarization of the U.S. Labour Market. ILR Review, 67, pp.734-761.

Ritz, J. M., and S. C. Fan (2015). STEM and technology education: International state-of-the-art", International Journal of Technology and Design Education. Vol. 25, No. 4. pp. 429-451.

Rodrik, D. (2018). New Technologies, Global Value Chains, and the Developing Economies. Pathways for Prosperity Commission Background Paper Series; No. 1. Oxford. United Kingdom.

Rohrbach-Schmidt, D. and Tiemann, M. (2011). Mismatching and Job Tasks in Germany – Rising Over-Qualification Through Polarization? Empirical Research in Vocational Education and Training, Vol. 3, No. 1. pp.39–53.

Roll, M. and Ifenthaler, D. (2020). The Impact of Learning Factories on Multidisciplinary Digital Competencies, in Wuttke, E., Seifried, J. and Niegemann, H. (eds.). Vocational Education and Training in the Age of Digitization. pp.24-39. Verlag Barbara Budrich.

Scheid, R. (2018). Learning Factories in Vocational Schools: Challenges for Designing and Implementing Learning Factories at Vocational Schools, in D. Ifenthaler (eds.), Digital Workplace Learning: Bridging Formal and Informal Learning with Digital Technologies. pp. 271-289. New York: Springer.

Schneider, B. (2009). Hierarchical Market Economies and Varieties of Capitalism in Latin America. Journal of Latin American Studies, Vol. 41, No. 3. pp. 553-575.

Senkrua, A. (2021). A Review Paper on Skills Mismatch in Developed and Developing Countries. International Journal of Sustainable Development & World Policy, Vol. 10, No. 1. pp.8–24.

Sloane, P., Battu, H. and Seaman, P. (1999). Overeducation, Undereducation and the British Labour Market. Applied Economics, Vol. 31. pp.1437–1453.

Sparreboom, T. and Tarvid, A. (2016). Imbalanced Job Polarization and Skills Mismatch in Europe. Journal for Labour Market Research, Vol. 49. pp.15–42.

Spitz-Oener, A. (2006). Technical Change, Job Tasks, and Rising Educational Demands: Looking outside the Wage Structure. Journal of Labor Economics, Vol. 24, No. 2. pp.235–270.

Spöttl, G. and Windelband, L. (2020). The 4th Industrial Revolution – Its Impact on Vocational Skills. Journal of Education and Work Volume, Vol. 34, No. 1. pp.29-52.

Stehle, S.M. and Peters-Burton, E.E. (2019). Developing Student 21st Century Skills in Selected Exemplary Inclusive STEM High Schools. IJ STEM Ed 6, 39.

Szalavetz, A. (2020). Digital Transformation and Local Manufacturing Subsidiaries in Central and Eastern Europe: Changing Prospects for Upgrading? in Drahokoupil, J. (eds.). The Challenge of Digital Transformation in the Automotive Industry: Jobs, Upgrading, and the Prospects for Development. Brussels: European Trade Union Institute. pp. 47-64.

Taglioni, D. and Winkler, D. (2016). Making Global Value Chains Work for Development, Vol. Tradeand Development series. Washington, DC: World Bank.

Thailand Board of Investment (2020). Thailand Investment Review: Enabling the New Normal with Automation and Robotics.

Tjahjono, B., Esplugues, C., Ares, E. and Pelaez, G. (2017). What Does Industry 4.0 Mean to Supply Chain? Procedia Manufacturing, Vol. 13. pp.1175-1182.

UNIDO (2019). Industrial Development Report 2020: Industrializing in the digital age. Vienna, Austria: United Nations Industrial Development Organization (UNIDO).

World Bank (2016). World Development Report 2016: Digital Dividends. Washington D.C: The World Bank.

Zago, R. (2020). Job Polarization, Skill Mismatch and the Great Recession. Banque de France Working Paper, February 2020, WP 755.

Zangiacomi, A., Pessot, E., Fornasiero, R., Bertetti, M. and Sacco, M. (2020). Moving Towards Digitalization: A Multiple Case Study in Manufacturing. Production Planning & Control, Vol. 31 2-3. pp.143–157.

Zeira, J (1998). Workers, Machines, and Economic Growth. Quarterly Journal of Economics, Vol. 113. pp.1091-1117.

Appendix I. Survey questionnaires

แบบสำรวจทักษะบุคลากร (SKILLS SURVEY QUESTIONNAIRE)

สำหรับพนักงานฝ่ายผลิต (**For manufacturing workers**)

คำชี้แจ้ง โปรดทำเครื่องหมาย ☑ ที่ตรงกับความคิดเห็นของท่านมากที่สุด

(Please indicate how much you agree with each of the following statements)

ตอนที่ 1 ข้อมูลส่วนบุคคลของผู้ตอบแบบสอบถาม (Personal Information)

1. เพศ (Gender) ☐ชาย (male) ☐หญิง (Female)
2. การศึกษา (Education) ☐ประถมศึกษาปีที่ 1-6 Primary / Elementary School ☐ มัธยมศึกษาปีที่ 1-3 Junior High School ☐มัธยมศึกษาปีที่ 4-6 Senior High School ☐ปริญญาตรี Bachelor Degrees ☐ปวช. Vocational Certificate ☐ปวส. Diploma/High Vocational Certificate
3. สถานศึกษา (School/ University) ☐สถานศึกษาของรัฐ Public school/University ☐สถานศึกษาของเอกชน Private school/University ☐ อื่นๆ ระบุชื่อสถานศึกษา..... Others (please specify the name of school)

ตอนที่ 2 ความคิดเห็นของรายการที่ประเมิน

ลำดับ No.	คำถาม/ Statement	ไม่เห็นด้วยมากที่สุด Strongly Disagree (-2)	ไม่เห็นด้วย Disagree (-1)	เฉยๆ Neutral (0)	เห็นด้วย Agree (+1)	เห็นด้วยมากที่สุด Strongly Agree (+2)
1	**ด้านการใช้งานเทคโนโลยี / Use of technology**					
1.1	บริษัทให้ความสำคัญในการนำเทคโนโลยีใหม่ๆ มาใช้งาน My company is keen on deploying new technologies (any types of technology).	(-2)	(-1)	(0)	(+1)	(+2)
1.2	บริษัทให้ความสำคัญในการนำเทคโนโลยีดิจิทัล ใหม่ๆ มาใช้งาน เช่น AI, หุ่นยนต์, เทคโนโลยีการทำงานโดยอัตโนมัติ เป็นต้น My company is keen on deploying new "digital" technologies (ex. AI, robots, automation tech, etc.).	(-2)	(-1)	(0)	(+1)	(+2)
1.3	ท่านคุ้นเคยกับเทคโนโลยีที่มีอยู่ในตอนนี้ I am familiar with working with existing technologies.	(-2)	(-1)	(0)	(+1)	(+2)
1.4	ท่านคุ้นเคยกับเทคโนโลยีใหม่ๆ ในที่ทำงาน I am familiar with working with newly introduced technologies at work.	(-2)	(-1)	(0)	(+1)	(+2)
1.5	ท่านคุ้นเคยกับเทคโนโลยีดิจิทัลในที่ทำงาน เช่น AI, หุ่นยนต์, เทคโนโลยีการทำงานโดยอัตโนมัติ เป็นต้น I am familiar with working with digital technologies at work (ex. AI, robots, automation tech, etc.).	(-2)	(-1)	(0)	(+1)	(+2)
1.6	ท่านมักจะรู้สึกลำบากในการเรียนรู้ใช้งานเทคโนโลยีใหม่ๆในการทำงาน	(-2)	(-1)	(0)	(+1)	(+2)

ลำดับ No.	คำถาม/ Statement	ไม่เห็นด้วยมากที่สุด Strongly Disagree (-2)	ไม่เห็นด้วย Disagree (-1)	เฉยๆ Neutral (0)	เห็นด้วย Agree (+1)	เห็นด้วยมากที่สุด Strongly Agree (+2)
	I often feel difficult to learn and use newly introduced technologies at work.					
2	**ด้านการศึกษา อบรม และทักษะอาชีพ / Vocational education/training**					
2.1	ทักษะ/ความรู้ทั่วไปที่ได้รับในสถานศึกษา เช่น คณิตศาสตร์ วิทยาศาสตร์ และภาษาอังกฤษ เป็นประโยชน์ต่อท่านในการได้งานทำ General skills/knowledge obtained in school (not specific vocational skills/knowledge) such as math, science, and English were helpful for me to get a job.	(-2)	(-1)	(0)	(+1)	(+2)
2.2	ทักษะ/ความรู้ทั่วไปที่ได้รับในสถานศึกษา เช่น คณิตศาสตร์ วิทยาศาสตร์ และภาษาอังกฤษ เป็นประโยชน์ต่อท่านในการทำงาน General skills/knowledge obtained in school (not specific vocational skills/knowledge) such as math, science, and English were helpful for me to continue my job at current workplace.	(-2)	(-1)	(0)	(+1)	(+2)
2.3	ท่านมองว่า หลักสูตรของสถานศึกษาที่ท่านจบมานั้นล้าสมัย ไม่ทันต่อโลกปัจจุบัน The curriculum of the school I graduated from is out-of-date.	(-2)	(-1)	(0)	(+1)	(+2)
2.4	สถานศึกษาของท่านมีโครงการฝึกงานให้แก่นักเรียนนักศึกษา The school I graduated from provided apprenticeship programs.	(-2)	(-1)	(0)	(+1)	(+2)
2.5	การเรียนในสถานศึกษาของท่าน ให้ความรู้และทักษะส่วนใหญ่ที่ท่านจำเป็นต้องใช้ในการทำงานในปัจจุบัน In secondary school, I obtained enough skills/knowledge to use current technologies that are introduced in the manufacturing process.	(-2)	(-1)	(0)	(+1)	(+2)
2.6	สถานศึกษาของท่านให้ความรู้และทักษะเพียงพอสำหรับการทำงานกับเทคโนโลยีดิจิทัลใหม่ๆ In secondary school, I obtained enough skills/knowledge to use new "digital" technologies that are introduced in the manufacturing process.	(-2)	(-1)	(0)	(+1)	(+2)
2.7	ความรู้ ทักษะที่เกี่ยวข้องกับเทคโนโลยีใหม่ๆ ที่ท่านเรียนในสถานศึกษาไม่เพียงพอต่อการทำงาน I feel like skills/knowledge about new technologies I obtained in school is not used enough at work.	(-2)	(-1)	(0)	(+1)	(+2)
2.8	ความรู้ ทักษะ ที่ท่านเรียนในสถานศึกษา ซับซ้อนหรือสูงกว่าระดับทักษะที่ท่านใช้ในการทำงาน The level of skills/knowledge taught in school is higher than the level of skills/knowledge required at work.	(-2)	(-1)	(0)	(+1)	(+2)

ลำดับ No.	คำถาม/ Statement	ไม่เห็นด้วยมากที่สุด Strongly Disagree (-2)	ไม่เห็นด้วย Disagree (-1)	เฉยๆ Neutral (0)	เห็นด้วย Agree (+1)	เห็นด้วยมากที่สุด Strongly Agree (+2)
2.9	ความรู้ ทักษะ ที่ท่านเรียนในสถานศึกษา ต่ำกว่าระดับทักษะที่ท่านจำเป็นต้องใช้ในการทำงาน The level of skills/knowledge taught in school is lower than the level of skills/knowledge required at work.	(-2)	(-1)	(0)	(+1)	(+2)
2.10	ในอีก 5 ปีข้างหน้า ทักษะและความรู้ที่ท่านได้เรียนมา จะยังคงเพียงพอสำหรับการทำงานของท่าน Skills/knowledge I obtained in school will be still enough to do my job after 5 years.	(-2)	(-1)	(0)	(+1)	(+2)
3	**ด้านทักษะเทียบกับงานที่ทำ / Personal perception over skills match/mismatch**					
3.1	ท่านมีระดับทักษะสูงกว่างานที่ทำอยู่ในปัจจุบัน I have a higher level of skills than my job requires.	(-2)	(-1)	(0)	(+1)	(+2)
3.2	ท่านมีระดับทักษะต่ำกว่าที่จำเป็นในตำแหน่งของท่าน I have a lower level of skills than my job requires.	(-2)	(-1)	(0)	(+1)	(+2)
3.3	ท่านคิดว่า 5 ปีจากนี้ ทักษะที่ท่านมี จะสูงกว่าที่ตำแหน่งงานของท่านต้องใช้ I think I will remain over-skilled in 5 years (I will have a higher level of skills than my job will require).	(-2)	(-1)	(0)	(+1)	(+2)
3.4	ท่านคิดว่า 5 ปีจากนี้ ทักษะที่ท่านมี จะต่ำกว่าที่ตำแหน่งงานของท่านต้องใช้ I think I will remain under-skilled in 5 years (I will have a lower level of skills than my job will require).	(-2)	(-1)	(0)	(+1)	(+2)
3.5	ท่านรู้สึกพอใจกับระดับทักษะที่ท่านมีในตอนนี้ Overall, I am satisfied with skills I currently have.	(-2)	(-1)	(0)	(+1)	(+2)
3.6	ท่านต้องการรับการฝึกอบรมทักษะเพิ่มเติม I wish to take additional training programs if possible.	(-2)	(-1)	(0)	(+1)	(+2)

Thank you very much for your cooperation!

ขอขอบพระคุณอย่างสูง ที่ให้ความกรุณาตอบแบบสอบถามนี้

Appendix II. List of interviews

ID	Sector	Affiliation	Position	Location	Recordings
INT1	National research institute	Office of National Higher Education Science Research and Innovation Policy Council, Thailand	Assistant to the President, Directorate for Manpower Strategy	Bangkok, Thailand	Voice recording
INT2	University	King Mongkut's University of Technology Thonburi (KMUTT), Thailand	Professor	Bangkok, Thailand	Voice recording
INT3	University	National Graduate Institute for Policy Studies (GRIPS), Japan	Professor	Bangkok, Thailand	Voice recording
INT4	International organization	United Nations Economic and Social Commission for Asia and the Pacific, Thailand	Economic officer	Online	Voice recording
WK1	Corporation	Auto parts manufacturer 2	Manufacturing worker	Samut Prakan, Thailand	Notetaking
WK2	Corporation	Auto parts manufacturer 3	Manufacturing worker	Samut Prakan, Thailand	Notetaking
WK3	Corporation	Auto parts manufacturer 6	Manufacturing worker	Samut Prakan, Thailand	Notetaking
WK4	Corporation	Auto parts manufacturer 6	Manufacturing worker	Samut Prakan, Thailand	Notetaking
WK5	Corporation	Auto parts manufacturer 6	Manufacturing worker	Samut Prakan, Thailand	Notetaking
WK6	Corporation	Auto parts manufacturer 8	Manufacturing worker	Samut Prakan, Thailand	Notetaking
WK7	Corporation	Auto parts manufacturer 8	Manufacturing worker	Samut Prakan, Thailand	Notetaking

Chapter 2

Can Governments Do More Than We Thought?: New Insights on the Role of Government in Global Value Chains and Skills Governance

Jaewon Kim

Abstract

The causal association between economic globalization and government size has been a major issue in the international political economy (IPE) literature. However, most existing studies do not address the issues within the specific context of global value chains (GVCs), such as complex multi-tier structures and lead firm-supplier networks. This paper explores whether openness to GVCs has a significant positive association with government expenditure. Focusing mainly on one of the most frequently discussed risks of GVC participation – skills of domestic labor, it checks whether government expenditure specifically on education increases as a state is more integrated into GVCs. It then investigates whether increased education expenditure has a robust and positive impact on skills readiness, such as general labor skills and skills to use technology. The empirical tests confirm that the cross-sectional correlation between the intensity of GVC participation and the share of government expenditure on secondary and tertiary education is positive and robust. The detailed examination by breaking up GVC participation into forward and backward indicates that the government whose economy is more engaged in forward GVC activities is likely to spend a higher share of education expenditure. The findings also suggest that GVC participation is more likely to positively impact domestic skills capacity in countries with high education expenditure. From this research, we can assume that absorbing advanced technologies and upgrading production and management depend not only on the capacity of individual firms in a host country but also on the capacity of an economy to mobilize a large pool of skilled workers. It suggests the state's less explicit but significant role as a facilitator within GVCs.

Key words: Global value chains, government expenditure, education expenditure, skills

JEL classification: F15, F16, H52, I22.

1. Introduction

The world has witnessed a homogenization of demand and convergence of consumer behavior within an increasing number of product categories across the globe. With standardized products that are both high quality and cost competitive, enterprises in the global market often adopt strategies of having multiple production lines and distribution channels across the border, facilitating the ‘globalization of production.’ The globalization of production is concomitant to the globalization of markets and, therefore, is another significant segment of economic globalization. As national markets become intensively linked and integrated into one global marketplace and products converge, scholarly and political attention has gradually moved from nation-to-nation trade relationships to individual enterprises' cross-border production activities (Cavusgil, 1993; Feenstra, 1998). Viewing the world as a collection of once separate individual national markets, firms have become free not only to access markets but to produce and source goods and services outside the national territory to take advantage of differences in the production cost, tax burdens, or the quality of manufacturing infrastructure (Cavusgil, 1993; Levy, 2008; Rugman and Verbeke, 2004). According to Feenstra (1998, p.31), such a phenomenon represents a point of departure from the vertically integrated traditional mode of production – the so-called "Fordist" mode of production – that large corporations typically used by having assembly line techniques for mass production within one site. To describe this new mode of production across the border, Bhagwati and Dehejia (1994) introduced the term "kaleidoscope comparative advantage," while Grossman and Rossi-Hansberg (2008) named it “task trade” and Leamer (1996) chose the term “delocalization.”

The activities of delocalizing certain stages of the production process are part of a corporation's supply chain, which refers to the full range of activities required to produce and deliver a product, from the supply of raw materials or intermediate parts to the delivery of finished products or services. Therefore, the globalization of production inspires a shift of focus toward the globalization of supply chain networks. The “New” New Trade Theory, developed in the 1980s, explains individual firms' trading behavior and their productivity heterogeneity within globalized supply chain networks. Melitz's (2003) model suggests that highly productive firms are the only ones that can accrue enough profits to maintain export operations that require a large amount of fixed costs. Helpman (1984) claims that “vertical multinationals" improve productivity by sharing production activities or, more specifically, outsourcing intermediate goods production to countries with lower labor costs. Helpman et al. (2004) further assert that their productivity is generally higher than other exporting firms. This theory effectively captures the trend in developing countries that began to position themselves as manufacturing subsidiaries of these vertical multinationals in the early 1990s. Hummels et al. (2001) referred to this growing feature in international trade of fragmentation of production stages and development of supply chains across multiple countries as “vertical specialization.”

Such vertical specialization across the border, or global value chains (GVCs), has distinctive features that can hardly be understood through the traditional perspective on international trade where final goods and services are produced and exported. GVCs comprise complex multi-tier structures and multinational enterprises (MNEs)-supplier networks. There are also variations in the direction and degree of a state's exposure to GVCs depending on endowments and comparative advantage, represented by forward and backward linkages. Along both linkages, subcontractors (countries) often compete intensely for lower cost and higher

quality production. The transfer of foreign technologies and firms' upgrading efforts to move up the value chain are other distinguished aspects of GVC participation.

Consequently, a state's integration into GVCs has profoundly impacted the domestic labor market and the features of individual occupation and skills needed in developed and developing countries. On one hand, it has provided unprecedented job opportunities for domestic workers. For instance, the manufacturing sector in many developing countries has seen explosive growth and offered jobs for a significant share of the workforce. On the other hand, automation technology has recently increasingly replaced repetitive and labor-intensive jobs and threatened many workers' employment and stable earnings. The skills gap has widened as low-skilled workers remain abundant while the industry requires higher-level skills to manage and control newly adopted technologies.

Against risks induced by international trade (in a traditional term), Cameron (1978) and Rodrik (1998) claim that the state plays a "mitigator" role by increasing government expenditure. Their empirical studies confirm that the degree of a state's exposure to trade is positively associated with the share of government expenditure in GDP. They further argue that the government increases public spending on social security and welfare programs such as job training or pension mainly in developed countries and on income-transfer programs in developing countries with limited administrative capacity as a means of social insurance against external risks. Their pathbreaking works provided the critical notion of the positive relationship between trade openness and the size of government, and many studies have substantiated their argument. While their argument has been dominant in the international political economy (IPE) literature, some recent studies have presented mixed or inconclusive results. Also, the majority of the earlier studies testing the validity of the positive relationship between trade openness and the size of

government cover the case of developed countries exclusively (e.g., Cameron, 1978; Garrett, 1998; Islam, 2004; Molana et al., 2004), while those that primarily highlight the feature of middle-income or developing countries have started to emerge only since the late 2000s (e.g., Ibrahim, 2015; Kueh et al., 2008). Such limitations make it difficult to generalize whether such an association is generally positive or negative or has no discernible linkage.

Drawing on insights from the well-established literature, this paper sheds light on whether openness to GVCs, a primary form of international trade nowadays, has a significant and positive association with government expenditure. Focusing mainly on one of the most frequently discussed risks of GVC participation – skills of domestic labor, it examines whether government expenditure on education increases as a state is more integrated into GVCs. It then moves on to investigate whether increased education expenditure has a robust and positive impact on skills readiness, such as general labor skills and skills to use technology. It will help us indirectly speculate the underlying motivations for the government's fiscal policy actions in the context of GVC integration. The association between GVC participation and government expenditure is examined through cross-sectional analyses of the statistical models with a set of variables extracted from a few reliable resources such as the UNCTAD-Eora Global Value Chain Database and the UNESCO Institute for Statistics (UIS) Database. Adding interaction terms to the models further expands our understanding of the complex association between GVCs, education expenditure, and domestic elements of labor. Such a detailed analysis is expected to contribute to the systemic conceptualization of the role of government in increasingly decentralized and firm-led sectoral GVC networks.

2. Literature Review

Given the complex nature of GVCs and the vast and profound risks associated with technological advancement on workers, industries, and states, it is unsurprising that this research involves various disciplines. This section provides an overview of a rich body of theoretical and empirical literature that spans a range of disciplines, including international political economy, labor, and education within a specific context of GVCs. First, it synthesizes key sources in the existing literature on the political economy of international economic integration and domestic politics. It is followed by a review of the literature investigating the impact of trade openness on government size. It will then be narrowed down to examining the literature on GVC-induced risks and government size to provide evidence to discuss how this research addresses the gap and contributes some new knowledge. Finally, it is followed by the examination of how literature has analyzed the impact of technological development on the occupational structure of a state. It is expected to provide further insight into labor- and skills-related external risks associated with participation in GVCs.

2.1 International economic integration, external risks, and the size of government

One of the major strands of literature on the effects of international economic integration on domestic politics involves the character of government size and spending. A vital departure point is Cameron (1978). In a pioneering contribution, Cameron (1978) provided a theoretical ground for the relationship between the level of trade openness and government expenditure. Cameron tested the impact of globalization on the expansion of the public sector with a sample of 18 OECD economies between 1960 and 1975. He equated globalization with trade openness by operationalizing globalization by the ratio of imports plus exports of goods and services to GDP. He found a positive and statistically significant correlation between trade openness and

government size. His basic argument is that exposure of a state to the world market encourages a government to spend more on social infrastructure to reduce the external shocks induced by the opening of the economy. It is backed by his detailed analysis that further finds a strong positive relationship between trade openness and the level of industrial concentration. Such increasingly high level of industrial concentration causes higher collective bargaining, such as unionization, to respond to insecurity and inequality. It, therefore, facilitates the government to compensate through, for instance, insurance, pensions, and social security services. Ruggie (1982) and Katzenstein (1985) are other essential precursors for this line of argument. They also argue that the opening of an economy and welfare expansion are mutually reinforcing, as trade liberalization is likely to increase demand on governments to eliminate external shocks and risks, and enlarging welfare state expenditure helps stabilize public sentiment towards trade liberalization.

Rodrik (1998) elaborated this argument into a modernized version of the *compensation hypothesis* in his widely cited paper *'Why Do More Open Economies Have Bigger Governments?'* While Cameron's earlier study is limited to 18 OECD economies, Rodrik (1998) turns to a broader set of samples encompassing 115 countries, including low- and high-income economies. With economic openness operationalized as the share of imports and exports relative to GDP and the size of government operationalized as the share of government expenditure in GDP, this cross-country panel data analysis shows that there is a positive and robust correlation between openness and the size of government regardless of the economic level of a country or period.

Rodrik draws on the discussion on exposure to the risks and social insurance as a plausible explanation that best fits the evidence. He postulates that as states open their economies, they face greater risks emanating from the global market turbulence. He states that

"[w]e can view larger government spending in such economies as performing an insulation function, insofar as the government sector is the "safe" sector (in terms of employment and purchases from the rest of the economy) relative to other activities, and especially compared to tradables. Hence, in countries significantly affected by external shocks, the government can mitigate risk by taking command of a larger share of the economy's resources (Rodrik, 1998; p.12)." This hypothesis is supported by an empirical test that investigates whether the association between economic openness and government expenditure is more robust in countries exposed to greater external shocks. He uses terms of trade risks and product concentration of export as empirical proxies to measure exposure to external risk. It leads us to conclude that economic openness matters to the size of government due to the critical role played by external shocks. Finally, running a set of regressions, he checks if government spending, particularly for risk-mitigating purposes, is linked to social security and welfare programs. Regardless of an economy's income level, government spending on social security and welfare programs, or compensatory programs in the broader term, appears to show more significant sensitivity to exposure to external shocks than general government consumption. He, however, distinguishes what kind of social insurance or welfare schemes are adopted according to a country's income level. He argues that advanced countries with social welfare programs in place tend to spend on social protection to respond to exposure to external risks. In contrast, developing countries that lack the requisite administrative capacity are likely to target the broadening of safety nets and rely on simpler schemes such as public employment and in-kind transfers that generally show up in government consumption.

Rodrik's seminal findings on the relationship between the level of trade openness and government size have been followed by a large number of empirical cross-country and case studies on both developed and developing economies: Adsera and Boix (2002) on 65 countries,

including 22 OECD members; Islam (2004) on six developed economies, namely, Australia, Canada, England, Norway, Sweden, and the USA; Molana et al. (2004) on 23 OECD countries; Kueh et al. (2008) on selected Southeast Asian economies, namely, Indonesia, Malaysia, the Philippines and Thailand; and Epifani and Gancia (2008) on a large set of samples comprising up to 143 countries. In general, many reinforce Rodrik's argument, while some point to a negative relationship between trade openness and government size, and some find no causal relationship between the two variables.

Some studies also make distinct contributions by addressing additional critical parameters on which the relative strength of the interconnectedness depends. For example, Adsera and Boix (2002) point out that previous studies on trade openness and government expenditures need to take the political mechanisms into account sufficiently. Instead, they highlight political-economic equilibria that link trade openness, government expenditure, and 'regime type.' They argue that "in fully democratic polities, a free trade regime leads to the expansion of the public sector to compensate losers from international recessions or shocks… since open economies can only shirk from committing resources to losing sectors of the economy by excluding them from the political decision-making process, free trade will not imply a bigger government under authoritarian regimes (Adsera and Boix, 2002; p,238)." On the other hand, Epifani and Gancia (2008) find that the correlation between trade openness and the size of government is contingent on a low elasticity of substitution between import and export.

While the debate over the relationship between trade openness and the size of government has grown large, the results of the empirical literature are mixed and still inconclusive. For example, some scholars revisit the core baseline assumption of Rodrik (1998) and others that economic integration leads domestic economies to become exposed to greater external risks or economic volatility. According to Iversen and Cusack (2000), while it is an undeniable fact that

labor market risks are affected by global market volatility, whether trade openness specifically is associated with such risks depends more on the degree to which global market volatility is higher than domestic market volatility, thus making existing studies not sufficient to show that trade-induced insecurity and inequality are directly related to government expenditure. They instead highlight that the risks countries face in modern industrialized societies are, to a large extent, products of technology-driven structural transformations such as increased productivity within domestic labor markets.

Shelton (2007), on the other hand, questions whether it is true that the increased government spending associated with the opening of an economy, particularly in developing countries, is necessarily related to social insurance. Focusing on tax-base volatility, he asserts that higher total government spending in economically open countries may be somewhat attributable to common pool problems that are generally endemic to all categories of government expenditure and concludes that "the effect to be a general increase across all functional categories rather than a spike in any particular category (Shelton, 2007; p. 2254).” Based on the statistical models and quantitative analysis, scholars such as Cavallo, De Gregorio and Loayza (2008) and Caselli et al. (2020) illustrate that trade openness does not necessarily create volatility, and the sign and size of the effect heavily depend on each country's characteristics and show that international trade even reduces such volatility in many countries.

In summary, while Rodrik's argument has remained dominant in the political economy literature, recent studies have shown mixed results on the association between trade openness and government spending and between trade openness and macroeconomic volatility. More recent studies have particularly disputed the robustness of the positive association between trade openness and volatility. Since the late 2000s, it has also been found that the association seems highly sensitive to the choice of data source, timeframe, and estimation tools. Therefore, the

fragility of the baseline association between trade openness and volatility upon which Rodrik (1998) and other scholars' compensation hypothesis has been built leaves the link between trade openness and government spending somewhat ambiguous.

Here, it is crucial to review some theoretical and empirical discussion on the association between trade openness and government spending, particularly in developing countries or those that have rapidly integrated into the global economy, mainly through the insertion into GVCs. Studies focusing primarily on developing countries have increased only since the late 2000s. There are not many, but some studies, including Kueh et al. (2008) on four Southeast Asian countries and Ibrahim (2015) on five African countries, attempt to show if the results of empirical tests on specific developing countries correspond to the findings of Rodrik (1998). The results are, again, mixed. However, due to the limited number of studies, it is challenging to generalize if the association between international economic integration and the size of government is generally positive or negative or if there is no discernible linkage.

The more critical issue is a significant literature gap in the comprehensive analysis of the association between international economic integration and specific external risks developing countries face and between the specificity of external risks and the size of government. We also have a limited understanding of the particularity of social insurance or welfare schemes adopted by developing countries with relatively low administrative capacity. When it comes to the analysis of the issues within the specific GVC framework, the gap widens more severely. Emerging countries' integration into GVCs as intermediary goods suppliers has recently become a major feature of the international economic integration process and entails several specific features that can hardly be discussed within the typical trade liberalization framework. Therefore, reviewing existing literature on the political economy of trade openness and government spending allows us to identify the scope for further exploration.

2.2 GVC participation and domestic skills capacity: opportunities and risks

Globalization of markets and production and the rapid growth of GVCs have profoundly impacted the labor market and the features of individual occupation and skills needed. Their impacts have been uneven across participating countries, industries, and individual occupations (Spilerman, 2009). Therefore, the related labor market literature has also embraced those focusing on macroeconomic dimensions of the effects of GVCs on the world of work, such as the global or regional structure of the division of labor, and others focusing on social dimensions, such as working conditions and gender equality. However, they are highly intertwined, and categorizing the massive volume of related studies is as complex as how the GVCs have emerged and evolved. One way to review these different but highly interdisciplinary bodies of literature is to group them into one that examines the consequence of GVCs for labor market opportunity in developed countries or those that are in the capital-intensive tiers of value chains and another one that examines the labor market effects of GVCs in the developing countries or those that have recently emerged as GVC participants along the labor-intensive tiers of value chains, just as Spilerman (2009) does. In the same vein, Farole (2016) also asserts the necessity of distinguishing the different labor market effects of GVCs in developed and developing countries. Many studies on developed countries that are typically "offshoring" or "outsourcing" production activities that local workers traditionally conducted focus on their effects on skills-biased technical change. On the other hand, those focusing on developing countries tend to explore the opportunities of GVCs for new jobs and wage effect (Farole, 2016). Among many labor issues, the following sub-section features the specific skills-related risks and opportunities.

Skills of domestic workers

The level of skills required in GVCs starkly differs depending on the segment of the value chain in which a firm or a state is inserted (Bamber et al., 2013; Fernandez-Stark et al., 2013; Ramirez and Rainbird, 2010). Therefore, workers must be equipped with skills corresponding to specific segments of GVCs. The stages with low-value entry levels, such as cut-make-trim activities within garment or footwear assembly, typically require a bulk of low-skilled labor (Fernandez-Stark and Bamber, 2018). As a country moves up to the knowledge- and technology-intensive stages of the value chain by performing new and more sophisticated activities, a vast pool of higher-skilled workforce is required (Fernandez-Stark and Bamber, 2018).

One of the critical features of the literature linking GVC participation to skills of labor is its emphasis on the functional 'upgrading' in GVCs and related skills development. The literature often uses case studies to examine the impact of firms' or industries' moving into more sophisticated knowledge- and technology-intensive activities in GVCs (Humphrey and Schmitz, 2002) on skills demand and supply. They identify upgrading trajectories by firms, with an initial focus on intermediate goods production and assembly and ultimately on branding their manufactures (Gereffi, 1999). Functional upgrading of firms' position along the value chain requires higher labor skills to operate in the design, branding, or marketing segments of GVCs (Humphrey, 2004). A typical example is Asian countries such as China, Thailand, and Viet Nam, which first entered GVCs through relatively simple assembly operations of garment and textile or processed food and are now expanding the operation trajectories to more sophisticated manufacturing of electronic parts and components or automotive (Fernandez-Stark and Bamber, 2018). Firms in Singapore, which used to be a competitive manufacturer in the electronics value chain earlier than other Southeast Asian countries in the 1990s, have upgraded to operating in high-tech and knowledge-intensive segments and sectors, and the relative distribution of required

skills and education has also shifted (Bamber, Guinn and Gereffi, 2013; Hiratsuka, 2013). De Vries et al. (2016) also lend support to this claim. Using Multi-Region Input-Output Tables developed by the Asian Development Bank and occupation data on jobs by educational attainment and business activities, they find that there has been a stark increase in low- and medium-skilled workers in the firms participating in GVCs throughout most of the developing countries in Southeast Asia and South Asia. In absolute terms, while India stands out, other latecomers such as Bangladesh, the Philippines, and Viet Nam have also seen a substantial increase in GVC workers with relatively lower skills. Their findings also show that the share of high-skilled R&D workers and those in the sales and marketing segments has also continuously increased in many of these countries, which the authors claim is further indicative evidence of operational upgrading in GVCs.

One of the most distinctive features of the literature on GVCs and skills development is that the focus of analysis is heavily on the role of firms. Many theoretical and empirical studies claim that GVC participation enables the skills development of domestic workers as a reaction of firms to maximize spillover effects or to cope with intense national, regional, and global competition. Gereffi et al. (2011), for instance, find that many individual private firms in developing countries who serve as suppliers of intermediary goods in GVCs strive to secure skilled labor by providing intensive on-the-job training and education beyond the basic level. They also highlight the cases where firms engage with educational institutions to offer internship programs to students and align school curricula to industrial needs. Taglioni and Winkler (2016) proceed further by examining the spillover effects. They argue that GVC integration promotes skills upgrading of local labor through the spillover effects or mutual learning, where a higher level of skills or knowledge is disseminated by labor from lead firms moving to local firms. They

also observe the skills development of local workers through in-house training offered by lead firms or, in many cases, by local firms who seek product and process innovation to stably supply quality inputs at lower cost and ultimately to upgrade from original equipment manufacturing (OEM) to original brand manufacturing (OBM). Criscuolo and Timmis (2017), Schwörer (2013), and Tajoli and Felice (2018) further find that spillovers of technology embedded in imported inputs contribute to the firm-level skills capacity and, ultimately, productivity growth. On the other hand, some studies, such as Hatani (2009) and Barrientos et al. (2011), point out from the supplier upgrading perspective that integration into GVCs does not guarantee skills and knowledge spillover due in large part to the tension and structural obstacles between the lead firm and local supplier as well as suppliers' reluctance to bare risks of innovation.

All in all, most studies take firm-centric approaches to understanding the dynamics of skills transfer, embedment, and development. While the importance of government intervention in GVC governance continues to be underlined recently, the body of knowledge, particularly in the context of domestic skills capacity, still needs to be explored. Even those confirming the critical role of government in maximizing skills and knowledge spillover tend to put firms at the center while seeing government as a mere enabler of firms' skills governance.

3. Theoretical Framework: The Role of Government As a Facilitator of GVCs

The GVC literature has discussed the governance issue, focusing extensively on the role of global lead firms while deviating from traditional approaches that put the state at the core of governance for economic development (Coe et al., 2004; Gereffi et al., 2005). Donaghey et al. (2014) point out that the highly international and complex nature of GVCs linking different *firms* creates fragmented and indirect employment relationships, which often makes the role of government considered trivial. It has rendered the literature strongly firm-centric. However, some scholars

have begun to acknowledge the significance of extending the scope of analysis regarding the roles and responsibilities of GVC actors to the state. For example, Ponte and Sturgeon (2014, p.197) claim that the "more ambitious analysis of how, overall, GVC governance is mutually constituted by broader institutional, regulatory and societal processes" is required. Similarly, Mayer and Phillips (2017, p.135) also argue that "it is time to think much more carefully about the centrality of politics in a GVC world, and particularly the role of states in the creation and maintenance of it."

Recently, a growing body of research has explored the role of government vis-à-vis GVCs to some extent by focusing mainly on how the state works as a 'regulator' or 'facilitator.' Seeing the state as a facilitator of GVCs has been a relatively widespread view in the GVC governance literature. Building on Gereffi (1994), who defined the role of government as primarily a facilitator in export-oriented growth, Gereffi and Sturgeon (2013) highlight the importance of national industrial policies formulated by the government for domestic firms' insertion into and upgrading within GVCs. In addition to the state's role as a facilitator, Mayer and Phillips (2017) add other key governance roles of the state within GVCs, namely as a regulator and a distributor. From their perspective, a state serves not only as the intentional architect of the GVC world who facilitates its emergence and spread but as the driver of the public deregulatory agenda and promoter of private regulatory regimes at the same time, and, in some cases, the intentional promoter of inequality by using eased tax policies or reducing social programs, often in the name of 'competitiveness.' Adopting both the facilitator and regulator roles, Horner and Alford (2019) further extend the role of a state as a producer and buyer in the context of GVCs. They claim that states sometimes become GVC actors who actively engage in competition with other countries or firms for market share through state-owned enterprises.

Among others, the theoretical framework of this research draws particularly on the role of government as a facilitator. As Horner and Alford (2019) claim, the government's facilitator role within GVCs takes various forms depending on which actor is facilitated and how. Generally, the GVC governance literature sees governments as facilitators that promote industrial policies and initiatives to create a preferable and competitive environment for local firms' GVC participation. It includes public investment in hard infrastructure for better connectivity and logistics, regulatory reforms to attract FDI, intellectual property protection, or economic integration agreements. The literature, however, tends to focus heavily on the government's explicit facilitator functions that affect firms firsthand. Studies examining the government's role in skills and capacity building are also inclined to feature firm-level supports such as increased R&D spending or subsidies for in-house training systems. On the other hand, the government functions that indirectly facilitate the development of the labor market, another important segment of GVCs, have yet to be given much attention.

Again, this is why an in-depth discussion of the theory of trade openness and government size is critical to complete the theoretical framework of this research. As described in the earlier section, the literature confirms that the primary purpose of increased government expenditure is to strengthen social security and welfare programs for individuals or to have a more extensive public employment system where open economy-driven risks to the household income can be absorbed. In other words, their empirical studies underscore the impact of greater trade openness on government size directed towards not only firms or other major actors in trade relations but also individuals. In light of the trade openness theory, this research broadens the scope of the role of government as a facilitator discussed in the conventional GVC governance literature to account more specifically for the overlooked individual aspect. Bringing together the

fundamental concepts of the two pieces of literature, this research delves into how openness to GVCs affects the size of government and whether it functions as a facilitator for the individual-level actors within GVCs.

While this research also emphasizes what governments do for "individuals" who are increasingly exposed to GVCs, it is slightly different from how the literature on trade openness sees the role of government. The risk-mitigating behavior of the government emphasized in this line of the literature is rather a passive reaction to the trade-induced economic insecurities. It focuses on securing the minimum-level well-being of individual households vulnerable to external shocks. Therefore, the primary purpose of increased public expenditure is to provide social insurance. In this case, disaggregation of government spending by functional category is not necessarily considered significant. It is because the ultimate policy goal for an increase in public spending on whatever category, e.g., education or health, is eventually linked to the support of the households who are under or potentially at risk.

On the other hand, this research views the facilitating role of government for individual actors as proactive. While the government as a passive risk mitigator primarily aims at relieving the shock to individuals already incurred as a result of greater trade participation, the government as a proactive facilitator utilizes public expenditure to enhance individuals' capacity to participate more in trade (or, more specifically, in GVCs in this research). The prime example is the mobilization of public financial resources for education. In the trade openness theory, increased government expenditure on education serves as a tool to ensure individuals' economic and social well-being. Within the framework of government being a proactive facilitator of GVCs, on the other hand, education expenditure serves as a means of enhancing the overall skills capacity of individuals that contributes to improving the state's competitiveness in the GVC. In other words,

the government's proactive role may eventually contribute to solidifying a pool of skilled workers that are essential for increasingly skills- and technology-intensive operations of firms that are integrated into GVCs.

4. Hypotheses

While GVCs certainly entail distinctive features that make them hardly be regarded in the same light as general trade liberalization, integration into GVCs also makes states more interconnected and interdependent, thus making them highly sensitive to competition and external shocks. It is potentially skills and jobs that are particularly affected by GVC-induced shocks as labor in each tier of value chains competes intensely for higher quality products or services at lower cost. This is especially the case when it comes to the issues related to the impact of extensive deployment of digital or other frontier technologies on workers. On the other hand, while the roles of firms and industry have become increasingly important in international trade and global lead firms are at the center of GVC governance in particular, government expenditure still plays an essential role in economic growth and social security. Among others, government expenditure on education has long been considered imperative for building an individual's capacity. A wealth of empirical studies has confirmed that educational attainment spearheads the advancement of labor productivity, income, and gender equality. Therefore, if the main arguments of the literature on trade openness, as well as the literature on GVC governance, are valid, the main hypotheses stipulate the following:

H1: Government expenditure on education above the secondary level is likely to be higher in economies that are more intensively integrated into GVCs.

H2: Skills capacity of domestic labor is likely to be higher in GVC-participating economies with a higher share of education expenditure.

The first hypothesis specifically focuses on government expenditure on secondary and tertiary education because of the embedded vocational contents. Following on from primary education, where the central objectivity is on building fundamental skills and establishing a foundation for life-long development, secondary education is characterized by a higher level of complexity with subject specialization and a greater focus on specific or transferable skills that are more directly connected to future employment and income. It is also where students start to be streamed into the general and vocational education and training (VET) track. Furthermore, tertiary education provides highly intensive programs for specific knowledge or skills needed in the job market.

A set of ancillary speculations will follow to probe the main hypotheses more systematically. First, a state's relative positions along the sequential production process within GVCs create substantial variations to be reflected in our analysis. Measuring exposure to international trade in the context of GVCs depends significantly on examining whether a state puts more importance on *forward* or *backward* participation. Forward participation refers to the share of domestic value-added contents embodied in other countries' gross exports. In contrast, backward participation shows the ratio of foreign value-added contents embodied in a country's gross export. Countries that participate in GVCs more intensely through forward linkages provide inputs to other countries that process them to export. On the other hand, countries that put more weight on backward linkages import intermediate goods to process and export. Not only a net gain or additional values produced by GVC participation but the intensity of competition, the impact of technological changes, skills requirements from the industry, and labor structure are uneven depending on along which linkages a country is situated. While studies on the association between openness to GVCs decomposed into forward and backward linkages and government

expenditure are almost non-existent, a few empirical studies on their associations with, for instance, labor productivity, job creation, and income distribution show that there is a discrepancy between forward and backward participation in terms of the direction and degree of impact (e.g. Banga, 2016; Korwatanasakul et al., 2020; Urata and Baek, 2019). Therefore, breaking up GVC participation into forward and backward allows us to examine the variations reflected in the association between GVC participation and government expenditure more thoroughly. After looking into how forward and backward GVC participation are associated with overall education expenditure, the main variable *education expenditure* will be subdivided into expenditure on *primary*, *secondary*, and *tertiary* education.

5. Model Specification

The author tests the main hypotheses and ancillary speculations using datasets drawn from various sources. For the first hypothesis, the association between trade value within GVCs and public expenditure on education will be tested. Education expenditure is specified as *education*, and trade value within GVCs is specified as *GVC*. For a more detailed analysis, it will be subdivided into *FVA*, which represents foreign value-added in a country's exports, and *DVX*, which represents domestic value-added in other countries' exports to third countries. *DVX* corresponds to the estimation of forward GVC participation, while *FVA* corresponds to the estimation of backward GVC participation. The main source for the data on education expenditure is the UNESCO Institute for Statistics (UIS) Database, which contains data on education expenditure as a percentage of GDP at the primary, secondary, and tertiary levels. Data on GVC participation is drawn from the UNCTAD-Eora Global Value Chain Database. It covers a total of 126 countries with a timeframe between 1990 and 2018.

Our regression models include several control variables related to demographic, economic, and other situational factors to limit the influence of other alternative explanations and justify the internal validity. Drawing on Wagner's law and subsequent studies on the factors affecting the dynamics of government expenditure (e.g., Alesina and Wacziarg, 1988; Benarroch and Pandey, 2008; Kolluri et al., 2000; Lamartina and Zaghini, 2010; and Wu and Lin 2012), a set of control variables included in all specifications as a basis are as follows: GDP (*GDP*); the size of population (*Population*); net inflows of foreign direct investment (*FDI*); tax revenue as a ratio of GDP (*Tax_revenue*); inflation rate (*Inflation*); urban population as a percentage of total population (*Urbanization*); the ratio of economically dependent population to the working-age population between 15 and 64 years old (*Dependency*). Additionally, to compare models by level of education, school-age population variables (*Primary_population*, *Secondary_population*, and *Tertiary_population*) are included in each specification.

For the second hypothesis that speculates the interaction of GVC participation and education expenditure and its impact on skills readiness, the author uses the following independent variables: the level of relevant skills of individuals to use and adapt frontier technologies (*Skills*); the level of readiness to use and adapt ICT infrastructure (*ICT*); and the number of researchers (or research professionals) engaged in new knowledge creation as a proportion of a population of one million (*Researcher_per_mill*). In order to control for alternative explanations related to the embedded technological skills capacity of a state, two explanatory variables are included in the models in addition to the baseline controls: the level of R&D capacity, which is the combination of the number of scientific publications and patents (*Research_Development*); and the level of technological capacity of the industry, which measures the share of high-technology goods exports and digitally deliverable services (*Industry_activity*).

All independent and control variables are computed as nine-year averages between 2001 and 2009, while all dependent variables are averaged over the 2010-2018 period using lagged measures. Also, all variables that are not shares are logs. The models include 85 to 87 observations, for which data on all dependent, independent, and control variables are obtained, and they are tested using ordinary least square regressions. A more detailed description of the definition, source of data, and summary statistics can be found in Table 3.1. The tables for summary statistics are attached as Appendix I.

Table 1. Definition and source of data

Variable	Definition	Source
GVC	The sum of DVX + FVA	UNCTAD-Eora Global Value Chain Database
DVX	The domestic Value Added of the country embodied in other countries' exports.	UNCTAD-Eora Global Value Chain Database
FVA	The foreign Value Added embodied in the country's exports.	UNCTAD-Eora Global Value Chain Database
Trade	Total merchandise exports	WTO Stats, World Bank WITS
Education	Government expenditure on education as a percent of GDP.	UNESCO Institute for Statistics
Health	Government expenditure on health as a percent of GDP.	World Health Organization Global Health Expenditure database
Social_protection	Government expenditure on social protection as a percent of GDP.	IMF Data – Government Finance Statistics (GFS)
Primary	Government expenditure on primary education as a percent of GDP.	UNESCO Institute for Statistics
Secondary	Government expenditure on secondary education as a percent of GDP.	UNESCO Institute for Statistics
Tertiary	Government expenditure on tertiary education as a percent of GDP.	UNESCO Institute for Statistics
Primary_population	Number of persons at the official age to attend primary level of education.	UNESCO Institute for Statistics
Secondary_population	Number of persons at the official age to attend secondary level of education.	UNESCO Institute for Statistics
Tertiary_population	Number of persons at the official age to attend tertiary level of education.	UNESCO Institute for Statistics

GDP	Gross domestic product (constant 2015 US$).	World Bank Data
FDI	Net inflows of foreign direct investment (current US$).	IMF Data - Balance of Payments database
Tax_revenue	Tax revenue as a percentage of GDP.	World Bank Data
Inflation	The annual percentage change in the market basket of goods and services consumed by households.	IMF Data - International Financial Statistics
Dependency	The ratio of the economically dependent population aged below 15 or over 64 to the working-age population aged between 15-64.	World Bank Data
Urbanization	Urban population as a percentage of total population	United Nations Population Division database
Population	Total number of residents of the reporting economy (regardless of legal status or citizenship).	World Bank Data
Skills	Level of skills to adopt and use frontier technologies. It is calculated using the combination of expected years of schooling from UNDP and high-skill employment as a percentage of the working population from ILO.	UNCTAD Statistics - Frontier Technology Readiness index
ICT	Level of ICT infrastructure to adopt and use frontier technologies. It is calculated using the combination of Internet users as a percentage of total and fixed broadband speed (in Mbit/s) from ITU.	UNCTAD Statistics - Frontier Technology Readiness index
Researcher_per_mill	Number of R&D personnel per million inhabitants.	UNESCO Institute for Statistics
Research_Development	Level of R&D capacity to adopt and use frontier technologies. It is calculated using the combination of the number of scientific publications (from SCOPUS) and the number of patents (from PatSeer) both on frontier technologies.	UNCTAD Statistics - Frontier Technology Readiness index
Industry_activity	Level of relevant industrial capacity to adopt and use frontier technologies. It is calculated using the combination of high-technology goods exports as a percentage of total goods trade and digitally deliverable services exports as a percentage of total service trade (from UNCTAD Stat).	UNCTAD Statistics - Frontier Technology Readiness index

To check if heteroscedasticity is present in our regressions, the Breusch-Pagan test was applied. The p-values for all specifications except that on the association between the GVC participation and primary education expenditure are above 0.05, indicating that the null hypothesis of homoskedasticity cannot be rejected. Therefore, the results allow us to confirm that there is no heteroskedasticity in our data, except for one model that is not the primary concern of our analysis.

6. Empirical Results

6.1 GVC participation and government expenditure on education

To test the first hypothesis, the first model shows the result of the association between the overall GVC participation and government expenditure by function particularly related to well-being and social security, namely education, health, and social protection. The GVC participation is then decomposed into forward and backward participation. Table 2 shows the regression results for the association between overall, forward, and backward GVC participation and government expenditure on education, health, and social protection as a percentage of GDP. The fit of the model is generally good, as adjusted R squares are between 0.34 and 0.53. First, we can see from Specification 1 that the association between the intensity of overall GVC participation and education expenditure share is positive but statistically weak, with a p-value less than 0.1 but above 0.05. However, the estimated coefficient of *DVX* is positive and statistically significant (Specification 2), while that of *FVA* turns out to be positive but weak (Specification 3). Expenditure on social protection also exhibits similar trends (Specifications 7, 8, and 9). On the other hand, specifications on health expenditure do not show any statistical significance (Specifications 4, 5, and 6).

Our result shows that openness to GVCs in general, including both forward and backward components, does not strongly support an empirical regularity confirmed in the literature on trade openness and government size. When decomposed, however, it shows that states with stronger forward GVC linkages are likely to have a bigger public education sector. On the contrary, states' strong engagement in backward GVCs or overall GVCs that include backward participation does not seem to determine the relative size of public education expenditure. As discussed earlier, the linkage through which a state is mainly penetrated into GVCs reflects markedly different domestic settings, such as the intensity of manufacturing and service, dependency on natural resources, and labor and employment structure. The result helps us reconfirm that there is a need to decompose the nature of GVC participation into forward and backward linkages for the more comprehensive analysis of further statistical models.

Table 2. Forward and backward GVC participation and government expenditure

Forward and backward GVC participation and government expenditure

	Dependent variable:								
	Education			Health			Social_protection		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(GVC)	0.3294*			-0.3496			2.0372*		
	(0.1744)			(0.3382)			(1.1508)		
log(DVX)		0.3548**			-0.2441			3.0583**	
		(0.1783)			(0.3500)			(1.2479)	
log(FVA)			0.2356*			-0.2798			1.0607
			(0.1358)			(0.2614)			(0.8257)
log(GDP)	0.1497	0.1189	0.2418	1.3539**	1.2403**	1.2905***	0.3157	-0.8630	1.4072
	(0.2727)	(0.2766)	(0.2502)	(0.5312)	(0.5396)	(0.4853)	(1.7628)	(1.8333)	(1.5344)
log(Population)	-0.2177	-0.2454	-0.2120	-0.9238**	-0.8730**	-0.9415**	-1.2460	-1.2474	-1.4357
	(0.1837)	(0.1808)	(0.1857)	(0.3543)	(0.3494)	(0.3574)	(1.1950)	(1.1468)	(1.2042)
log(FDI)	-0.2976*	-0.2805*	-0.2807*	0.2166	0.1760	0.2063	-0.2699	-0.2647	-0.1149
	(0.1575)	(0.1547)	(0.1565)	(0.3078)	(0.3043)	(0.3048)	(0.8978)	(0.8652)	(0.9038)
Tax_revenue	0.1261***	0.1256***	0.1237***	0.0439	0.0445	0.0466	0.3368**	0.3297**	0.3172**
	(0.0209)	(0.0208)	(0.0209)	(0.0407)	(0.0409)	(0.0407)	(0.1334)	(0.1290)	(0.1350)
Inflation	0.0052	-0.0009	0.0163	-0.0519	-0.0459	-0.0656	-0.0064	-0.0542	0.0602
	(0.0307)	(0.0304)	(0.0323)	(0.0594)	(0.0593)	(0.0619)	(0.2176)	(0.2087)	(0.2394)
Urbanization	0.0043	0.0040	0.0039	0.0001	0.0010	0.0003	-0.0279	-0.0258	-0.0313
	(0.0094)	(0.0094)	(0.0095)	(0.0183)	(0.0183)	(0.0182)	(0.0705)	(0.0684)	(0.0717)
Dependency	0.0271**	0.0269**	0.0250**	0.0560**	0.0578***	0.0579***	0.0726	0.0989	0.0410
	(0.0114)	(0.0113)	(0.0112)	(0.0215)	(0.0216)	(0.0211)	(0.0901)	(0.0877)	(0.0876)
Constant	-0.6758	-0.0826	-0.9940	-12.2928***	-12.1591***	-12.1019***	-26.2472*	-19.0395	-28.8204**
	(2.3071)	(2.3869)	(2.2834)	(4.3799)	(4.5504)	(4.3152)	(13.6136)	(13.7837)	(13.7069)
Observations	90	90	90	92	92	92	52	52	52
R^2	0.4862	0.4886	0.4828	0.3480	0.3434	0.3486	0.4983	0.5277	0.4816
Adjusted R^2	0.4354	0.4381	0.4317	0.2851	0.2801	0.2858	0.4050	0.4399	0.3852
Residual Std. Error	1.0992 (df = 81)	1.0966 (df = 81)	1.1028 (df = 81)	2.1496 (df = 83)	2.1571 (df = 83)	2.1486 (df = 83)	5.1271 (df = 43)	4.9746 (df = 43)	5.2116 (df = 43)
F Statistic	9.5809*** (df = 8; 81)	9.6724*** (df = 8; 81)	9.4514*** (df = 8; 81)	5.5370*** (df = 8; 83)	5.4268*** (df = 8; 83)	5.5517*** (df = 8; 83)	5.3389*** (df = 8; 43)	6.0059*** (df = 8; 43)	4.9943*** (df = 8; 43)
Note:									*p<0.1; **p<0.05; ***p<0.01

Having shown that the link between forward GVC participation and overall government expenditure on education is positive, we now turn to the main model that shows the association

between GVC participation and public expenditure by level of education (Table 3). All regressions again provide a good fit to the data, explaining 39 to 48 percent of the cross-country variance in the share of education expenditure. The interesting result displayed here is that the coefficients of the specifications only for secondary and tertiary education expenditure turn out to be positive and statistically significant, both at the 95 percent confidence level. On the other hand, GVC participation in any direction (either forward or backward) does not have any statistically meaningful impact on primary education expenditure. The result provides support to our first hypothesis that the more a state is integrated into GVCs, the higher the share of public education expenditure above the secondary level is.

The distinction between secondary and tertiary education is that we find no association between backward GVC participation and secondary education expenditure, while both backward and forward GVC participation are strongly associated with tertiary education expenditure. On the other hand, further analysis of the quantitative magnitude shows that the coefficient values of secondary education are higher than those of tertiary education, given a one-unit increase in both *log(GVC)* and *log(DVX)*. It suggests that the impact of overall and forward GVC participation on the share of secondary education expenditure is more significant than that of tertiary education.

Table 3. Forward and backward GVC participation and education expenditure

Forward and backward GVC participation and education expenditure

	Dependent variable:								
	Primary			Secondary			Tertiary		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(GVC)	0.0345			0.1942**			0.0885**		
	(0.0782)			(0.0887)			(0.0394)		
log(DVX)		-0.0081			0.2130**			0.0956**	
		(0.0809)			(0.0908)			(0.0411)	
log(FVA)			0.0523			0.1069			0.0603**
			(0.0594)			(0.0692)			(0.0291)
log(GDP)	0.0799	0.1248	0.0583	-0.1390	-0.1537	-0.0562	-0.1484**	-0.1527**	-0.1246**
	(0.1208)	(0.1213)	(0.1097)	(0.1435)	(0.1432)	(0.1357)	(0.0596)	(0.0599)	(0.0549)
log(Population)	-0.8267***	-0.8120***	-0.8308***	-0.1475	-0.1530	-0.1251	0.4636**	0.4304*	0.5295**
	(0.1951)	(0.1972)	(0.1935)	(0.4445)	(0.4424)	(0.4530)	(0.2177)	(0.2201)	(0.2149)
log(FDI)	-0.1099	-0.1019	-0.1138*	-0.0868	-0.0808	-0.0692	-0.0378	-0.0346	-0.0331
	(0.0676)	(0.0669)	(0.0667)	(0.0791)	(0.0779)	(0.0795)	(0.0325)	(0.0321)	(0.0323)
Tax_revenue	0.0399***	0.0398***	0.0393***	0.0381***	0.0385***	0.0368***	-0.0008	-0.0005	-0.0019
	(0.0091)	(0.0091)	(0.0091)	(0.0107)	(0.0107)	(0.0109)	(0.0049)	(0.0049)	(0.0049)
Inflation	-0.0117	-0.0124	-0.0086	-0.0101	-0.0128	-0.0064	0.0029	0.0014	0.0061
	(0.0132)	(0.0131)	(0.0137)	(0.0153)	(0.0151)	(0.0162)	(0.0066)	(0.0066)	(0.0070)
Urbanization	0.0009	0.0007	0.0011	0.0064	0.0059	0.0062	0.0094***	0.0093***	0.0093***
	(0.0041)	(0.0041)	(0.0041)	(0.0048)	(0.0047)	(0.0048)	(0.0021)	(0.0021)	(0.0021)
Dependency	0.0042	0.0039	0.0040	-0.0032	-0.0029	-0.0049	-0.0018	-0.0017	-0.0025
	(0.0058)	(0.0058)	(0.0057)	(0.0056)	(0.0055)	(0.0055)	(0.0024)	(0.0024)	(0.0024)
log(Primary_population)	0.8168***	0.7937***	0.8312***						
	(0.1845)	(0.1856)	(0.1829)						
log(Secondary_population)				0.1959	0.1827	0.1717			
				(0.3910)	(0.3895)	(0.3975)			
log(Tertiary_population)							-0.4089**	-0.3849*	-0.4716**
							(0.2006)	(0.2025)	(0.1968)
Constant	2.2358*	2.0073*	2.3604**	1.4215	1.6790	1.1256	0.5123	0.6755	0.3485
	(1.1332)	(1.1719)	(1.1093)	(1.1646)	(1.1876)	(1.1660)	(0.5618)	(0.5856)	(0.5461)
Observations	88	88	88	89	89	89	80	80	80
R^2	0.4705	0.4693	0.4744	0.3856	0.3907	0.3674	0.4739	0.4764	0.4686
Adjusted R^2	0.4094	0.4080	0.4138	0.3156	0.3213	0.2953	0.4063	0.4090	0.4002
Residual Std. Error	0.4651 (df = 78)	0.4657 (df = 78)	0.4634 (df = 78)	0.5423 (df = 79)	0.5401 (df = 79)	0.5503 (df = 79)	0.2187 (df = 70)	0.2182 (df = 70)	0.2198 (df = 70)
F Statistic	7.7020*** (df = 9; 78)	7.6635*** (df = 9; 78)	7.8235*** (df = 9; 78)	5.5079*** (df = 9; 79)	5.6285*** (df = 9; 79)	5.0981*** (df = 9; 79)	7.0069*** (df = 9; 70)	7.0754*** (df = 9; 70)	6.8574*** (df = 9; 70)
Note:									*p<0.1; **p<0.05; ***p<0.01

To illustrate the specificity of GVCs, the author compares the regression model that shows the association between general trade openness and the relative size of public education expenditure. It is to see whether the share of government expenditure on different levels of education is affected by general trade openness as explored extensively by a volume of existing studies, including Rodrik (1998), or is associated particularly with GVCs, a specific form of trade openness. The table in Appendix II reports the results. Having all control variables identical to those used in the previous models, the estimated coefficient of *trade* (total of merchandise exports) turns out to be statistically insignificant across all specifications. It suggests that greater integration into the global economy through general trade is not necessarily linked to an increase in the share of government spending on either primary, secondary, or tertiary education.

All in all, our evidence lends support to the first hypothesis that the cross-sectional correlation between the intensity of GVC participation and the share of government expenditure on secondary and tertiary education are positive and robust. However, the detailed examination by breaking up GVC participation into forward and backward provides slightly mixed results, as we can see that intensive integration into GVCs through backward linkages only affects tertiary education expenditure. In addition, within the specifications for tertiary education expenditure, the standardized coefficient of backward GVC participation is smaller than that of forward GVC participation. This relatively less significant impact of backward engagement on education expenditure may be associated to a certain extent with the fact that countries with stronger backward linkages tend to have a higher share of the manufacturing sector in GDP and, more importantly, are in labor-intensive segments of GVCs where low- and middle-skilled manufacturing jobs are abundant. Many developing countries, for instance, are in a buyer's position who imports intermediates to produce or assemble more sophisticated near-end or final

goods. The integration into backward linkages is often an entry point to GVC participation in these countries, and the participating countries tend to maintain stronger backward engagement by increasing the manufacturing capacity. Therefore, competitiveness often depends on the availability of low-cost labor with low- to mid-level skills instead of highly educated or high-skilled labor. On the other hand, countries with strong forward GVC linkages are in a seller's position that exports locally generated value-added inputs for downstream production. These value-added inputs can be either primary inputs such as natural resources or, reversely, technologically advanced parts and components. Baldwin and Lopez-Gonzalez (2013) and Kowalski et al. (2015) explain that such structural variations of GVC participation are strongly associated with the structural changes along the development path of each economy. They find that the backward linkages tend to develop in the early and middle stages of industrialization, where the manufacturing sector flourishes. On the other hand, the forward linkages expand during the very early stages of economic development when an economy specializes in the exports of natural resources or agricultural products, and they become dominant again when an economy enters into the mature industrial stages where technology develops and the highly competitive service sector emerges. Advanced economies with strong forward linkages often position themselves as "headquarter" economies. Therefore, the strong forward engagement of an economy specifically at later development stages requires a large pool of high-skilled labour. It may be a potential explanation as to why the government, whose economy is more engaged in forward GVC activities, spends a higher share of expenditure on secondary and tertiary education.

A plausible explanation for why secondary education expenditure is more sensitive to (forward) GVC participation than tertiary education is that most governments provide free

compulsory education at the primary and secondary levels, where public investment plays a crucial role. On the other hand, tertiary educational institutions depend relatively more heavily on private sources such as individuals or businesses. Massification of tertiary education has been a common phenomenon across both the developed and developing worlds over the last few decades. Many countries choose a cost-sharing approach to accommodate the increasing demand for occupation-specific skills and knowledge required in the job market through tertiary education. It involves not only private payments but also the privatization of the financing, provision, and accountability of education services. The spread of privatization tends to be more rapid at the tertiary level than at the primary or secondary level due mainly to its high unit cost, sensitivity to efficiency and effectiveness, and the importance of utilizing industrial linkages for curriculum development. It can also be attributed to the fact that the privatization of primary and secondary education often generates strong opposition as many stakeholders perceive that basic education is a fundamental human right and a public good, and thus delegating education functions to the private entity services damages such beliefs. Privatization of tertiary education, on the other hand, is relatively more unrestricted from such controversy.

6.2 GVC participation, government expenditure on education, and domestic skills capacity

Having shown that the association between GVC participation (forward participation in particular) and government expenditure on secondary and tertiary education is positive and statistically significant, the author moves on to the second hypothesis. It is tested by comparing regressions in which GVC participation interacts with education expenditure. It is to examine whether a higher education expenditure share of GVC participating economies contributes in effect to a higher level of domestic skills capacity. Ultimately, it is meant to examine whether the GVC participation alone can be a critical factor that enhances skills capacity, or it is only when

significant government support in education financing is accompanied. First, Table 4 presents the model that shows the association between forward GVC participation and overall labor skills, ICT use, and research population. It is then compared with the model with the interaction terms. Having cross-sectional samples with 87 observations, the regressions for *Skills* and *ICT* (Specifications 1, 3, 5, and 7) provide a very good fit with a high adjusted R^2 of 0.7985-0.9016. The fit of the regression for *Researcher_per_mill* is also above 0.8, while the number of observations is 68.

The results confirm that a higher degree of forward GVC participation is correlated with a higher level of skills capacity, with the coefficients of all specifications being positive and significant. The coefficients of *ICT* and *Researcher_per_mill,* in particular, are highly significant at the 99 percent confidence level, suggesting that participating in GVCs through forward linkages contributes significantly to the development and greater usage of ICT infrastructure and higher density of trained workers engaged in research and development (R&D). The results with the interaction terms, which is our primary interest, are remarkable. Throughout all specifications, we can see a robust positive correlation between the interaction of forward GVC participation and education expenditure and skills capacity, with the coefficients at either 95 or 99 percent confidence interval. The fits of all specifications also slightly improved from 7985-0.9016 to 0.8073-0.9051. More noteworthy, the coefficients of forward GVC participation now all turn statistically insignificant. They all get closer to zero and even turn negative for *Skills* and *Researcher_per_mill*. It allows us to confirm that forward GVC participation is more likely to be associated positively with domestic skills capacity when countries spend more public expenditure on education.

The regression model on the backward GVC participation exhibits similar but slightly different results. First, we can see from Table 5 that between 77 and 90 percent of the cross-country parameters are explained by the regressions, which indicates a good fit of the model. Similar to the case of forward participation, the adjusted R^2 also slightly improves in all specifications when the interaction term is introduced. However, the coefficients of the backward GVC participation are positive and robust at the same time only for *Skills* and *ICT*. While more intensive engagement in GVCs through backward linkages also signals a positive association with the density of professional research staff (*Researcher_per_mill*), it does not appear to have any statistical significance. When the interaction between the backward GVC participation and education expenditure is added, the model presents slightly different but consistent results. The expected results are shown for all dependent variables including *Skills*, *ICT* and *Researcher_per_mill*. The coefficients of the interaction term are positive and statistically significant, while the coefficients of backward participation now become negative and insignificant.

Table 4. Forward GVC participation, education expenditure, and skills capacity

Forward GVC participation, education expenditure, and skills capacity

	Dependent variable:							
	Skills		ICT		Human_capital		Researcher_per_mill	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(DVX)	0.0302**	-0.0076	0.0456***	0.0006	2.7094**	-0.4135	709.9032***	-56.4074
	(0.0137)	(0.0219)	(0.0166)	(0.0254)	(1.1244)	(1.7868)	(213.7155)	(340.8300)
Education		-0.1354**		-0.2246***		-12.7275**		-2,401.8180**
		(0.0657)		(0.0765)		(5.3685)		(905.5713)
log(GDP)	0.0220	0.0272	-0.0263	-0.0250	0.2652	0.4551	-213.1144	-81.7367
	(0.0221)	(0.0223)	(0.0268)	(0.0260)	(1.8142)	(1.8225)	(328.1765)	(318.2104)
log(Population)	-0.1045***	-0.1006***	-0.0889***	-0.0879***	-4.6879***	-4.3868***	-1,197.5470***	-1,140.9290***
	(0.0131)	(0.0135)	(0.0159)	(0.0157)	(1.0769)	(1.1005)	(205.1750)	(198.2432)
log(FDI)	0.0007	0.0023	0.0210	0.0185	-2.2658**	-2.2386**	-154.8363	-120.9792
	(0.0112)	(0.0112)	(0.0136)	(0.0131)	(0.9203)	(0.9181)	(175.2022)	(169.4761)
Tax_revenue	0.0020	0.0016	0.0001	0.0023	0.1401	0.1640	-30.0473	-39.6093
	(0.0016)	(0.0018)	(0.0019)	(0.0021)	(0.1283)	(0.1481)	(23.6301)	(25.5127)
Inflation	0.0017	0.0026	0.0004	0.0023	-0.0368	0.0547	1.8735	11.7919
	(0.0022)	(0.0023)	(0.0027)	(0.0027)	(0.1849)	(0.1890)	(34.7514)	(34.2115)
Urbanization	0.0010	0.0008	0.0002	0.0003	0.0804	0.0774	-1.0284	-4.9146
	(0.0007)	(0.0007)	(0.0008)	(0.0008)	(0.0543)	(0.0546)	(10.6439)	(10.5058)
Dependency	-0.0016**	-0.0023**	-0.0005	-0.0008	0.0212	-0.0252	38.7406***	20.7672
	(0.0008)	(0.0009)	(0.0010)	(0.0010)	(0.0647)	(0.0730)	(12.7017)	(14.2848)
Research_Development	0.5574***	0.5130***	0.5768***	0.5532***	44.6133***	41.9287***	7,927.0050***	7,550.5980***
	(0.1083)	(0.1099)	(0.1317)	(0.1279)	(8.9026)	(8.9775)	(1,639.7590)	(1,589.6100)
Industry_activity	-0.1797**	-0.1385	0.0545	0.0994	-6.9611	-3.7680	-933.4350	-315.4932
	(0.0836)	(0.0856)	(0.1016)	(0.0996)	(6.8688)	(6.9900)	(1,306.3360)	(1,304.2590)
log(DVX):Education		0.0066**		0.0097***		0.5930**		116.2347***
		(0.0031)		(0.0036)		(0.2525)		(42.5299)
Constant	0.9147***	1.5099***	0.9187**	1.8968***	95.6420***	153.1182***	10,746.9100**	23,023.1000***
	(0.2865)	(0.4134)	(0.3482)	(0.4811)	(23.5408)	(33.7749)	(4,407.1360)	(6,093.4240)
Observations	87	85	87	85	87	85	68	67
R^2	0.9130	0.9187	0.8859	0.9018	0.8219	0.8348	0.8348	0.8546
Adjusted R^2	0.9016	0.9051	0.8709	0.8854	0.7985	0.8073	0.8059	0.8223
Residual Std. Error	0.0751 (df = 76)	0.0746 (df = 72)	0.0913 (df = 76)	0.0868 (df = 72)	6.1743 (df = 76)	6.0968 (df = 72)	981.7243 (df = 57)	941.3082 (df = 54)
F Statistic	79.7700*** (df = 10; 76)	67.7617*** (df = 12; 72)	59.0221*** (df = 10; 76)	55.1016*** (df = 12; 72)	35.0804*** (df = 10; 76)	30.3239*** (df = 12; 72)	28.8135*** (df = 10; 57)	26.4490*** (df = 12; 54)
Note:								*p<0.1; **p<0.05; ***p<0.01

Table 5. Backward GVC participation, education expenditure, and skills capacity

Backward GVC participation, education expenditure and skills capacity

	Dependent variable:							
	Skills		ICT		Human.capital		Researcher_per_mill	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(FVA)	0.0218**	0.0029	0.0288**	-0.0014	1.4474	-0.9147	128.4894	-379.5491*
	(0.0107)	(0.0145)	(0.0132)	(0.0170)	(0.8967)	(1.1726)	(170.0683)	(204.7435)
Education		-0.0983*		-0.2096***		-13.5881***		-2,497.2420***
		(0.0552)		(0.0646)		(4.4542)		(733.7506)
log(GDP)	0.0306	0.0262	-0.0097	-0.0194	1.4955	0.7321	339.2882	179.3748
	(0.0205)	(0.0209)	(0.0252)	(0.0244)	(1.7113)	(1.6843)	(321.0874)	(295.0985)
log(Population)	-0.1008***	-0.0980***	-0.0840***	-0.0822***	-4.4366***	-4.0720***	-1,229.4410***	-1,126.9390***
	(0.0133)	(0.0136)	(0.0163)	(0.0159)	(1.1072)	(1.0963)	(223.9357)	(205.8233)
log(FDI)	0.0007	0.0012	0.0212	0.0174	-2.2356**	-2.3028**	-132.6419	-130.5083
	(0.0113)	(0.0113)	(0.0138)	(0.0133)	(0.9392)	(0.9141)	(190.6229)	(174.7312)
Tax_revenue	0.0021	0.0016	0.0003	0.0022	0.1480	0.1622	-29.3425	-41.9459
	(0.0016)	(0.0018)	(0.0019)	(0.0021)	(0.1308)	(0.1474)	(25.7959)	(26.3172)
Inflation	0.0030	0.0031	0.0023	0.0033	0.0674	0.0929	15.7234	4.3802
	(0.0023)	(0.0023)	(0.0028)	(0.0027)	(0.1897)	(0.1875)	(39.4136)	(36.7019)
Urbanization	0.0010	0.0009	0.0002	0.0004	0.0788	0.0845	-5.0024	-5.9963
	(0.0007)	(0.0007)	(0.0008)	(0.0008)	(0.0554)	(0.0543)	(11.5117)	(10.6895)
Dependency	-0.0019**	-0.0022**	-0.0010	-0.0009	-0.0063	-0.0318	25.2386*	13.1403
	(0.0008)	(0.0008)	(0.0009)	(0.0010)	(0.0642)	(0.0673)	(13.1008)	(12.9217)
Research_Development	0.5676***	0.5328***	0.5933***	0.5776***	45.6585***	43.0065***	8,512.6440***	8,013.7270***
	(0.1086)	(0.1101)	(0.1337)	(0.1288)	(9.0651)	(8.8799)	(1,775.4420)	(1,629.3450)
Industry_activity	-0.2090**	-0.1996**	0.0262	0.0262	-7.6148	-7.0357	-398.4371	-311.0669
	(0.0903)	(0.0904)	(0.1111)	(0.1058)	(7.5357)	(7.2969)	(1,546.1290)	(1,423.3040)
log(FVA):Education		0.0049*		0.0091***		0.6390***		122.8511***
		(0.0026)		(0.0030)		(0.2074)		(34.0178)
Constant	0.8494***	1.3069***	0.8135**	1.7565***	88.9779***	154.0667***	10,189.4800**	23,758.5400***
	(0.2847)	(0.3915)	(0.3503)	(0.4580)	(23.7570)	(31.5818)	(4,788.1610)	(5,669.6920)
Observations	87	85	87	85	87	85	68	67
R^2	0.9122	0.9172	0.8820	0.8990	0.8147	0.8361	0.8048	0.8454
Adjusted R^2	0.9006	0.9034	0.8665	0.8821	0.7903	0.8088	0.7706	0.8110
Residual Std. Error	0.0755 (df = 76)	0.0753 (df = 72)	0.0929 (df = 76)	0.0881 (df = 72)	6.2988 (df = 76)	6.0730 (df = 72)	1,067.2120 (df = 57)	970.7309 (df = 54)
F Statistic	78.9590*** (df = 10; 76)	66.4838*** (df = 12; 72)	56.8076*** (df = 10; 76)	53.3892*** (df = 12; 72)	33.4102*** (df = 10; 76)	30.6086*** (df = 12; 72)	23.5056*** (df = 10; 57)	24.6013*** (df = 12; 54)

Note: *p<0.1; **p<0.05; ***p<0.01

In sum, the two sets of statistical models lend strong support for our argument on domestic skills capacity as a result of a mix of GVC integration and deliberate government intervention in education. Except for the case of the association between backward participation and overall skills, we can confirm that the positive and statistically meaningful correlation between GVC participation and domestic skills capacity is highly contingent on a high share of government expenditure on education. It complements the conventional view on integration into GVCs itself as a driver of upgrading in skills composition of the workforce, technological advancement, or productivity growth. A series of work detailed in, for instance, Criscuolo and Timmis (2017), Schwörer (2013), and Taglioni and Winkler (2016) find that GVCs offer firms opportunities to get access to information for industrial upgrading and innovation or to take advantage of technological spillover by importing and processing sophisticated intermediate goods. They see that the enrichment of the skill set available in the GVC participating country depends to a large extent on the materialization of spillover effects and that firms are at the core of this process. In their view, it is firms who choose to specialize in specific tasks, invest in upgrading products and the process of the task based on knowledge and technology accumulated in imported inputs, and provide training to workers in the face of competition. On the other hand, there exist quite a few empirical studies that report no significant association between GVC participation and technology, knowledge, or productivity spillovers (Hatani, 2009; Barrientos et al., 2011; Blalock and Gertler, 2009; Lu et al., 2017; Wang et al., 2014). For instance, Blalock and Gertler (2009) on Indonesian manufacturers find that GVC participation alone does not guarantee spillovers nor benefits from foreign technologies, and spillover effects hinge on individual domestic firms' absorptive capacity represented by R&D investment. In this regard, Lee and Gereffi (2021) point out that innovation or upgrading of suppliers cannot be achieved merely through knowledge or technology transfer from lead firms but must be supported by intra-

firm measures such as internal training. They further highlight the efforts of domestic suppliers for “a wider search for necessary capabilities, and new and creative ways of combining discrete elements of innovation (Lee and Gereffi, 2021; p.12).”

On top of the apparent roles of firms, our empirical results point to the significance of what governments can carry out to support the growth of capabilities of domestic suppliers and, ultimately, a host economy to maximize knowledge and technology spillovers. It is the case not only for economies in the supplier position but also for those specializing as buyers in the value chain. For instance, while our study does not further detail the independent variable "*Skills*” into specific skill level or content, it can be assumed that an increase in education expenditure share in countries with strong forward linkages would potentially contribute to the broadening of a pool of high-skilled workers for more sophisticated cognitive tasks. For those with strong backward linkages in the supplier network, on the other hand, the maximization of spillover effects backed by government investment in education may contribute to the broadening of a pool of more mid- to high-skilled workers who can conduct sophisticated manufacturing tasks with newly introduced information and communication technologies, and ultimately to the moving up to higher value-adding tiers of GVCs.

7. Conclusion

GVC participation provides local firms with opportunities to access global markets and upgrade their production and business capacity through the transfer of new technologies. Local firms’ integration into GVCs offers new economic opportunities to the entire economy of a state as their specialization in specific tasks creates jobs, attracts investment, and increases the scale of production and exports. The focus on the central role of MNEs in governing complex global production networks often leaves the role of government aside from the discourse. Issues of the

accumulation of skills, such as spillover and training, also tend to be discussed within the firm-centered framework. However, drawing on the broader literature on trade openness and the size of government, this research features how GVC participation exerts influence on government spending and how increased consumption contributes to upgrading within GVCs. The cross-country statistical evidence confirms a strong correlation between GVC participation and government spending on education. As postulated in Hypothesis 1, secondary and tertiary-level education whose educational content and organization are concentrated more directly on employment and employable skills are more likely to have a significant and positive association with GVC openness. Another interesting finding is that the statistical significance and magnitude of the correlation between GVC participation and education expenditure and their impact on skills capacity differ significantly by the GVC linkages in which a state is positioned. It appears that the forward linkage-based GVC participation induces an increase in government expenditure on secondary and tertiary education more vibrantly. On the other hand, we can see from the results that countries integrated in GVCs mainly through backward linkages do not necessarily increase education expenditure share. It raises concerns about the potential widening of a gap in skills capacity between those performing higher value-added capital- and knowledge-intensive activities along the forward linkages and those taking part in low- to middle-skilled tasks with low-value content along the backward linkages. It may perpetuate current GVC governance structures as limited skills capacity can be a significant hindrance for local firms in lower tiers of GVCs to achieve functional and operational upgrading and move up the value chain. The findings presented in this paper also suggest that GVC participation is more likely to positively impact domestic skills capacity in countries whose share of education expenditure is high. It provides clues as to why many existing case studies find mixed evidence on the spillover effect of trade through GVC networks. From this research, we can assume that absorbing advanced technologies

and upgrading production and management depend not only on the capacity of individual firms in a host country but also on the capacity of an economy to mobilize a large pool of skilled workers. It suggests the state's less explicit but significant role as a facilitator within GVCs in addition to more direct and explicit roles that have been widely discussed in the literature, such as protecting intellectual property or implementing regulatory reforms. The state's investment in education is essential for local firms in the GVC networks to access a large pool of human resources to effectively absorb high technological contents embodied in imports or managerial expertise brought by dispatched workers from multinationals. Therefore, taking excessively firm-centric approaches to GVC and skills governance without considering the role of government in supporting the creation of competitive environments for GVC participation and upgrading may harm a state's long-term growth of trade within GVCs.

Bibliography

Adsera, A. and Boix, C. (2002). Trade, Democracy, and the Size of the Public Sector: The Political Underpinnings of Openness. International Organization, Vol. 56. pp. 229–262.

Alesina, A. and Wacziarg, R. (1998). Openness, Country Size and Government. Journal of Public Economics, Vol. 69, No. 3. pp. 305-321.

Baldwin, R. and Lopez-Gonzalez, J. (2013). Supply-Chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. No. w18957. National Bureau of Economic Research.

Bamber, P. and Gereffi, G. (2013). Costa Rica in the Aerospace Global Value Chain: Opportunities for Entry and Upgrading. Durham, NC: Centre on Globalization, Governance and Competitiveness.

Bamber, P., Fernandez-Stark, G. Gere- and A. Guinn (2013). Connecting Local Producers in Developing Countries to Regional and Global Value Chains Update. OECD Trade Policy Paper No. 160, OECD Publishing.

Banga, K. (2016). Impact of Global Value Chains on Employment in India. Journal of Economic Integration Vol. 31, No. 3. pp. 631–673.

Barrientos, S., Gereffi, G. and Rossi, A. (2011). Economic and Social Upgrading in Global Production Networks: A New Paradigm for a Changing World. International Labour Review, 150, pp. 319–340.

Benarroch, M. and Pandey, M. (2008). Trade Openness and Government Size. Econ. Lett, Vol. 101 No. 3. pp. 157–159.

Bhagwati, J. and Vivek, D. (1994). Freer Trade and Wages of the Unskilled — Is Marx Striking Again? in Bhagwati, J. and Kosters, M. (eds.), Trade & Wages. Washington D.C.: American Enterprise Institute.

Blalock, G. and Gertler, P.J. (2009). How Firm Capabilities Affect Who Benefits from Foreign Technology. Journal of Development Economics, Elsevier, Vol. 90, No. 2, pp. 192-199.

Block, F. (2008). Swimming Against the Current: The Rise of a Hidden Developmental State in the United States. Politics and Society, Vol. 36. pp. 169–206.

Cameron, D.R. (1978). The Expansion of the Public Economy: A Comparative Analysis. The American Political Science Review, Vol. 72. pp. 1243–1261.

Caselli, F, Koren, M, Lisicky, M and Tenreyro, S (2020). Diversification Through Trade. The Quarterly Journal of Economics, Vol. 135, No. 1. pp. 449–502.

Cavallo, E (2008). Output Volatility and Openness to Trade: A Reassessment. Economía, Vol. 9, No. 1. pp. 105–152.

Cavusgil, S. T. (1993). Globalization of Markets and Its Impact on Domestic Institutions. Indiana Journal of Global Legal Studies, Vol. 1, Iss. 1, Article 5.

Coe, N.M., Hess, M. and Yeung, H.W.C. (2004). Globalizing Regional Development: A Global Production Networks Perspective. Transactions of the Institute of British Geographers, 29. pp. 468–484.

Criscuolo, C. and Timmis, J. (2017). The Relationship Between Global Value Chains and Productivity. International Productivity Monitor, 32, pp. 61–83.

de Vries, G., Chen, Q., Hasan, R. and Li, Z. (2016). Skills and Activity Upgrading in Global Value Chains: Trends and Drivers for Asia. ADB Economics Working Paper Series. Asian Development Bank.

Donaghey, J., Reinecke, J., Niforou, C. and Lawson, B. (2014). From Employment Relations to Consumption Relations: Balancing Labor Governance in Global Supply Chains. Human Resource Management, Vol. 53, No. 2. pp. 229–252.

Epifani, P. and Gancia, G. (2008). Openness, Government Size and the Terms of Trade. The Review of Economic Studies, Vol. 76, No. 2. pp. 629-668.

Farole, T. (2016). Do Global Value Chains Create Jobs? IZA World of Labor.

Feenstra, R. (1998). Integration of Trade and Disintegration of Production in the Global Economy. Journal of Economic Perspectives, Vol. 12. pp. 31–50.

Fernandez-Stark, K. and Bamber, P. (2018). Promoting Skills, Jobs and Competitiveness in Global Value Chains: Policies and Practices for Developing Countries. In A. Sakamoto (Ed.), Skills and the Future of Work: Strategies for Future Growth in Asia Pacific. Bangkok: International Labour Organisation (ILO).

Fernandez-Stark, K., Bamber, P. and Gereffi., G. (2010). Workforce Development in Chile's Offshore Services Industry. Durham, N.C.: Duke University, Center on Globalization, Governance & Competitiveness.

Fernandez-Stark, K., Bamber, P. and Gereffi., G. (2011). The Offshore Services Global Value Chain: Economic Upgrading and Workforce Development. Durham, NC: Center on Globalization, Governance & Competitiveness, Duke University.

Fernandez-Stark, K., Bamber, P. and Gereffi., G. (2013). Costa Rica in the Offshore Services Global Value Chain: Opportunities for Upgrading. Durham N.C.: Center on Globalization, Governance and Competitiveness. Commissioned by the Costa Rican Ministry of Foreign Trade.

Friedman, T. (2005). The World Is Flat: A Brief History of the Twenty-First Century. New York: Farrar, Straus, and Giroux.

Garrett, G. (1995). Capital Mobility, Trade, and the Domestic Politics of Economic Policy. International Organization, Vol. 49. pp. 657–687.

Garrett, G. (1998). Partisan Politics in the Global Economy. New York: Cambridge University Press.

Gereffi, G. (1994). The Organization of Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks, in Gereffi, G. and Korzeniewicz, M. (eds.), Commodity Chains and Global Capitalism. pp. 95–122. Praeger Publishers.

Gereffi, G. (1995). Global Production Systems and Third World Development, in Stallings, B. (eds.), Global Change, Regional Response: The New International Context of Development. pp. 100–142. Cambridge; New York and Melbourne: Cambridge University Press.

Gereffi, G. (1999). International Trade and Industrial Upgrading in the Apparel Commodity Chain. Journal of International Economics, Vol. 48, No. 1. pp. 37–70.

Gereffi, G. (2005). The Global Economy: Organization, Governance, and Development, in Smelser, N.J. and Swedberg, R. (eds.), The Handbook of Economic Sociology. pp. 160–182. 2nd edition, Princeton, NJ: Princeton University Press.

Gereffi, G. and Memedovic, O. (2003). The Global Apparel Value Chain: What Prospects for Upgrading for Developing Countries. Sectoral Studies Series. Vienna, Austria: United Nations Industrial Development Organization (UNIDO).

Gereffi, G. and Sturgeon, T. (2013). Global Value Chains and Industrial Policy: The Role of Emerging Economies, in Elms, D. and Low, P. (eds.), Global Value Chains in a Changing World. pp. 329–360. Geneva: World Trade Organization (WTO).

Gereffi, G., Fernandez-Stark, K. and Psilos, P. (2011). Skills for Upgrading: Workforce Development and Global Value Chains in Developing Countries. Durham, N.C.: Duke Center on Globalization, Governance and Competitiveness and the Research Triangle Institute.

Gereffi, G., Humphrey, J. and Sturgeon, T. (2005). The Governance of Global Value Chains. Review of International Political Economy, Vol. 12, No. 1. pp. 78–104.

Gourevitch, P. (1978). The Second Image Reversed: The International Sources of Domestic Politics. International Organization, Vol. 32. pp. 881-912.

Grossman, G. M., and Rossi-Hansberg, E. (2008). Trading Tasks: A Simple Theory of Offshoring. American Economic Review, Vol. 98, No. 5. pp. 1978–1997.

Hatani, F. (2009). The Logic of Spillover Interception: The Impact of Global Supply Chains in China. Journal of World Business, Vol. 44, No. 2. pp. 158–166.

Helpman, E. (1984). A Simple Theory of International Trade with Multinational Corporations. Journal of Political Economy, Vol. 92, No. 3. pp. 451–471.

Helpman, E., M. J. Melitz and Stephen R. Y. (2004). Export Versus FDI with Heterogeneous Firms. American Economic Review, Vol.94, No.1, pp. 300-316.

Hiratsuka, D. (2013). Case Analysis: The Production Networks of Hard Disk. Paper presented at the Regional Conference on Integrating Domestic Industries with Global Production Networks and Supply Chains, Singapore.

Horner, R and Alford, M (2019). The Roles of the State in Global Value Chains: An Update and Emerging Agenda. GDI Working Paper, 2019-036. Manchester: The University of Manchester.

Hummels, D., Ishii, J. and Yi, K.M. (2001). The Nature and Growth of Vertical Specialization in World Trade. Journal of International Economics, Vol. 54, No. 1. pp. 75–96.

Humphrey, J. (2004). Upgrading in Global Value Chains. ILO Working Paper, No. 28.

Humphrey, J. and Schmitz, H. (2002). How Does Insertion in Global Value Chains Affect Upgrading in Industrial Clusters? Regional Studies, Vol. 36, No. 9. pp. 1017–1027.

Ibrahim, T. M. (2015). The Causal Link Between Trade Openness and Government Size: Evidence from the Five Largest Economies in Africa. International Journal of Business and Economic Sciences Applied Research, ISSN 2408-0101. Eastern Macedonia and Thrace Institute of Technology, Kavala, Vol. 8, Iss. 1. pp. 121-135.

Islam, M.Q. (2004). The Long Run Relationship Between Openness and Government Size: Evidence from Bounds Test. Applied Economics, Vol. 36. pp. 995–1000.

Iversen, T. and Cusack, T. (2000). The Causes of Welfare State Expansion. World Politics, Vol. 52. pp. 313–349.

Katzenstein, P.J. (1985). Small States in World Markets: Industrial Policy in Europe. Ithaca, N.Y.: Cornell University Press.

Keohane, R. and Milner, H. (1996). Internationalization and Domestic Politics. New York: Cambridge University Press.

Kolluri, B.R., Panik, M.J. and Wahab, M.S. (2000). Government Expenditure and Economic Growth: Evidence from G7 Countries. Applied Economics, Vol. 32, No. 8, pp. 1059–1068.

Korwatanasakul, U., Baek, Y. and Majoe, A. (2020). Analysis of Global Value Chain Participation and the Labour Market in Thailand: A Micro-level Analysis. ERIA Discussion Paper Series, No. 331.

Kowalski, P., Lopez-Gonzalez, J. Ragoussis, A. and Ugarte, U. (2015). Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies. OECD Trade Policy Paper 179, OECD Publishing, Paris.

Kueh, S.H., Puah, C.H. and Apoi, A. (2008). Outward FDI of Malaysia: An Empirical Examination from Macroeconomic Perspective. Economic Bulletin, Vol. 6. pp. 1-11.

Lamartina, S. and Zaghini, A. (2010). Increasing Public Expenditures: Wagner's Law in OECD Countries. German Economic Review, Vol. 12, No. 2, pp. 149-164.

Leamer, E.E. (1996). In Search of Stopler-Samuelson Effects on U.S. Wages. NBER Working Paper Series No. 5427. Cambridge: National Bureau of Economic Research.

Lee, J. and Gereffi, G. (2021). Innovation, Upgrading, and Governance in Cross-Sectoral Global Value Chains: The Case of Smartphones. Industrial and Corporate Change, Vol. 30, No. 1, pp. 215–231.

Levy, D. L. (2008). Political Contestation in Global Production Networks. Academy of Management Review, 33.

Lu, Y., Tao, Z. and Zhu, L. (2017). Identifying FDI spillovers. Journal of International Economics, Vol. 107, pp. 75–90.

Mansfield, E. and Busch, M. (1995). The Political Economy of Nontariff Barriers: A Cross National Analysis. International Organization, Vol. 49. pp. 723–749.

Mansfield, E., Milner, H. and Rosendorff, B.P. (2000). Why Democracies Cooperate More: Electoral Control and International Trade Agreements. International Organization, Vol. 56. pp. 477–513.

Mayer, F.W. and Phillips, N. (2017). Outsourcing Governance: States and the Politics of A 'Global Value Chain World. New Political Economy, Taylor & Francis Journals, Vol. 22, No. 2. pp. 134–152.

Melitz, M.J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. Econometrica, Vol.71, No.6, pp. 1695-1725.

Milner, H. (1988). Resisting Protectionism. Princeton, NJ: Princeton Univ. Press.

Milner, H. (1999). The Political Economy of International Trade. Annual Review of Political Science, Vol. 2. pp. 91–114.

Milner, H. and Keohane, R. (1996). Internationalization and Domestic Policy: An Introduction, in Keohane, R.O. and Milner H.V. (eds), Internationalization and Domestic Politics, Cambridge: Cambridge University Press.

Milner, H. and Kubota, K. (2005). Why the Move to Free Trade? Democracy and Trade Policy in the Developing Countries. International Organization, Vol. 43, No. 2. pp. 239–272.

Milner, H. and Mukherjee, B. (2009). Democratization and Economic Globalization. Annual Review of Political Science, Vol. 12. pp. 163–181.

Molana, H., Montagna, C., Violato, M. (2004). On the Causal Relationship between Trade-openness and Government Size: Evidence from 23 OECD Countries. University of Dundee Discussion Paper, No. 164.

Pegoraro, D., De Propris, L. and Chidlow, A. (2021). Regional factors enabling manufacturing reshoring strategies: A case study perspective. Journal of International Business Policy.

Ponte, S., and Sturgeon, T. (2014). Explaining Governance in Global Value Chains: A Modular Theory-Building Effort, Review of International Political Economy, Vol. 21, No. 1. pp. 195-223.

Ramirez, P. and Rainbird, H. (2010). Making the Connections: Bringing Skill Formation into Global Value Chain Analysis. Work, Employment and Society, Vol. 24, No. 4. pp. 699–710.

Rodrik, D. (1997). Has Globalization Gone Too Far? Washington, DC: Institute for International Economics.

Rodrik, D. (1998). Why Do More Open Economies Have Bigger Governments? Journal of Political Economy, Vol. 106, No. 5. pp. 997–1032.

Rodrik, D. (2018). New Technologies, Global Value Chains, and the Developing Economies. Pathways for Prosperity Commission Background Paper Series; no. 1. Oxford. United Kingdom.

Rudra, N. (2002). Globalization and the Decline of the Welfare State in Less-Developed Countries. International Organization, Vol. 56, No. 2. pp. 411–445.

Ruggie, J. (1982). International Regimes, Transactions, and Change: Embedded Liberalism in the Postwar Economic Order. International Organizations, Vol. 36. pp. 379–415.

Rugman, A.M. and Verbeke, A. (2004). A Perspective on Regional and Global Strategies of Multinational Enterprises, Journal of International Business Studies, Vol. 35, No. 1. pp. 3-18.

Scheve, K. and Slaughter, M. (2001). What Determines Individual Trade Policy Preferences? Journal of International Economics, Elsevier, Vol. 54, No. 2. pp. 267–292.

Schwörer, T. (2013). Offshoring, Domestic Outsourcing and Productivity: Evidence for A Number of European Countries. Review of World Economics, Vol. 149, No. 1. pp. 131–149.

Shelton, C.A. (2007). The Size and Composition of Government Expenditure. Journal of Public Economics, Vol. 91. pp. 2230–2260.

Spilerman, S. (2009). How Globalization Has Impacted Labour: A Review Essay. European Sociological Review, Vol. 25, No. 1. pp. 73-86.

Taglioni, D. and Winkler, D. (2016). Making Global Value Chains Work for Development, Vol. Trade and Development series, Washington, DC: World Bank.

Tajoli, L. and Felice, G. (2018). Global Value Chains Participation and Knowledge Spillovers in Developed and Developing Countries: An Empirical Investigation. The European Journal of Development Research, Vol.30, No.3. pp. 505-532.

Urata, S. and Baek, Y. (2019). The Determinants of Participation in Global Value Chains: A Cross-Country, Firm-Level Analysis. ADBI Working Paper 1116. Tokyo: Asian Development Bank Institute.

Wang, J., Wei, Y., Liu, X., Wang, C. and Lin, H. (2014). Simultaneous Impact of the Presence of Foreign MNEs on Indigenous Firms' Exports and Domestic Sales. Management International Review, Vol. 54, No. 2. pp. 195–223.

Wu, A.M., Lin, M. (2012). Determinants of Government Size: Evidence from China. Public Choice, Vol. 151. pp. 255–270.

Zimmer, A. and Toepler, S. (1996). Cultural Policies and the Welfare State: The Cases of Sweden, Germany, and the United States. The Journal of Arts Management, Law, and Society, Vol.26, No. 3. pp. 167–193.

Appendix I. Summary statistics

Variable	N	Mean	Std. Dev.	Min	Max
GVC	126	45,177,459,524	109,759,842,921	29,900,000	797,000,000,000
FVA	126	23,355,806,587	57,696,354,854	6,630,000	446,000,000,000
DVX	126	21,849,961,111	57,364,261,691	14,400,000	395,000,000,000
Trade	124	69,246,000,000	154,768,000,000	18,000,000	979,486,000,000
Education	124	4.4	1.7	1.4	13
Health	124	6.7	2.7	2	16
Social_protection	56	12	6.6	0.6	24
Primary	123	1.4	0.65	0.018	4.1
Secondary	126	1.5	0.7	0.37	4.5
Tertiary	107	0.34	0.29	0.0052	1.1
Primary_population	118	3645723	12019548	4865	123736611
Secondary_population	119	4335299	15797845	5955	165407401
Tertiary_population	120	3066120	10522986	4075	109474762
GDP	126	379,014,654,382	1,470,305,802,927	564,267,790	1,532,410,000,0000
FDI	122	10,972,357,280	30,557,997,499	592,378	211,544,000,000
Tax_revenue	96	17	7.4	3.1	50
Inflation	119	5.6	4.3	-0.21	24
Dependency	122	61	18	32	108
Urbanization	126	59	24	9.4	100
Population	126	33763109	109321940	29316	1147129506
Skills	114	0.5	0.25	0.029	0.99
ICT	113	0.45	0.26	0.058	0.95
Researcher_per_mill	90	1908	2148	15	7329
Research_Development	113	0.3	0.25	0.0036	0.98
Industry_activity	113	0.54	0.19	0.22	1

Appendix II. Trade and education expenditure

Trade openness and education expenditure

	Dependent variable:		
	Primary	Secondary	Tertiary
	(1)	(2)	(3)
log(Trade)	0.0447	0.1584	0.0640
	(0.0872)	(0.1032)	(0.0455)
log(GDP)	0.0784	-0.0732	-0.1183*
	(0.1150)	(0.1427)	(0.0612)
log(Population)	-0.8155***	-0.1580	0.5592**
	(0.1934)	(0.4513)	(0.2178)
log(FDI)	-0.1106	-0.0697	-0.0307
	(0.0674)	(0.0796)	(0.0331)
Tax_revenue	0.0401***	0.0390***	-0.0018
	(0.0091)	(0.0109)	(0.0049)
Inflation	-0.0118	-0.0122	0.0023
	(0.0131)	(0.0154)	(0.0067)
Urbanization	0.0006	0.0050	0.0089***
	(0.0041)	(0.0048)	(0.0022)
Dependency	0.0044	-0.0046	-0.0028
	(0.0058)	(0.0056)	(0.0024)
log(Primary_population)	0.7990***		
	(0.1796)		
log(Secondary_population)		0.1714	
		(0.3976)	
log(Tertiary_population)			-0.5164**
			(0.1985)
Constant	2.7023	2.9537	1.0309
	(1.6440)	(1.8468)	(0.8643)
Observations	88	89	80
R^2	0.4710	0.3671	0.4515
Adjusted R^2	0.4100	0.2950	0.3810
Residual Std. Error	0.4649 (df = 78)	0.5504 (df = 79)	0.2233 (df = 70)
F Statistic	7.7164*** (df = 9; 78)	5.0919*** (df = 9; 79)	6.4020*** (df = 9; 70)
Note:			*p<0.1; **p<0.05; ***p<0.01

Chapter 3

Decision to Privatize: Conditions for the Privatization of Primary Education

Jaewon Kim

Abstract

Primary education used to be under tight government control but has increasingly become no exception to a privatization trend to mitigate budgetary constraints and improve the quality of educational services. At the same time, privatization of primary education has been deeply controversial and contested for being a threat to upholding the right to education. This paper systematically analyzes the political, economic, and institutional conditions under which states transfer regulatory authority and responsibilities for primary education services to the private sector. This paper tests six hypotheses regarding the factors affecting states' privatization policy: democracy, state capacity to control corruption, financial constraints, and urbanization. The analysis by state income level suggests that primary education privatization depends largely on the readjustment of domestic political and economic representations. The dynamics between the four factors and privatization in developed and developing countries appear notably different and even opposite in some cases.

Keywords: Privatization; education financing; public goods; democracy; corruption control; economic globalization.

JEL classification: H52, H11, H60, I22, F15, O16.

1. Introduction

Privatization of public goods, once heavily criticized for its purported negative impacts such as perverse income redistribution, has become a central policy measure in most sectors over the last few decades. Transferring the ownership of nationalized industries to private entities has spurred across developed economies, notably since the 1980s when the United Kingdom successfully launched the extensive privatization of its privatized state-owned enterprises. It soon became a popular strategy in many developing economies as well to enhance economic performance. The main argument for the shift in state ownership to the private sector has been that the use of resources by public bureaucracies is inefficient, and market-driven management by private businesses improves their efficient allocation and management. Grounded in neoliberal approaches, introducing free market competition among private actors has been expected to improve the quality of services and lower prices while mitigating a heavy financial burden on the state.

To date, numerous empirical evaluations on privatization outcomes have documented mixed results. Earlier studies that measured the financial and operating performance of state-owned enterprises (SOEs) and private firms, such as Boardman and Vining (1989) and Majumdar (1996), confirmed that private firms are likely to be more productive and profitable than SOEs. A series of empirical studies have followed them, indicating better performance of privatized SOEs than non-privatized SOEs (D'Souza and Megginson, 1999; Frydman et al., 1999; Nellis, 1999; Shleifer, 1998). However, there has also been widespread public criticism and discontent with privatization concerning its negative consequences on welfare and equity (Nellis, 2006; Cuadrado-Ballesteros and Peña-Miguel, 2018). While efficiency gains through privatization are

still considered positive (Shahraki, 2011; Zhao, 2013), many recent studies also take a skeptical view of 'privatization as a purely effective remedy' for a state's agency problems. From job insecurity (Michailidis and Efstathiou, 2015) and unemployment (Naito, 2013) to unequal access to resources (Streeck, 2014), a wealth of empirical research has identified that privatization does not necessarily translate into improvements in macroeconomic performance in both developed and developing economies.

Education, widely considered to have strong public good components, used to be under tight government control but has become no exception to such a privatization trend. Schools at all education levels have become increasingly privatized through, for instance, charter schools and voucher programs to mitigate prolonged budgetary constraints, improve the quality of educational services, increase equity and efficiency, and ultimately enhance learning outcomes (Belfield and Levin, 2002; Verger et al., 2016; Chakrabarti and Peterson, 2009). Many developing countries whose public education system remains low-quality or hardly accessible have witnessed an upsurge of low-fee private schools (LFPS). However, education becoming privatized has been deeply controversial and contested for being a threat to upholding the right to education. The essence of privatization that makes "the public sector more like businesses and more business-like (Ball and Youdell, 2008; p. 9)" has stirred considerable opposition due to concerns surrounding free quality basic education as a fundamental human right that is supposed to be guaranteed for everyone. Furthermore, as in Verger et al. (2016, p.3), education privatization is "a policy that runs the risk of undermining educational equity, and whose presupposed benefits—whether in terms of efficiency or quality gains—have not been empirically and rigorously tested."

Hence, existing literature has focused to a large extent on the reviewing of the consequences of education privatization (e.g., Harrison, 2005; Rizvi, 2016; Lubienski, 2006; Ashley et al., 2014). On the other hand, we lack a comprehensive understanding of political and economic factors promoting or limiting the privatization of such services that entail sensitive public good components. While a few conceptually discuss the causes of education privatization addressing the demand-side and supply-side pressures (Belfield and Levin, 2002; Crnkovic and Pozega, 2008), it is still not established through which dynamics the ownership of once strictly state-led education governance is shared with nonstate actors and private ownership is constituted. This paper aims to provide a systematic analysis of the political, economic, and institutional conditions under which states transfer regulatory authority and responsibilities for producing and delivering educational services to the private sector. The central focus of this paper is deliberately put on primary education privatization. Compared to other levels or types of education, such as secondary, tertiary, or vocational education, primary education has been recognized to be more strongly linked to fundamental human rights, equality, and welfare, and thus known to have more solid public good components (UNICEF, 2007; UNESCO, 2019). Therefore, examining the determinants of primary education privatization is expected to contribute to conceptualizing the complex interplay between states and private actors reshaping governance authority.

This paper proposes six hypotheses regarding the factors affecting states' decision to privatize primary education: *democracy; state capacity to control corruption; income inequality; burden of education financing; urbanization*; and *integration into global value chains (GVC)*. To test the hypotheses, this paper uses cross-sectional data from 111 countries for which all the requisite data exist between 2011 and 2020. According to the United Nations' income level-based

country classification, 111 countries are divided into developed (40 countries) and developing country (71 countries) groups. Developing countries are likely to be more constrained by a lack of access to financial resources to ensure universal primary education, and the rapid growth of LFPS partially confirms this. On the other hand, private primary schools expanding in developed countries are usually not LFPS but, in many cases, elite schools with high tuition fees. The net enrolment rate in primary education in most of these countries has also reached nearly 100 percent, while there is a considerable gap in the developing world. Such different settings allow us to expect that the conditions and driving forces of primary education privatization would vary significantly by income level. Therefore, it is reasonable to assume that an analysis based on aggregated data encompassing both developing and developed countries would result in a distorted interpretation of the political and economic conditions for primary education privatization.

The subsequent section reviews how the literature has addressed the emergence of privatization mechanisms and its expansion to the education sector. Section 3 describes and discusses the main hypotheses and is followed by Section 4, which details data and model specifications. The following section discusses the results obtained through statistical modeling. Then, Section 6 provides a brief comparative analysis of the privatization patterns in three countries in Southeast Asia, namely Cambodia, Thailand, and Singapore, that represent different income groups, and the final section concludes.

2. Privatization of Primary Education: Context and Literature

2.1 Privatization

Over recent decades, both theoretical and empirical studies devoted to privatization have rapidly grown as much as the adoption of privatization schemes has become popular across the globe.

The early contributions to the related literature are largely an elaboration of the principal-agent approaches to ownership and delegation. As Sappington and Stiglitz (1987) argue, the choice between public and private entities for the provision of goods and services entails the issues of substantial delegation of responsibility. The principal-agent theory is a relevant theoretical framework to examine the scope of the public sector roles and responsibilities and the inherent limits of government (Cavaliere and Scabrosetti, 2006; Martimort, 2006). This section reviews the development of studies within the literature on the association between privatization and efficiency by examining those influenced by the principal-agent model.

In their seminal paper *Privatization, Information and Incentives*, Sappington and Stiglitz (1987) define the motivations for the governments choosing among alternative forms for the production of goods and services: economic efficiency; fulfilling of distributional objectives (equity); and maximum rent extraction. Based on the 'fundamental privatization theorem' they examine conditions under which these motivations are realized *perfectly* by particularly highlighting an auction system among potential producers for the right to provide the good. The fundamental privatization theorem refers to the situation where public production cannot do better than private production when the auction is properly designed. They claim that "with the risk neutral firms initially sharing symmetric beliefs about costs, the bidding procedure will guarantee that no rents accrue to the producer. Thus, the government can ensure the ideal outcome via delegation of production, even though it has no knowledge of the production technology (Sappington and Stiglitz, 1987; p.570)." In other words, when the governments can be guaranteed that production is undertaken by those with a comparative advantage and competence and that the goals of equity and maximum rent extraction are reached at the same time, they can always choose to delegate production functions to the private sector by using an auction system.

However, they also attach some conditions to explain why the government's objectives are difficult to achieve *perfectly* in practice: namely, risk aversion, limited competition, and the informed principal. The core assumption of the Theorem is that potential producers with better knowledge and information on production technology are also not averse to risk. In reality, however, private producers who know better about the technology of production can sometimes be more averse to potential risk than the government does. The government then must pay risk premia to delegated producers, which reduces the incentives for more efficient performance captured by the government and consequently dilutes the advantage of delegating. Limited competition refers to the situation where an insufficient number of competitors participate in the bidding process and the government cannot foster more competitive bidding. On the other hand, the issue of informed principal occurs when, unlike general assumptions, potential producers (the agent) have less information than the government (the principal). Potential producers will be discouraged from participating in bidding once they know the government is well-informed, as they expect the government to be capable of setting a minimum that is equal to the good's expected value.

The work by Sappington and Stiglitz has been followed by studies focusing on information, such as those on asymmetric information between the principal and the agent or more specifically information flows along hierarchical relationships within the principal group. Shapiro and Willig (1990) and Schmidt (1990) discuss the intrinsic differences between public ownership and regulation of a private firm based on incentives and more fundamentally on available information. According to them, one of the benefits of public ownership is that the government has better information about the cost of a nationalized firm than about a privatized firm. Therefore, the government does not have to pay an informational rent to the state-owned

firm. Shapiro and Willig (1990) elaborate that reduced information can act as a barrier to government members who pursue their own objectives. From their view, governments are sometimes *malevolent* and may try to achieve their own goals in a context in which all the information about the firm is available. Privatization, on the other hand, would leave them with informational limitations as the regulator of the privatized firm can only obtain information indirectly. Hence, it hinders them from pursuing their private objectives, and consequently increases efficiency.

A controversial issue here is that discussing the benefits of privatization necessitates the assumption of a malevolent government (Cavaliere and Scabrosetti, 2006). While similar to the perspective of Shapiro and Willig (1990), the argument put forward by Schmidt (1990) and Laffont and Tirole (1993) eliminates the assumption that the government is malevolent. They assume that the managers of the state-owned firm are less likely to be motivated to reduce costs as they hardly gain incentives for doing so but tend to face fewer budget constraints as the government always subsidizes costs to ensure the ex-post efficient production level. On the other hand, the managers at the privatized firm are highly motivated to reduce production costs as they have better incentives to invest to lower costs. In some cases, however, it would lead them to significantly reduce the ultimate production level, which can ultimately affect society negatively.

Taken together, the literature on privatization and efficiency generally describes some core traditional principal-agent problems related to risk-bearing, incentive structure, and monitoring and regulation. When it is applied to the case of privatization in developing countries that are increasingly adopting the privatization scheme, there is a possibility that their relatively weaker governance capacity would make those problems worse and lead to the failure of privatization. Dharwadkar et al. (2000) claim that the traditional agency problems within the

principal-agent framework that developing countries are likely to face in the process of privatization are intensified by ineffective governance mechanisms and limited protection of minority shareholders. As they further point out, effective governance mechanisms in developed countries offer privatized firms more systematic solutions to tackle agency problems, while “the weak governance context in emerging economies limits the viability of such solutions (Dharwadkar et al., 2000; p.651)." To date, it is still the case that the limited governance capacity matters for many developing countries when they design and implement the privatization policy, and the traditional agency problems that are intensified by such limited capacity have become a barrier to more extensive privatization. Therefore, it is pertinent to examine how the government perceives such agency problems, possible structural solutions, the dynamics of governance issues, and their impact on the privatization initiatives by income level.

2.2 Engagement of the private sector in education

One of the characteristics of the neoliberal approach to education is integrating its production and services into the market. The policy reforms under neoliberalism are conceptually grounded on two core mechanisms: the privatization of assets that the public sector has traditionally mobilized and emphasis on the system of choice and competition as operating principles of the provision of public services (Fitz and Hafid, 2007). Neoliberalists have claimed that education can also be regarded as a typical product or service that can be purchased and traded in the marketplace. It has been against the orthodox view among scholars and practitioners for a long time that the state should be the major actor responsible for financing, producing, and delivering educational services. The emerging neoliberal patterns of market-based relationships between educational institutions and users (or clients) have resulted in radical structural adjustment of education systems.

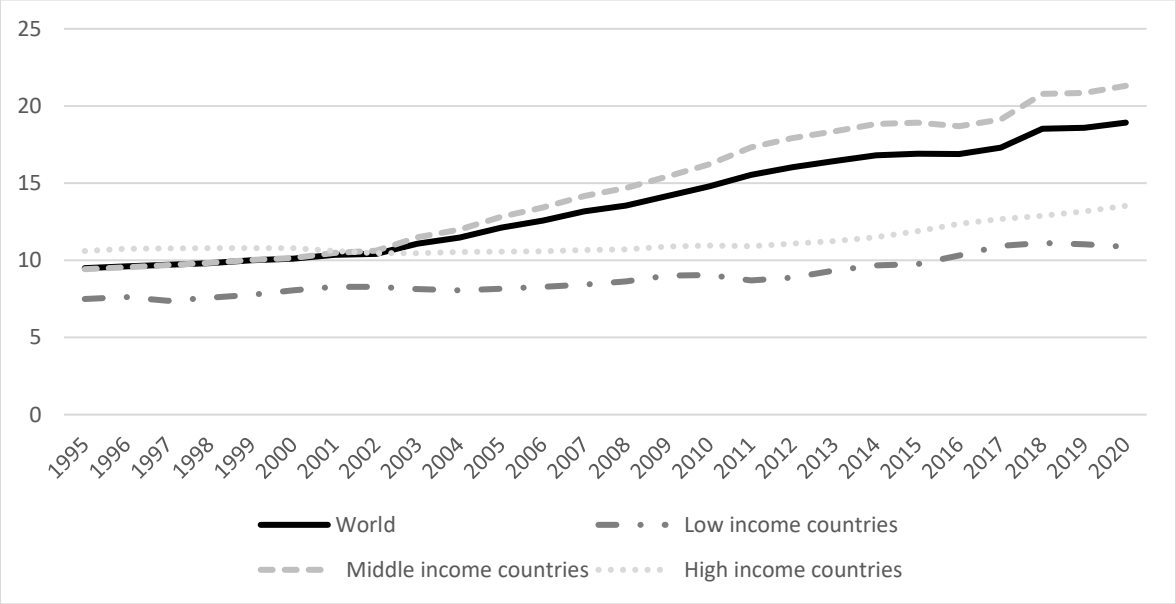
Neoliberal reforms to education can be generally described as the marketization of financing and provision of educational services, with the central aims to enhance efficiency and stability and ensure responsiveness to specific labor market demand (Anderson, 2008). The specific rationale put forward is that the labor force needs of a new economy are shaped particularly within the parameters of expediting globalization and technological advancement and, therefore, can no longer be served satisfactorily under the traditional educational framework (Levidow, 2002). The neoliberal doctrine also advocates transferring educational services into private ownership (Whitty and Power, 2000). Privatization of education through reformed policy tools such as voucher programs or charter schools has also been inserted into vocational education to ensure financial stability and raise the quality of education by encouraging competition among providers in the public and private sectors. According to Anderson (2008), international actors such as the OECD and the World Bank have strongly advocated such a neoliberal market-based and demand-driven model for education, and the World Bank in particular has become an enthusiastic architect of the model.

However, neoliberalists' enthusiasm for the privatization of education and the market dynamics entrenching in educational systems has fueled the heated debate on how and to what extent such market principles should be applied to education (Colclough, 1996; Raduntz, 2005) or, more fundamentally, whether the marketization of education is good or bad (Alan and Gunby, 2003; Bartlett et al., 2002; Dei and Karumanchery, 1999; Lynch, 2006). The distinctive feature of the neoliberal approach particularly to primary education is that concerns over introducing market mechanisms are far more widespread and significant than those on upper education levels, for its traditionally public good-intensive nature and direct linkages to fundamental human rights. For instance, the inherent nature of higher or vocational education that straddles the boundary

between the public and private sectors makes it relatively more prone to adopting privatization measures than other education sectors and less controversial when market principles such as deregulation are applied (Education lnternational, 2008).

On the one hand, the primary education sector has become a proactive adopter and beneficiary of privatization schemes in many countries over the past few decades. Privatization has significantly contributed to the realization of ambitious national and international plans for universal access to primary education articulated in the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs) (UNESCO, 2015). Figure 1 below shows that the share of enrolment in private primary education institutions has doubled between 1995 and 2020. It has increased drastically, particularly since the early 2000s when the MDGs set ensuring completion of a full course of primary schooling as one of the main targets to be achieved by 2015. An income-level analysis further indicates that primary education has become privatized at a particularly notable pace in middle-income countries. Compared to less than 10 percent in 1995, enrolment in private primary schools in middle-income countries reached above 21 percent in 2020, which is higher than the world average of 19 percent. With an upsurge of private primary schools, the financial and administrative burden on the states to provide universal educational opportunities has decreased (Andrabi et al., 2015; Tooley et al., 2007; Tulloch et al., 2014).

Figure 1. The growth of enrolment in private primary schools, 1995-2020



Source: Author's construction based on the UNESCO Institute for Statistics (http://data.uis.unesco.org/)

Many theoretical and empirical studies also support the argument that private primary schools provide higher quality educational services than public schools. For instance, Andrabi et al. (2008) on Pakistan, Tooley et al. (2011) on Nigeria, and Kingdon and Banerji (2009) on rural India find a high level of consistency in the findings that teaching quality represented by teacher-pupil ratio or time spent on teaching activity appears to be better in private primary schools. UNESCO (2015) also explains that higher financial resources of private schools through the receipt of tuition fees and additional private funding may lead to better conditions for private school teachers. Another commonly accepted argument by advocates of education privatization is the private sector's responsiveness to customer demand and higher innovativeness. Improved responsiveness to local or individual educational demands is expected to result from market-type competition among multiple providers. In accordance with this assumption, Edwards and Whitty (1992, p. 112) claim that the privatization of education allows service provision and delivery to be more diverse and flexible and respond to the "growing heterogeneity, fragmentation, and

difference in modern societies." Shleifer and Vishny (1998) also assert that private schools may be constrained less by strict rules on administration and management but are freer to utilize flexible incentive schemes or various input combinations to meet the demands of parents and students.

On the other hand, another line of research raises doubts over whether relying on private entities can lead to more rapid and effective universalization particularly of primary education. Some argue that greater emphasis on private schooling may rather lead to the undersupply of primary education services as individuals are likely to become interested only in personal return (Stiglitz, 1999; Smith and Joshi, 2016). Others questioning the role of LFPS in widening basic education opportunities claim that the poorest or the most marginalized often remain neglected despite the growth of LFPS, as the majority of such schools are located in urban areas, and even those with the lowest fees are in many cases cost prohibitive for poor households (Ashley et al., 2014; Woodhead et al., 2013; Harma, 2009; Chimombo, 2009). An increasing number of recent empirical studies also highlight the poorer environment of private primary schools. Many reviews state that low salaries, high turnover, and under-qualification of teachers in LFPS have become a concern in many developing countries. Regarding teacher salaries, Bhatta and Pherali (2017) indicate that most teachers in LFPS in Nepal are given temporary contracts without additional social benefits such as pension funds or insurance. The observed gap between teacher salaries in LFPS and public schools in some areas of Ghana (Riep, 2014) and India (Kamat et al., 2016) is even greater, which is only around 15-25 percent of the salaries of public school teachers. Another issue raised concerning low salaries is teachers' qualifications (Verger et al., 2016). To keep wages low, many low-fee private institutions tend to hire teachers with short teaching experience or even without a teaching license (Bhatta and Pherali, 2017; Riep, 2014).

Quite aside from the arguments regarding economic or functional effectiveness, another aspect of primary education privatization that sparks more fierce controversy is its potential threat to the universality of the right to free, quality basic education and, more fundamentally, to equality. The basic premise of opposing primary education privatization based on the rights-based approach is that markets are inevitably inequitable as goods and services are distributed unequally (Willmore, 2004; Tomasevski, 2003; Hawley, 1995). Under this framework, states are "the optimal provider and financier of education (Menashy, 2014; p.15)" and, therefore, must remain the central duty bearer (Archer, 2006; Tomasevski, 2003). As Willmore (2004) puts it, the provision of equal access to primary education that can be guaranteed only by the government contributes to equality within primary education itself and equality of further access to secondary and higher education. When individuals become habituated to the freedom to choose schools in the early stage of education, there is a possibility that "they will sort themselves by social class, ethnic group or level of ability, thereby harming those who end up in schools filled with students of low social origin and limited intellectual talent (Willmore, 2004; p.20)."[6]

Privatization in the primary education sector has been a particularly contentious policy issue that has come to the fore of a heated debate within development circles. It may explain why enrolment rates in private primary schools vary significantly even among countries with similar degrees of financial burdens for education. So far, however, studies have relied significantly on individual case studies or qualitative assessments. Hence, a cross-country empirical analysis of political, economic, and international dynamics around the privatization of the sector whose

[6] Willmore (2004), however, adds that public schools also do not necessarily ensure equality of educational opportunity as students are sorted by their place of residence which is affected heavily by social class or ethnic identity.

public value is incomparably substantial is expected to contribute to a better understanding of state governance and complex interdependence between the state and private actors.

3. Conditions for Primary Education Privatization: Hypotheses

3.1 Democracy

Conventionally, it has been considered that authoritarian regimes without much political burden for reelection or popularity are likely to privatize more (Kelly, 1996; Gould, 2005) as rulers are "able to ignore societal interests opposed to economic measures that impose austerity (Biglaiser and Danis, 2002; p.84)." Authoritarian governments, in general, have a greater capacity to oppress protestors, civil servants, or labor unions that are often against privatization reforms (Beinen and Waterbury, 1989). Their political opponents with limited political space are easily excluded from the privatization decisions and processes (Gould, 2005). González et al. (2020) further highlight how authoritarian rulers maintain political and economic power by deliberately transferring state ownership to politically connected corporations. Their case study on the Pinochet regime's privatization in Chile illustrates that the sale of SOEs in dictatorships to certain political firms connected to Pinochet enabled privatized firms to form dynamic political connections, which later significantly affected the functioning of succeeding governments. Some empirical studies, however, offer competing explanations for the effects of regime type on the privatization movement. An earlier investigation by Biglaiser and Danis (2002) on privatization practices in 76 developing countries between 1987 and 1994, when extensive state divestiture began to occur, reveals that democratic regimes are more likely to privatize SOEs despite the abovementioned advantages that authoritarian governments may have enjoyed throughout the privatization process. They explain such a tendency from both sellers' and buyers' standpoints. Sellers, or 'survival-minded' authoritarian governments, place military officers in key positions

in SOEs to loot firms and prevent countercoup attempts. For buyers, on the other hand, proper measures to enforce property rights are of great concern as their purchase of state enterprises must be protected. In this regard, democratic governments tend to have more transparent legal institutions that ensure the protection of property rights to a greater extent (Maravall, 1995; Leblang, 1996), which consequently encourages the private sector's purchase of SOEs. On the other hand, more recent empirical studies on democracy and privatization, such as Doyle (2010) and Breen and Doyle (2013), indicate a positive but statistically insignificant association between the two variables.

As shown, only a few studies on regime type and privatization exist, and they report mixed results. To set a hypothesis, therefore, it would be helpful to examine how the literature on public spending discusses the role of states in promoting primary education. In broader terms, electoral competition in democratic countries often prompts governments to respond more actively to the basic interests of citizens, such as eliminating poverty and increasing the production of public goods to reduce inequality (Sen, 1981; Acemoglu and Robinson, 2000). Universal primary education has also become increasingly regarded as a basic public interest, particularly since the early 1990s when the World Declaration on Education for All was adopted globally. The importance of free and equal access to primary education for girls and boys alike was reaffirmed in the MDGs in 2000. Since such critical milestones in the international dialogue, many empirical studies on the political regime and education spending have been conducted, and the majority of them suggest that democracies tend to outspend autocracies on education (Kaufman and Segura-Ubiergo, 2001; Stasavage, 2005; Azar and Espuelas, 2021; Samuels and Vargas, 2023). Those particularly on primary education also find that democracy matters for higher public spending (Brown, 1999; Harding and Stasavage, 2014; Galego, 2010). They

explain that electoral competition and interest group pressures lead the government to mobilize increased public spending to abolish primary school fees. It informs us that a series of international collective commitments have carried particular importance in ensuring free compulsory primary schooling to the public, which, as a result, has increased the size of public spending on education. States with more established democracies are generally assumed to be more responsive to such public interests and, therefore, more likely to strengthen the role of states in education financing and management. It underpins the following hypothesis:

Hypothesis 1: States with a higher level of democracy are less likely to transfer ownership of primary education services, all else equal.

3.2 Corruption control

Since the launch of extensive privatization programs, whether corruption is the inevitable price to pay has been one of the most discussed issues. As Reinsberg et al. (2019; p.701) put it, "corruption opportunities exist along the entire privatization process, from inception to tender, and sale of public assets, and they likely are larger when the administrators of the former system manage the privatization schemes." The corruption-inducing impact of privatization has been confirmed by abundant empirical studies (Kaufmann and Siegelbaum, 1997; Rose-Ackerman, 2002; Painter, 2005; Reinsberg et al., 2019). One of the reasons why privatization is susceptible to corruption is asymmetric information given to insiders and outsiders. During the privatization process, the insiders or the administrators of the former system can get access to information on newly privatized public assets more easily. They, therefore, can exploit it to obtain favorable treatment for bidding (Reinsberg et al., 2019). Moreover, during the valuation of firms that are supposed to be privatized, outside observers' getting access to precise and transparent firm-level information on profitability or performance is difficult. Such information issues arise even when

assessing the results of privatization transactions (Kaufmann and Siegelbaum, 1997). Difficulties with determining the market value of once state-owned assets that typically do not go through rigorous commercial valuation leave room for various interpretations, and it often leads to the creation of a margin to be filled by bribes (Celarier, 1997).

Such corrupt and fraudulent practices throughout the privatization process are fundamentally linked to privatized SOEs' poor performance. For instance, bidders who pay off government officials to win the tender are likely to concentrate on maximizing personal gains after privatization, which would negatively affect the production, delivery, or management of privatized goods and services. Some cross-country comparisons such as Bortolotti et al. (2001), Chong and Riaño (2003), and Bjorvatn and Søreide (2005) find that a high level of corruption and weak legal institutions are associated with poor post-privatization performance. Many case studies particularly on the failure of privatization in developing countries support the argument by pointing out the issues of widespread corruption, cronyism, and the state's lack of credibility (Craig, 2000; Meseguer, 2002). For instance, two case studies on privatization practice in China by Fisman and Wang (2014) and Ru and Zou (2022) clearly illustrate how SOEs purchased by corrupt buyers keep on engaging in other corrupt activities after the privatization and how such practice has substantially negative impacts on privatized SOEs' performance. Gomez (2002) and Wedeman (2002) who assess the outcome of privatization in Malaysia also describe the absence of an open tender process and increased rent-seeking behavior that allowed the government to choose a bidder based on personal or political connections. The dominance of political considerations over the assessment of efficiency and economic optimality has hampered the setting of stringent institutional and economic criteria for privatization in Malaysia.

The negative impact of private owners' tunneling value out of privatized SOEs and incompetent production and management of once state-owned goods and services is massive. Failed privatization most commonly leads to a significant increase in service costs. An increase in costs then results in a higher rate of disconnection from fundamental services, whose subsequent impact is particularly detrimental to lower-income households. Another consequence of the failed privatization program is the deterioration of the quality of services due to firms' cost-cutting activities after privatization (Hart, 2003; Shleifer, 1998). When it comes to the failed primary education privatization, tuition fees, even at LFPS, may increase significantly, or private schools are likely to be concentrated more heavily in urban areas to reach a broader pool of their customers – the school-age population. Consequently, it limits many poor and rural households' access to schooling. In addition, cost-cutting school management, including the employment of underqualified teachers or the use of low-quality materials or facilities, would deteriorate the quality of education. A subsequent lack of access to affordable and quality primary education not only harms its fundamental human rights principle but impedes the acquisition of the public's early ability, knowledge, and qualifications that are fundamental to poverty reduction, employment, and economic growth. Therefore, the corruption-inducing nature of privatization and its detrimental effects on a wide range of socioeconomic factors lead us to develop the following hypothesis:

Hypothesis 2: States with a lower capacity to control corruption are less likely to transfer ownership of primary education services, all else equal.

3.3 Income inequality

The impact of inequality on educational opportunities and attainment has been widely discussed in the literature on education. A significant part of the literature highlights the gap in access to

education and educational attainment as a manifestation of growing income inequality (Campbell et al., 2005; Lynch and O'Riordan, 1998; Mayer, 2010). Conversely, a wealth of studies has also examined whether and how the expansion of education contributes to reducing the intergenerational transmission of poverty and, ultimately, income inequality (Corak, 2013; De Gregorio and Lee, 2002). The impact of inequality in income distribution on educational opportunities, as pronounced in previous studies, implies its potential contribution to educational choices and privatization, as an increase in private schools means growing reliance on private sources, including household income, for educational financing.

From the government's perspective, full-employment schemes, wage subsidies, or redistributive policies such as progressive taxes or social transfers are primary measures to reduce economic inequality (Dabla-Norris et al., 2015). The public sector also utilizes the provision of public goods and services as an important policy instrument for the redistribution of income, particularly in favor of the lower-income groups (El-Naggar, 1989). In other words, efficiency is not the only factor to be evaluated in privatizing the ownership of public goods and services, but "consideration of equity should at least have the same weight as those of efficiency (El-Naggar, 1989; p.12)." Therefore, countries with greater income inequality due mainly to governments that fail or are less willing to implement extensive policy measures to encourage economic equality may also have smaller governments and depend more on private sources. As education, particularly primary education, is relatively more sensitive to equity issues for its value as rights and long-term redistribution effects (Hanushek et al., 2003), holding or transferring the ownership of education services to the private sector is expected to hinge significantly on the government's approaches to relieving economic inequality.

From the perspectives of consumers of educational services, abundant empirical studies have examined social stratification and parental choice of schools, and many indicate a strong association between household income or social class and preference for private school participation (Anders et al., 2020; Dearden et al., 2011; Lee et al., 1994). For instance, private schools particularly in developed countries tend to be often considered elite institutions with high tuition fees as they generally have smaller class sizes and better school facilities and provide pupils with a wider variety of educational opportunities such as various extracurricular options (Anders et al., 2020; Reeves et al., 2017). In addition, private schools are often more adept in preparing pupils for admission to elite higher education institutions through not only resources at the disposal but also accumulated social and cultural capital (Green and Kynaston, 2019; Montacute and Cullinane, 2018; Stenhouse and Ingram, 2024). Such advantages may be crucial determinants for high-income families who can afford high tuition fees to choose private schools. The graduates advantaged through private school education are likely to enjoy more advantages in the labor market, which further influences their future income. Therefore, private schools may continue to reproduce the advantages and contribute to chronic social and economic inequality (Stenhouse and Ingram, 2024). In sum, countries with high income inequality may have governments with less capacity or will to implement extensive redistribution policies, including the provision of public goods and services, and a solidifying pool of high-income consumers who prefer private school participation to continue reproducing social and economic advantages. This leads us to set the following hypothesis:

Hypothesis 3: States with higher income inequality are more likely to transfer ownership of primary education services, all else equal.

3.4 The burden of education financing

Undoubtedly, one of the driving forces most widely put forward to explain the expansion of privatization is the burden on states to finance deficits and liabilities of goods and services. Evidence from a wide range of privatization programs in numerous countries suggests that the economic inefficiency of state management leads to heavy operational losses (Akram, 2003; Omran, 2002; Shirley and Walsh, 2000; Putnins, 2015). Such losses put the state under greater budgetary pressure and contribute to the growing fiscal deficits, consequently increasing public debts. As Vagliasindi (2008) argues, setting off losses occurring from public goods management may cause the diversion of resources from other essential public tasks, leading to the overall misallocation of limited resources and ultimately harming a country's growth potential.

Over the past few decades, abolishing school fees to achieve universal access to primary education has increased the financial burden on states. Globally, government expenditure on education registered an increase from around 3.8 percent of GDP in 2000 to 4.4 percent in 2015. In many low- to middle-income countries, a large share of increased government expenditure on education has been mobilized to ensure equitable basic learning opportunities for children from marginalized or underprivileged households and communities. Public investment for equitable primary education includes not only providing school facilities or abolishing tuition fees but also providing nutrition programs, adapted mother-tongue instruction for ethnic minorities, and a remote education system for hard-to-reach children (UNESCO, 2015). In addition to reducing disparity in learning, international agendas for educational development focus on enhancing the teaching and learning environment and overall primary education quality. Some core standards of quality education include teacher-pupil ratio and teacher qualifications. States' emphasis on achieving high primary enrolment rates resulted in the slow improvement or even exacerbation of class size in many developing economies. For instance, the teacher-pupil ratio in low-income

countries increased significantly from 1:35 in 1990 to 1:45 in 2008, while there has been some modest improvement since then. Such a high teacher-pupil ratio critically impacts the teaching-learning process and, ultimately, educational outcomes. In their studies, Alderman et al. (2001), Waita et al. (2016), and Wright et al. (2017) find a strong statistical association between larger classes and lower test scores. Reducing the teacher-pupil ratio can be achieved by building more school facilities and employing more teachers, both of which put a heavy financial burden on the state. Employing trained and qualified teachers is also essential to optimize the environment for quality education. Many countries, however, face budgetary constraints to produce and deploy professionally trained and qualified teachers based entirely on government expenditure.

Such financial shortfalls limit the public resources available for education and lead states to choose to strengthen the role of the private sector by increasing the proportion of non-government sources for financing. Low-fee private primary schools are an excellent example of increasing private sector provision of educational services in developing economies. As Briskman (2018, p.212) points out, the growth of LFPS is usually not because states deliberately promote them as a policy but "because financial constraints in education budgets prevent expansion of the education sector, thus leaving an economic opportunity for private education providers." On the other hand, the problem of education finance and a subsequent move towards primary education privatization appear on different terms in developed economies. While the majority of developing economies have faced the explosive growth of population and thus substantial changes in current and projected enrolments, population growth has generally become stabilized or even negative in developed economies, and their enrolments have already reached the target (Péano, 1998).

Overall, the general notion is that dependency on LFPS is stronger at the secondary or post-secondary level of education, and states still tend to make significant efforts to hold

ownership of the provision and management of basic-level education. However, the increasing financial burden to ensure equitable access to *quality* education and growth in the current and projected pupil population, particularly in developing economies outlined above, are expected to reinforce the role of the private sector in primary education financing. Therefore, they inform the following hypothesis:

Hypothesis 4: States under a heavier burden of education financing are more likely to transfer ownership of primary education services, all else equal.

3.5 Urbanization

Urbanization, the demographic process whereby a large share of the population shifts from rural to urban areas, has been an irreversible ongoing phenomenon in both developed and developing countries over the last several decades. The share of urban dwellers increased from 43 percent of the world's population in 1990 to 57 percent in 2021.[7] Such rapid and complex settlement transition accompanies the reallocation of resources from agricultural to industrial activities, thus inevitably leading to drastic changes in the overall socioeconomic structure of a state. As the concentration of populations into urban settings proceeds, issues faced by urban infrastructure radically increase. Urbanization, densification, and the development of metropolitan areas magnify the aggregate demands for not only basic and economic infrastructure such as housing, water supply, transport, and electricity but also public services including education and health care (Poumanyvong et al., 2012; Shahbaz et al., 2016; Turok and McGranahan, 2013). Such a rapidly growing demand for infrastructure and public services results in strain on the state's fiscal capacity (Lewis, 2013). In addition to financial difficulties, challenges faced by urban services

[7] World Bank (2023). World Development Indicators: Urban 2023. https://databank.worldbank.org/Urban-2023/id/1623846f. Accessed on October 5th, 2023.

include institutional factors such as the strong internal organizational structure of various urban communities, and patronage or rent-seeking behavior of urban elites who are unwilling to provide extended public services to informal settlements (Bakker, 2003). The increasing financial burden due to a surge in demand from a rapidly expanding population and inefficient management of infrastructure and public services calls for additional financial resources and expertise through privatization or public-private partnerships (PPPs).

The debates over urbanization and privatization increased in scale and scope particularly in the domain of water supply management during the initial pace of rapid urbanization. Water has long been considered a public good for its symbolic significance as a non-substitutable essential resource, strategic political and social values, and the massive demand from increasingly industrialized and urbanized societies (Bakker, 2003). The justification for the state's water supply management has been challenged in recent decades due to the inefficient provision of services in rapidly expanding and unplanned urban areas. As a result, in over one hundred urban cities in developing countries, the control over water supply systems was transferred to private multinational companies in the early 2000s when the pace of urbanization began to accelerate globally (Bakker, 2003).

The sprawl has similar implications for the deteriorating quality of education services in urban public schools. The massive and unplanned installation of school-age population in limited urban areas may lead to inadequate school facilities, lack of teaching and learning materials, or high teacher-pupil ratio, and it is expected to be more severe in urban slums. Some empirical studies such as World Bank (2004) and Fomba et al. (2023) indicate that urbanization negatively affects the quality of primary education in many developing countries. World Bank (2004), for instance, demonstrates that nearly half of the students from urban primary schools experienced

problems with a lack of textbooks and school supplies, and tended to be less satisfied with attending schools than those from rural primary schools.

The emergence of heterogeneous urban communities representing different races, ethnicities, cultures, religions, or languages may also place the state's education management under greater strain. The centralized public education system may often fail to meet individual communities' specific demands for school curriculum or discipline. Securing a desirable degree of diversity within schools is expected to require additional financial resources and expertise as the unified public education structure shall be reorganized and adapted accordingly. The assumption is partially supported by several existing studies such as Hess and Leal (2001) and Cohen-Zada and Sander (2008) on the association between religious orientation and the demand for private schools, and Wrinkle et al. (1999) on the impact of race and ethnicity on the choice of private schools. Educational demand can also potentially become diversified based on income level, parent's educational background, or social status. In urbanized city centers that are usually densely populated with high-income and college-educated households (Couture and Handbury, 2020), a growing demand for differentiated or higher-quality education may lead to a strong preference for elite private schools.

To sum up, the strain on the state's fiscal capacity due to a rapidly growing demand for infrastructure and public services in urbanized areas and pressure from various urban communities with diverse educational demands are expected to lead the government to engage private actors more actively for effective delivery and management of educational services. Consequently, urbanization will lead to a shift of ownership of education services from the public sector to private hands, as noted in Hypothesis 5:

Hypothesis 5: States who experience more intensive urbanization are more likely to transfer ownership of primary education services, all else equal.

3.6 Integration into global value chains

How trade affects domestic politics and institutions has been rigorously analyzed in theoretical and empirical literature. One of the major strands of research focuses on external shocks induced by trade and its impact on the increasing role of government in the economy (Cameron, 1978; Rodrik, 1998; Adsera and Boix, 2002). They theorize that a high degree of trade liberalization induces economic volatility and insecurity in domestic markets, and, therefore, the government increases public expenditure to meet the demand for social security and welfare programs. Public expenditure on education is crucial in this regard as equal distribution of educational opportunities contributes to the equitable development of human capital, which helps a state to maximize and equally distribute the gains from trade liberalization (Galor and Moav, 2004; Kosack and Tobin, 2015; Lang and Tavares, 2018). As in much of the existing literature, public expenditure on education indeed appears to have a strong positive correlation with economic globalization (Rodrik, 1998; Ansell, 2008; Baskaran and Hessami, 2011).

Increasing public expenditure on education does not necessarily mean the decreasing importance of private education. The baseline assumption of the literature is that openness to trade induces external risks, and, as a response, governments mobilize public expenditure to minimize detrimental impacts, not necessarily to expand the state's influence or to shrink the private sector powers. It is especially the case when public expenditure increases to reduce risks associated with the accumulation of domestic human capital, as they may result in cyclical unemployment or a severe income gap and impede economic growth in the long run. In such

cases, public expenditure on education and additional financial resources from the private sector are complementary to each other, not substitutive.

In addition, considering the skills-related risks and opportunities arising particularly from a state's integration into global value chains (GVC), a specific form of trade, it is expected that the role of education continues to grow and both public and private financing for education become equally important. Some predominant skills-related issues within GVCs include upgrading and new technologies. Upgrading in GVCs refers to moving from the low-tiers that generally perform labour-intensive manufacturing tasks with lower value-added to the upper-tiers that conduct capital- and knowledge-intensive tasks and generate higher value-added. Upgrading, therefore, depends largely on the availability of workforce with specialized skills (Humphrey, 2004). Moreover, rapidly evolving disruptive technologies, such as automation and robotics, have replaced human labourers in the manufacturing sector (Zangiacomi et al., 2020; Lasi et al., 2014) and forced them to acquire new sets of skills for employment (Bloom et al., 2012). Therefore, investment in education and training is a critical aspect of GVC policies (Amendolagine et al., 2019; Pipkin and Fuentes, 2017).

A wealth of studies examining the neoliberal nature of foreign direct investment (FDI) further provide implications for the potential association between the GVC participation and privatization. FDI is encouraged by the new set of free market-oriented reforms such as deregulation, liberalization of domestic stock markets, generous financial investment incentives, and tax reforms that help to create a favourable business environment for domestic and multinational enterprises. At the core of such reforms is a neoliberal belief that the free market ensures the most efficient allocation of global resources. The growth of FDI that is typically accompanied by a state's expansion within GVC networks leads the private sector to play more

significant roles within the state's market economy while putting the government under pressure to withdraw from intervention (Vickers and Yarrow, 1991). Moreover, in many cases, multinational firms demand privatization not only for the creation of new FDI channels but also for their direct involvement in the privatization programs. Hence, privatization, or withdrawal of the state from the production and management of goods and services, often goes along with economic globalization (Nunnenkamp, 2001; Simmons et al., 2008). Considering that upgrading in GVCs and skills-intensive manufacturing and services that are higher value-added require an abundance of human capital, pressures intensified by economic globalization on government over more effective provision of higher quality education are also expected to force the transfer of ownership of education services from the government to the private sector. Therefore, Hypothesis 6 stipulates the following:

Hypothesis 6: States with a higher level of GVC participation are more likely to transfer ownership of primary education services, all else equal.

4. Model Specification

The hypotheses are tested through a cross-sectional statistical analysis. Throughout all specifications, the dependent variable *PRIMARY_EDUCATION_PRIVATIZATION* represents a share of enrolment in private primary institutions. It covers a total of 40 developed states and 71 developing states. Our sample exhibits a highly dynamic trend of primary education privatization in both the developed and developing world. In some states, such as Belize, Lebanon, and the United Arab Emirates, the average share of enrolment in private primary schools between 2016 and 2020 is above 70 percent. On the other hand, it remains at below 1 percent in other states such as Belarus, Uzbekistan, Croatia, and the Netherlands. Such a broad range of variation in the

sample implies highly complex and dynamic domestic conditions that affect the state's decision to shift the ownership of primary education services.

To test Hypothesis 1 on the impact of a state's level of democracy on privatizing primary education, the independent variable specified as *DEMOCRACY* is used. It captures the degree to which citizens can enjoy civil liberty, freedom to exercise political choices, free and fair elections, and a functioning government. The degree of *DEMOCRACY* ranges from 0 (least democratic) to 10 (most democratic). The variable *CORRUPTION_CONTROL* tests Hypothesis 2 on the importance of the precondition to have sufficient state capacity to control corruption for primary education privatization. It captures perceptions of the public capacity to control corrupted behavior for private gain on a scale of -2.5 to 2.5, with a higher value indicating stronger public power. Hypothesis 3 on the likelihood of association between income inequality and primary education privatization, the variable *INEQUALITY* is used. It captures the income share held by highest 10 percent of the population. To test Hypothesis 4 on the privatization of primary education as a means to reduce a state's financial burden for education, the models use the variable *EDUCATION_EXPENDITURE*. It indicates government expenditure on education as a percentage of GDP. Examining whether an increase in the share of private primary school enrolment is associated with a decrease in public spending on education is expected to help us understand if private education is complementary or substitutional to public education in nature. Hypothesis 5 on the privatization effect of urbanization uses the variable *URBANIZATION*. It represents the urban population as a percentage of the total population. Finally, to assess Hypothesis 6, the models use *DVX* and *FVA*. GVC participation can be broadly categorized into forward and backward participation. *DVX* captures the estimation of forward GVC participation, which represents domestic value-added in other countries' exports to third countries. On the other

hand, *FVA* captures the estimation of backward GVC participation, which represents foreign value-added in a country's total exports. Many newly emerging countries in the developing world tend to enter GVCs by specializing in production activities through such backward linkages.

To control relationships for alternative explanations and obtain a consistent estimate of the correlation between main independent variables and privatization of primary education, each specification of the models uses a set of control variables that capture demographic, economic, and situational factors. The natural logarithm of *GDP*, specified as GDP per capita in constant 1997 international dollars, and *GROWTH*, the annual percentage change in the GDP per capita based on constant local currency, control for the potential contribution of a state's average level of prosperity to privatization. The variable *INFLATION*, the rate at which the costs of goods and services rise over a year, controls for the situation where financial instability and a sharp slowdown in growth lead the government to abandon its monopoly status and resort to privatization schemes. The natural logarithm of *POPULATION* represents the size of the total population of each state. Additional control variables reflecting a specific situational factor relevant to this study are *SCHOOLING_YEARS* and *TEACHER_PUPIL*. *SCHOOLING_YEARS* represents the average number of completed years of schooling of the population aged 25 years and above. It is a widely used indicator of a state's stock of human capital and the performance of the education system. On the other hand, *TEACHER_PUPIL* represents the average number of pupils per teacher at the primary level of education, and it controls for how and to what degree governments constraints for education quality assurance affect their decision to privatize.

Finally, the variable *EDUCATION_ODA*, specified as the amount of bilateral official development assistance (ODA) for education in million USD, captures the flow of ODA to the education sector from the member countries of the OECD Development Assistance Committee

(DAC) to individual developing countries as aid recipients. ODA is a significant complementary source of financing in many developing countries. ODA is mobilized in a broad range of sectors to further the socio-economic growth of the recipient countries. Education, together with infrastructure and water supply and sanitation, is among the sectors to which the largest portion of ODA is allocated. Therefore, a separate model for developing countries includes *EDUCATION_ODA* to control for the role of ODA in the education sector in relieving states' financial burden and decreasing opportunities for the private sector to take over the ownership of education financing and management.

All independent and control variables introduced above are averaged over the 2011-2015 period, while the dependent variable is computed as five-year averages between 2016 and 2020, using lagged measures. The definition and source of data are detailed in Table 1 below. The tables for summary statistics are attached as Appendix I and II.

Table 1. Definition and source of data

Variable	Definition	Source
PRIMARY_EDUCATION_ PRIVATIZATION	Percentage of enrolment in private primary institutions.	UNESCO Institute for Statistics
DEMOCRACY	The extent to which citizens can enjoy civil liberties, free and fair elections, and political pluralism, participate in politics, and have a functioning government.	Economist Intelligence Unit (2023)
CORRUPTION_CONTROL	The level of perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Worldwide Governance Indicators
EDUCATION_EXPENDITURE	Government expenditure on education as a percentage of GDP.	UNESCO Institute for Statistics
PRIMARY_POPULATION	Number of persons at the age defined in a country's regulations or laws to	UNESCO Institute for Statistics

	attend a primary level of education.	
TEACHER_PUPIL	The average number of pupils per teacher in primary education institutions.	UNESCO Institute for Statistics
INEQUALITY	Pre-tax income share held by highest 10 percent of the population	World Inequality Database
URBANIZATION	The percentage of the total national population living in urban areas.	The World Bank Data
DVX	The domestic Value Added of the country embodied in other countries' exports.	UNCTAD-Eora Global Value Chain Database
FVA	The foreign Value Added embodied in the country's exports.	UNCTAD-Eora Global Value Chain Database
SCHOOLING_YEARS	The average number of completed schooling years of the population aged 25 years and above.	UNESCO Institute for Statistics
INFLATION	The rate at which prices for goods and services increase in an economy.	The World Bank Data
GDP	Gross domestic product divided by midyear population.	The World Bank Data
GROWTH	Annual percentage growth rate of GDP per capita based on constant local currency.	The World Bank Data
POPULATION	The number of total populations.	The World Bank Data
EDUCATION_ODA	The percentage of total official development assistance allocated to the education sector.	OECD Database

5. Discussion of Results

First, using the ordinary least squares (OLS) regression, two separate models that compare the conditions for primary education privatization in developed and developing countries are tested. Each model consists of four specifications with different combinations of control variables. With a total of 40 observations for developed countries and 71 for developing countries, both models generally provide a good fit to the data. To detect heteroscedasticity in regression residuals, the author performed the Breusch-Pagan test. The p-values for all models are much greater than 0.05, indicating that the null hypothesis of the variance of the residuals being constant cannot be

rejected. Hence, heteroscedasticity is not present in the models, which allows this research to proceed to the analysis of the output of the regressions.

Table 2 below displays the regression results for developed countries. Specification 1 shows the regression including three control variables, *SCHOOLING_YEARS*, *TEACHER_PUPIL* and *INFLATION* in addition to all independent variables, while Specifications 2 and 3 control for wealth- and population-related variables, respectively. Lastly, Specification 4 includes all independent and control variables discussed earlier. Table 3, on the other hand, displays the results for developing countries. The same set of independent and control variables in the model for developed countries is used, and the specifications with different combinations of control variables follow the same order as Table 2.

Table 2. Conditions for primary education privatization in developed countries

	Dependent variable:			
	PRIMARY_EDUCATION_PRIVATIZATION			
	(1)	(2)	(3)	(4)
DEMOCRACY	-8.7324*** (2.1355)	-8.6780*** (2.3454)	-8.4803*** (2.1804)	-8.5668*** (2.3270)
CORRUPTION_CONTROL	8.1918** (3.1410)	11.0802** (4.6949)	6.7926* (3.7013)	10.1664** (4.7149)
INEQUALITY	63.7369* (33.1480)	58.2014 (35.8908)	75.2498* (36.9514)	81.8726* (40.5788)
EDUCATION_EXPENDITURE	2.5278 (2.4410)	1.6852 (2.6956)	2.8535 (2.5010)	1.8854 (2.6774)
URBANIZATION	0.3616** (0.1760)	0.4360** (0.2059)	0.3418* (0.1795)	0.4209** (0.2045)
log(DVX)	-4.4306 (2.9942)	-3.1144 (3.4965)	-3.2696 (3.4118)	-0.3543 (4.1461)
log(FVA)	6.5248* (3.2570)	5.3835 (3.6379)	7.1027** (3.3776)	6.0670 (3.6502)
SCHOOLING_YEARS	-2.9761* (1.5242)	-2.8453 (1.7465)	-3.0288* (1.5383)	-2.4928 (1.7557)
TEACHER_PUPIL	0.6216 (0.6402)	0.4858 (0.6761)	0.7628 (0.6738)	0.6993 (0.6930)
INFLATION	-0.3296 (1.6841)	-0.9093 (2.0836)	-0.0790 (1.7321)	-0.3214 (2.1217)
log(GDP)		-5.0471 (6.2336)		-7.3206 (6.4577)
GROWTH		-0.1563 (0.9718)		-0.7153 (1.0679)
log(POPULATION)			-2.2149 (3.0336)	-4.3034 (3.5469)
Constant	-1.0150 (31.5988)	46.5530 (68.0596)	-2.1589 (31.8948)	63.9741 (68.9831)
Observations	40	40	40	40
R^2	0.7751	0.7809	0.7793	0.7926
Adjusted R^2	0.6975	0.6835	0.6926	0.6889
Residual Std. Error	10.7175 (df = 29)	10.9637 (df = 27)	10.8048 (df = 28)	10.8691 (df = 26)
F Statistic	9.9936*** (df = 10; 29)	8.0175*** (df = 12; 27)	8.9873*** (df = 11; 28)	7.6434*** (df = 13; 26)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 3. Conditions for primary education privatization in developing countries

	Dependent variable:			
	PRIMARY_EDUCATION_PRIVATIZATION			
	(1)	(2)	(3)	(4)
DEMOCRACY	2.0826** (1.0228)	2.1532** (1.0057)	2.1801** (1.0260)	2.1578** (1.0158)
CORRUPTION_CONTROL	-2.8144 (3.2979)	-0.7239 (3.3690)	-1.5186 (3.5177)	-0.6419 (3.5344)
INEQUALITY	24.0227 (23.4209)	38.0069 (23.8127)	19.0204 (23.8782)	37.2407 (25.6748)
EDUCATION_EXPENDITURE	-3.7356*** (0.9363)	-4.1710*** (0.9379)	-3.6549*** (0.9386)	-4.1530*** (0.9698)
URBANIZATION	0.2650*** (0.0927)	0.3716*** (0.1128)	0.3139*** (0.1036)	0.3724*** (0.1142)
log(DVX)	-1.4018 (1.5170)	-1.1738 (1.4896)	-2.7491 (1.9842)	-1.3058 (2.1681)
log(FVA)	0.8232 (1.6182)	1.2322 (1.6008)	0.5091 (1.6440)	1.1881 (1.6970)
SCHOOLING_YEARS	-2.3394*** (0.7292)	-1.8472** (0.7576)	-1.9835** (0.8033)	-1.8277** (0.7981)
TEACHER_PUPIL	-0.2601 (0.1738)	-0.4273** (0.1876)	-0.2700 (0.1739)	-0.4252** (0.1909)
INFLATION	0.2930 (0.3781)	0.1792 (0.3744)	0.2243 (0.3833)	0.1743 (0.3821)
log(GDP)		-7.0709** (3.3722)		-6.8861* (4.0439)
GROWTH		-0.2747 (0.5816)		-0.2876 (0.6063)
log(POPULATION)			2.2885 (2.1751)	0.2200 (2.6046)
Constant	23.3296 (15.2373)	63.3648*** (23.7447)	6.9569 (21.7700)	60.9303 (37.4735)
Observations	71	71	71	71
R^2	0.3861	0.4321	0.3974	0.4322
Adjusted R^2	0.2838	0.3146	0.2850	0.3027
Residual Std. Error	11.0735 (df = 60)	10.8326 (df = 58)	11.0636 (df = 59)	10.9265 (df = 57)
F Statistic	3.7734*** (df = 10; 60)	3.6775*** (df = 12; 58)	3.5371*** (df = 11; 59)	3.3370*** (df = 13; 57)
Note:				*p<0.1; **p<0.05; ***p<0.01

Across all specifications in Table 2, it appears that the level of democracy has a negative and robust effect on primary education privatization in developed countries. The estimated coefficient of *DEMOCRACY* is significant at the 99 percent confidence level, and they remain nearly unaffected when different control variables are included. Hence, it lends strong support to

Hypothesis 1 that states with a more mature or consolidated democracy are less likely to choose to privatize primary education services. The result aligns with a rights-based discourse that regards primary education as a public good (Tomlinson, 1986; Boissiere, 2004; Locatelli, 2018). The fact that primary education is fundamental to acquiring basic literacy and numeracy skills that are prerequisites for academic and intellectual growth and building communication and interpersonal skills for socialization justifies the right to primary education. Within this framework, primary education shall be equally and equitably accessible to all children and, therefore, must be free, compulsory, and universal. In this regard, states shall play an unequivocal role and be the primary provider of such services. In fact, "[w]ith the emergence of the welfare state, the idea that the state has the primary responsibility for providing education to all its citizens became a moral and political imperative (Rizvi, 2016; p.2)." It led most advanced economies to establish robust public education systems, particularly after the Second World War (Rizvi, 2016). Surprisingly, the result is completely opposite in the case of developing countries. Table 3 shows that *DEMOCRACY* enters positively and is statistically highly significant at the 95 percent confidence level. The positive and robust association between the level of democracy and enrolment in private primary schools remains consistent across all specifications. It implies that, in developing countries with more established democracies, private actors are more likely to actively participate in a range of primary education services, unlike in developed countries. One plausible explanation for the result being against the hypothesis is the following. Many developing countries have experienced the transition to democracy relatively more recently over a shorter period than most developed countries did (Behrend, 2021; Teshome, 2008). Rapid democratization may result in the delaying of the establishment of effective political order and control (Ward and Gleditsch, 1998) or the weakening of institutional capacity for structural adjustment (Polterovich and Popov, 2007). On the other hand, democratization releases long-

suppressed demands by various social groups and increases the political voice for civil rights protection (Milner and Mukherjee, 2009; Liddle, 2002). For instance, during the so-called third wave of democratization, which lasted until the early 1990s, many authoritarian governments in Southern Europe, Latin America, and East Asia transitioned to democratic ones. It coincided with when Education for All (EFA) was established as a global agenda for educational governance. Many newly democratized developing countries who embraced EFA recognized the importance of ensuring equal access to primary education. However, with limited internal sources of financing and immature institutional capacity, many countries showed a high financial dependency on ODA (Turrent and Oketch, 2009; UNESCO, 2012). It is in this context that privatization schemes have become more attractive to the government. In short, we can assume that democratic governments in the developing world are more likely to be responsive to the heightened demand for education. However, due to limited capacity for financing and administration, they choose to depend on private sources. Another plausible answer relates to using public education as a political instrument to shape and control public opinion. In many authoritarian countries, education tends to be considered the strict preserve of the state, not necessarily for its importance as *a right* but for its usefulness as *an effective tool to rule*. Rulers often provide public schooling to deliver ideological content and promote compliance with autocratic power structures to minimize the risk of uprising (Alesina and Reich, 2015; Testa, 2018; Masud, 2018). As a rebound from such experience, democratization and the push for civil and political freedom may lead a state to withdraw from the monopoly on education governance and encourage the participation of various non-state actors to meet newly emerging demands for educational content and the educational environment.

The test on the association between perceptions of the government's capacity to control corruption and the privatization of primary education also shows interesting results. In Table 2 for developed countries, the estimated coefficient of the variable *CORRUPTION_CONTROL* turns out to be positive and statistically significant at the 95 percent confidence level in all specifications. In addition, with control variables included, the coefficient notably increases in magnitude. On the other hand, in Table 3 for developing countries, the estimated coefficient remains negative and statistically insignificant across all specifications. It suggests that the strength and effectiveness of institutional setup and practice to prevent corruption are important conditions for primary education privatization in developed countries, while it is not necessarily the case in developing countries. Such discrepancy may be attributable to some extent to the different reactions of the private sector to strict corruption control of a state. From the private sector perspective, the high institutional quality of the government to combat and control corruption may be perceived as a safeguard against favoritism or other fraudulent or corrupt practices that are likely to occur during the privatization process. In line with this, the literature on welfare states points out that in many developed economies with histories of greater equality — such as Scandinavian economies — there is a high level of social trust in government and a high level of expectations from it as well to control and combat corruption, and "the roots of generalized trust lie in a more equitable distribution of resources and opportunities in a society" that have been realized through more honest and systematic government institutions (Rothstein and Uslaner, 2005; p.44). Therefore, a high level of positive perception of the government's capacity to combat and control corruption and social trust that the corruption-free environment is provided in any circumstances may encourage more private actors to participate in various privatization programs in developed countries. On the other hand, there is a possibility that greater perceived control of corruption may be a discouraging factor for businesses in developing

countries to participate in privatization programs. An increasingly transparent and fair bidding process providing equal opportunities to all participants may burden many firms that are used to utilizing patronage, connections, or bribes to obtain favorable treatment for bidding. Many would also find it not profitable to obtain the ownership of services if there is a high chance of their attempts to maximize personal gains through privatized goods and services being strictly monitored and regulated. Hence, it provides some clues to understand why the estimated coefficient of positive perception of corruption control is negative and statistically insignificant in the case of developing countries. From the state's perspective, developed countries are expected to have a more elaborate system to monitor and evaluate post-privatization performance. Developed countries will likely be more sensitive to whether privatization programs fulfilled their objectives and contributed to improved services. As a prerequisite to successful privatization, whether the government can control corruption likely to occur before, during, and after the privatization shall be a crucial factor to be considered before the launch of privatization schemes.

The variable INEQUALITY also exhibits limited but interesting results. In the case of developed countries, the estimated coefficients on INEQUALITY are positive and moderately significant. As described in Section 3.3, private schools in developed countries often refer to elite education institutions in urban areas with high tuition fees. They are often characterized by providing higher quality physical facilities, teachers, and a wider variety of educational opportunities, such as various extracurricular options and language learning and supporting pupils' admission to renowned higher education institutions (Anders et al., 2020; Reeves et al., 2017; Green and Kynaston, 2019). From the earlier stages of education, including the primary level, high-income families who can afford high tuition fees may choose private schools so their

children can enjoy such advantages, which are likely to further influence their labor market opportunities and future income. Therefore, the widening income gap and social class solidification may increase higher-income households' demand for private schools. The lack of significance in the case of developing countries may be attributed to the fact that many governments in the developing world have used public schooling in recent decades to reduce economic inequality (Abdullah et al., 2015). The expansion of free public education has particularly benefitted low-income households who previously had limited access to opportunities for obtaining skills and knowledge. In addition, a significant portion of private schools mushroomed in developing countries over the past decades are LFPS whose purpose is to serve children from economically and geographically underprivileged households.

The estimated coefficient on the variable *EDUCATION_EXPENDITURE* is negative and highly significant across all specifications for developing countries (Table 3), while it is consistently positive but insignificant in the case of developed countries (Table 2). The result describing that private education grows as a share of the budget for primary education decreases in developing countries corresponds to the conventional argument that the primary motivation for privatizing public services is to reduce a financial burden on the state. Considering the coefficients increasing in magnitude when the GDP-related control variables are included, it can be assumed that private sources play a significant role as a substitute for limited public primary education financing in developing countries regardless of the income level within the group. In particular, LFPS may account for a critical portion of private primary education that substitutes the public sector ownership, as many studies report the burgeoning landscape of LFPS across different countries in the developing world (Verger et al., 2018). While the argument on the impact of budgetary constraints on the government’s decision to privatize applies even to the case

of primary education services in developing countries, the reason why developed countries do not show a similar trend could be due to less financial stress of the government or higher capacity to mobilize or prioritize investment in basic services.

The results for *URBANIZATION* indicate that the degree of urbanization is positively and highly significantly associated with primary education privatization in both developed and developing countries. Moreover, the estimated coefficient increases quite significantly in magnitude as control variables are included in both groups. As discussed in the earlier section, one of the plausible explanations is that urbanization results in the rapid growth of the primary school-age population in concentrated areas and increases the financial burden for the government. However, considering the insignificance of financial constraints in developed countries as a condition for primary education privatization, the explanation is likely to be more appropriate for developing countries. A more convincing explanation for developed countries may be related closely to the diversifying demand for education adapted to various communities representing different ethnicities, cultures, religions, or languages. For more flexible and efficient adaptation of standardized public primary education, the government may share ownership and accountability with the private sector. Another explanation that might apply to both groups is the growth of local government autonomy geared by extensive urbanization. The patterns of urbanization hold the potential for local governments to exercise greater autonomy as locally managed services can meet spatially concentrated demands more efficiently by reducing redundant transportation or administrative costs and maximizing the advantages of scale economies (Glaeser, 2011; Boex et al., 2016). Challenges faced by rapid urban growth encourage the localization of development, and urban municipalities are granted more accountability and responsibility to produce and deliver local public services. In many urban cities, however, the

share of the informal economy is very high, and thus a large portion of their local population is not integrated as formal taxpayers (ILO, 2001; Elgin and Oyvat 2013). Many local governments also have limited economic strength to access capital markets (ILO, 2001). In line with this, the World Bank (2000, p.11) points out that "[a]n important part of good urban financial management involves adopting a commercial approach to many of the service and administrative functions of cities, while keeping social concerns in view. A commercial approach is also a prerequisite for involvement of the private sector or eventual privatization of urban services." Aside from financial reasons, the degree of preference for privatization or marketization differs across individual urban governments for various political reasons. Some local governments with autonomy who possess the power and freedom to make policy decisions independent of strict control of the central government may be more open to the privatization of primary education. It may result in a discrepancy between state-level and local government-level decisions to privatize.

Finally, the variable *DVX* (forward GVC participation) consistently enters with a negative sign in both the developed and developing country groups. At the same time, however, the estimated coefficient remains statistically insignificant across all specifications in both groups. The case of *FVA* (backward GVC participation) also exhibits no statistical significance when all control variables are included, while the signs are opposite in two groups. That is, the results for both groups do not support the hypothesis that states with a higher degree of GVC participation are more likely to privatize primary education services. Altogether, the results align with Andonova (2013) on the conditions for transnational public-private partnerships (PPPs). In her statistical model, trade and FDI appear to have limited significance as a condition for collaborative state engagement with nonstate actors for environmental governance. Andonova (2013) argues that while globalization may facilitate the diffusion of private regulation, whether

nonstate actors engage in governance seems to be influenced more strongly by the domestic constituency effect of business networks. Similarly, the lack of statistical significance could be partially associated with the specificity of primary education, as repeatedly highlighted earlier. While the expansion of trade is likely to strengthen the role of private actors and, in many cases, FDI increases the direct demand from multinational firms to launch privatization programs in host countries, there is a possibility that primary education is less susceptible to such external pressures for its long-entrenched value as a public-owned service. The governments may be more circumspect in providing opportunities for foreign investors to get involved in the governance of domestic educational services, as the participation of purely market-oriented external actors may disrupt individual states' fundamental approaches to human capital accumulation.

The analysis of the association between some control variables and primary education privatization also exhibits some interesting patterns. The estimated coefficient of the variable *SCHOOLING_YEARS* turns out to be consistently negative and statistically highly significant in the developing countries group. It indicates that the higher the average education level of the population the lower the chance of primary education ownership being shifted to the private sector. One of the plausible assumptions is that the public increasingly recognizes the right to (basic) education and requires the role of a state as they become more exposed to educational opportunities. The estimated coefficient of the control variable *GDP* being negative and statistically significant in developing countries also strengthens the argument that a state's financial capacity is a critical factor affecting its decision to privatize primary education services, as is indicated in the test on *EDUCATION_EXPENDITURE*.

To further examine whether ODA, another important source of education financing in many developing countries, significantly affects the results in Table 3, an additional model

including *EDUCATION_ODA* as a control variable was prepared. From the results shown in Table 4, we can confirm that ODA to the education sector does not have a critical impact on the association between selected dependent variables and primary education privatization. The coefficients on *EDUCATION_ODA* are statistically insignificant across all specifications, while those on *EDUCATION_EXPENDITURE* and *URBANIZATION* remain highly significant. Even with the assistance of foreign aid, central and local governments appear to struggle with domestic financing for primary education and rely significantly on the private entity as a substitute.

Table 4. Conditions for primary education privatization in developing countries as ODA recipients

	Dependent variable:			
	PRIMARY_EDUCATION_PRIVATIZATION			
	(1)	(2)	(3)	(4)
DEMOCRACY	2.4944** (1.0636)	2.5469** (1.0414)	2.4865** (1.0711)	2.5843** (1.0494)
CORRUPTION_CONTROL	-2.8358 (3.3095)	-0.6884 (3.3824)	-2.1526 (3.6439)	-1.3974 (3.6026)
INEQUALITY	20.3258 (24.8289)	33.3896 (25.0014)	17.0779 (25.9650)	40.5468 (27.8458)
EDUCATION_EXPENDITURE	-3.7403*** (0.9371)	-4.1707*** (0.9386)	-3.7034*** (0.9470)	-4.3087*** (0.9718)
URBANIZATION	0.2909*** (0.0939)	0.3802*** (0.1130)	0.3131*** (0.1060)	0.3735*** (0.1142)
log(DVX)	-1.6639 (1.5827)	-1.3960 (1.5516)	-2.2490 (2.0330)	-0.4595 (2.2098)
log(FVA)	0.3635 (1.6411)	0.7203 (1.6292)	0.2691 (1.6650)	0.9847 (1.6972)
SCHOOLING_YEARS	-1.7632** (0.8086)	-1.3274 (0.8193)	-1.6619* (0.8430)	-1.3954* (0.8319)
TEACHER_PUPIL	-0.1975 (0.1796)	-0.3663* (0.1919)	-0.2051 (0.1815)	-0.3806* (0.1945)
INFLATION	0.2227 (0.3834)	0.0936 (0.3799)	0.1889 (0.3929)	0.1323 (0.3876)
log(GDP)		-6.6735* (3.3885)		-8.0733* (4.1333)
GROWTH		-0.4773 (0.5923)		-0.4005 (0.6094)
log(POPULATION)			1.1441 (2.4682)	-1.7678 (2.9531)
EDUCATION_ODA	0.0239 (0.0195)	0.0230 (0.0193)	0.0192 (0.0221)	0.0293 (0.0220)
Constant	24.9175 (15.5620)	64.9170*** (24.0184)	16.3394 (24.2490)	84.9081** (41.2173)
Observations	69	69	69	69
R^2	0.4011	0.4483	0.4034	0.4520
Adjusted R^2	0.2855	0.3179	0.2755	0.3099
Residual Std. Error	11.0664 (df = 57)	10.8124 (df = 55)	11.1434 (df = 56)	10.8761 (df = 54)
F Statistic	3.4705*** (df = 11; 57)	3.4383*** (df = 13; 55)	3.1553*** (df = 12; 56)	3.1811*** (df = 14; 54)
Note:				*p<0.1; **p<0.05; ***p<0.01

The two separate models for developed and developing country groups suggest that the patterns of primary education privatization vary significantly by a state's income level. Democracy matters for both, but in the opposite direction. The common ground we could assume from the result is that a higher level of democracy is associated with greater concern over

universal access to primary education in both developed and developing countries. In this context, the reason why the privatization pattern appears to be the exact opposite is likely to be related to whether a democratic state that aims to provide universal primary education services has enough financial capacity to realize it by itself. As is shown in the association between education expenditure and private education, the factor related to financial constraints on primary education governance consistently appears to be a critical condition for a state's decision to privatize related services in developing countries, and their association remains highly significant regardless of an influx of foreign aid. The reason why an increase in private primary schooling is highly associated with urbanization is also likely to be linked to increasing financial constraints on both central and local governments. On the other hand, the preparedness of the structural environment for a fair and transparent privatization process and successful post-privatization performance seems to be of more significance in developed countries. In addition, the degree of economic inequality matters in developed countries, and it is assumed that higher-income households' preference for elite private schools may encourage the marketization of education even at an early stage and, therefore, its privatization. The insignificance of GVC participation as a factor that affects primary education privatization reconfirms that governance of at least the basic level education is influenced more by a series of domestic political and economic factors, presumably due to the long-entrenched value of primary education as a public-owned service. The role of primary education as a promoter of basic-level foundational skills may also explain its limited association with privatization, as such skills are not directly related to those required for GVC activities. Therefore, it invites further exploration of whether and how integration into GVCs affects the privatization of upper-level education that helps form more specific labor market skills.

6. Comparative Analysis: Patterns for Primary Education Privatization in Cambodia, Thailand, and Singapore

Over the last few decades, the regional economy of Southeast Asia has grown explosively through market-driven policy measures such as trade liberalization, global value chain (GVC) participation, and FDI. To survive and thrive in a competitive international market system, the demand for high-skilled workers has increased and the role of government to develop and implement well-crafted education and training policies has expanded in many countries in the region. The explosive growth of the urban population has immensely influenced the restructuring of the relationship between the central and local governments, while gradually advancing democracy has raised awareness of the significance of and rights to education. However, the region also possesses highly dynamic and distinctive characteristics among countries in many respects such as demographic structure, wealth, regime type, size of government, and, most importantly, human capital accumulation and education level of population. For instance, the region includes a high-income country such as Singapore and at the same time some of the least developed countries such as Myanmar and Lao People's Democratic Republic. Some countries are fairly democratic or making notable progress while some remain under autocratic rules. Therefore, the comparison of the patterns of primary education privatization in some selected countries in Southeast Asia is expected to help us more intuitively understand the political and economic dynamics that affect the ownership and accountability of education governance and the relationship between the public and private sectors.

Cambodia

After the slow recovery in the 1990s from the legacy of the brutal rule of the Khmer Rouge and civil war, Cambodia has seen rapid economic growth over the last two decades. The country has become successfully integrated into GVCs as an intermediary goods supplier and FDI inflows

have recorded exponential growth. It led Cambodia to reach lower-middle-income status in 2015. During this period, however, the improvement of political rights and civil liberty has been disappointing. After two decades of civil war, "the largest, most sophisticated post-Cold War UN intervention to that time" was implemented in Cambodia to organize nationwide elections, disarm competing political forces, and promote human rights in the early 1990s (St. John, 2005; p.407). While it contributed to the enhancement of the procedural aspect of democracy, a pre-emptive coup by Hun Sen and his grip on power since 1997 have left Cambodia under authoritarian single-party rule by the Cambodian People's Party (CPP). The latest democracy index measured by the Freedom House indicates poor performance of Cambodia, whose political rights score remains at 5 out of 40 and civil liberties score remains at 19 out of 60.[8]

Between the 1990s and 2000s, the net enrolment rate for primary education in Cambodia increased progressively from 84 percent to 94 percent. However, as St. John (2005) points out, the main purpose of such a government's effort during this time that ostensibly emphasized social justice was to meet the expectations of international donors who poured essential financial and technical assistance to stabilize its economy and resolve political turmoil. Primary education was strictly under the government's control, and private education was almost non-existent (below 1 percent) during this period. The more recent trend shows that the enrolment rate dropped to 87 percent, which is a serious setback. Public spending on education remains at around 1.7 percent of GDP without significant improvement, which falls short of the minimum 4 to 6 percent of GDP recommended by the International Declaration on Education adopted at the World Education Forum in 2015. On the other hand, the net enrolment rate in private primary schools increased from 1.6 percent in 1999 to 5.2 percent in 2018. Again, however, it is much lower than

[8] Freedom House (2023). Freedom in the World 2022: Cambodia. https://freedomhouse.org/country/cambodia/freedom-world/2022#PR. Accessed on October 30, 2023.

the world average (18 percent), regional average in Southeast Asia (15 percent), and the average of low-income countries (11 percent) in 2018.

A moderate increase in the share of private primary school enrolment since the mid-2000s can be partially attributable to the government's effort on institutional reforms to promote democratic and efficient governance. At the heart of the reform launched after the election of commune councils in 2002 was *decentralization* (Pellini, 2005). The reform aimed at transferring functions and services originally monopolized by the central government to democratically elected local governments to ensure better production and delivery of essential services to its citizens. It can be assumed that more authority shifted to local decision makers and communities opened space to some extent for various non-state actors to get involved in education governance. It is in line with the empirical result and discussion for Hypothesis 1 that highlights democracy as an important condition for education privatization in developing countries. Another explanation could be the explosive growth of the primary school-age population from 1.4 million to 2 million between the 1990s and the early 2000s.[9] The Cambodian government embraced the Education for All (EFA) agenda launched in 1990 and formulated a series of Education Strategic Plans (ESP) to provide equal opportunities to access primary and secondary education (Tan, 2007). It contributed to the rapid inclusion of the rural and marginalized population into formal education. On the other hand, it also resulted in overcrowded classrooms, a lack of trained teachers, and poor school facilities. As illustrated in Hypothesis 4, it is plausible to assume that financial constraints to accommodate an explosively growing school-age population may have increased the private sector participation in education governance. The country's increasing but relatively low share of urban population also explains the trend of private primary education, which has

[9] UNESCO UIS Statistics (2023). School-age population by level of education. http://data.uis.unesco.org/#. Accessed on October 30, 2023.

increased at a moderate pace but remained much lower than the world average. Its urban population as a share of the total population remains at 25 percent as of 2022, far below the world average of 57 percent. The moderate growth of private primary education since the mid-2000s coincides with the relatively more rapid growth of the urban population during the same period. The number of cases where private actors, including MNEs and large domestic forms, develop and manage urban infrastructure projects has significantly increased in recent decades (UNFPA Cambodia, 2014).

However, as Brehm and Silova (2014, p.95) point out, "the number of private schools remains marginal and attendance is generally limited to elite families in urban areas and low-fee private schools are relatively scarce" in Cambodia. The recent elections in 2017 and 2023 condemned as 'neither free nor fair' by international society also signal the country's democracy being under threat, and it is expected to have a further negative impact on rights to education.

Thailand

In Thailand, the role of private institutions seems much bigger at a glance than in any of its neighboring countries. The latest data shows that the share of enrolment in private primary schools is above 22 percent in 2020, which is remarkably higher than the regional average (14.7 percent) as well as the world average (18.7 percent). It is even slightly higher than the average of middle-income countries (21 percent), whose pace of primary education privatization has been much higher than other income groups (see Figure 1). Changes in the share of private enrolment at the primary level over the last 30 years further show a constant increase from 9.5 percent in 1990 to the peak in 2020.

Thailand is known to have enjoyed continuous economic growth over the last 30 years, rapidly overcoming a series of worldwide economic crises. It took less than a generation for Thailand to move from a low-income to an upper-middle-income country. A key source of Thailand's fast economic growth, among others, is its comparative advantage in manufacturing. Thailand has been successfully integrated into GVCs as an emerging production hub for electronics and automobiles. The early 1990s when Thailand embarked on a remarkable economic expansion was also the period when the country witnessed a drastic transition to democracy. In 1992 a free election was carried out after many years of coups and suppression, and the Democratic Party-led government was formed under the leadership of Prime Minister Chuan Leekpai. The new government set forth the goal of consolidating the democratic political system and initiated the process of political reform to realize transparent and accountable governance (Klein, 1998; Neher, 1996). The election in 1995 further helped the government to pave the way to realize democratic government with no interference from the military. The central policy measure to strengthen democratic procedures was to transfer more decision-making authority to the local councils. It aimed at making the bureaucracy more efficient and responsive to the demands of the public (Neher, 1996). The eagerness of the government for democracy and subsequent decentralization led to the rapid growth of civil society and non-state actors. The right to receive education was also reconfirmed and the political commitments were articulated. For instance, the National Education Act promulgated in 1999 extended the six years of compulsory education to nine years that include primary and lower secondary education. Between 1995 and 2000, public spending on education increased exponentially from 3.1 percent to 5.25 percent of GDP. The 1999 National Education Act further stipulates that various non-state actor groups, including enterprises, community organizations, and other social institutions, shall have the right to provide basic education. This Act contributed to strengthening the presence of private actors in

primary education governance and a subsequent increase in the enrolment in private primary schools.

Thailand faced the reversal of democracy and growing authoritarianism since the mid-2000s with the rise and fall of Prime Minister Thaksin Shinawatra. Repeated coups and resurgent military power have diminished civilian control by elected representatives (Chambers, 2010). During this period, public expenditure on education decreased significantly over the decade, and it remains at 2.6 percent (as of 2022), which is even below the level of the early 1990s. However, private primary education continued to grow throughout the 2010s, and the privatization schemes were actively applied to secondary and tertiary education as well as vocational education and training. The growing role of the private sector in education governance in Thailand can be explained to some extent by the large-scale privatization reforms initiated in 1998 amidst the financial crisis and pressure from domestic conglomerates and business associations for the application of stronger market principles to public services. Another explanation could be an unprecedently rapid urbanization since the early 2000s. Compared to a gradual increase from 27 percent to 31 percent between 1980 and 2000, Thailand has recently experienced explosive growth of urban population from 31 percent to 51 percent within as little as twenty years. More than half of the population are currently living in Bangkok and its vicinities such as Nonthaburi and Samut Prakan. Like in other countries, it resulted in the concentration of demand for housing and urban infrastructure (Limskul and Puttanapong, 2018). Privatization schemes were undertaken across different sectors, including the country's first water supply privatization project initiated in 2003. It is therefore plausible to assume that the increasing burden on the central and local governments to capture the needs of ever-growing urban families with school-

age children has contributed to the continuous growth of private education even at the primary level, as illustrated in Hypothesis 4.

Singapore

The case of Singapore is also interesting. Singapore is the only country in Southeast Asia that is recognized as a developed country in economic terms while being the smallest country in the region at the same time. Singapore, the city-state of merely 730 square kilometers, is also a highly advanced free-market economy. It has achieved an unparalleled degree of economic success over half a century by extensively engaging in the international economy. The country's lack of natural resources and a limited domestic demand base led the government to pursue export-led industrialization through multinationals. The growth of labor-intensive manufacturing in the initial development stage was quickly replaced by higher value-added manufacturing and services that require middle- to high-skilled workers. Since the 1990s, financial and business services began to flourish as the country was successfully positioned as a regional and international finance center (Kumar and Siddique, 2010). Over the last two decades, the government has concentrated on creating a highly advanced research and development (R&D) environment to transition to a knowledge- and innovation-based economy. Complete support from the government such as PhD scholarships, training programs, and research funding has been provided to increase the national R&D capacity through the Agency of Science, Technology and Research (A*STAR) established in 2002 (Yeo, 2016).

As the path taken to accomplish rapid and solid economic growth shows, Singapore has overcome the lack of natural resources and limited demographic conditions through extensive state-led investment in human capital. Education policies in Singapore have been also framed

consistent with the national agenda for human capital development and economic growth (Boon and Gopinathan, 2008; Biswajit, 2016). It is compulsory for all Singaporean citizens to attend *public* primary schools, with only a few exceptions for those who attend full-time religious institutions or do homeschooling. Most of the private primary education institutions in Singapore are international schools for expatriates. As a result, the share of enrolment in private primary institutions has remained at as low as 4 percent since public primary education became compulsory under the Compulsory Education Act implemented in 2003. Private secondary education is also marginal at around 5 percent of the total enrolment. The solid state's ownership of primary and secondary education services can be largely attributed to its specificity of being a natural resource-poor city-state that depends heavily on accumulated human capital. It is also plausible to point out the country's unique political environment as an important factor that contributes to the strong public education system. Singapore has a relatively more established democracy compared to its regional peers. Elections are largely free and fair, and its legal framework allows for political pluralism. As Hwee (2002, p.203) points out, however, "Singapore has never been fully accepted as a democratic country by Western liberal standards… It is often described as a model of 'soft authoritarianism', or a limited democracy at best." The latest democracy index by the Freedom House also confirms that Singapore enjoys only partial freedom, with both scores for political rights and civil liberties remaining much below the average of other developed economies. Since its independence in 1965, Singapore has been under the *de facto* one-party system where the People's Action Party (PAP) has dominated parliamentary politics. The immense influence of the PAP across the business community, trade unions, civil society, NGOs, and media has strengthened its network of political and economic control and justified the state's monopoly over financial, industrial, and human resources (Tan, 2011). On the other hand, the legacy of the early PAP government led by Lee Kuan Yew, the

founding Prime Minister between 1959 and 1990, on having zero tolerance for corruption has been preserved throughout the party's dominance. The Prevention of Corruption Act enacted in 1960 remains the primary legislation regulating acts of bribery and corruption. Allocating adequate resources and authority to the Corrupt Practices Investigation Bureau and severely punishing all corruption offenders regardless of political affiliation or position, Singapore has been continuously ranked as one of the least corrupt countries in the world. According to the latest Corruption Perceptions Index prepared by Transparency International, Singapore was ranked the 5th least corrupt country out of 180, with a corruption perception score of 83 in 2022. As a reminder, a low level of democracy and high perceived corruption control capacity are significant underlying conditions for more active privatization of primary education services in developed countries. The deep-rooted dominance of PAP and voluntary trade-off of some degrees of democracy for rapid socioeconomic advancement provide some explanations as to why the conditions and patterns of primary education privatization in developed countries described in Hypotheses 1 and 2 are not sufficient to explain the privatization case in Singapore.

The brief comparison of Cambodia, Thailand, and Singapore reveals that transferring the ownership of primary education services to the private sector is an outcome of the highly dynamic interplay between political, economic, demographic, and historical factors. It shows that even the countries that share similar geographical and cultural proximity take entirely different paths toward primary education governance. The case of Cambodia and Thailand provides evidence of the significance of the maturity of democracy, urban growth, and financial constraints as conditions for the private sector participation in primary education services. On the other hand, the case of Singapore draws further attention to the complex political environment and historical background of the relationship between the government, business, and the public to

understand the state's leadership that stretches to education governance. The comparative analysis also allows us to assume that individual states' approaches to primary education and its governance are largely reflective of national development agenda, institutional maturity, reputation and responsibility in the international community, and the influence of international donors. It is in line with Andonova (2013, p.506) who points out that the patterns of the sharing of roles for governance across the public and private spheres reflect "much greater and more disaggregated variability associated with domestic interests and activism, relative institutional openness… and the facilitating role of international institutions and assistance." Hence, it points to the importance of further comprehensive case studies on the patterns of primary education privatization in individual countries.

7. Conclusion

This paper examined under what conditions developed and developing countries choose to transfer the ownership of primary education governance to the private sector. The two separate models suggest that the patterns of primary education privatization vary significantly by a state's income level. The preparedness of the structural environment for a fair and transparent privatization process and successful post-privatization performance seems to be of more significance in developed countries. On the other hand, democracy matters for both, but in the opposite direction. The common ground we could assume from the result is that a higher level of democracy is associated with greater concern over universal access to primary education in both developed and developing countries. In this context, the reason why the privatization pattern appears to be the exact opposite is likely to be related to whether a democratic state that aims to provide universal primary education services has enough financial capacity to realize it by itself. The factor related to financial constraints on primary education governance consistently appears

to be a critical condition for a state's decision to privatize related services in developing countries. It also suggests that increasing urbanization as a crucial condition for primary education privatization shall be interpreted differently by income level. Countries with sufficient financial capacity may feel more pressure from increasing demand for diversified or elite education services concentrated in urban areas, while those with limited finance may be motivated to privatize in order to accommodate the increasing school-age population. This is where the cautionary assertion that association is not causation shall be emphasized. We can only assume that the abovementioned factors, including financial capacity, shall be the underlying motivations for similar or different patterns of the decision to privatize primary education in developed and developing countries. As Andonova (2013) points out, the patterns of sharing roles for governance across the public and private spheres reflect much more complex and disaggregated variability that requires understanding domestic interests, institutional structure, and political constituencies. Hence, it points to the importance of further comprehensive case studies on the patterns of primary education privatization in individual countries.

Bibliography

Abdullah, A., Doucouliagos, H. and E. Manning (2015) Does Education Reduce Income Inequality? A Meta-Regression Analysis: Does Education Reduce Income Inequality?. Journal of Economic Surveys, Vol. 29, pp. 301–316.

Acemoglu, D, and Restrepo, P. (2018). The Race between Man and Machine: Implications of Technology for Growth, Factor Shares and Employment. American Economic Review, Vol. 108, pp.1488-1542.

Acemoglu, D. and Autor, D.H. (2010). Skills, Tasks and Technologies: Implications for Employment and Earnings, in Ashenfelter, O. and Card, D. (eds.). Handbook of Labor Economics, Vol. 4b, pp. 1043-1171. San Diego and Amsterdam.

Acemoglu, D. and Robinson, J. A. (2000). Why Did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective. The Quarterly Journal of Economics, Vol. 115, No. 4, pp.1167-1199.

Adams, W. C. (2015). Conducting Semi-Structured Interviews, in Wholey, J.S., Harty, H.P. and Newcomer, K.E. (eds.). Handbook of Practical Program Evaluation, Jossey-Bass, San Francisco. pp.492-505.

Adsera, A. and Boix, C. (2002). Trade, Democracy, and the Size of the Public Sector: The Political Underpinnings of Openness. International Organization, Vol. 56. pp. 229–262.

Agénor, P.R. and Canuto, O. (2015). Middle-Income Growth Traps." Research in Economics, Vol. 69, No. 4. pp.641–660.

Akram, T. (2003). The Dismal Performance of Non-Financial State-owned Corporations in Bangladesh. Department of Economics, Columbia University, New York, mimeo.

Alan, W, and Gunby, P. (2003). The Marketization of New Zealand Schools: Assessing Fiske and Ladd. Journal of Economic Literature, Vol. 41, No. 3, pp.863-884.

Alcácer, V. and Cruz-Machado, V. (2019). Scanning the industry 4.0: a literature review on technologies for manufacturing systems. Engineering Science and Technology, an International Journal, Vol. 22, No. 3. pp.899–919.

Alderman, H., Orazem, P. and Paterno, E. (2001). School Quality, School Cost and the Public/Private School Choices of Low-Income Households in Pakistan, Journal of Human Resources, Vol. 36, pp. 304-306.

Alesina, A. and Reich, B. (2015). Nation-Building. Working paper, Department of Economics, Harvard University.

Alesina, A. and Wacziarg, R. (1998). Openness, Country Size and Government. Journal of Public Economics, Vol. 69, No. 3. pp. 305-321.

Allen, J., and R. van der Velden. (2001). Educational Mismatches Versus Skill Mismatches: Effects on Wages, Job Satisfaction, and On-the-Job Search. Oxford Economic Papers 3. pp.434–452.

Almeida, R.K., and Reyes A. (2016). Investment in Job Training: Why Are SMEs Lagging so Much Behind? Policy Research Working Paper 5358, World Bank, Washington, DC.

Amendolagine, V., Presbitero, A. F., Rabellotti, R., and Sanfilippo, M. (2019). Local Sourcing in Developing Countries: The Role of Foreign Direct Investments and Global Value Chains. World Development, Vol. 113, pp.73–88.

Anders, J., Green, G., Henderson, M. and Henseke, G. (2020). Determinants of Private School Participation: All About the Money?. Centre for Education Policy and Equalising Opportunities (CEPEO) Working Paper, No. 20-06.

Anderson, D. (2008). Productivism, Vocational and Professional Education, and the Ecological Question. Vocations and Learning 1, pp.105-129.

Andrabi T., Das J. and Khwaja, A.I. (2008). A Dime A Day: The Possibilities and Limits of Private Schooling in Pakistan. Comparative Education Review, Vol. 52, pp.329-355.

Andrabi, T., Das, J. and Khwaja, A.I. (2015). Delivering Education: A Pragmatic Framework for Improving Education in Low-Income Countries, in: Dixon, P., Humble, S. and Counihan, C. (eds.), Handbook of International Development and Education. Edgar Elgar Publishing, Cheltenham, UK, pp. 85-130.

Ansell, B. (2008). Traders, Teachers, and Tyrants: Democracy, Globalization, and Public Investment in Education. International Organization, Vol. 62, No. 2, pp. 289-322.

Archer, D. (2006). The Impact of the World Bank and IMF on Education Rights. Convergence, Vol. 39, 2/3, pp.7-18.

Artes, J., Salinas-Jimenez, M. D. M. and Salinas-Jimenez, J. (2014). Small Fish in a Big Pond or Big Fish in a Small Pond? The Effects of Educational Mismatch on Subjective Wellbeing. Social Indicators Research 119. pp.771–789.

Ashley, L. D., Mcloughlin, C., Aslam, M., Engel, J., Wales, J., Rawal, S. and Nicolai, S. (2014). The Role and Impact of Private Schools in Developing Countries: A Rigorous Review of the Evidence. Final report. Education Rigorous Literature Review.

Autor, D. H., Katz, L. F. and Kearney, M. S. (2006). The Polarization of the U.S. Labor Market. American Economic Review, Vol. 96, No. 2. pp.189–194.

Autor, D. H., Levy, F. and Murnane, R. J. (2003). The Skill Content of Recent Technological Change: An Empirical Exploration." Quarterly Journal of Economics, Vol. 118, No. 4. pp.1279–1333.

Azar, P. and Espuelas, S. (2021). Democracy and Primary Education Spending in Spain, 1902-22. University of Barcelona Economics. Working Paper No. 409.

Bakker, K. (2003). Archipelagos and Networks: Urbanization and Water Privatization in the South. The Geographical Journal, Vol. 169, No. 4, pp. 328-341.

Baldwin, R. and Lopez-Gonzalez, J. (2013). Supply-Chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. No. w18957. National Bureau of Economic Research.

Ball, S. J. and Youdell, D. (2008). Hidden Privatisation in Public Education. Brussels, Belgium: Education International.

Bamber, P. and Gereffi, G. (2013). Costa Rica in the Aerospace Global Value Chain: Opportunities for Entry and Upgrading. Durham, NC: Centre on Globalization, Governance and Competitiveness.

Bamber, P., Fernandez-Stark, G. Gere- and A. Guinn (2013). Connecting Local Producers in Developing Countries to Regional and Global Value Chains Update. OECD Trade Policy Paper No. 160, OECD Publishing.

Banga, K. (2016). Impact of Global Value Chains on Employment in India. Journal of Economic Integration Vol. 31, No. 3. pp. 631–673.

Bank of Thailand (2018). กับดัก Skills Mismatch และความท้าทายสู่ Education 4.0. MPG Economic Review.

Barrientos, S., Gereffi, G. and Rossi, A. (2011). Economic and Social Upgrading in Global Production Networks: A New Paradigm for a Changing World. International Labour Review, 150, pp. 319–340.

Bartlett, L., Frederick, M., Gulbrandsen, T. and Murillo, E. (2002). The Marketization of Education: Public Schools for Private Ends. Anthropology & Education Quarterly, Vol. 33, No. 1, pp.5-29.

Baskaran, T. and Hessami, Z. (2011). Public Education Spending in a Globalized World: Is there a Shift in Priorities Across Educational Stages? Working Paper Series, 2011/42. Department of Economics, University of Konstanz.

Behrend, J. (2021). Challenges to Democracy in Developing Countries. In: Leal Filho, W., Marisa Azul, A., Brandli, L., Lange Salvia, A., Özuyar, P.G., Wall, T. (eds) Peace, Justice and Strong Institutions. Encyclopedia of the UN Sustainable Development Goals. pp. 61-70. Springer, Cham.

Beinen, H. and Waterbury, J. (1989). The Political Economy of Privatization in Developing Countries. World Development, Vol. 17, pp.617-32.

Belfield, C. and Levin, H. (2002). Education Privatization: Causes, Consequences and Planning Implications. Fundamentals of Educational Planning, No. 74.

Benarroch, M. and Pandey, M. (2008). Trade Openness and Government Size. Econ. Lett, Vol. 101 No. 3. pp. 157–159.

Benassi, C., Durazzi, N. and Fortwengel, J. (2020). Not All Firms Are Created Equal: SMEs and Vocational Training in the UK, Italy, and Germany. MPIfG Discussion Paper 20/4.

Bhagwati, J. and Dehejia, V. (1994). Freer Trade and Wages of the Unskilled — Is Marx Striking Again? in Bhagwati, J. and Kosters, M. (eds.), Trade and Wages - Leveling Wages Down?. Washington, DC: AEI Press.

Bhatta, P. and Pherali, T. (2017). Nepal: Patterns of Privatisation in Education: A Case Study of Low-Fee Private Schools and Private Chain Schools. Brussels: Education International.

Biglaiser, G. and Danis, M. A. (2002). Privatization and Democracy: The Effects of Regime Type in the Developing World. Comparative Political Studies, Vol. 35, No. 1, pp.83-102.

Bishop, P. and Wiseman, N. (1999). External Ownership and Innovation in the United Kingdom. Applied Economics, Vol. 31, No. 4, pp. 443-450.

Biswajit, M. (2016). Investment in Human Capital and Economic Growth in Singapore. Global Business Review, Vol. 17, No. 2, pp.425-437.

Blair, G. and Imai, K. (2012). Statistical Analysis of List Experiments. Political Analysis. 20. pp.47−77.

Blalock, G. and Gertler, P.J. (2009). How Firm Capabilities Affect Who Benefits from Foreign Technology. Journal of Development Economics, Elsevier, Vol. 90, No. 2, pp. 192-199.

Blinder, A. S., and A. B. Krueger (2013). Alternative Measures of Offshorability: A Survey Approach. Journal of Labor Economics, Vol. 31, No. S1. pp.97-128.

Block, F. (2008). Swimming Against the Current: The Rise of a Hidden Developmental State in the United States. Politics and Society, Vol. 36. pp. 169–206.

Blomstrom, M. and Wolff, E. (1994). Multinational Corporations and Productivity Convergence in Mexico, in: Baumol, W., Nelson, R. & Wolff, E. (eds). Convergence of Productivity: Cross-national studies and historical evidence. Oxford: Oxford University Press.

Bloom, N., R. Sadun and J. Van Reenen (2012). Americans Do IT Better: US Multinationals and the Productivity Miracle. American Economic Review, Vol. 102, No. 1. pp.167-201.

Board of Investment of Thailand (2019). Thailand Investment Review: Thailand Advanced Manufacturing. Vol. 29.

Boardman, A. and Vining, A.R. (1989). Ownership and Performance, Competitive Environments: A Comparison of the Performance of Private, Mixed, and State-Owned Enterprises. Journal of Law and Economics, Vol. 32, pp. 1-33.

Boex, J. Malik, A., Brookins, D. and Edwards, B. (2016). Dynamic Cities? The Role of Urban Local Governments in Improving Urban Service Delivery Performance in Africa and Asia. Working Paper. International Growth Center. C-89227-CCN-1.

Boissiere, M. (2004). Rationale for Public Investments in Primary Education in Developing Countries. Background Paper for the Evaluation of the World Bank's Support to Primary Education. Washington, D.C.: The World Bank.

Boon, G.C. and Gopinathan, S. (2008). The Development of Education in Singapore Since 1965. In Lee, S.K., Goh, B., Fredriksen, B. and Tan, J.P. (eds), Toward a Better Future: Education and Training for Economic Development in Singapore Since 1965. pp.12-38. Washington, DC: The World Bank.

Boyce, C. and Neale, P. (2006). Conducting In-depth Interviews: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input. Pathfinder International Tool Series. Monitoring and Evaluation – 2. Pathfinder International.

Breen, M. and Doyle, D. (2013). The Determinants of Privatization: A Comparative Analysis of Developing Countries. Journal of Comparative Policy Analysis, Vol. 15, No. 1, pp.1-20.

Brehm, W. and Silova, I. (2014). Hidden Privatization of Public Education in Cambodia: Equity Implications of Private Tutoring. Journal for Educational Research Online, Vol. 6, No. 1, pp.94-116.

Briskman, L. (2018). Review: Critical Human Rights, Citizenship and Democracy Education: Entanglements and Regenerations. In McCloskey, S. (2018). Policy & Practice: A Development Education Review (pp.204-208). Centre for Global Education.

Brown, D. (1999). Reading, Writing, and Regime Type: Democracy's Impact on Primary School Enrollment. Political Research Quarterly, Vol. 52, No. 4, p. 681-707.

Brown, D. and Hunter, W. (2004). Democracy and Human Capital Formation: Education Spending in Latin America, 1980-1997. Comparative Political Studies, Vol. 37, No. 7, pp.842-864.

Cameron, D.R. (1978). The Expansion of the Public Economy: A Comparative Analysis. The American Political Science Review, Vol. 72. pp. 1243–1261.

Campbell M., Haveman R., Sandefur G. and Wolfe B. (2005). Economic Inequality and Educational Attainment across a Generation. Focus, Vol. 23. pp.11–15.

Caselli, F, Koren, M, Lisicky, M and Tenreyro, S (2020). Diversification Through Trade. The Quarterly Journal of Economics, Vol. 135, No. 1. pp. 449–502.

Cavaliere, A. and Scabrosetti, S. (2006). Privatization and Efficiency: From Principals and Agents to Political Economy. Privatisation Regulation Corporate Governance Working Papers 12201, Fondazione Eni Enrico Mattei (FEEM).

Cavallo, E (2008). Output Volatility and Openness to Trade: A Reassessment. Economía, Vol. 9, No. 1. pp. 105–152.

Cavenile, L. (2021). Offshoring, Computerization, Labor Market Polarization and Top Income Inequality. Vol. 69, ISSN 0164-0704.

Cavusgil, S. T. (1993). Globalization of Markets and Its Impact on Domestic Institutions. Indiana Journal of Global Legal Studies, Vol. 1, Iss. 1, Article 5.

Celarier, M. (1997). Privatization: A Case Study in Corruption. Journal of International Affairs, Vol. 50, No. 2, pp. 531-543.

Chakrabarti, R. and Peterson, P. (2009). School Choice International: Exploring Public-Private Partnerships. Cambridge, MA: MIT Press.

Chambers, P. (2010). Thailand on the Brink: Resurgent Military, Eroded Democracy. Asian Survey, Vol. 50, No. 5, pp. 835-858.

Chimombo, J. (2009). Expanding Post-Primary Education in Malawi: Are Private Schools the Answer? Compare, Vol. 39, No. 2, pp.167-184.

Coe, N.M., Hess, M. and Yeung, H.W.C. (2004). Globalizing Regional Development: A Global Production Networks Perspective. Transactions of the Institute of British Geographers, 29. pp. 468–484.

Cohen-Zada, D. and Sander, W. (2008). Religion, Religiosity and Private School Choice: Implications for Estimating the Effectiveness of Private Schools. Journal of Urban Economics, Vol. 64, Issue 1, pp.85-100.

Colclough, C. (1996). Education and the Market: Which Parts of the Neoliberal Solution Are Correct? World Development, Vol. 24, Issue 4, pp.589-610.

Colpan, A.M. and Jones, G. (2016). Business Groups, Entrepreneurship and the Growth of the Koç Group in Turkey Business History, Vol. 58, Nol. 1. pp. 69-88.

Corak, M. (2013). Income Inequality, Equality of Opportunity, and Intergenerational Mobility. Journal of Economic Perspectives, Vol. 27, No. 3. pp. 79–102.

Couture, V. and Handbury, J. (2020). Urban Revival in America. Journal of Urban Economics, Vol. 119, No. 2.

Craig, J. (2000). Evaluating Privatisation in Zambia: A Tale of Two Processes. Review of African Political Economy, Vol. 27, No. 85, pp.357-66.

Criscuolo, C. and Timmis, J. (2017). The Relationship Between Global Value Chains and Productivity. International Productivity Monitor, 32, pp. 61–83.

Crnkovic, B. and Pozega, Z. (2008). Causes and Models of Privatization in Higher Education. Interdisciplinary Management Research, Josip Juraj Strossmayer University of Osijek, Faculty of Economics, Croatia, Vol. 4, pp.124-134.

Cuadrado-Ballesteros, B. and Peña-Miguel, N. (2018). The Socioeconomic Consequences of Privatization: An Empirical Analysis for Europe. Social Indicators Research, Vol. 139, No. 1, pp.163–183.

Cultrera, L., Mahy, B., Rycx, F. and Vermeylen, G. (2022). Educational and Skills Mismatches: Unravelling Their Effects on Wages Across Europe, Education Economics. DOI:10.1080/09645292.2022.2050995.

D'Souza, J. and Megginson, W. L. (1999). The Financial and Operating Performance of Privatised Firms During the 1990s. Journal of Finance, Vol. 54, No. 4, pp.1397-1438.

Dabla-Norris, E., Kochhar, K., Suphaphiphat, N., Ricka, F. and Evridiki, T. (2015). Causes and Consequences of Income Inequality: A Global Perspective, IMF Staff Discussion Note 15/13. Washington, D.C.: International Monetary Fund.

Das, M and Hilgenstock, B. (2018). The Exposure to Routinization: Labor Market Implications for Developed and Developing Economies. IMF Working Paper.

De Vaus, D. (1991). Surveys in Social Research, 3rd Edition. London: Routledge.

de Vries, G., Chen, Q., Hasan, R. and Li, Z. (2016). Skills and Activity Upgrading in Global Value Chains: Trends and Drivers for Asia. ADB Economics Working Paper Series. Asian Development Bank.

Dearden, L., Ryan, C. and Sibieta, L. (2011). What Determines Private School Choice? A Comparison between the United Kingdom and Australia. Australian Economic Review, Vol. 44, No. 3. pp. 308–320.

Dei, G. J. S. and Karumanchery, L. L. (1999). School Reforms in Ontario: The "Marketization of Education" and the Resulting Silence on Equity. Vol. 45 No. 2. p.111-131.

Dharwadkar, R., George, G. and Brandes, P. (2000). Privatization in Emerging Economies, an Agency Theory Perspective. Academy of Management Review, 25, 650-669.

Díaz-Díaz N.L., Aguiar-Díazb I. and Saá-Pérezc P. (2008). The Effect of Technological Knowledge Assets on Performance: The Innovative Choice in Spanish Firms. Research Policy, Vol.37, Issue. 9, pp. 1515–1529.

Donaghey, J., Reinecke, J., Niforou, C. and Lawson, B. (2014). From Employment Relations to Consumption Relations: Balancing Labor Governance in Global Supply Chains. Human Resource Management, Vol. 53, No. 2. pp. 229–252.

Doner, R. and Schneider, B. (2016). The Middle Income Trap. More Politics Than Economics. World Politics, Vol. 68. pp.608–644.

Doner, R. and Schneider, B. (2019). Technical Education in the Middle-Income Trap: Building Coalitions for Skill Formation, The Journal of Development Studies, p.1-18.

Doyle, D. (2010). Politics and Privatization: Exogenous Pressures, Domestic Incentives and State Divestiture in Latin America. Journal of Public Policy, Vol. 30, No. 3, pp.291-320.

Duncan, G. J., and S. D. Hoffman. (1981). The Incidence and Wage Effects of Overeducation. Economics of Education Review, Vol. 1. pp.75–86.

Economist Intelligence Unit. (2023). Democracy Index 2022: Frontline democracy and the battle for Ukraine.

Education International. (2008). Report of the EI Taskforce on Globalization, GATS and Vocational Education. Geneva.

Edwards, T. and Whitty, G. (1992). Parental Choice and Educational Reform in Britain and the United States. British Journal of Educational Studies, Vol. 40, No. 2, pp.101-117.

Egger, H., Kreickemeier U., Moser, C. and Wrona, J. (2016). Offshoring and Job Polarisation between Firms. CEPIE Working Paper No. 08/16. Center of Public and International Economics. Technische Universität Dresden.

Einola, K. and Alvesson, M. (2021). Behind the Numbers: Questioning Questionnaires. Journal of Management Inquiry, Vol. 30, No. 1. pp.102–114.

El-Naggar, S. (1989). Privatization and Structural Adjustment in the Arab Countries. Washington D.C.: International Monetary Fund.

Elgin, C. and Oyvat, C. (2013). Lurking in the Cities: Urbanization and the Informal Economy. Structural Change and Economic Dynamics, Vol. 27, pp.36-47.

Ellison, G., E. Glaeser, and W. Kerr (2010). What Causes Industry Agglomeration? American Economic Review, Vol. 100, No. 3. pp.889–927

Epifani, P. and Gancia, G. (2008). Openness, Government Size and the Terms of Trade. The Review of Economic Studies, Vol. 76, No. 2. pp. 629-668.

Falk, M. (2008). Effects of Foreign Ownership on Innovation Activities: Empirical Evidence for Twelve European Countries. National Institute Economic Review, Vol. 204, No. 85, pp. 85-97.

Farole, T. (2016). Do Global Value Chains Create Jobs? IZA World of Labor.

Feenstra, R. (1998). Integration of Trade and Disintegration of Production in the Global Economy. Journal of Economic Perspectives, Vol. 12. pp. 31–50.

Fernández, M.L. (2017). Challenges of Economic Globalization. Revista de Relaciones Internacionales, Estrategia y Seguridad, Vol. 12, No. 1, pp. 23-50.

Fernandez-Stark, K. and Bamber, P. (2018). Promoting Skills, Jobs and Competitiveness in Global Value Chains: Policies and Practices for Developing Countries. In Sakamoto, A. and Sung, J. (Ed.), Skills and the Future of Work: Strategies for Future Growth in Asia Pacific. Bangkok: International Labour Organisation (ILO).

Fernandez-Stark, K., Bamber, P. and Gereffi., G. (2010). Workforce Development in Chile's Offshore Services Industry. Durham, N.C.: Duke University, Center on Globalization, Governance & Competitiveness.

Fernandez-Stark, K., Bamber, P. and Gereffi., G. (2011). The Offshore Services Global Value Chain: Economic Upgrading and Workforce Development. Durham, NC: Center on Globalization, Governance & Competitiveness, Duke University.

V Finkel, E., Eastwick, P. and Reis, H. (2015). Best Research Practices in Psychology: Illustrating Epistemological and Pragmatic Considerations with the Case of Relationship Science. Journal of Personality and Social Psychology, Vol. 108, No. 2. pp.275-297.

Fisman R. and Wang Y. (2014). Corruption in Chinese privatizations. The Journal of Law, Economics, and Organization, Vol. 31, pp.1-29.

Fitz, J. and Hafid, T. (2007). Perspectives on the Privatization of Public Schooling in England and Wales. Educational Policy, Vol. 21, No. 1, pp.273–296.

Fomba, B.K., Talla, D.F. and Ningaye, P. (2023). Institutional Quality and Education Quality in Developing Countries: Effects and Transmission Channels. Journal of the Knowledge Economy, Vol. 14, pp.86–115.

Frey, C. B., and Osborne, M. (2013). The Future of Employment: How Susceptible are jobs to Computerisation? University of Oxford.

Friedman, T. (2005). The World Is Flat: A Brief History of the Twenty-First Century. New York: Farrar, Straus, and Giroux.

Frydman, R., Gray, C.W., Hessel, M. and Rapaczynski, A. (1999). When Does Privatization Work? The Impact of Private Ownership on Corporate Performance in the Transition Economies. Quarterly Journal ofEconomics, Vol. 114, No. 4, pp.1153–1191.

Galego, F. (2010). Historical Origins of Schooling:The Role of Democracy and Political Decentralisation. Review of Economics and Statistics, Vol. 92, No. 2, pp.228-243.

Galor, O. and Moav, O. (2004). From Physical to Human Capital Accumulation: Inequality and the Process of Development. Review of Economic Studies, Vol. 71, pp.1001-1026.

Garrett, G. (1995). Capital Mobility, Trade, and the Domestic Politics of Economic Policy. International Organization, Vol. 49. pp. 657–687.

Garrett, G. (1998). Partisan Politics in the Global Economy. New York: Cambridge University Press.

Gereffi, G. (1994). The Organization of Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks, in Gereffi, G. and Korzeniewicz, M. (eds.), Commodity Chains and Global Capitalism. pp. 95–122. Praeger Publishers.

Gereffi, G. (1995). Global Production Systems and Third World Development, in Stallings, B. (eds.), Global Change, Regional Response: The New International Context of Development. pp. 100–142. Cambridge; New York and Melbourne: Cambridge University Press.

Gereffi, G. (1999). International Trade and Industrial Upgrading in the Apparel Commodity Chain. Journal of International Economics, Vol. 48, No. 1. pp. 37-70.

Gereffi, G. (2005). The Global Economy: Organization, Governance, and Development, in Smelser, N.J. and Swedberg, R. (eds.), The Handbook of Economic Sociology. pp. 160–182. 2nd edition, Princeton, NJ: Princeton University Press.

Gereffi, G. and Memedovic, O. (2003). The Global Apparel Value Chain: What Prospects for Upgrading for Developing Countries. Sectoral Studies Series. Vienna, Austria: United Nations Industrial Development Organization (UNIDO).

Gereffi, G. and Sturgeon, T. (2013). Global Value Chains and Industrial Policy: The Role of Emerging Economies, in Elms, D. and Low, P. (eds.), Global Value Chains in a Changing World. pp. 329–360. Geneva: World Trade Organization (WTO).

Gereffi, G., Fernandez-Stark, K. and Psilos, P. (2011). Skills for Upgrading: Workforce Development and Global Value Chains in Developing Countries. Durham, N.C.: Duke Center on Globalization, Governance and Competitiveness and the Research Triangle Institute.

Gereffi, G., Humphrey, J. and Sturgeon, T. (2005). The Governance of Global Value Chains. Review of International Political Economy, Vol. 12, No. 1. pp. 78–104.

Gibbon, P. and Ponte, S. (2005). Africa, Value Chains and the Global Economy. Temple University Press: Philadelphia.

Glaeser, E. (2011). Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier. London: Penguin.

Glas, A. and Kleemann, F. (2016). The Impact of Industry 4.0 on Procurement and Supply Management: A Conceptual and Qualitative Analysis. International Journal of Business and Management Invention, Vol. 5, No. 6. pp. 55-66.

Glawe, L. and Wagner, H. (2020). The Middle-Income Trap 2.0: The Increasing Role of Human Capital in the Age of Automation and Implications for Developing Asia. Asian Economic Papers, Vol. 19, No. 3. pp.40–58.

González, F., Prem, M. and Urzúa, F. (2020). The Privatization Origins of Political Corporations: Evidence from the Pinochet Regime. The Journal of Economic History, Vol. 80, No. 2, pp.417-456.

Goos, M. and Manning, A. (2003). McJobs and MacJobs: The Growing Polarisation of Jobs in the UK, in: Dickens, R., Gregg, P. and Wadsworth, J. (eds.). The Labour Market Under New Labour. Palgrave Macmillan, London.

Goos, M. and Manning, A. (2007). Lousy and Lovely Jobs: The Rising Polarization of Work in Britain. Review of Economics and Statistics, Vol. 89. pp.118-133.

Goos, M., Manning, A. and Salomons, A. (2009). The Polarization of the European Labor Market. American Economic Review Papers and Proceedings, 99. pp.58-63.

Gould, J. (2005). Where Have All the Illiberal Democracies Gone? Privatization as a Catalyst to Regime Change in Postcommunist Europe. Global Europe Program. Meeting Report, 316.

Gourevitch, P. (1978). The Second Image Reversed: The International Sources of Domestic Politics. International Organization, Vol. 32. pp. 881-912.

Gray, J. (2013). The Company States Keep: International Economic Organizations and Investor Perceptions. Cambridge: Cambridge University Press.

Green, F. and Kynaston, D. (2019). Engines of Privilege: Britain's Private School Problem. London: Bloomsbury.

Greenstone, M., Hornbeck, R. and Moretti, E. (2010). Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings. Journal of Political Economy, Vol. 118, No. 3. pp.536–598.

Grossman, G. M., and Rossi-Hansberg, E. (2008). Trading Tasks: A Simple Theory of Offshoring. American Economic Review, Vol. 98, No. 5. pp. 1978–1997.

Groves, R. M., F. J. Fowler, M. P. Couper, J. M. Lepkowski, E. Singer, and R. Tourangeau. (2009). Survey methodology. 2nd edition. Hoboken, NJ: John Wiley.

Grzybowska, K. and Łupicka, A. (2017). Key Competencies for Industry 4.0. Economics & Management Innovations, Vol. 1, No. 1. pp.250–253.

Guadalupe, M., Kuzmina, O. and Thomas, C. (2012). Innovation and Foreign Ownership. American Economic Review, Vol. 102, No. 7. pp.3594-3627.

Hamzeh R. Zhong R. and Xu XW. (2018). A Survey Study on Industry 4.0 for New Zealand Manufacturing. Procedia Manufacturing, 26. pp.49-57.

Hanushek, E., Leung, C. and Yilmaz, K. (2003). Redistribution Through Education and Other Transfer Mechanisms. Journal of Monetary Economics, Vol. 50. pp. 1719–1750.

Harding, R. and Stasavage, D. (2014). What Democracy Does (and Doesn't Do) for Basic Services: School Fees, School Inputs, and African Elections. The Journal of Politics, Vol. 76, No.1, pp. 229-245.

Harma, J. (2009). Can Choice Promote Education for All? Evidence from Growth in Private Primary Schooling in India. Compare, Vol. 39, No. 2, pp.151-165.

Harrison, M. (2005). Competition, Regulation and Private Schools. Australian Economic Review, Vol. 38, No. 1, pp. 66-74.

Hart, O. (2003). Incomplete Contracts and Public Ownership: Remarks, and an Application to Public-Private Partnerships. Economic Journal, Vol. 113, pp.69-76.

Hartwell, C.A. (2018). Old Wine and New Bottles: A Critical Appraisal of the Middle-Income Trap in BRICS Countries. Russian Journal of Economics, ARPHA Platform, Vol. 4, No. 2. Pp.133-154.

Hatani, F. (2009). The Logic of Spillover Interception: The Impact of Global Supply Chains in China. Journal of World Business, Vol. 44, No. 2. pp. 158–166.

Hawley, W. (1995). The False Premises and False Promises of the Movement to Privatize Public Education. Teachers College Record, Vol. 96, No. 4, pp.735-743.

Helper, S., E. Reynolds, D. Traficonte, and A. Singh. (2021). Factories of the Future: Technology, Skills, and Digital Innovation at Large Manufacturing Firms. MIT Work of the Future. Research Brief, 19.

Helpman, E. (1984). A Simple Theory of International Trade with Multinational Corporations. Journal of Political Economy, Vol. 92, No. 3. pp. 451–471.

Helpman, E., Melitz, M. J. and Yeaple, S. (2004). Export Versus FDI with Heterogeneous Firms. American Economic Review, Vol.94, No.1, pp. 300-316.

Hess, F. and Leal, D. (2001). Quality, Race, And the Urban Education marketplace. Urban Affairs Review, Vol. 37, No. 2, pp.249-266.

Heyman, F. (2016). Job Polarization, Job Tasks and the Role of Firms. Working Paper Series, 1123, Research Institute of Industrial Economics.

Hiratsuka, D. (2013). Production Networks in Asia: A Case Study from the Hard Disk Drive Industry. ADBI Working Paper Series 301.Horner, R and Alford, M (2019). The Roles of the State in Global Value Chains: An Update and Emerging Agenda. GDI Working Paper, 2019-036. Manchester: The University of Manchester.

Hummels, D., Ishii, J. and Yi, K.M. (2001). The Nature and Growth of Vertical Specialization in World Trade. Journal of International Economics, Vol. 54, No. 1. pp. 75–96.

Humphrey, J. (2004). Upgrading in Global Value Chains. ILO Working Paper, No. 28.

Humphrey, J. and Schmitz, H. (2002). How Does Insertion in Global Value Chains Affect Upgrading in Industrial Clusters? Regional Studies, Vol.36, No. 9. pp.1017–1027.

Hwee, Y. L. (2002). Electoral Politics in Singapore. In Croissant, A. (ed.), Electoral Politics in Southeast & East Asia. Singapore: Friedrich-Ebert-Stiftung. pp. 203-232.

Ibrahim, T. M. (2015). The Causal Link Between Trade Openness and Government Size: Evidence from the Five Largest Economies in Africa. International Journal of Business and Economic Sciences Applied Research, Vol. 8, Iss. 1. pp. 121-135.

ILO (2001). The Impact of Decentralization and Privatization on Municipal Services. Report for discussion at the Joint Meeting on the Impact of Decentralization and Privatization on Municipal Services. Geneva: International Labour Organization.

ILO (2016). ASEAN in Transformation: The Future of Jobs at Risk of Automation. Bureau for Employers' Activities, Working Paper No 9. International Labour Office. Geneva: International Labour Organization (ILO).

ILO (2017). Purchasing Practices and Working Conditions in Global Supply Chains: Global Survey Results. INWORK Issue Brief No. 10. Geneva.

Intarakumnerd, P. (2019). Thailand's Middle-Income Trap: Firms' Technological Upgrading and Innovation and Government Policies. Seoul Journal of Economics 2019, Vol. 32, No. 1, pp.107-135.

Islam, M.Q. (2004). The Long Run Relationship Between Openness and Government Size: Evidence from Bounds Test. Applied Economics, Vol. 36. pp. 995–1000.

Iversen, T. and Cusack, T. (2000). The Causes of Welfare State Expansion. World Politics, Vol. 52. pp. 313–349.

Jenn N. (2006). Designing A Questionnaire. Malays Fam Physician, Vol. 1, No. 1. pp.32-35.

Jitsuchon, S. (2012). Thailand in a Middle-income Trap. TDRI Quarterly Review, Vol. 27 No. 2, p.13-20.

Jones T., Baxter M. and Khanduja V. (2013). A Quick Guide to Survey Research. Ann R Coll Surg Engl, Vol. 95, No. 1. pp.5-7.

Kamat, S., Spreen, C.A. and Jonnalagadda, I. (2016). Profiting from the Poor: The Emergence of Multinational Edu-Businesses in Hyderabad, India, Education International.

Katzenstein, P.J. (1985). Small States in World Markets: Industrial Policy in Europe. Ithaca, N.Y.: Cornell University Press.

Kaufman, R. and Segura-Ubiergo, A. (2001). Globalization, Domestic Politics, and Social Spending in Latin America. World Politics, Vol.53, pp.553-587.

Kaufmann, D. and Siegelbaum, P. (1997). Privatization and Corruption in Transition Economies. Journal of International Affairs, Vol. 50, No. 2, pp. 419-458.

Kelley, K., Clark, B. and Brown, V. and Sitzia, J. (2003). Good Practice in the Conduct and Reporting of Survey Research, International Journal for Quality in Health Care, Vol. 15, Issue 3, pp. 261–266.

Kelly, J. (1996). One Piece of a Larger Puzzle: The Privatization of VIASA, in Ravi Ramamurti (eds.). Privatizing Monopolies: Lessons from the Telecommunications and Transport Sectors in Latin America. pp. 241-277. Baltimore: Johns Hopkins University Press.

Keohane, R. and Milner, H. (1996). Internationalization and Domestic Politics. New York: Cambridge University Press.

Keynes, J M (1930). Economic Possibilities for our Grandchildren, in Essays in Persuasion, New York, W.W. Norton & Co., 1963, 358-373.

Kharas, H. and Kohli, H. (2011). What is the Middle Income Trap, Why Do Countries Fall into It, and How Can It Be Avoided? Global Journal of Emerging Market Economies. Vol. 3, No. 3. pp. 281–289.

Kingdon, G. and Banerji, R. (2009). Addressing School Quality: Some Policy Pointers from Rural North India, Policy Brief No. 5, Research Consortium on Educational Outcomes and Poverty, University of Cambridge, United Kingdom.

Kiran, J. (2018). Expanding the Framework of the Varieties of Capitalism: Turkey as a Hierarchical Market Economy. Journal of Eurasian Studies, Vol. 9, Issue. 1. pp.42-51.

Klein, J.R. (1998). The Constitution of the Kingdom of Thailand, 1997: A Blueprint for Participatory Democracy. Working Paper 8. The Asia Foundation.

Knott, E., Rao, A.H., Summers, K. and Teeger, C. (2022). Interviews in the Social Sciences. Nat Rev Methods Primers 2, 73.

Kolluri, B.R., Panik, M.J. and Wahab, M.S. (2000). Government Expenditure and Economic Growth: Evidence from G7 Countries. Applied Economics, Vol. 32, No. 8, pp. 1059–1068.

Koopman, R., Wang, Z. and Wei, S.J. (2014). Tracing Value-added and Double Counting in Gross Exports. American Economic Review, Vol. 104, No. 2. pp.459-494.

Korwatanasakul, U., Baek, Y. and Majoe, A. (2020). Analysis of Global Value Chain Participation and the Labour Market in Thailand: A Micro-level Analysis. ERIA Discussion Paper Series, No. 331.

Kosack, S. and Tobin, J. L. (2015). Which Countries' Citizens Are Better Off With Trade? World Development, Vol. 76, pp.95-113.

Kowalski, P., Lopez-Gonzalez, J. Ragoussis, A. and Ugarte, C. (2015). Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies. OECD Trade Policy Paper 179, OECD Publishing, Paris.

Kueh, S.H., Puah, C.H. and Apoi, A. (2008). Outward FDI of Malaysia: An Empirical Examination from Macroeconomic Perspective. Economic Bulletin, Vol. 6. pp. 1-11.

Kumar, S. and Siddique, S. (2010). The Singapore Success Story: Public-Private Alliance for Investment Attraction, Innovation and Export Development. Serie Comercio Internacional. No. 99.

Laffont, J.J. and Tirole, J. (1993). A Theory of Incentives in Procurement and Regulation. MIT Press, Cambridge.

Lamartina, S. and Zaghini, A. (2010). Increasing Public Expenditures: Wagner's Law in OECD Countries. German Economic Review, Vol. 12, No. 2, pp. 149-164.

Lang, V.F. and Tavares, M.M. (2018). The Distribution of Gains from Globalization. IMF Working Paper. Washington D.C.: International Monetary Fund.

Lasi, H., Fettke, P., Kemper, H.G., Feld, T. and Hoffmann, M. (2014). Industry 4.0. Business & information systems engineering, Vol. 6, No. 4. pp.239-242.

Leamer, E.E. (1996). In Search of Stopler-Samuelson Effects on U.S. Wages. NBER Working Paper Series No. 5427. Cambridge: National Bureau of Economic Research.

Leblang, D. (1996). Property Rights, Democracy and Economic Growth. Political Research Quarterly, Vol. 49, No. 1, pp. 5-26.

Lee, J. and Gereffi, G. (2021). Innovation, Upgrading, and Governance in Cross-Sectoral Global Value Chains: The Case of Smartphones. Industrial and Corporate Change, Vol. 30, No. 1, pp. 215–231.

Lee, V. E., Croninger, R. G. and Smith, J. B. (1994). Parental Choice of Schools and Social Stratification in Education: The Paradox of Detroit. Educational Evaluation and Policy Analysis, Vol. 16, No. 4. pp. 434–457.

Leuven, E. and Oosterbeek, H. (2011). Overeducation and Mismatch in the Labor Market. IZA DP No. 5523. Discussion Paper Series. Institute for the Study of Labor (IZA).

Levidow, L. (2002). Marketizing Higher Education: Neoliberal Strategies and Counter Strategies. In K.Robins and F.Webster (eds.) The Virtual University? Knowledge, Markets and Management. 227-248. Oxford: Oxford University Press.

Levy, D. L. (2008). Political Contestation in Global Production Networks. Academy of Management Review, 33.

Lewis, B.D. (2013). Urbanization and Economic Growth in Indonesia: Good News, Bad News and (Possible) Local Government Mitigation, Regional Studies, Vol. 48, No.1, pp.192-207.

Liddle, W. (2002). Coercion, Co-optation, and the Management of Ethnic Relations in Indonesia. In Brown, M.E., & Ganguly, S. (Eds.), *Government Policies and Ethnic Relations in Asia and the Pacific* (pp. 273-320). Cambridge, MIT Press.

Limskul, K. and Puttanapong, N. (2018). Asia's Social Infrastructure Demand Estimate: The Case of Thailand. Background paper for the Research on Demand Estimate on Infrastructure in Asia. Japan International Cooperation Agency (JICA) Research Institute.

Locatelli, R. (2018). Education As a Public and Common Good: Reframing the Governance of Education in a Changing Context. UNESCO Education Research and Foresight, Working Paper 22.

Lu, Y., Tao, Z. and Zhu, L. (2017). Identifying FDI spillovers. Journal of International Economics, Vol. 107, pp. 75–90.

Lubienski, C. (2006). School Diversification in Second-Best Education Markets: International Evidence and Conflicting Theories of Change. Educational Policy, 20(2), 323-344.

Lynch, K. and O'Riordan, C. (1998). Inequality in Higher Education: A Study of Class Barriers. British Journal of Sociology of Education, 19(4), 445–478.

Majumdar, S.K. (1996). Assessing Comparative Efficiency of the State-Owned, Mixed, and Private Sectors in Indian Industry. Public Choice, Vol. 96, pp. 1-24.

Mansfield, E. and Busch, M. (1995). The Political Economy of Nontariff Barriers: A Cross National Analysis. International Organization, Vol. 49. pp. 723–749.

Mansfield, E., Milner, H. and Rosendorff, B.P. (2000). Why Democracies Cooperate More: Electoral Control and International Trade Agreements. International Organization, Vol. 56. pp. 477–513.

Maravall, J. M. (1995). The Myth of the Authoritarian Advantage. in Larry Diamond & Marc F. Plattner (Eds.), Economic reform and democracy. pp. 13-27. Baltimore: Johns Hopkins University Press.

Martimort, D. (2006). An Agency Perspective on the Costs and Benefits of Privatization. Journal of Regulatory Economics, Vol. 30, pp. 5-44.

Masud, M. (2018). Authoritarian Claims to Legitimacy: Syria's Education under the Regime of Bashar al-Assad. Mediterranean Studies, Vol. 26, No. 1. pp.80-111.

Matsumoto, M. and Bhula-or, R. (2018). Problem of Skills Mismatch in Asia and the Pacific: How Useful Are the Existing Measurement for Future Skills Strategies? in Skills and the Future of Work: Strategies for Inclusive Growth in Asia and the Pacific. pp. 338-363. Geneva: ILO.

Mavromaras, K., Mcguinness, S., O'Leary, N., Sloane, P. and Wei, Z. (2013). Job Mismatches and Labour Market Outcomes: Panel Evidence on University Graduates. Economic Record. 89.

Mayer, S. E. (2010). The Relationship Between Income Inequality and Inequality in Schooling. Theory and Research in Education, 8(1), 5-20.

Mayer, F.W. and Phillips, N. (2017). Outsourcing Governance: States and the Politics of A 'Global Value Chain World. New Political Economy, Taylor & Francis Journals, Vol. 22, No. 2. pp. 134–152.

McGuinness, S. (2006). Overeducation in the Labour Market. Journal of Economic Surveys, Vol. 20, No. 3. pp.387-418.

McNamara, C. (1999). General Guidelines for Conducting Interviews. University of Minnesota.

Melitz, M.J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. Econometrica, Vol.71, No.6, pp. 1695-1725.

Menashy, F. (2014). Theorizing Privatization in Education: Comparing Conceptual Frameworks and the Value of the Capability Approach. Current Issues in Comparative Education, Vol. 16, No. 1, pp.13-25.

Meseguer, C. (2002). The Diffusion of Privatization in Industrial and Latin American Countries: What Role for Learning? mimeo, Juan March Institute, Madrid.

Michaels, G. and Natraj, A. and Van Reenen, J. (2010). Has ICT polarized Skill Demand?: Evidence from Eleven Countries Over 25 Years. Centre for Economic Performance Discussion Paper, No. 987.

Michailidis, M. P. and Efstathiou, S. (2015). The Process of Privatization and Employee Morale. Journal of Regional & Socio-Economic Issues, Vol. 5, No. 1, pp.6–24.

Miller, P. W. (2007). Overeducation and Undereducation in Australia. Australian Economic Review, Vol. 40, No. 3. pp.292-299.

Milner, H. (1988). Resisting Protectionism. Princeton, NJ: Princeton Univ. Press.

Milner, H. (1999). The Political Economy of International Trade. Annual Review of Political Science, Vol. 2. pp. 91–114.

Milner, H. and Keohane, R. (1996). Internationalization and Domestic Policy: An Introduction, in Keohane, R.O. and Milner H.V. (eds), Internationalization and Domestic Politics, Cambridge: Cambridge University Press.

Milner, H. and Kubota, K. (2005). Why the Move to Free Trade? Democracy and Trade Policy in the Developing Countries. International Organization, Vol. 43, No. 2. pp. 239–272.

Milner, H. and Mukherjee, B. (2009). Democratization and Economic Globalization. The Annual Review of Political Science, Vol. 12, pp.163–181.

Minichiello, V., Aroni, R., Timewell, E. and Alexander, L. (1995). In-depth interviewing: Principles, Techniques, Analysis. Melbourne, Vic., Australia: Longman.

Mokyr, J., Vickers, C. and Ziebarth, N. L. (2015). The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different? Journal of Economic Perspectives, Vol. 29, No. 3. pp.31-50.

Molana, H., Montagna, C., Violato, M. (2004). On the Causal Relationship between Trade-openness and Government Size: Evidence from 23 OECD Countries. University of Dundee Discussion Paper, No. 164.

Montacute, R. and Cullinane, C. (2018). Access to Advantage: The Influence of Schools and Place on Admission to Top Universities. London: Sutton Trust.

Mosley, L. and Uno, S. (2008). Racing to the Bottom or Climbing to the Top? Economic Globalization and Collective Labor Rights. Comparative Political Studies, Vol. 40, No. 8, pp.923-948.

Naito, T. (2013). Privatization of Public Firms and Urban Unemployment in An Integrated Economy. Review of Urban & Regional Development Studies, Vol. 25, No. 2, pp.93–106.

Neher, C.D. (1996). The Transition to Democracy in Thailand. Asian Perspective, Vol. 20, No. 2, Special Issue on A Peace Regime on the Korean Peninsula. pp. 301-321.

Nellis, J. (1999). Time to Rethink Privatization in Transition Economies? IFC Discussion paper, No. 38, Washington, D.C.: World Bank Group.

Nellis, J. (2006). Privatization: A Summary Assessment. Working Papers 87, Center for Global Development.

Nooriah Y. and Zakiyah J. (2015). Graduate Employability and Preparedness: A Case Study of University of Malaysia Perlis (UNIMAP), Malaysia GEOGRAFIA Online Malaysian Journal of Society and Space. Vol. 11. pp.129-43.

Nunnenkamp, P. (2001). Foreign Direct Investment in Developing Countries: What Policymakers Should Not Do and What Economists Don't Know, Kieler Diskussionsbeiträge, No. 380.

OECD (2021). Vocational Education and Training in Thailand. OECD Reviews of Vocational Education and Training. Paris: OECD Publishing.

Oldenski, L. (2014). Offshoring and the Polarization of the U.S. Labour Market. ILR Review, 67, pp.734-761.

Omran, M. (2002). The Performance of State-Owned Enterprises and Newly Privatized Firms: Empirical Evidence from Egypt. Fondazione Eni Enrico Mattei, Nota di Lavoro No. 73.

Painter, M. (2005). The Politics of State Sector Reforms in Vietnam: Contested Agendas and Uncertain Trajectories. Journal of Development Studies, Vol.41, No.2, pp.261-283.

Péano, S. (1998). The Financing of Education Systems. in Delors, J. (1998). Education for the Twenty-First Century: Issues and Prospects. pp. 89-108. UNESCO Publishing.

Pegoraro, D., De Propris, L. and Chidlow, A. (2021). Regional factors enabling manufacturing reshoring strategies: A case study perspective. Journal of International Business Policy.

Pellini, A. (2005). Decentralisation of Education in Cambodia: Searching for Spaces of Participation Between Traditions and Modernity. Compare, Vol. 35, No. 2, pp.205-216.

Pipkin, S., and Fuentes, A. (2017). Spurred to Upgrade: A Review of Triggers and Consequences of Industrial Upgrading in the Global Value Chain. World Development, Vol. 98, pp.536–554.

Polterovich, V. and Popov, V. (2007). Democratization, Quality of Institutions and Economic Growth. TIGER Working Paper Series, No.102. Warsaw: Transformation, Integration and Globalization Economic Research (TIGER).

Ponte, S., and Sturgeon, T. (2014). Explaining Governance in Global Value Chains: A Modular Theory-Building Effort, Review of International Political Economy, Vol. 21, No. 1. pp. 195-223.

Poumanyvong, P., Kaneko, S. and Dhakal, S. (2012). Impacts of Urbanization on National Transport and Road Energy Use: Evidence from Low, Middle and High Income Countries, Energy Policy, Vol. 46, pp.268-277.

Putnins, T.J. (2015). Economics of State-Owned Enterprises. International Journal of Public Administration, Vol. 38, No. 11, pp.815-832.

Raduntz, H. (2005). The Marketization of Education Within the Global Capitalist Economy. Counterpoints, 280, pp.231-245.

Ramirez, P. and Rainbird, H. (2010). Making the Connections: Bringing Skill Formation into Global Value Chain Analysis. Work, Employment and Society, Vol. 24, No. 4. pp. 699–710.

Reeves, A., Friedman, S., Rahal, C. and Flemmen, M. (2017). The Decline and Persistence of the Old Boy: Private Schools and Elite Recruitment 1897 to 2016. American Sociological Review, Vol. 82, No. 6. pp.1139–1166.

Reinsberg, B., Stubbs, T., Kentikelenis, A. and King, L. (2019). Bad Governance: How Privatization Increases Corruption in the Developing World. Regulation & Governance, Vol. 14, No. 4, pp.698-717.

Riep, C. (2014). Omega Schools Franchise in Ghana: 'Affordable' Private Education for the Poor or For-Profiteering?. In Macpherson, I., Robertson, S.L., & Walford, G. (Eds.), Education, Privatization and Social Justice: Case studies from Africa, South Asia and South East Asia (pp.259-277). Oxford: Symposium Books.

Ritz, J. M., and S. C. Fan (2015). STEM and technology education: International state-of-the-art", International Journal of Technology and Design Education. Vol. 25, No. 4. pp. 429-451.

Rizvi, F. (2016). Privatization in Education: Trends and Consequence. Education Research and Foresight: Working Papers, No. 18. Paris: UNESCO.

Rodrik, D. (1997). Has Globalization Gone Too Far? Washington, DC: Institute for International Economics.

Rodrik, D. (1998). Why Do More Open Economies Have Bigger Governments? Journal of Political Economy, Vol. 106, No. 5. pp. 997–1032.

Rodrik, D. (2018). New Technologies, Global Value Chains, and the Developing Economies. Pathways for Prosperity Commission Background Paper Series; No. 1. Oxford. United Kingdom.

Rohrbach-Schmidt, D. and Tiemann, M. (2011). Mismatching and Job Tasks in Germany – Rising Over-Qualification Through Polarization? Empirical Research in Vocational Education and Training, Vol. 3, No. 1. pp.39–53.

Roll, M. and Ifenthaler, D. (2020). The Impact of Learning Factories on Multidisciplinary Digital Competencies, in Wuttke, E., Seifried, J. and Niegemann, H. (eds.). Vocational Education and Training in the Age of Digitization. pp.24-39. Verlag Barbara Budrich.

Rose-Ackerman, S. (2002). Corruption and the Ethics of Global Business. Journal of Banking and Finance, Vol. 26, pp.1889-1918.

Rothstein, B. and Uslaner, E.M. (2005). All for All: Equality, Corruption, and Social Trust. World Politics, Vol. 58, No. 1, pp. 41-72.

Ru, H. and Zou, K. (2022). How Do Individual Politicians Affect Privatization? Evidence from China. Review of Finance, Vol. 26, Issue 3, pp. 637-672.

Rudra, N. (2002). Globalization and the Decline of the Welfare State in Less-Developed Countries. International Organization, Vol. 56, No. 2. pp. 411–445.

Ruggie, J. (1982). International Regimes, Transactions, and Change: Embedded Liberalism in the Postwar Economic Order. International Organizations, Vol. 36. pp. 379–415.

Rugman, A.M. and Verbeke, A. (2004). A Perspective on Regional and Global Strategies of Multinational Enterprises, Journal of International Business Studies, Vol. 35, No. 1. pp. 3-18.

Samuels, D. and Vargas, T.R. (2023). Democracy, Rural Inequality, and Education Spending. World Development, Vol. 162, pp.106-136.

Sappington, D. and Stiglitz, J. (1987). Privatization, Information and Incentives. Journal of Policy Analysis and Management, Vol. 6, pp. 567-582.

Scheid, R. (2018). Learning Factories in Vocational Schools: Challenges for Designing and Implementing Learning Factories at Vocational Schools, in D. Ifenthaler (eds.), Digital Workplace Learning: Bridging Formal and Informal Learning with Digital Technologies. pp. 271-289. New York: Springer.

Scheve, K. and Slaughter, M. (2001). What Determines Individual Trade Policy Preferences? Journal of International Economics, Elsevier, Vol. 54, No. 2. pp. 267–292.

Schmidt, K. (1990). The Costs and Benefits of Privatization. Mimeo, University of Bonn.

Schneider, B. (2009). Hierarchical Market Economies and Varieties of Capitalism in Latin America. Journal of Latin American Studies, Vol. 41, No. 3. pp. 553-575.

Schwörer, T. (2013). Offshoring, Domestic Outsourcing and Productivity: Evidence for A Number of European Countries. Review of World Economics, Vol. 149, No. 1. pp. 131–149.

Seita, A. (1997). Globalization and the Convergence of Values. Cornell International Law Journal, Vol. 30, Issue 2, pp.429-491.

Sen, A. (1981). Poverty and Famines. Oxford University Press.

Senkrua, A. (2021). A Review Paper on Skills Mismatch in Developed and Developing Countries. International Journal of Sustainable Development & World Policy, Vol. 10, No. 1. pp.8–24.

Shahbaz, M., Chaudhary, A. R. and Ozturk, I. (2016). Does Urbanization Cause Increasing Energy Demand in Pakistan? Empirical Evidence from STIRPAT Model. Munich Personal RePEc Archive (MPRA), Paper No. 70313.

Shahraki, J. (2011). The Investigation of Relationship Between Privatization and Economic Growth in Iran. International Journal of Business, Humanities and Technology, Vol. 1, No. 2, pp.167–174.

Shapiro, K. and Willig, R. (1990). Economic Rationales for the Scope of Privatization, in Suleiman, E.N. and Waterbury, J. (eds.) The Political Economy of Public Sector Reform and Privatization, Boulder, Colorado: Westview Press.

Shelton, C.A. (2007). The Size and Composition of Government Expenditure. Journal of Public Economics, Vol. 91. pp. 2230–2260.

Shirley, M. M. and Walsh, P. (2000). Public versus Private Ownership: The Current State of the Debate, Policy Research Working Papers. Washington, DC: World Bank.

Shleifer, A. (1998). State versus Private Ownership. Journal of Economic Perspectives, Vol. 12, pp.133-151.

Shleifer, A. and Vishny, R.W. (1998). The Grabbing Hand. Government Pathologies and Their Cures. Cambridge, MA: Harvard University Press.

Simmons, B., Dobbin, F. and Garrett, G. (2008). Introduction: The Diffusion of Liberalization. in The Global Diffusion of Markets and Democracy, ed. Simmons, B., Dobbin, F. and Garrett, G. pp.1-63. New York: Cambridge University Press.

Sloane, P., Battu, H. and Seaman, P. (1999). Overeducation, Undereducation and the British Labour Market. Applied Economics, Vol. 31. pp.1437–1453.

Smith, W. C. and Joshi, D. K. (2015). Public vs. Private Schooling as a Route to Universal Basic Education: A Comparison of China and India. International Journal of Educational Development, Vol. 46, pp.153-165.

Sparreboom, T. and Tarvid, A. (2016). Imbalanced Job Polarization and Skills Mismatch in Europe. Journal for Labour Market Research, Vol. 49. pp.15–42.

Spilerman, S. (2009). How Globalization Has Impacted Labour: A Review Essay. European Sociological Review, Vol. 25, No. 1. pp. 73-86.

Spitz-Oener, A. (2006). Technical Change, Job Tasks, and Rising Educational Demands: Looking outside the Wage Structure. Journal of Labor Economics, Vol. 24, No. 2. pp.235–270.

Spöttl, G. and Windelband, L. (2020). The 4th Industrial Revolution – Its Impact on Vocational Skills. Journal of Education and Work Volume, Vol. 34, No. 1. pp.29-52.

St. John, R.B. (2005). Democracy in Cambodia — One Decade, US$5 Billion Later: What Went Wrong?. Contemporary Southeast Asia, Vol. 27, No. 3, pp. 406-428.

Stasavage, D. (2005). Democracy and Education Spending in Africa. American Journal of Political Science, 49, (2), 343-358.

Stehle, S.M. and Peters-Burton, E.E. (2019). Developing Student 21st Century Skills in Selected Exemplary Inclusive STEM High Schools. IJ STEM Ed 6, 39.

Stenhouse, R.L. and Ingram, N. (2024). Private School Entry to Oxbridge: How Cultural Capital Counts in the Making of Elites. British Journal of Sociology of Education. pp. 1-17.

Stiglitz, J. (1999). Knowledge as a Global Public Good. In Kaul, I., Grunberg, I. and Stern, M. (Eds.), Global Public Goods: International Cooperation in the 21st Century (pp. 308-325). Oxford University Press, New York.

Streeck, W. (2014). The Politics of Public Debt: Neoliberalism, Capitalist Development and the Restructuring of the State. German Economic Review, Vol. 15, No. 1, pp.143–165.

Szalavetz, A. (2020). Digital Transformation and Local Manufacturing Subsidiaries in Central and Eastern Europe: Changing Prospects for Upgrading? in Drahokoupil, J. (eds.). The Challenge of Digital Transformation in the Automotive Industry: Jobs, Upgrading, and the Prospects for Development. Brussels: European Trade Union Institute. pp. 47-64.

Taglioni, D. and Winkler, D. (2016). Making Global Value Chains Work for Development. Tradeand Development Series. Washington, DC: World Bank.

Tajoli, L. and Felice, G. (2018). Global Value Chains Participation and Knowledge Spillovers in Developed and Developing Countries: An Empirical Investigation. The European Journal of Development Research, Vol.30, No.3. pp. 505-532.

Tan, C. (2007). Education Reforms in Cambodia: Issues and Concerns. Educational Research for Policy and Practice, Vol. 6, No. 1. pp.15-24.

Tan, K.P. (2011). The People's Action Party and Political Liberalization in Singapore. In Lye, L.F. and Hofmeister, W. (eds), Political Parties, Party Systems and Democratization in East Asia. Singapore: World Scientific. pp. 107-131.

Teshome, B.W. (2008). Democracy and Elections in Africa: Critical Analysis. International Journal of Human Sciences, Vol. 5, No. 2.

Testa, P (2018). Education and Propaganda: Tradeoffs to Public Education Provision in Nondemocracies. Journal of Public Economics, Vol. 160, pp.66-81.

Thailand Board of Investment (2020). Thailand Investment Review: Enabling the New Normal with Automation and Robotics.

Tjahjono, B., Esplugues, C., Ares, E. and Pelaez, G. (2017). What Does Industry 4.0 Mean to Supply Chain? Procedia Manufacturing, Vol. 13. pp.1175-1182.

Tomasevski, K. (2003). Education Denied: Costs and Remedies. New York: Zed Books.

Tomlinson, J. (1986). Public Education, Public Good. Oxford Review of Education, Vol. 12, No. 3, pp. 211-222.

Tooley, J., Bao, Y., Dixon, P., & Merrifield, J. (2011). School Choice and Academic Performance: Some Evidence from Developing Countries. Journal of School Choice, 5(1), 1-39.

Tooley, J., Dixon, P., & Gomathi, S.V. (2007). Private Schools and the Millennium Development Goal of Universal Primary Education: A Census and Comparative Survey in Hyderabad, India. Oxford Review of Education, 33(5), 539–560.

Tulloch, J., Kramer, A. and Overbey, L. (2014). Private Schools for the Poor: Educating Millions in the Developing World. Enterprise Solutions for Development Working Paper, 03.

Turok, I. and McGranahan, G. (2013). Urbanization and Economic Growth: The Arguments and Evidence for Africa and Asia. Environment and Urbanization, Vol. 25, No. 2, pp.465-482.

Turrent V. and Oketch, M. (2009). Financing Universal Primary Education: An Analysis of Official Development Assistance in Fragile States. International Journal of Educational Development, Vol. 29, Issue 4, pp.357-365.

UNESCO (2012). Youth and Skills: Putting Education to Work. EFA Global Monitoring Report, 2012. Paris: United Nations Educational, Scientific and Cultural Organization.

UNESCO (2015). Pricing the Right to Education: The Cost of Reaching New Targets by 2030. Education for All Global Monitoring Report. Policy Paper 18. Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO).

UNESCO (2019). Right to Education Handbook. Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO).

UNFPA Cambodia (2014). Report on Urbanization and Its Linkages to Socio-Economic and Environmental Issues. Cambodia: United Nations Population Fund (UNFPA).

UNICEF (2007). Implementation Handbook for the Convention on the Rights of the Child. Geneva: United Nations Children's Fund (UNICEF).

UNIDO (2019). Industrial Development Report 2020: Industrializing in the digital age. Vienna, Austria: United Nations Industrial Development Organization (UNIDO).

Urata, S. and Baek, Y. (2019). The Determinants of Participation in Global Value Chains: A Cross-Country, Firm-Level Analysis. ADBI Working Paper 1116. Tokyo: Asian Development Bank Institute.

Verger, A., Fontdevila, C. and Zancajo, A. (2016). The Privatization of Education: A Political Economy of Global Education Reform. New York, NY: Teachers College Press.

Verger. A., Fontdevila, C. and Zancajo, A. (2018). Constructing Low-Fee Private Schools as an Educational Model for the Global South: From Local Origins to Transnational Dynamics. In Verger, A., Novelli, M. and Altinyelken, H.K. (eds). Global Education Policy and International Development: New Agendas, Issues and Policies (2nd edition). London: Bloomsbury, pp. 255–276.

Vickers, J. and Yarrow, G. (1991). Economic Perspectives on Privatization. Journal of Economic Perspectives, Vol. 5, No. 2, pp.111–132.

Waita, K.J., Mulei, K.O., Mueni, K.B., Mutune, M. and Kalai, J.M. (2016). Pupil Teacher Ratio and Its Impact on Academic Performance in Public Primary Schools in Central Division, Machakos County, Kenya. European Journal of Education Studies, Vol. 6, pp.37-68.

Wang, J., Wei, Y., Liu, X., Wang, C. and Lin, H. (2014). Simultaneous Impact of the Presence of Foreign MNEs on Indigenous Firms' Exports and Domestic Sales. Management International Review, Vol. 54, No. 2. pp. 195–223.

Ward, M. and Gleditsch, K.S. (1998). Democratizing for Peace. The American Political Science Review, Vol. 92, No. 1, pp. 51-61.

Whitty, G. and Power, S. (2000). Marketization and privatization in mass education systems. International Journal of Educational Development, Vol. 20, No. 2, pp.93-107.

Willmore, L. (2004). Basic Education as a Human Right. Institute of Economic Affairs. 17-21.

Woodhead, M., Frost, M., James, Z. (2013). Does Growth in Private Schooling Contribute to Education for All? Evidence From a Longitudinal, Two Cohort Study in Andhra Pradesh, India. International Journal of Educational Development, Vol. 33, No. 1, pp.65-73.

World Bank (2000). Cities in Transition: World Bank Urban and Local Government Strategy. Washington, D.C.: The World Bank.

World Bank (2004). School Fees. A Roadblock to EFA Education Notes. Washington D.C.: The World Bank.

World Bank (2016). World Development Report 2016: Digital Dividends. Washington D.C: The World Bank.

Wortzel, H.V. and Wortzel, L.H. (1989). Privatization: Not the Only Answer. World Development, Vol. 17, No. 5, pp.633-641.

Wright, MC., Bergom, I. and Bartholomew, T. (2017). Decreased Class Size, Increased Active Learning? Intended and Enacted Teaching Strategies in Smaller Classes. Active Learning in Higher Education, Vol. 20, No. 1, pp.51-62.

Wrinkle, R.J., Stewart, J., & Polinard, J. L (1999). Public School Quality, Private Schools and Race. American Journal of Political Science, 43, 1248-1253.

Wu, A.M., Lin, M. (2012). Determinants of Government Size: Evidence from China. Public Choice, Vol. 151. pp. 255–270.

Yeo, P. (2016). Going Beyond Comparative Advantage: How Singapore Did It. In Cherif, R., Hasanov, F. and Zhu, M. (2016). Breaking the Oil Spell: The Gulf Falcons' Path to Diversification. International Monetary Fund.

Zago, R. (2020). Job Polarization, Skill Mismatch and the Great Recession. Banque de France Working Paper, February 2020, WP 755.

Zangiacomi, A., Pessot, E., Fornasiero, R., Bertetti, M. and Sacco, M. (2020). Moving Towards Digitalization: A Multiple Case Study in Manufacturing. Production Planning & Control, Vol. 31 2-3. pp.143–157.

Zeira, J (1998). Workers, Machines, and Economic Growth. Quarterly Journal of Economics, Vol. 113. pp.1091-1117.

Zhao, S. (2013). Privatization, FDI Inflow and Economic Growth: Evidence from China's Provinces, 1978–2008. Applied Economics, Vol. 45, No. 15, pp.2127–2139.

Zimmer, A. and Toepler, S. (1996). Cultural Policies and the Welfare State: The Cases of Sweden, Germany, and the United States. The Journal of Arts Management, Law, and Society, Vol.26, No. 3. pp. 167–193.

Appendix I. Summary statistics - Developed countries

Variable	N	Mean	Std. Dev.	Min	Pctl. 25	Pctl. 75	Max
PRIMARY_EDUCATION_PRIVATIZATION	58	19	21	0.37	3.5	24	98
DEMOCRACY	48	7.4	1.9	1.8	7.2	8.6	9.9
CORRUPTION_CONTROL	60	1.1	0.74	-0.28	0.48	1.7	2.3
EDUCATION_EXPENDITURE	58	4.7	1.5	1.5	3.7	5.5	7.8
PRIMARY_POPULATION	57	1308053	3417439	1895	76412	955913	24610101
TEACHER_PUPIL	56	13	3	7.7	11	14	20
URBANIZATION	60	76	20	14	67	89	100
FDI_SHARE	58	34	140	-0.94	1.6	5.9	951
SCHOOLING_YEARS	52	11	1.7	7	10	13	14
INFLATION	56	1.9	1.4	-0.37	1.4	2.2	8.5
GDP	60	38513	28457	8441	18605	45876	167809
GROWTH	59	2.2	2.4	-3.9	0.89	3.5	10
POPULATION	60	19464569	45704278	36790	1023260	12571048	316129283

Appendix II. Summary statistics - Developing countries

Variable	N	Mean	Std. Dev.	Min	Pctl. 25	Pctl. 75	Max
PRIMARY_EDUCATION_ PRIVATIZATION	108	15	16	0.11	4.6	21	86
DEMOCRACY	100	4.9	1.7	1.5	3.4	6.3	8.2
CORRUPTION_CONTROL	110	-0.53	0.56	-1.4	-0.91	-0.31	1
EDUCATION_EXPENDITURE	105	4.3	1.7	0.55	3.1	5.4	9.3
PRIMARY_POPULATION	109	5311415	15865338	1459	313417	3874181	127536845
TEACHER_PUPIL	100	29	14	9.1	18	36	81
URBANIZATION	111	48	20	11	33	63	91
FDI_SHARE	111	4.6	6.1	-0.51	1.8	5.5	51
SCHOOLING_YEARS	111	7	2.9	1.2	4.7	9.3	13
INFLATION	108	6.5	7.1	0.48	2.4	7.8	54
GDP	109	3769	3137	301	1124	5544	13905
GROWTH	111	3.9	3.1	-13	2.6	5.5	10
POPULATION	112	52167707	178754634	0	3188660	30598383	1362837000
EDUCATION_ODA	108	58	81	0.15	15	64	621