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LABOR MARKETS AND SOCIAL POLICY
IN A RAPIDLY TRANSFORMING AND AGING THAILAND

AGING AND THE LABOR MARKET IN THAILAND

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FOREWORD

This report is one in a series of notes being produced on strengthening social protection and labor market policies in Thailand in the context of aging and economic transformation. Other notes in the series provide an overview of the social protection system, assess Thailand's pension schemes, evaluate the macro and fiscal implications of aging, and investigate the aged care system.

The report does not address the COVID-19 outbreak and its implications for Thailand's labor market and the evolution of population aging in detail. The crisis has had a significant impact on Thailand's economy and labor market, but insufficient data are currently available for a full assessment. The note does mention the COVID-19 outbreak in several places to point out potential impacts.

The note was written by Harry Moroz (task team leader) and J. J. Naddeo, with inputs from Kiatipong Ariyapruhya, Elena Glinkaya, Himanshi Jain, Francesca Lamanna (co-task team

leader), Pataraporn Laowong, Arvind Nair, Robert Palacios, Pamornrat Tansanguanwong, Sarulchana Viriyataveekul, Thomas Walker, and Judy Yang. The team was assisted by Corinne Bernaldez, Poonyanuch Chockanapitaksa, Pimon Iamsripong, and Buntarika Sangarun. The team is grateful for the productive collaboration with the Office of the National Economic and Social Development Council.

The work was conducted under the guidance of Yasser El-Gammal (practice manager for Social Protection and Jobs, East Asia and Pacific Region), Philip O'Keefe (former practice manager for Social Protection and Jobs, East Asia and Pacific Region), and Birgit Hansl (country manager for Thailand). The team is grateful for the excellent advice provided by three peer reviewers: Matteo Morgandi, Ignacio Raul Apella, and Dilaka Lathapipat. Ratchada Anantavasilpa, Clarissa Crisostomo David, and Kanitha Kongrukgreatiyos also provided useful comments. Junko Onishi, Frederico Gil Sander, and Thomas Walker provided comments at the Concept Note stage.

EXECUTIVE SUMMARY

Thailand's labor market faces several challenges. Labor force participation has been declining, the shift of jobs out of the low-productivity agriculture sector has slowed, and informality is the norm. The COVID-19 outbreak has likely reinforced these trends. Thailand's workforce has not transitioned to the types of jobs involving nonroutine tasks and interpersonal communication that increasingly characterize knowledge-driven economies. The labor force participation of women is 20 percentage points lower than that of men, a gap that has persisted for two decades. Needs associated with caring for a growing population of older people could put additional pressure on working women. The higher labor force participation rate of older people in rural areas reflects a need to work longer to make ends meet despite the nearly universal Old Age Allowance social pension.

Older people face particular challenges in the labor market. Older people often have care responsibilities and, despite living longer and healthier lives than in the past, continue to face health challenges. The report uses data from the Socioeconomic Survey to show that both factors are associated with lower labor force participation among older people. The report also draws on the Socioeconomic Survey to show that Thailand's contributory pensions can have disincentive effects on older people's labor force participation, although low coverage means that these effects are not of immediate concern. The Old Age Allowance, a social pension, may have some disincentive effects as well, although in this case the adequacy of benefits is likely a greater concern. The report also raises concerns about how prepared current and future older people are for the changes taking place in the world of work. Analysis of the task intensity of occupations shows that older people are not working in the jobs of the future, which require a set of less manual, more cognitive skills. Young people are transitioning out of the more routine occupations that were in demand in the past and into quickly growing occupations. But prime-age workers—the older workers of the near future—remain in more routine jobs where demand is falling.

This difficult labor market is complicated by a rapidly aging population, which implies a smaller workforce in the future. The working-age share of Thailand's population is projected to decline from 71 percent of the population in 2020 to 56 percent in 2060. This is equivalent to a decline in the working-age population of nearly 30 percent, the third largest decline in the East Asia and Pacific region, after only Japan and the Republic of Korea. Meanwhile, the share of the population 65 or older is projected to rise from 13 percent in 2020 to 31 percent of the population in 2060—the 22nd largest share globally. This aging

is occurring quickly: the 65-plus population in Thailand doubled between 2000 and 2020 and will double again by 2040 to 26 percent of the population.

Thailand is less wealthy than other countries were at similar stages of population aging, meaning that fewer resources are available to confront the challenges of aging. Thailand is aging at a lower level of income than other countries. Analysis for the report shows that, at every stage of aging, Thailand has had lower GDP per capita than the global average. Indeed, the East Asia and Pacific region's older economies—Hong Kong SAR, China; Japan; Korea; and Singapore—had GDP per capita of around \$41,000 (purchasing power parity in 2011 international dollars) when their elderly dependency ratios were at the same level as Thailand's today. This is more than twice the level of Thailand's current GDP per capita.

Population aging has significant implications for Thailand's labor market and for its overall economic development. All else equal, Thailand's declining working-age population implies a mechanical decrease in growth of income per capita. Projections of the potential impact suggest that, absent any adjustments, changes in demographics will lower growth of GDP per capita by 0.86 percent in the 2020s. Impacts on the labor market could be substantial. The report shows that, assuming constant labor force participation rates by age and gender, Thailand's projected demographic changes would lead to a reduction in the overall labor force participation rate of about 5 percentage points between 2020 and 2060 and a reduction in the overall size of the labor force of 14.4 million people. Such a decline could result in labor market shortages that could further hinder Thailand's prospects for growth. Automation, digitization, and other trends associated with Industry 4.0 may alleviate some of these shortages while exacerbating others as the demand for skills evolves.

The negative effects of population aging are not inevitable, but addressing them requires changes across labor markets and by people of all ages. Population aging is not just about older people. The causes of and responses to population aging are tied to the actions of and policies affecting people of all ages.

Expansions of Thailand's labor supply could counteract the shrinking labor force implied by population aging. Increases in healthy life expectancy mean that older people are likely to be able to work longer. The large gap between male and female labor force participation means that there is significant potential to activate the labor supply of women. Migrants have been filling gaps in Thailand's labor force in recent decades and could be better used to do so in the future.

Simulations undertaken for this report confirm that expanding the supply of labor could offset some of the negative implications of population aging. Simulations of different scenarios of labor force participation and migration show that higher rates of labor force participation among older people and women and a liberalized migration system could increase Thailand's labor supply in the long run relative to current projections under population aging. Liberalized migration and increased female labor force participation would have the largest effect.

Even under these scenarios, Thailand's labor force will still decline as its population ages, implying that the labor force will need to become more productive. A smaller labor force will need to be more efficient in order to maintain and improve living standards. As fertility declines, this process will require more intensive investment in human capital as well as higher saving rates, capital deepening, and adoption of labor-saving technologies that offset labor scarcity. These latter changes will themselves require the appropriate human capital to complement investments in physical capital.

Policy can help to address the challenges created by population aging. Policy can help to activate the labor supply of older people, women, and migrants. At the same time, policy makers can help to ensure that sufficient investments are made in the quality of present and future workers so that they become more productive. Finally, population aging creates several opportunities, particularly in the care sector but also in the larger "silver economy," that policy makers can exploit.

- *Policies to extend working lives* can target older people in urban areas, who tend to retire at earlier ages than their rural peers. These policies will need to target not just people at or

just below retirement age, but also the prime-age workers who are working in declining occupations so that they can continue to work as they get older.

- *Policies to increase female labor force participation* can target women directly, such as by providing training programs that break down occupational segregation, and can activate women's participation indirectly, such as by increasing the income security of older people and providing paternal leave.
- *Improvements to the migration system* can help to fill short-ages in low- and high-skill occupations. A national migration plan or strategy could set the stage for more predictable migration policy. Changes to the migration system could include allowing migration of longer duration to take advantage of the improved productivity of migrants as they work in a country and incentivizing high-skill migration.
- *A commitment to a lifelong approach to learning* can help to stimulate the productivity gains needed as the working-age population shrinks. This effort would involve developing new approaches to technical and vocational education and training as well as nonformal training focused on the needs of individual learners and adapted to labor market demand. Performance-based financing and learner-targeted subsidies and vouchers are important approaches to consider.
- *Opportunities created by aging* can be exploited by providing training for workers in the care sector, particularly unemployed and other vulnerable workers, and by complementing investments in services for local older people with those for older people from abroad.

Table ES.1 summarizes the enabling conditions in each of these areas, the challenges that must be confronted, and potential policy responses.

Table ES.1 Summary of policy recommendations

Policy area	Enabling conditions	Challenges	Policy response
1. Extend working lives	<ul style="list-style-type: none"> • Healthy life expectancy is increasing • Successive age cohorts have higher education levels • Jobs are becoming less manual and physical • Technologies that reduce physical strain at work could make older workers more productive 	<ul style="list-style-type: none"> • Older people have care responsibilities • Health problems (for example, noncommunicable diseases) are common • Age discrimination is evident • Contributory pensions may have labor market disincentive effects • Flexible work such as remote work is still rare 	• Leverage partnerships and use incentives to encourage flexible working arrangements and age-friendly workplaces
			• Study the influence of wage compensation schemes on the employment of older workers
			• Evaluate the effectiveness of the existing tax subsidy for promoting the employment of older people
			• Explore options for raising the retirement age
			• Create upskilling and reskilling programs adapted to the needs of prime-age and older people in urban areas
			• Promote healthy lifestyles throughout the life cycle
2. Increase female labor force participation	<ul style="list-style-type: none"> • The gap between female and male labor force participation is significant • Women have increasingly high levels of education • A low fertility rate means fewer care responsibilities for children 	<ul style="list-style-type: none"> • Women have greater care responsibilities for children and older people • There has been an increase in teenage pregnancy, which is linked to lower educational attainment • A marriage penalty persists for women • Sectoral segregation leads to a gender wage gap • Women are underrepresented in management positions • Women are underrepresented in fields of study linked to high-productivity jobs 	• Expand access to and decrease the cost of child care
			• Expand access to long-term care options for older people
			• Ensure income security for older people
			• Increase the generosity and coverage of parental leave policies, including providing for paternal leave
			• Deploy training programs targeted to and designed for women
			• Consider legal changes and undertake communications campaigns to influence gender norms
3. Use migration strategically to fill labor market gaps	<ul style="list-style-type: none"> • Migrants to Thailand tend to be young, to migrate for work, and to be employed • High-skill migrants can fill skills gaps 	<ul style="list-style-type: none"> • Migrants may have a negative impact on employment and wages, although any impacts are likely small • Brain drain of high-skill locals leaving Thailand can create additional skills gaps 	• Develop a long-term national migration plan
			• Consider lengthening the duration of migration work permits, including for low-skill workers
			• Simplify the memorandum of understanding migration process to encourage formal migration
			• Create a package of interventions, including permit migrant workers to change employers
			• Expedite permit renewals, perhaps through a trusted employer system
			• Create a package of interventions, including streamlined admissions and incentives to promote high-skill migration
			• Engage Thailand's diaspora and incentivize return
4. Invest in lifelong learning to increase productivity	<ul style="list-style-type: none"> • Declining fertility can allow for more intensive investments in human capital • There is no strong evidence that older people are less productive 	<ul style="list-style-type: none"> • Current and soon-to-be-older workers lack in-demand skills • Soon-to-be-older workers are more likely to work in automatable jobs • The training sector is characterized by lack of coordination, lack of linkages with the private sector, lack of accountability mechanisms, and perceptions of poor quality 	• Explore alternative models of employer engagement in skills development
			• Consider performance-based financing models for training
			• Explore learner-centered approaches to training, such as subsidies or vouchers
			• Adapt training programs to the learning needs of adult learners
			• Strengthen employment services, particularly the labor market information system, and link them to training

Policy area	Enabling conditions	Challenges	Policy response
5. Leverage opportunities created by population aging	<ul style="list-style-type: none"> • Domestic demand for care work is growing • Overseas demand for tourism targeted to older people, retirement services, and medical tourism is growing • Care jobs are growing • Opportunities exist in the “silver economy” 	<ul style="list-style-type: none"> • Recruiting, deploying, and retaining qualified care workers are challenging due to poor working conditions, low pay, and lack of access to social protection • The care workforce is small relative to Thailand’s international peers • The existing care workforce lacks the required skills • The health workforce is aging 	<ul style="list-style-type: none"> • Provide training in care work, particularly to unemployed and other vulnerable workers
			<ul style="list-style-type: none"> • Promote Thailand as a destination for older tourists, retirees, and medical tourists, leveraging investments for local older people

Despite the need for action on multiple policy fronts, investing in human capital across the life cycle and stabilizing the financial security of older people are top priorities. Rapid changes in technology and in the nature of work, including those stimulated by the COVID-19 outbreak, will require workers with new types of skills to fill labor market needs created by population aging. These skills will require not only a good technical understanding of emerging digital technologies, but also soft skills like communication, critical thinking, and persuasion. Thailand will have to focus intently on improving the skills of its workforce. Thus the recommendations in table ES.1 include several policies related to improving skills development. The financial security of older people will also be a priority. Thailand has recently enacted policies related to older people, including expansion of the Old Age Allowance and various efforts to facilitate longer working lives. These policies should be coordinated with other policy areas, particularly pensions policy, to protect older

people whose financial health is at risk. Many older people, particularly in rural areas, have to work well into old age. Although universal, the Old Age Allowance is insufficient to support the livelihoods of older people. Barriers to employment of older people remain high. Table ES.1 includes several policy recommendations to help to improve the financial security of older people. A separate note on pensions reform covers pensions policy and proposes more detailed potential reforms.

The report is structured as follows. Part 1 provides an overview of the labor market in Thailand with a focus on older people. Part 2 introduces the issue of population aging in Thailand and discusses its implications for past and future economic development. Part 3 discusses the channels through which aging will affect Thailand’s labor market. Part 4 presents policy recommendations to mitigate the negative impacts and reinforce the positive impacts of population aging in Thailand.

ABBREVIATIONS

AIDS	acquired immunodeficiency syndrome
ASEAN	Association of Southeast Asian Nations
COL	Critical Occupations List
ESS	Employment Services System
GDP	gross domestic product
HIV	human immunodeficiency virus
ICT	information and communication technology
ILO	International Labour Organization
ISCO	International Standard Classification of Occupations
LMI	labor market information
MOU	memorandum of understanding
MRA	mutual recognition arrangement
MSDHS	Ministry of Social Development and Human Security
NCD	noncommunicable disease
NESDC	National Economic and Social Development Council
NSF	National Skills Fund
NV	nationality verification
OECD	Organisation for Economic Co-operation and Development
PCA	principal component analysis
PHE	Preston, Himes, and Eggars
PPP	purchasing power parity
RP-T	Residence Pass-Talent
RTI	routine task index
SAR	special administrative region
SNIES	Sistema Nacional de Información de la Educación Superior
SOC	Standard Occupational Classification
STEM	science, technology, engineering, mathematics
TVET	technical and vocational education and training
UN WPP	United Nations World Population Prospects

PART 1: AGING AND THE LABOR MARKET

Part 1 provides an overview of the labor market in Thailand with a focus on older people. The first section summarizes the main findings. The second section describes the labor market in Thailand. The third section investigates segmentation of the labor market by age.

MAIN FINDINGS

Despite low unemployment, Thailand’s labor market faces several challenges. The size of Thailand’s labor force has declined in recent years, as have labor force participation rates. The gap between female and male labor force participation is significant—around 20 percentage points—and has remained constant for two decades. The unemployment rate is very low, although job growth has been weak in recent years. While employment has shifted away from the agriculture sector over the longer term, this transition has slowed. Education levels have increased, but mid-skill jobs dominate. Consistent with the continued prominence of agricultural employment, most workers are informal. Private wage employment has not grown as a share of employment in the last two decades.

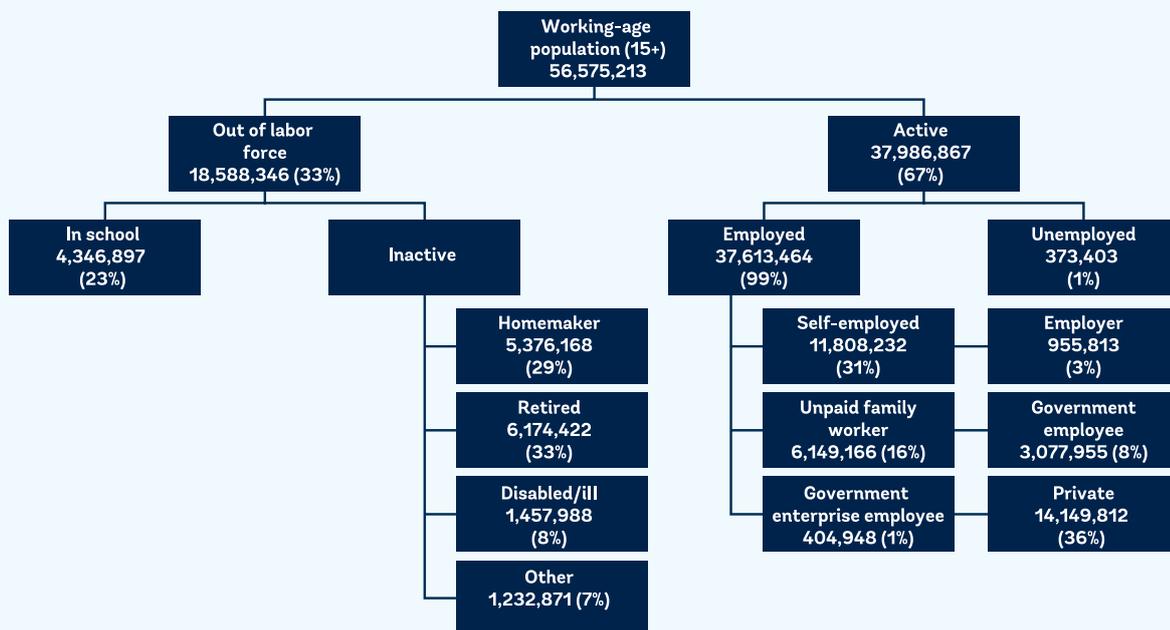
Older people in rural areas tend to work until advanced ages in low-quality jobs. Labor force participation rates begin to decline in earnest at age 60—the age of eligibility for the Old Age Allowance and the retirement age for public sector pensions, but five years later than the retirement age for private sector pensions. However, about one-quarter of older people continue working until advanced ages in Thailand, similar to upper-middle- and high-income countries in the East Asia and Pacific region. Older men are more likely to work than older women. Older people have significantly higher labor force participation rates in rural areas, consistent with having less access to social protection, which means that older people must continue working to support themselves. Overall two-thirds of Thailand’s employed older people live in rural areas. Wages decline with age such that by age 65 men make 59 percent of their peak wages and women make 46 percent. Older people tend to work in lower-quality jobs with high rates of self-employment, high informality, and poor working conditions.

OVERVIEW OF THAILAND’S LABOR MARKET

Thailand has a large labor force that can compete with the other large economies of the East Asia and Pacific region. Thailand’s working-age population¹ was 57 million in 2019 (figure 1.1), of whom 67 percent participated in the labor market. At around 38 million, the labor force is the sixth largest in the East Asia and Pacific region and the fourth largest of countries in the Association of Southeast Asian Nations (ASEAN). Of those not participating in the labor market, 23 percent were in school and 77 percent were inactive for other reasons. Of those who were employed, 38 percent were private sector wage workers, while another 31 percent were self-employed.

¹Consistent with the definition used by Thailand’s National Statistical Office, the working-age population is defined as people 15 years of age and older.

Figure 1.1 The labor market status of Thailand’s population, 2019



Source: Thailand Labor Force Survey 2019.

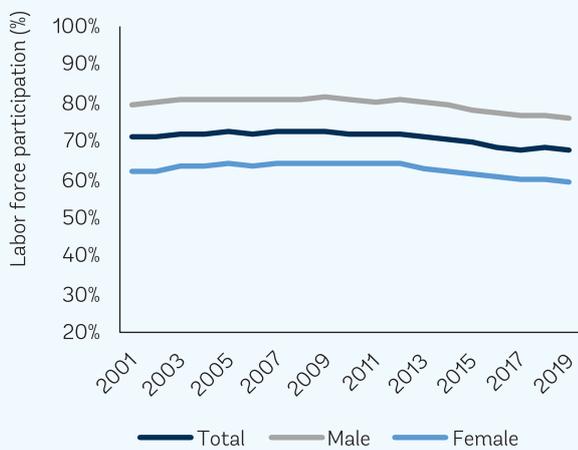
Labor force participation rates have trended down in recent years.

Labor force participation was fairly steady in the 2000s and early 2010s at just above 70 percent (figure 1.2). However, people began dropping out of the labor market after 2013: between 2012 and 2019, the size of the labor force shrank by more than 1.2 million people and the labor force participation rate declined nearly 5 percentage points. Despite this decline, the current rate is comparable to the participation rate in other middle- and upper-income countries in the East Asia and Pacific region, such as China and Indonesia (figure 1.3).

Female labor force participation lags significantly behind male labor force participation. Male and female labor force participation rates have generally followed the same pattern as the overall labor force participation rate since 2000 (figure 1.2). During this

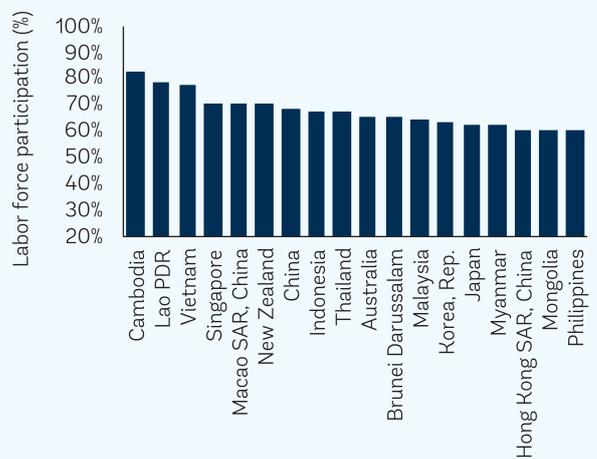
period, female labor force participation has consistently been around 17 percentage points lower than male labor force participation. In 2019 the participation rate was 76 percent for men compared to just 59 percent for women. The most common reasons reported for being out of the labor force are retirement and household duties. The gap in participation rates is slightly higher in rural than in urban areas (18.2 percent versus 14.7 percent). Thailand’s female labor force participation rate is similar to that of Australia and China (figure 1.4, panel a), but the gap between female and male labor force participation is larger in Thailand than in several other countries in the East Asia and Pacific region (figure 1.4, panel b). Labor force participation rates within Thailand vary from 69.7 percent in Bangkok and 70 percent in the Central region to 62.6 percent in the Northeast.

Figure 1.2 Labor force participation rate in Thailand, 2001–19



Source: Thailand Labor Force Survey 2001–19.

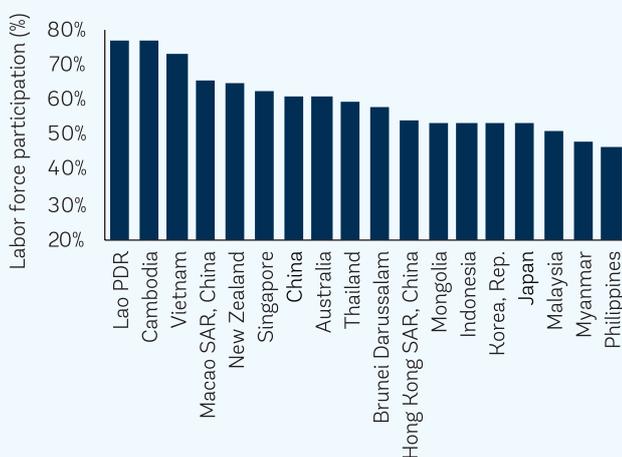
Figure 1.3 Labor force participation rate in the East Asia and Pacific region, 2019



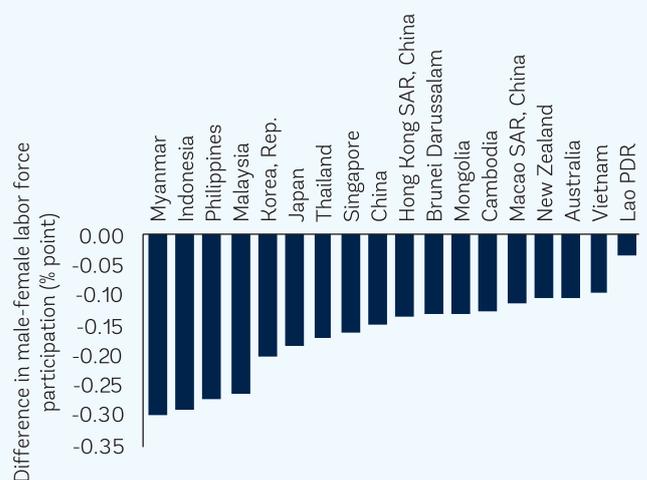
Source: ILOSTAT database.

Figure 1.4 Labor force participation rate in the East Asia and Pacific region, by gender, 2019

a. Female labor force participation rates



b. Difference between male and female labor force participation rates



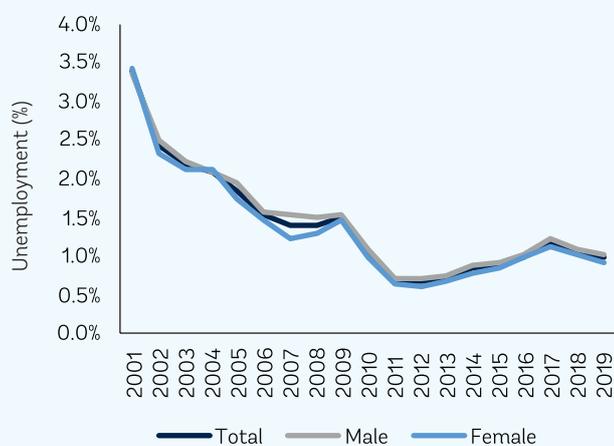
Source: ILOSTAT database.

Thailand's labor market is close to full employment. Thailand's unemployment rate is very low. The rate declined from 3.4 percent in 2001 to a low of 0.7 percent in 2011, 2012, and 2013, before ticking up slightly in more recent years (figure 1.5). Differences between male and female unemployment rates are small. Unemployment rates are consistently low across all regions of Thailand, with the exception of the conflict-affected southern province of Narathiwat, where 4.1 percent of the population is unemployed. The next highest rate of unemployment is still relatively low: 2.5 percent in Sakaeo in the east and Songkhla in the south.

Job growth has been weak in Thailand for the last several years. Annual employment growth averaged 2 percent between 2000 and the early 2010s (figure 1.6). However, job growth weakened in the middle 2010s, recovered briefly in 2018, and fell again in 2019. This weakness occurred as economic growth stalled due to political uncertainty. The labor force participation rate declined in those years, while the unemployment rate ticked up slightly. Since 2014, employment has shifted slightly away from the Northeast and North and toward the Central region, which is home to about one-third of jobs in Thailand, the most in the country, followed by the Northeast, which has one-quarter of Thailand's jobs.

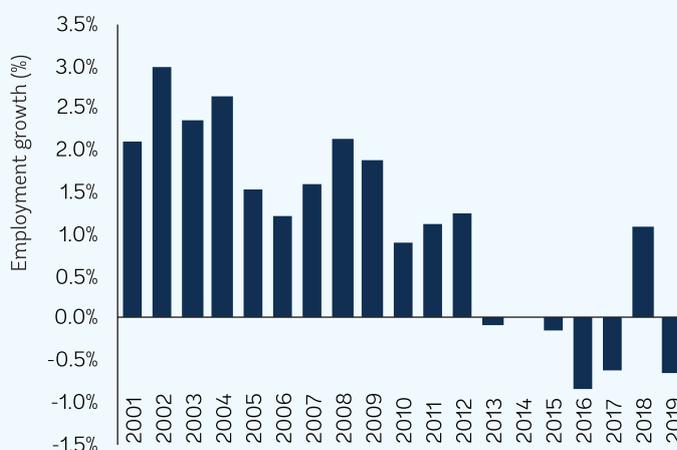
The services sector provides most of the jobs in Thailand, but agriculture remains important. Structural transformation of people moving from the lower-productivity agriculture sector to the higher-productivity manufacturing and services sectors stalled in Thailand in the 2000s and early 2010s (World Bank 2016). Higher real wages in the agriculture sector and weak job growth in other sectors drew people to on-farm jobs. Agriculture still employs about one-third of all workers (figure 1.7). Agriculture's share of employment sets Thailand apart from its peers: agriculture accounts for just 23 percent of employment in the Philippines, 10 percent in Malaysia, and 5 percent in the Republic of Korea. Employment in services has expanded since 2014, making services the country's largest employer, while employment in manufacturing has been steady at about 15 percent of employment. Average annual growth rates in the five-year periods leading up to 2019 reflect this pattern (figure 1.8). With the exception of services and public administration, all sectors averaged negative growth between 2015 and 2019. Agriculture dominates employment in the Northeast, North, and South regions (figure 1.9). Services dominate employment in Bangkok. Employment in the Central region is more diversified across services, manufacturing, and agriculture.

Figure 1.5 Unemployment rate in Thailand, 2001–19



Source: Thailand Labor Force Survey 2001–19.

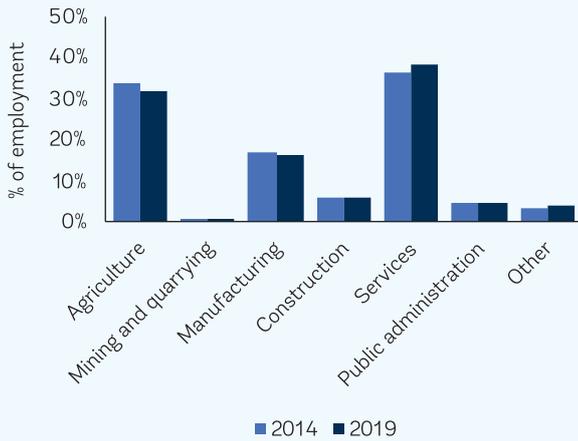
Figure 1.6 Annual employment growth in Thailand, 2001–19



Source: Thailand Labor Force Survey 2001–19.

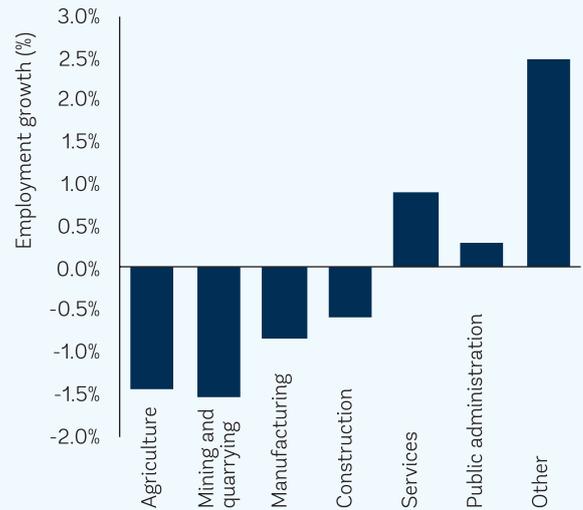
Note: Data are not shown for 2014 because of a change in sampling in the Labor Force Survey in 2014.

Figure 1.7 Employment in Thailand, by sector, 2014 and 2019



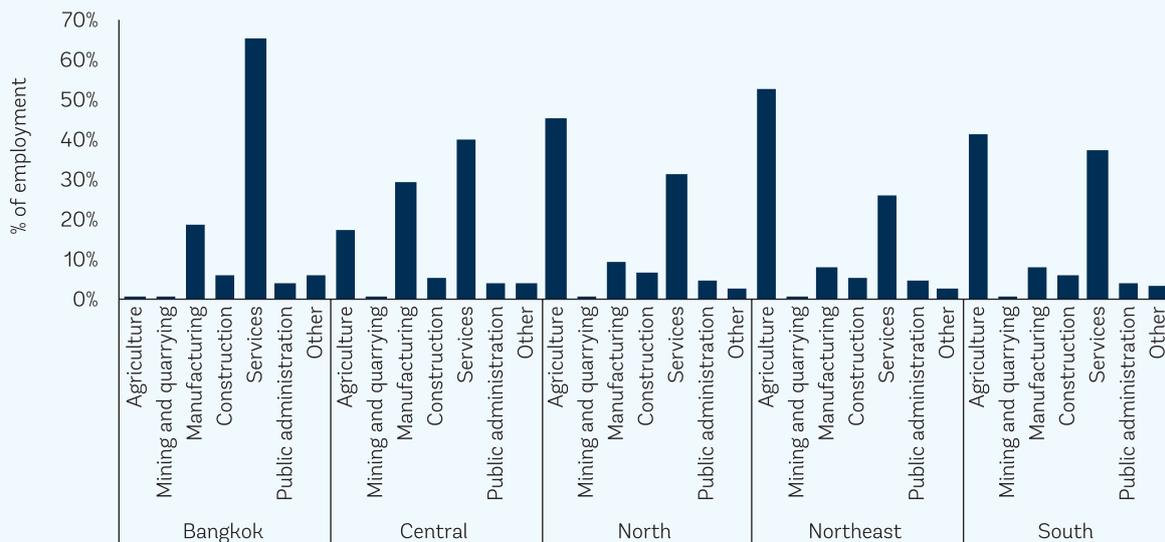
Source: Thailand Labor Force Survey 2014 and 2019.

Figure 1.8 Average annual growth rate of employment in Thailand, by sector, 2015–19



Source: Thailand Labor Force Survey 2015–19.

Figure 1.9 Distribution of employment in Thailand, by sector and region, 2019



Source: Thailand Labor Force Survey 2019.

The education level of workers has risen significantly, but mid-skill jobs still dominate employment.

In 2001, around 40 percent of workers in Thailand had no education (figure 1.10, panel a). By 2019, this had been cut in half to 21 percent. During the same period, workers with a university education more than doubled from 8 percent to 17 percent. However, most workers in Thailand are employed in mid-skill jobs,² particularly as agriculture workers, who make up 29 percent of employment, and services, and sales workers, who make up 20 percent of employment. Just 13.8 percent of workers are employed as a high-skill manager, professional,

or technician or associate professional. The implications, which are discussed in more detail in part 3, are important for how automation will affect the labor force, as these technologies tend to affect mid-skill jobs the most. The skill level of the workforce varies significantly by sector (figure 1.10, panel b). Nearly all agricultural workers are classified as mid-skill, while a substantial portion of workers in services (21 percent) and public administration (48 percent) are classified as high-skill.

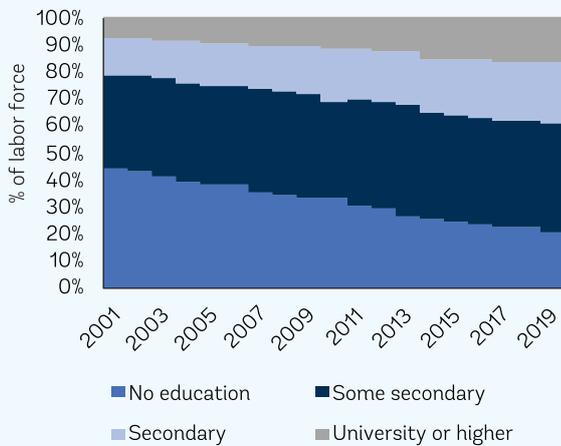
² The International Standard Classification of Occupations (ISCO) is used to classify occupations into high-, medium-, and low-skill levels. High-skill corresponds to managers (ISCO 1), professionals (ISCO 2), and technicians and associate professionals (ISCO 3). Mid-skill corresponds to clerical support workers (ISCO 4), services and sales workers (ISCO 5), skilled agricultural, forestry, and fishery workers (ISCO 6), craft and related trades workers (ISCO 7), and plant and machine operators and assemblers (ISCO 8). Low-skill corresponds to elementary occupations (9).

Informal employment is prevalent. Private wage employment has not grown as a share of employment in the last two decades. Private wage employment made up 35 percent of all employment in 2001 versus 38 percent in 2019. During this period, the share of self-employment also remained constant at about one-third of employment. The Informal Employment Survey conducted by the National Statistics Office defines informality as employed people who are not protected by or eligible for social security (Buddhari and Rugpenthum 2019). According to the survey,

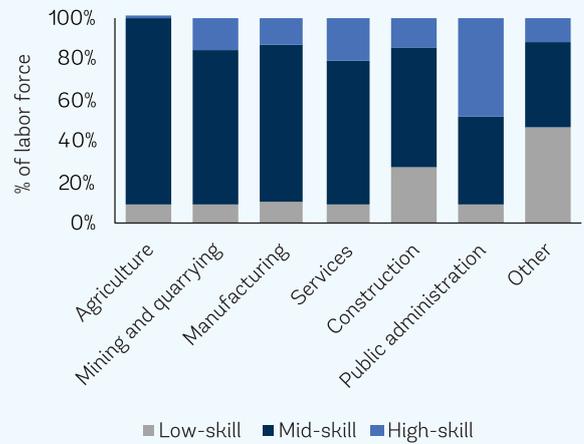
54 percent of employment was informal in 2019—similar to the percentage in 2016, 2017, and 2018. Women and men have similar rates of informality. Informal employment is much more common in rural than in urban areas: in 2019 two-thirds of employment was informal in rural areas versus around 40 percent in urban areas. Nearly all employment (91 percent) in the agriculture sector is informal (figure 1.11). Informality rates are also very high in construction (44 percent) and services (42 percent).

Figure 1.10 Employment in Thailand, by education level, skill level, and sector

a. By education level, 2001–19

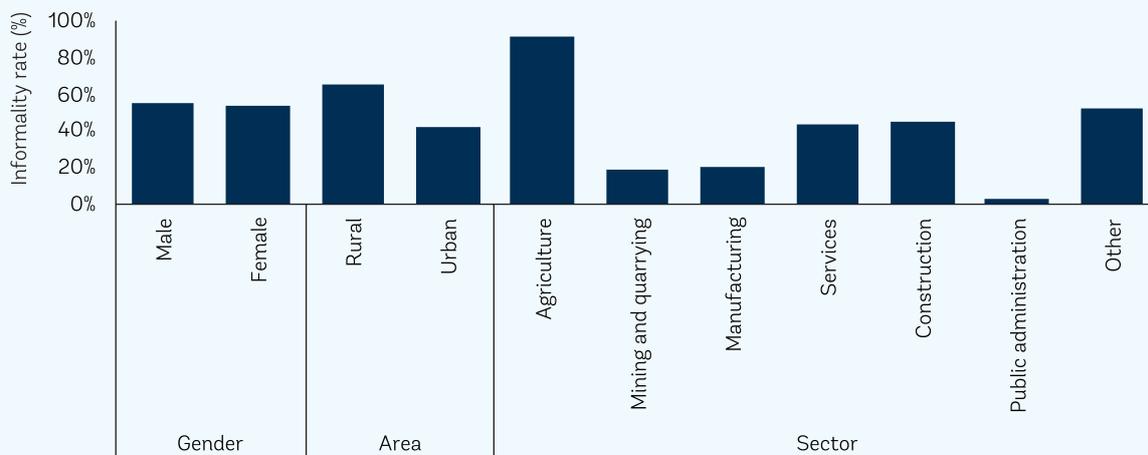


b. By skill level and sector, 2019



Source: Thailand Labor Force Survey 2001–19.

Figure 1.11 Informality rate in Thailand, by gender, urban and rural areas, and sector, 2019



Source: Thailand Informal Employment Survey 2019.

Internal migrants move to find longer-term employment and to fill seasonal labor demands. According to the 2010 Population and Housing Census, 6.2 million people migrated for at least six months between 2005 and 2010 (NSO 2010), representing 9.4 percent of the population. More than one-quarter of these migrants moved to look for work, and another 14 percent moved to take up a job. Nearly one-quarter of the population lived in a different location from their birthplace in 2010. The 2019 Migration Survey, which asks about migration within the last year only, found that around 570,000 people or 1 percent of the population had moved internally. About one-third of internal migrants migrate for work. Longer-duration internal migration in Thailand involves mainly flows away from the North and Northeast regions and to Bangkok and the Central region, while seasonal migration involves flows away from Bangkok and the Central region during the wet season and the opposite during the dry season (Smith, Lim, and Harkins 2019; UNESCO 2019). Neither the census nor the Migration Survey captures this seasonal migration. Rural areas have served as safety nets during previous economic downturns, with migrants returning to agricultural areas during the 1997–98 Asian financial crisis and during the 2008–09 global financial crisis (Pholphirul 2012).

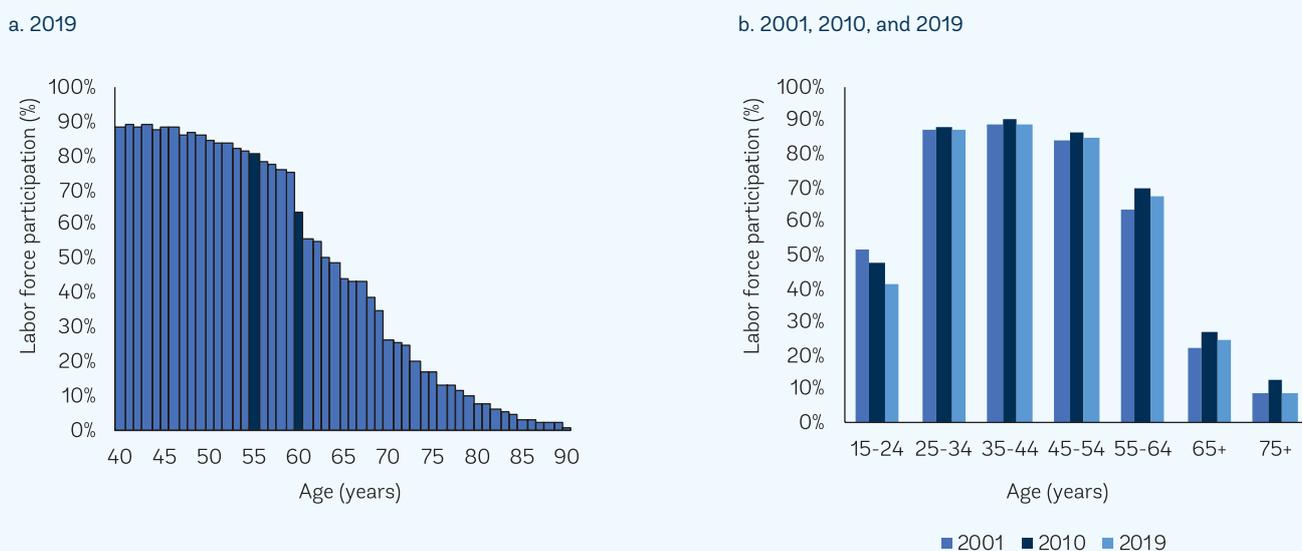
Movement of people to Thailand from abroad plays an important role in filling shortages in low-skill sectors. Thailand is a hub for migration in Southeast Asia, with 50 percent more migrants than any other country in the subregion (Testaverde et al. 2017). Migration has grown significantly in the last two decades. Thailand was home to an estimated 3.7 million migrants in 2014 (Smith, Lim, and Harkins 2019). By 2018, Thailand hosted 4.9 million migrants, including 3.9 million migrant workers from Cambodia, the Lao People’s Democratic Republic, Myanmar, and

Vietnam. Migrants from these four countries represent 10 percent of Thailand’s labor force. Most migrants to Thailand migrate for work in low-skill sectors, primarily in agriculture, construction, and fisheries; a comparatively small number work in professional occupations (OECD and ILO 2017; Testaverde et al. 2017). Outmigration is common, but not nearly as significant as immigration. In 2017, around 1.1 million people from Thailand were living overseas (Smith, Lim, and Harkins 2019). The COVID-19 outbreak and the transmission control policies implemented by the government significantly disrupted migration flows into Thailand and caused an exodus of migrant workers from Thailand to neighboring countries, potentially leading to labor shortages.

AGE AND THE LABOR MARKET

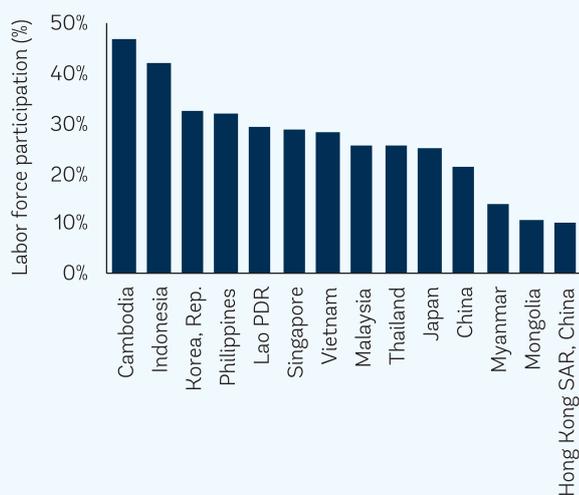
A significant number of older people continue to work until advanced ages in Thailand. The labor force participation rate begins to decline in earnest at age 60—the age of eligibility for the Old Age Allowance and the retirement age for public sector pensions, but five years later than the retirement age for private sector pensions (figure 1.12, panel a). About one-quarter of people 65 and older participate in the labor market, with higher rates for those between 65 and 74 (34 percent) and lower rates for those 75 and older (8 percent). The labor force participation rate of older people rose gradually between 2000 and 2010, before leveling off and falling slightly between 2010 and 2019 (figure 1.12, panel b). But labor force participation is higher now than in 2000. The labor force participation rate of older people is about the same in Thailand as in upper-middle- and high-income countries in the East Asia and Pacific region, although it is lower than Korea’s rate, which is 32 percent (figure 1.13).

Figure 1.12 Labor force participation rate in Thailand, by age, 2001, 2010, and 2019



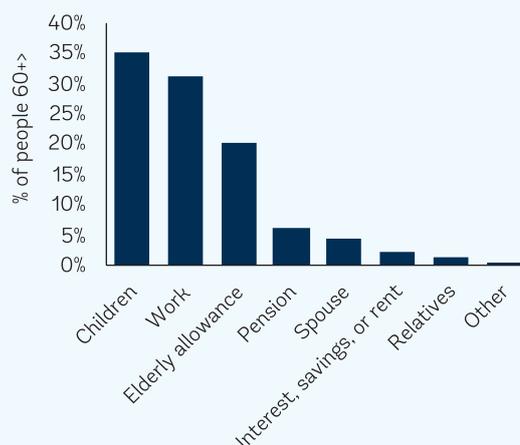
Source: Thailand Labor Force Survey 2001, 2010, and 2019. Note: On panel a, the red bars indicate age 55 and age 60.

Figure 1.13 Labor force participation rate of people 65 and older in the East Asia and Pacific region, 2019



Source: ILOSTAT database.

Figure 1.14 Main source of income reported by people 60 and older in Thailand, 2017



Source: UNFPA 2019.

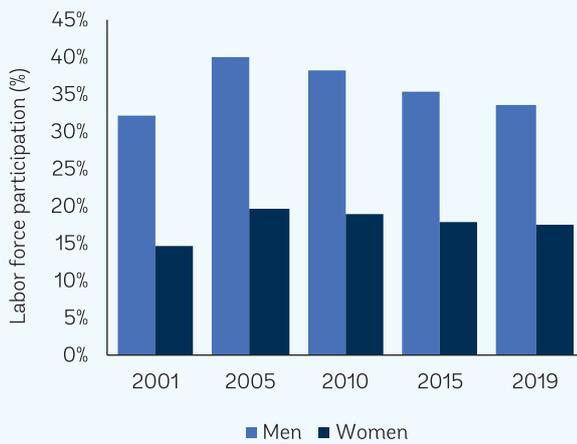
Older people rely on work as a primary source of income.

Thailand's Survey of Older Persons, which was last conducted in 2017, shows that around 38 percent of people 60 and older reported working in the last 12 months, down from 41 percent in 2014 but about the same as in 2007 (UNFPA 2019). This percentage declines as age increases. Among older people, 31 percent reported that work is their main source of income, second only to the 35 percent who reported that their children are their main source of income (figure 1.14). The percentage reporting work as the main source has remained similar in successive rounds of the Survey of Older Persons even as the percentage reporting children as their main source of income declined from 54 percent in 1994 to 35 percent in 2017. In contrast, reliance on the Old Age Allowance increased from 3 percent in 2007 to 20 percent in 2017 consistent with universalization of the program. Most older workers said that they work either because they are strong enough to work or because they need income for their families or themselves (NSO 2018).

Older men are more likely to work than older women.

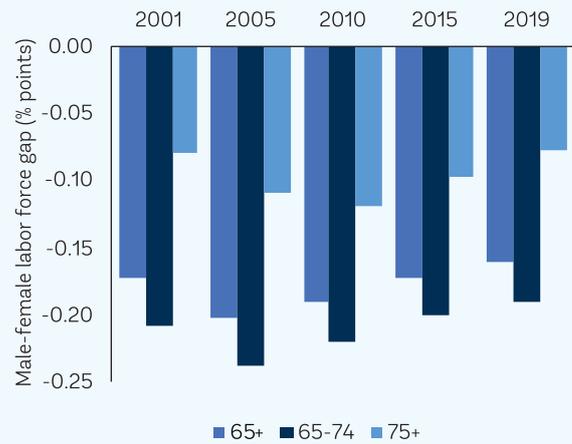
In 2019, 33 percent of men 65 and older participated in the labor market versus 17 percent of women in this age group (figure 1.15). The gap between the labor force participation of older men and older women is about 16 percentage points, similar to that of the population as a whole (figure 1.16). Consistent with this gap, women are significantly more likely than men to report their spouse as an income source (Teerawichitchainan et al. 2019). The gap in participation rates increased between 2001 and 2005, but has declined since. The gap is significantly larger for people between the ages of 65 and 74 than for those 75 and above. This aligns with the increase in widowhood among older women, which means that few have their spouses as sources of income (Teerawichitchainan et al. 2019). These patterns are supported by evidence from the Survey of Older Persons, which shows that nearly 50 percent of men 60 and older reported working in the last 12 months in 2017 compared to around 30 percent of women (UNFPA 2019). This gap between men's and women's work has persisted through the 1994, 2007, 2014, and 2017 rounds of the survey.

Figure 1.15 Labor force participation rate of people 65 and older by gender, 2001–19



Source: Thailand Labor Force Survey 2001, 2005, 2010, 2015, and 2019.

Figure 1.16 Percentage point gap between female and male labor force participation at older ages, 2001–19



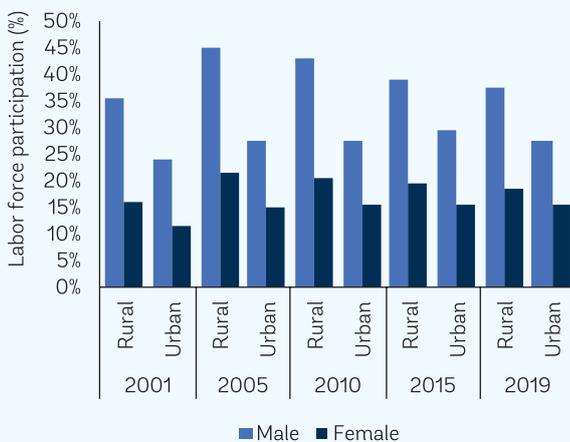
Source: Thailand Labor Force Survey 2001, 2005, 2010, 2015, and 2019.

Older people have significantly higher labor force participation rates in rural areas. In 2019, about 40 percent of men 65 and older and 20 percent of women 65 and older participated in the labor market in rural areas versus 27 percent of men and 16 percent of women in urban areas (figure 1.17, panel a). The gap was largest in 2005 at 18 percentage points for men and 7 percentage points for women, declining to 10 percentage points for men and 3 percentage points for women by 2019. The gaps in participation between urban and rural areas are not apparent among the working-age population (figure 1.17, panel b). At younger ages, these gaps likely suggest that young

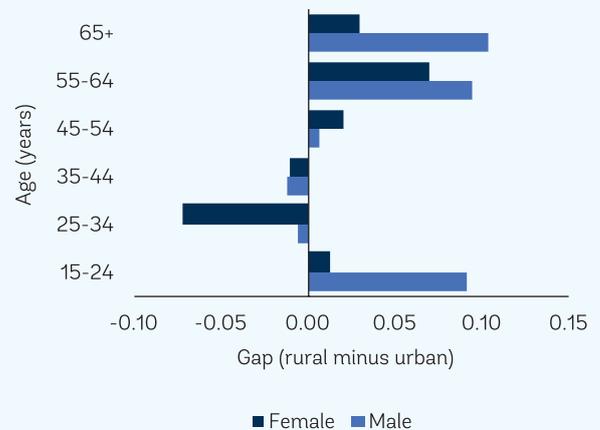
people are entering rural labor markets early and forgoing additional schooling. At older ages, the gaps are consistent with the lower access to social protection in rural areas, which means that older people must work into old age to support themselves. Indeed, the 2017 Survey of Older Persons shows that about 41 percent of people 60 and older in rural areas reported work as a source of income in the past 12 months compared to 32 percent of older people in urban areas. Urban older people are more likely to cite pensions and interest, savings, and property as income sources. Overall, two-thirds of Thailand’s employed older people live in rural areas.

Figure 1.17 Labor force participation rate in urban and rural areas of Thailand, by gender and age

a. Men and women age 65+, 2001–19

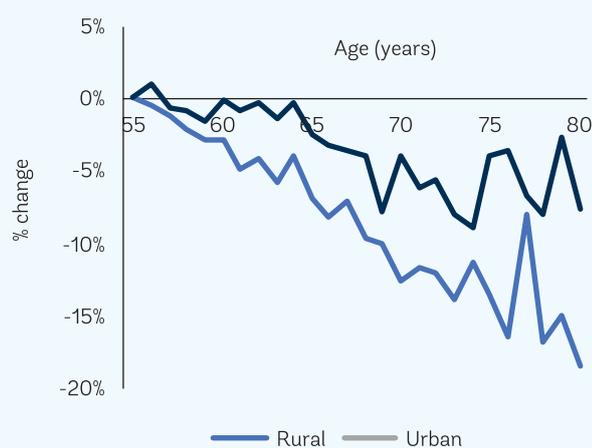


b. Difference in participation, by age, 2019



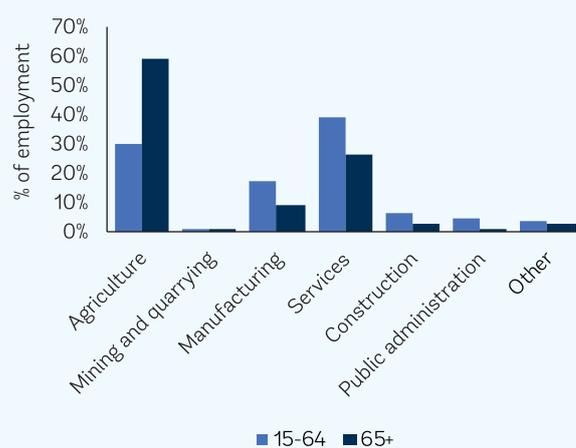
Source: Thailand Labor Force Survey 2001, 2005, 2010, 2015, and 2019.

Figure 1.18 Percentage change in hours worked since age 55 in urban and rural areas in Thailand, 2019



Source: Thailand Labor Force Survey 2019.

Figure 1.19 Distribution of employment in Thailand, by sector and age, 2019



Source: Thailand Labor Force Survey 2019.

Older workers in rural areas reduce their hours of work more quickly than those in urban areas.

Older workers work slightly fewer hours than younger workers. Workers between the ages of 55 and 64 worked an average of 40.6 hours a week in 2019 and those 65 and older worked an average of 37.8 hours a week. Younger workers between age 25 and 44 worked 44 hours on average per week. Based on earlier data, HelpAge International (2016) found that workers 60 and over in Thailand work more than their peers in the Philippines and Vietnam. Despite their higher labor force participation, older people reduce the hours they work more rapidly with age in rural areas than in urban areas, perhaps reflecting the greater prevalence of older workers in self-employment, which allows for more flexibility in hours worked (figure 1.18)

The prevalence of older workers in agriculture indicates age-based segmentation of the labor market.

Older people are much more likely to work in agriculture. About 60 percent of older people working in 2019 worked in agriculture versus about 30 percent of people between 15 and 64 years of age, who were more concentrated in services and manufacturing (figure 1.19). While agricultural employment fell about 9 percentage points among working-age people between 2008 and 2019, the share of older workers working in agriculture barely changed. Indeed, the average age of workers in agricultural employment is increasing at a faster rate (12 percent) than the average age of the total labor force (7.3 percent).

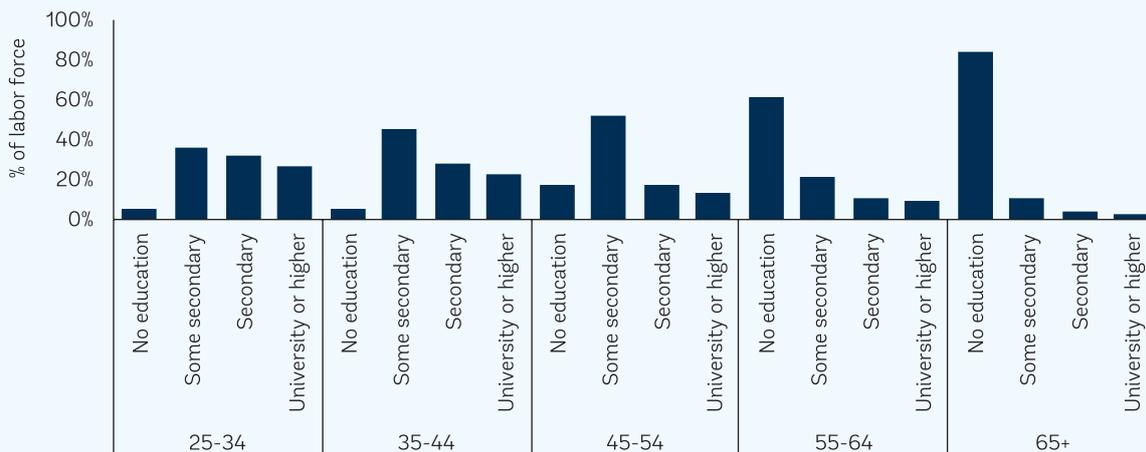
Agricultural workers who are older are not necessarily less productive, but they may require targeted support.

The aging of the agricultural workforce could create challenges for increasing Thailand’s low agricultural productivity if older farmers have poorer health or are less willing or able to adopt new technologies. One recent study of agricultural productivity and the aging agricultural workforce in Thailand found that this aging does not affect on-farm productivity, while another found that aging farmers increase a sector’s technical inefficiency but that older farmers combined with capital decrease this inefficiency (Saiyut et al. 2017; Suphannachart 2017). Although mixed, these results suggest that an aging agricultural workforce does not necessarily imply lower agricultural productivity. Instead, older farmers, like their younger peers, may benefit from training and access to productivity-enhancing technologies.

Older people, particularly in rural areas, tend to have low levels of education.

Education levels have been improving in Thailand, and younger people are much better educated than older people (figure 1.20). In 2019, nearly 30 percent of people between the ages of 25 and 34 had a university education or above, compared with just 2 percent of workers 65 and older. More than 80 percent of older people had no education (that is, less than a primary school education). There is also an urban-rural education gap for older people. Education levels are higher among older people in urban areas, where around 13 percent of workers 55 and older have completed secondary school, than in rural areas, where only 6 percent have.

Figure 1.20 Distribution of employment in Thailand, by education and age, 2019

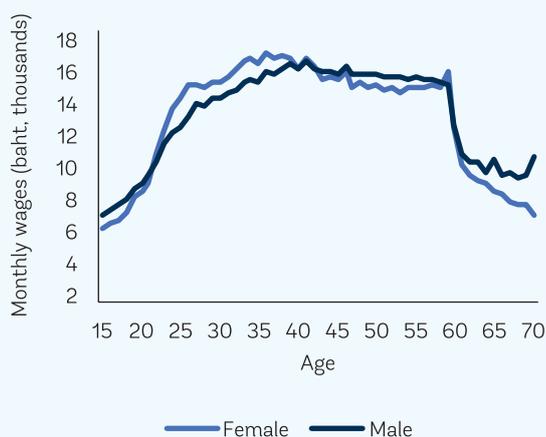


Source: Thailand Labor Force Survey 2019.

Wages decline at older ages. Controlling for education level because older workers tend to be less educated than younger ones, wages peak for women at around B 17,200 per month at age 36 before declining fairly quickly, while wages of men peak slightly lower, at around B 16,700 per month at age 41, where they plateau for several years (figure 1.21). By age 65, both women and men make substantially less: men make 62 percent of their peak wages and women make just 50 percent. Over the course of

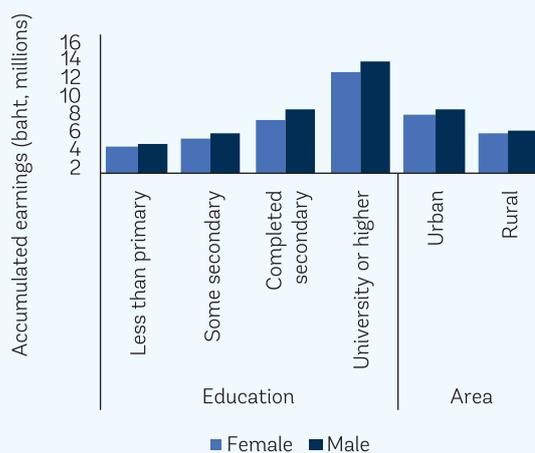
their lifetime, workers in rural areas, female workers, and workers with less education accumulate less income than urban workers, male workers, and more highly educated workers (figure 1.22). For instance, the lifetime earnings of women with a university education are 2.5 times higher than those of women with just some secondary education. This has significant implications for the ability of these workers to support themselves when they are old.

Figure 1.21 Monthly wages in Thailand, by gender and age, 2019



Source: Thailand Labor Force Survey 2019.
 Note: Monthly wages are predicted using a regression of the natural log of employment income on age, age-squared, and education.

Figure 1.22 Average lifetime accumulated earnings in Thailand, by gender, education, and location, 2019



Source: Thailand Labor Force Survey 2019.
 Note: Based on synthetic estimates of lifetime earnings between ages 20 and 59.

Older people work in lower-quality jobs. Older people have more precarious employment. Rates of self-employment are much higher among older people: in 2019, around two-thirds of workers 65 and older were self-employed, the largest share of any age group. While an important source of income, self-employment lacks the stability and job-linked benefits of wage employment. Consistent with the prevalence of less stable employment, older people also have much higher rates of informality, indicating that they lack access to social protection (figure 1.23). Three-quarters of workers between 55 and 64 and 91 percent of those 65 and older work in informal jobs. Work in second jobs is also more prevalent among older workers (figure 1.24).

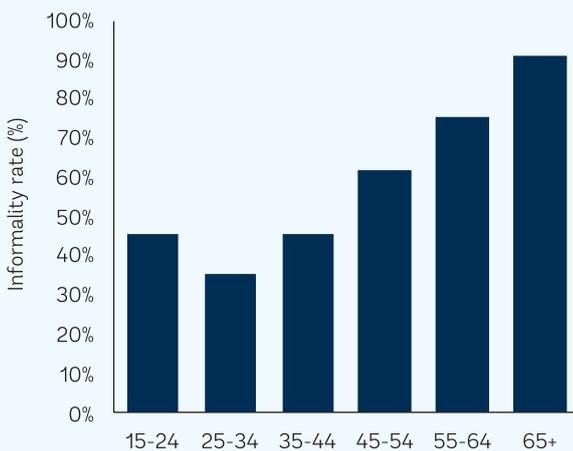
An index combining different aspects of job quality shows that overall job quality declines with age. Several indicators of job quality such as having a second job, underemployment, informality, and working conditions can be combined to define a single index of

job quality.³ Figure 1.25 shows the job quality index calculated for each age group in Thailand in 2019. An index value of 1 indicates having a job that is 1 standard deviation above the mean job quality that year. The index shows that job quality overall declines as workers age. Older workers have job quality that is two-thirds of a standard deviation below that of the average job in 2019. Younger workers, in contrast, have jobs that are about half a standard deviation above the quality of the average job.

Thailand faces these labor market challenges in the context of a population that is aging quickly. Part 2 turns to a discussion of population aging in Thailand and its implications for the labor market and economic development.

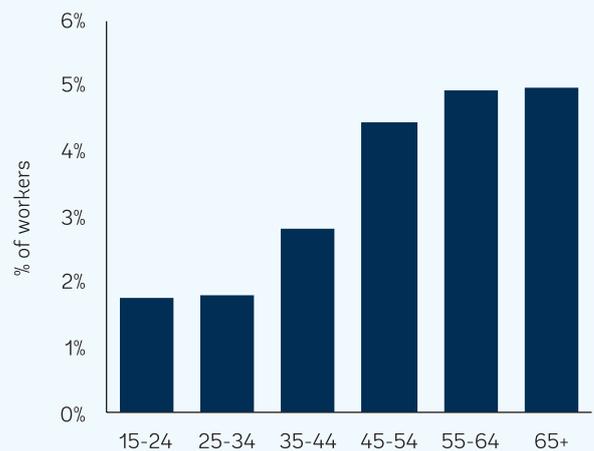
³ Del Carpio, Gruen, and Levin (2017) outline a procedure to capture different dimensions of job quality in a single index. That procedure is replicated using data from Thailand's Labor Force Survey to measure if a worker is underemployed, self-employed, working in the informal sector, overqualified, or working in poor conditions. Appendix B provides details on the methodology.

Figure 1.23 Informality rate in Thailand, by age, 2019



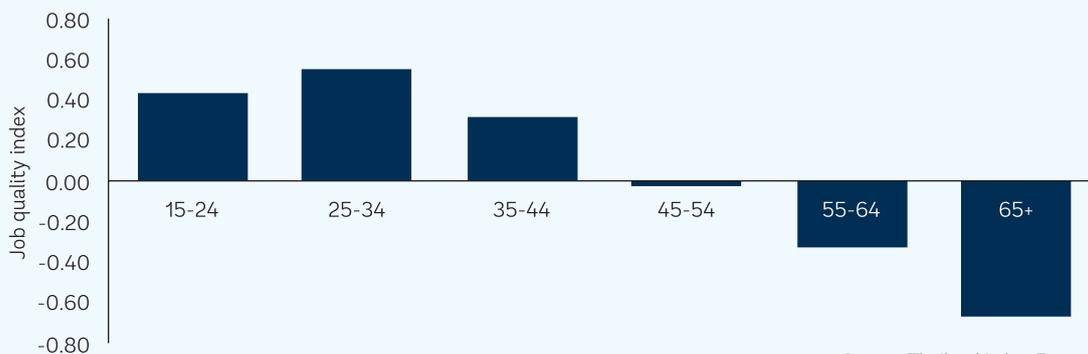
Source: Thailand Labor Force Survey 2019.

Figure 1.24 Share of workers with a second job in Thailand, by age, 2019



Source: Thailand Labor Force Survey 2019.

Figure 1.25 Job quality in Thailand, by age, 2019



Source: Thailand Labor Force Survey 2019.

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PART 2:

DEMOGRAPHIC TRENDS AND PROJECTIONS

Part 2 introduces the issue of population aging in Thailand and discusses its implications for past and future economic development.

MAIN FINDINGS

Thailand is aging rapidly. The working-age share of the population is shrinking, and the older-age share is increasing. The share of the population 65 or older is projected to rise from 13 percent today to 31 percent in 2060. This will be the 22nd largest share globally. These trends will ultimately result in a decline of Thailand's population beginning in 2029. Overall, Thailand's population aging looks more like that of the wealthy countries of East Asia than that of its middle-income peers. Older people are not distributed evenly across Thailand: they represent a higher proportion of the population in the North and Northeast, a result of higher rates of outmigration of younger people from these regions.

Thailand faces significant economic pressures from aging, but these pressures could be offset by behavioral responses reinforced by policy. Thailand has benefited from a demographic dividend that has boosted economic development during a demographic transition driven by a rapid decline in fertility and, to a lesser extent, by net immigration and higher life expectancy. However, the increasing share of older people in Thailand and the shrinking working-age population could have a negative impact on economic growth and fiscal sustainability. Behavioral

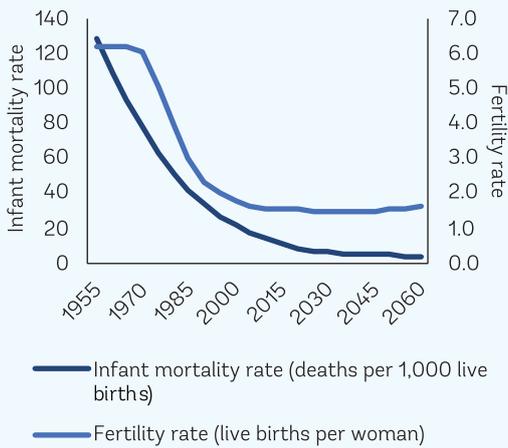
responses could counteract these negative impacts by, for example, increasing the number of people working, improving the productivity of the workforce, and leading to higher saving rates, capital deepening, and adoption of labor-saving technologies. Policy can reinforce, complement, and supplement these behavioral responses.

THAILAND'S DEMOGRAPHIC TRANSITION

Economic development and demographic changes are closely intertwined. Economic development is closely linked to the demographic transition from a period of high mortality and fertility when population growth is relatively constrained to a period of low mortality and fertility when population expands (Bloom, Canning, and Sevilla 2003). As development proceeds, improvements in public health and medicine result in a decline in mortality rates, especially for young children, and an increase in life expectancy. This trend increases the growth rate of the population and the number of children relative to the working-age population, creating a youth population "bulge." The decline in mortality is followed by a decline in fertility, as decisions about childbearing are influenced in part by the greater likelihood that children will survive. This decline in fertility results in a decline in the number of younger people relative to the working-age population, which itself has increased as a result of declining mortality rates. The population "bulge" then moves into the working ages.

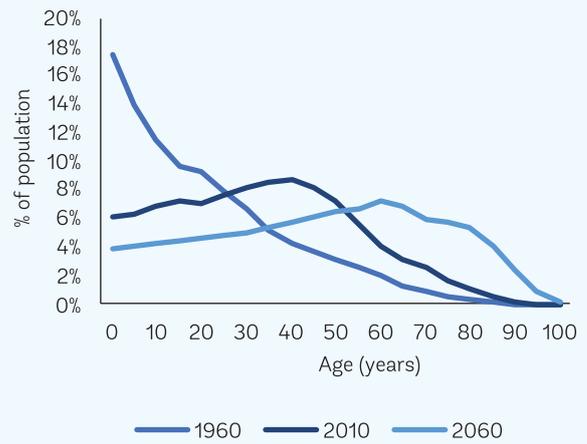
Thailand has undergone its demographic transition. With improvements in medicine and sanitation, mortality rates, particularly infant mortality rates, fell steadily in the middle of the 20th century, resulting in the so-called "million birth cohort" (Carmichael 2011; Prasartkul, Thaweessit, and Chuanwan 2019). This decline was followed by a decline in fertility beginning in the early 1970s (figure 2.1). The result was first a bulge in the population of people younger than age 15. The youth bulge then grew older as population aging set in: the working-age population between ages 15 and 64 represented the largest share of the population in 2010. Figure 2.2 shows the evolution of this bulge over time.

Figure 2.1 Infant mortality and fertility rates in Thailand, 1955–2060



Source: UN 2019b.

Figure 2.2 Figure 2.2 Distribution of population in Thailand, by age, 1960, 2010, and 2060



Source: UN 2019b.

A demographic dividend can boost economic growth during the demographic transition given the right policy environment.

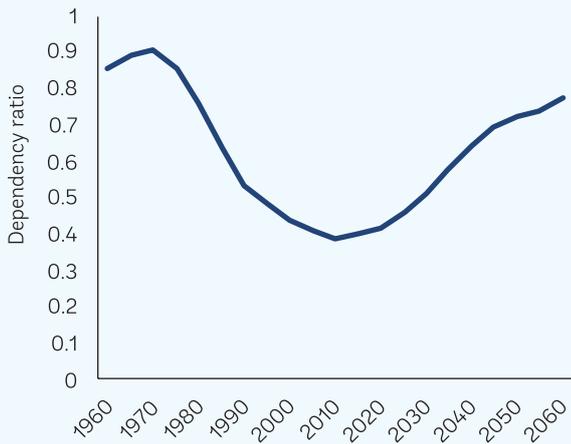
The demographic dividend is the rise in income per capita that results from the relative increase in the working-age population during the demographic transition. The dividend arises from three main mechanisms (Bloom and Canning 2008; Bloom, Canning, and Sevilla 2003). First, the dividend arises via increases in labor supply. The effect is mechanical: the larger the share of people in ages typically associated with working, the greater the number of people who are likely to be working, which in turn increases per capita output. This is often called the first demographic dividend. Increases in labor supply also arise from a behavioral effect: women are more likely to enter the workforce when fertility is low (Bloom et al. 2009). Second, the dividend arises from the growth of savings because working-age people tend to save more (a compositional effect) and because better health and longer lives may incentivize saving (a behavioral effect) (Bloom et al. 2007; Lee, Mason, and Miller 2000). Third, the dividend arises via human capital, as lower mortality rates and longer life expectancies alter the incentives for investment in education and health. These changes in female labor supply and in physical and human capital are often called the second demographic dividend (Mason, Lee, and Jiang 2016). These mechanisms make clear that policy matters for how the demographic dividend operates and whether it operates at all: labor markets must be flexible to absorb more potential workers, savings devices must be in place, and health and education must be accessible.

Thailand benefited from a demographic dividend as its population grew older during its demographic transition.

The demographic dividend has been an important factor in economic growth in East Asia since 1965 (Bloom, Canning, and Malaney 2000; Bloom and Finlay 2009; Bloom and Williamson 1998). Thailand was an important beneficiary, as shown by the evolution of the total dependency ratio, which divides the number of young and older people by the number of working-age people (a smaller ratio indicates a larger working-age population). Thailand’s total dependency ratio declined from 1970 until 2010, indicating a growing number of working-age people relative to “dependents” and resulting in a (first) demographic dividend (figure 2.3). Providing evidence for this, Ha and Lee (2016) find that the contribution of declining dependency to economic convergence in Thailand was greatest in the 2000s. Bloom and Finlay (2009) estimate that between 1965 and 2005 demographic changes accounted for 20 percent of economic growth in Thailand.⁴ This figure compares to 10 percent in Japan, 16 percent in China, and 51 percent in Singapore (figure 2.4). A similar estimate for the period 1960 to 2000 finds that the demographic dividend was responsible for 16 percent of economic growth during that period (Mason and Kinugasa 2008). Demographic changes at the household level were also important. Between 1988 and 2013, working-age adults increased as a share of household size, which may have boosted household production capacity. Indeed, changes in the demographic composition of households accounted for 8 percent of the decline in poverty in this period (World Bank 2016).

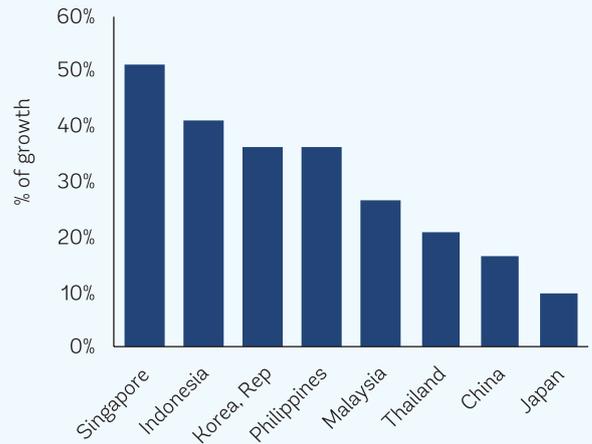
⁴ Demographic change contributed 0.88 percentage point to economic growth in this period (Bloom and Finlay 2009).

Figure 2.3 Total dependency ratio in Thailand, 1960–2060



Source: UN 2019b.

Figure 2.4 Share of economic growth accounted for by demographic change in East Asia and Pacific, 1965–2005



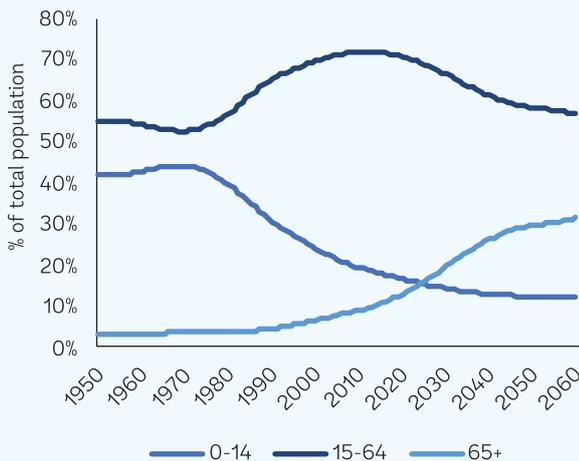
Source: Bloom and Finlay 2009.

POPULATION AGING IN THAILAND

Thailand is now in the stage of population aging in which the working-age share of the population is shrinking and the older-age share is increasing. Once the demographic transition is complete, longer life expectancy combines with low fertility rates and the aging of the large working-age population to create a sizable population of older people. At this stage, gains in life expectancy occur primarily toward the end of life (Eggleston

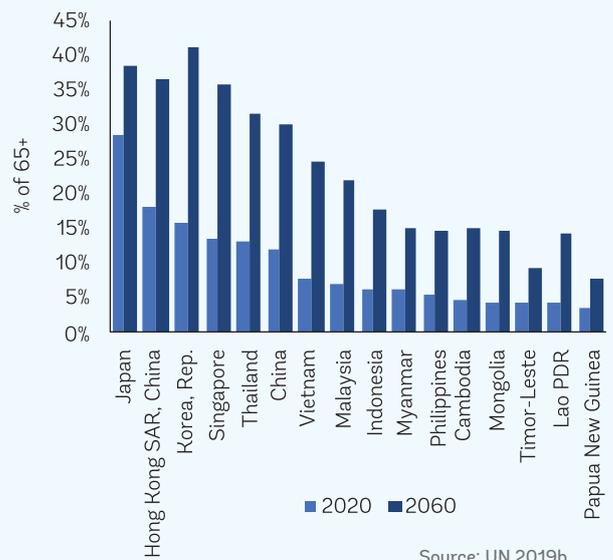
and Fuchs 2012). The working-age share of the population in Thailand grew continuously from 1950 until 2010 but then declined between 2010 and 2015 and again between 2015 and 2020 (figure 2.5). The share of the population that is 65 or older, in contrast, barely changed until the 1980s but then began growing. Indeed, 9 million people, representing 13 percent of Thailand’s population, are now 65 or older, which is double the share in 2000. This is the fifth largest share in the East Asia and Pacific region and the 58th largest globally (figure 2.6).

Figure 2.5 Share of population in Thailand, by age group, 1950–2060



Source: UN 2019b.

Figure 2.6 Share of 65-plus population in East Asia and Pacific, by country, 2020 and 2060



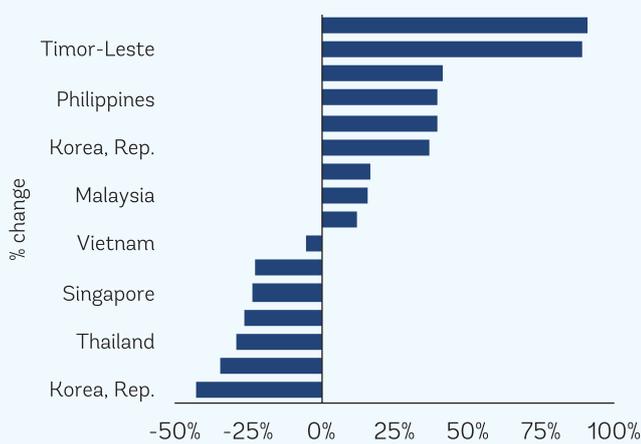
Source: UN 2019b.

Thailand’s working-age population is projected to continue shrinking, while the population of older people is projected to continue growing. The working-age share of the population is projected to decline from 71 percent of the population in 2020 to 56 percent in 2060 (figure 2.5). This is equivalent to a nearly 30 percent decline in the working-age population, the third largest decline in the East Asia and Pacific region after the Republic of Korea (43 percent) and Japan (34 percent) (figure 2.7). Meanwhile, the share of the population 65 or older is projected to rise from 13 percent to 31 percent (figure 2.5). This is the 22nd largest share globally. The population of the “oldest old”—that is, people age 80 and older—is projected to increase significantly from less than 1 percent of the population in 1960 to 3 percent in 2020 and to 13 percent in 2060, one of the highest in the region (figure 2.8). The continued aging of Thailand’s population can be seen in the movement of the population “bulge” in figure 2.2 from the young ages in 1960 to the working ages in 2010 and finally to the older ages in 2060. These trends

will ultimately lead to a decline in Thailand’s population beginning in 2029.

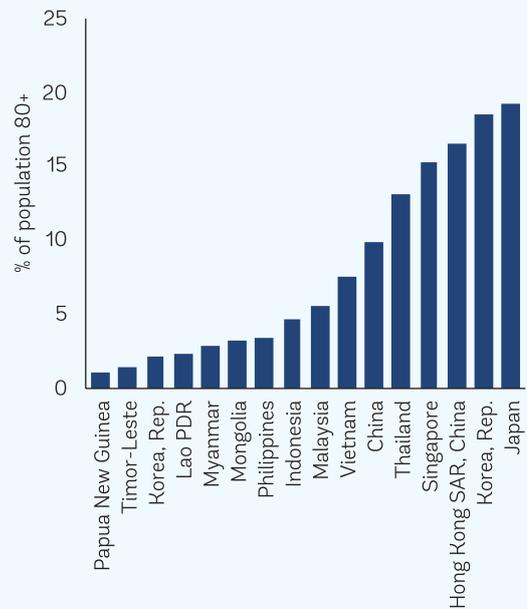
Categorizing the East Asia and Pacific region’s demographic diversity can help to put Thailand’s aging in context. A recent World Bank report on aging in the East Asia and Pacific region, *Live Long and Prosper*, categorized countries in the region into three groups in order to classify their demographic diversity (World Bank 2015). This same typology is useful for placing Thailand’s aging population in context. The region’s wealthy economies that have the highest shares of population 65 or older are classified as “red”: Hong Kong SAR, China; Japan; Korea; and Singapore. Quickly aging countries are classified as “orange”: China, Indonesia, Malaysia, Mongolia, and Vietnam. Thailand is a member of this group, but is kept separate for this analysis. Finally, Cambodia, the Lao People’s Democratic Republic, Myanmar, Papua New Guinea, the Philippines, and Timor-Leste are classified as “green”: although they are still young, they will begin to age in the coming decades.

Figure 2.7 Percentage change in the working-age population in East Asia and Pacific, by country, 2020–60



Source: UN 2019b.

Figure 2.8 Percent of the population age 80 and older in East Asia and Pacific, by country, 2060



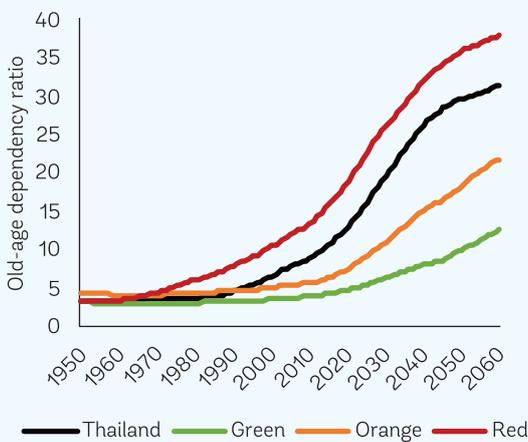
Source: UN 2019b.

Thailand's population aging looks more like that of the wealthy countries of East Asia than its middle-income peers. In 1950, the share of the population 65 or older was quite similar across Thailand and the red, orange, and green countries (figure 2.9, panel a). By 1970, the 65-plus population in red economies had begun to increase quickly. This increase began in Thailand in 1990 but did not begin in the orange countries until around 2010. By 2040, the share of the 65-plus population is projected to be 32 percent in red economies, 26 percent in Thailand, and just 15 percent in orange countries. The old-age dependency ratio, which divides the number of older people by the working-age population, provides an alternative measure of the old-age population, but this time in relation to the number of working-age people, who are more likely to be in the labor market. This measure began to accelerate in

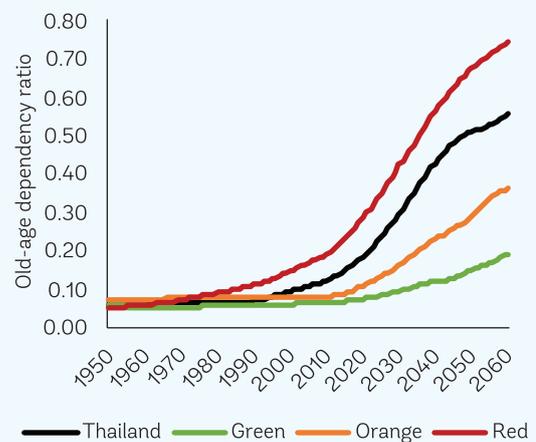
the red economies in the 1950s and in Thailand in the late 1980s (figure 2.9, panel b). The dependency ratio is projected to grow in Thailand and the red economies at a similar rate from 2020 to 2040, reaching ratios of 0.43 and 0.57, respectively. In the orange countries, in contrast, the old-age dependency ratio began to rise in the 2010s and will increase at a slower rate, reaching just 0.23 in 2040. In contrast, differences in the remaining years of life—life expectancy—are less apparent between Thailand and the orange countries. This is clearest for life expectancy at birth, but also for life expectancy at age 60 (figure 2.10). Red economies have experienced fast growth in life expectancy, while Thailand has experienced fairly constant growth on this metric. This finding is consistent with the smaller role of life expectancy in population aging, which is discussed in more detail below.

Figure 2.9 Population aging in East Asia and Pacific, 1950–2060

a. Share of 65-plus population



b. Old-age dependency ratio

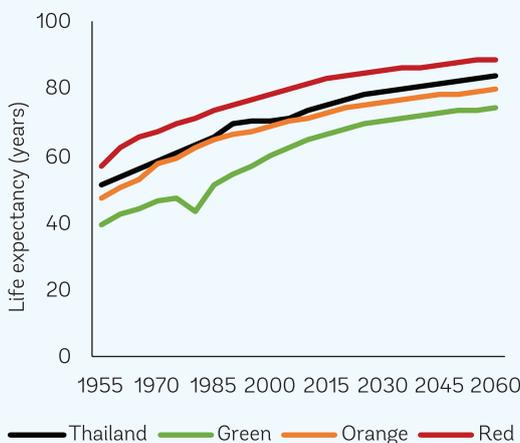


Source: UN 2019b.

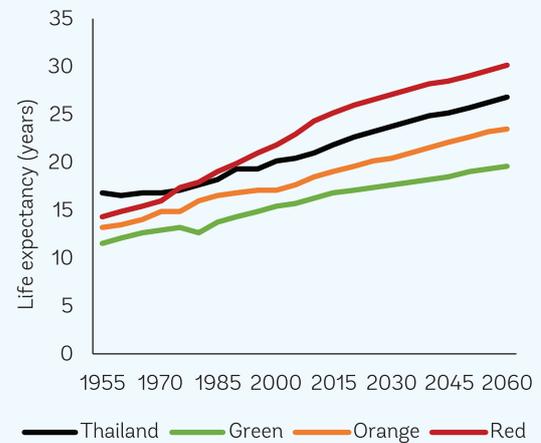
Note: Green = young populations that will begin to age in the coming decades. Orange = populations that are aging quickly. Red = old populations that have the highest shares of people 65 or older. See the text for more detail.

Figure 2.10 Life expectancy in East Asia and Pacific, 1955–2060

a. At birth



b. At age 60



Source: UN 2019b.

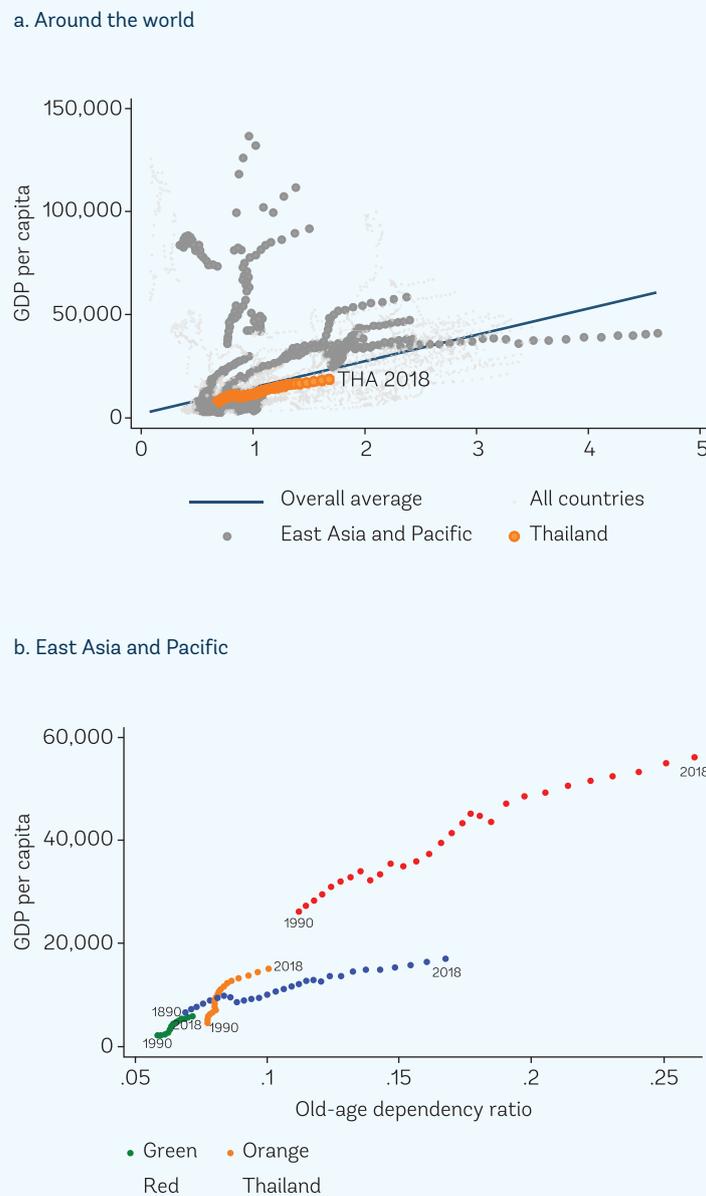
Note: Green = young populations that will begin to age in the coming decades. Orange = populations that are aging quickly. Red = old populations that have the highest share of people 65 or older. See the text for more detail.

Population aging is occurring quickly in Thailand. In The 65-plus population in Thailand doubled between 2000 and 2020 and will double again by 2040 to 26 percent of the population. Between 2000 and 2020, the 65-plus population in orange countries increased by only a quarter. Between 2020 and 2040, their older population will also double, but only to 15 percent of the population. The number of years for the share of the 65-plus population to increase from 7 percent of the population to 14 percent is often used to gauge the speed of population aging. This transition took 115 years in France and 69 years in the United States; it is projected to take only 20 years in Thailand, the fourth-fastest rate in the region, behind Singapore (17 years) and Korea and Vietnam (18 years).

Thailand is aging at a lower level of income than other countries.

Figure 2.11, panel a, plots the old-age dependency ratio of all countries between 1980 and 2018 against GDP per capita (purchasing power parity [PPP] at constant 2011 international dollars) with a best fit line representing the average GDP per capita of a country at a specific old-age dependency ratio. As shown in this figure, Thailand has aged without ever crossing this line, implying that at every stage of aging Thailand has had GDP per capita that is lower than average. Figure 2.11, panel b, which replicates panel a for Thailand and the red, orange, and green countries, shows that the older red economies had GDP per capita of around \$41,000 when their elderly dependency ratio was at the same level as Thailand's today. This is more than twice the level of Thailand's current GDP per capita. In sum, Thailand is less wealthy than other countries were at similar stages of population aging.

Figure 2.11 Income and old-age dependency, 1980–2018



Source: World Bank, World Development Indicators; UN 2019b.

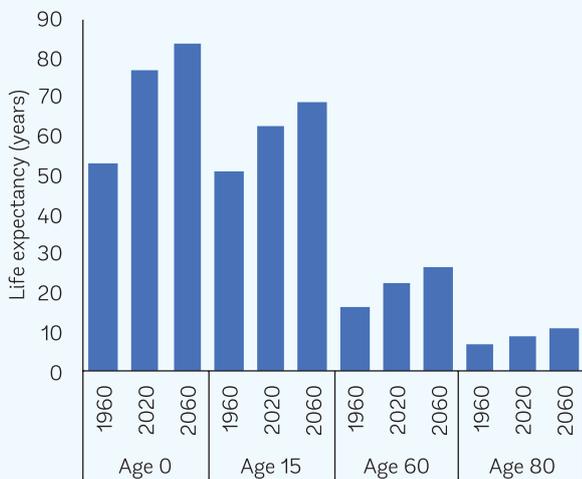
Note: GDP per capita is purchasing power parity (constant 2011 international \$). Green = young populations that will begin to age in the coming decades. Orange = that are aging quickly. Red = old populations that have the highest share of the people 65 or older. See text for more detail.

Declines in fertility and increases in life expectancy have played an important role in population aging in Thailand. The rapid pace of aging is in part a result of the sharp drop in fertility rates associated with a family planning program that spurred contraceptive use (Knodel, Chamrathirong, and Debavalya 1987; Prasartkul, Thaweessit, and Chuanwan 2019; UNFPA 2019). Improvements in life expectancy have also driven the aging of the population. Life expectancy at birth grew 24 years between 1960 and 2020: a child born in 1960 was only expected to live until age 53, while one born in 2020 is expected to live until age 77 (figure 2.12).

International migration has also influenced population aging in Thailand. Thailand has historically been a net recipient of migrants, particularly low-skill migrants from Cambodia, Lao PDR,

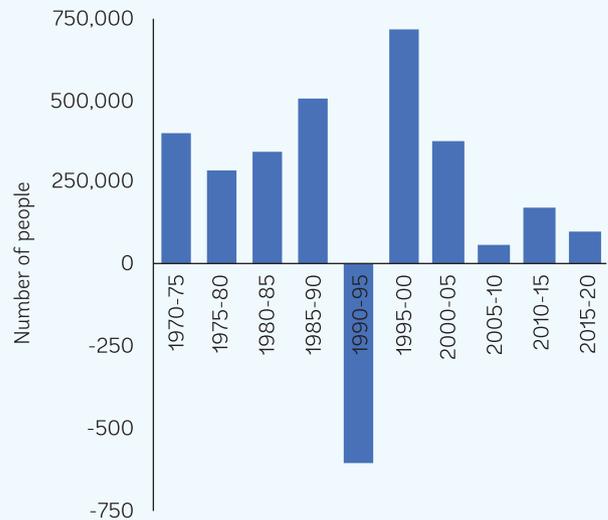
and Myanmar, meaning that more people arrive in Thailand than leave. This has been true in each five-year period since 1970, with the exception of 1990 to 1995, although net migration rates have been lower in recent years (figure 2.14). Migrants in Thailand tend to be younger than the local population (figure 2.15). In fact, Thailand's aging population is likely a driver of migration, as migrants seek to fill gaps created by aging workforces (Testaverde et al. 2017). Past studies have found that older populations are associated with higher rates of immigration (Zaiceva and Zimmermann 2016). Notably, outmigrants from Thailand are also young. The positive net migration rate means that this effect is being offset, but it also implies that a negative net migration rate in the future could contribute to population aging.

Figure 2.12 Life expectancy in Thailand at different ages, 1960, 2020, and 2060



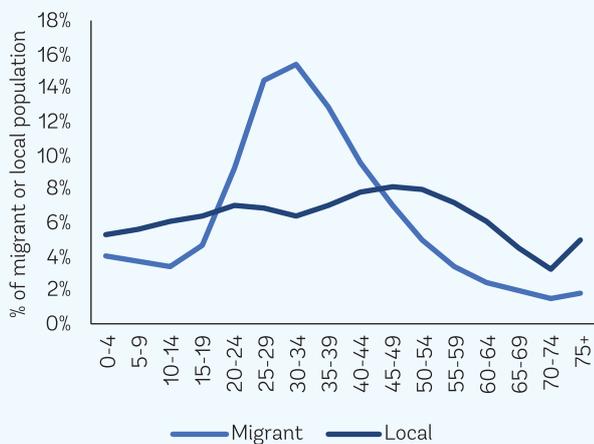
Source: UN 2019b.

Figure 2.13 Net migration in Thailand, 1970-2020



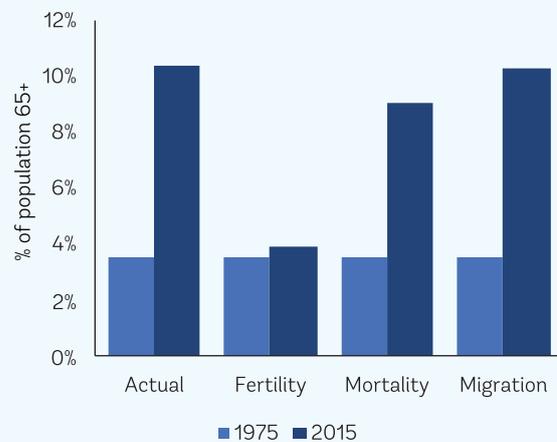
Source: UN 2017.

Figure 2.14 Age distribution of migrants and locals in Thailand, 2019



Source: UN 2019b.

Figure 2.15 Share of 65-plus population in Thailand under different demographic scenarios, 1975 and 2015



Source: UN 2017.

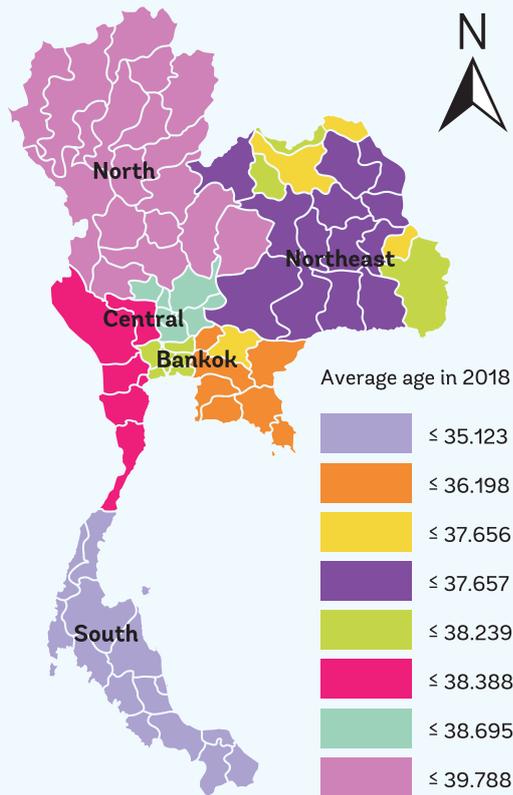
A rapid decline in fertility is the primary factor explaining the speed of population aging in Thailand. Overall, changes in fertility have dominated changes in life expectancy and migration. Figure 2.15 compares the share of the population that is 65 and older under different scenarios: constant fertility, constant mortality, and constant migration.⁵ The scenarios show the significant impact of fertility: had fertility rates remained at 1975 levels, the share of the population that is 65 and older would have been 4 percent in 2015, 6 percentage points lower than the actual value of 10 percent. Life expectancy (mortality) and migration have had a much smaller impact.

Aging patterns vary across geography in Thailand. Differences in aging are relatively small across urban and rural areas according to demographic estimates by the Office of the National Economic and Social Development Council (NESDC), a government economic planning agency. Around half (48 percent) of older people lived in

rural areas in 2018. A smaller share of working-age people (44 percent) lived in rural areas. Within urban and rural areas, the distribution of the population by age is similar across urban and rural areas, with a slight skew toward the working ages in urban areas. Older people are not distributed evenly across Thailand: they represent a higher proportion of the population in the North and Northeast (map 2.1), where nearly 15 percent of the population was older than 65 in 2018 (figure 2.16, panel a). The NESDC projects that this share will increase to more than one-quarter by 2040. Bangkok, which is currently the youngest region, is projected to age quickly to become the third youngest in 2040 (map 2.2). In 2018, 53 percent of Thailand’s older people lived in the Northeast and North regions, which only accounted for 45 percent of Thailand’s total population (figure 2.16, panel b). By 2040, however, this share is projected to shrink, while that of Bangkok is projected to grow.

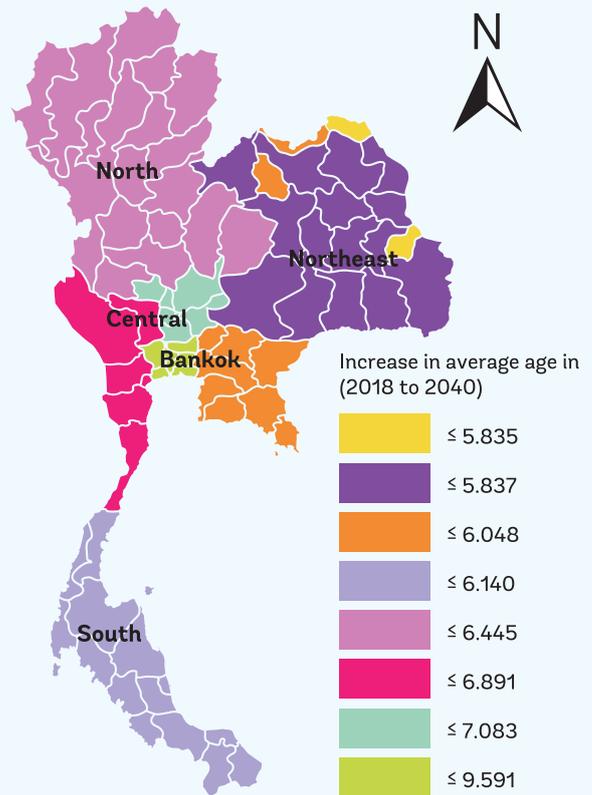
⁵ Appendix A discusses the simulations in more detail.

Map 2.1 Average age in Thailand, by province, 2018



Source: NESDC 2019.

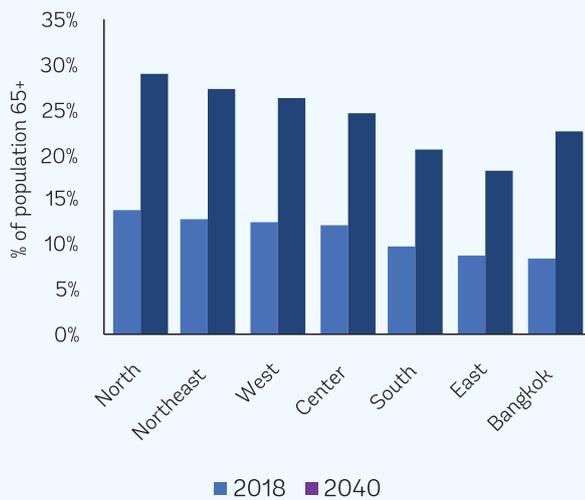
Map 2.2 Change in average age in Thailand, by province, 2019–40



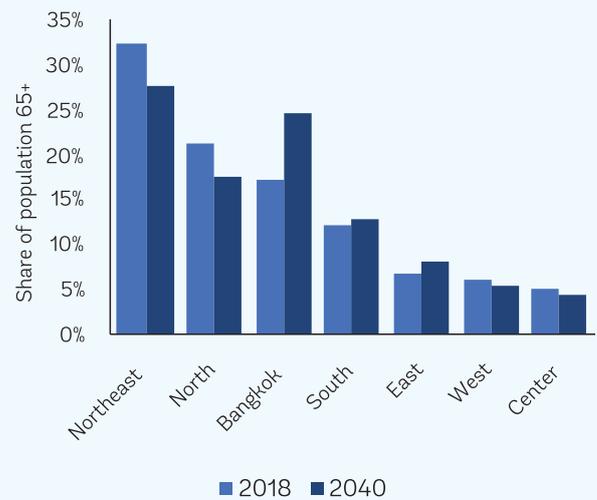
Source: NESDC 2019.

Figure 2.16 Share of population age 65 and older in Thailand, 2018 and 2040

a. Share of regional population age 65 and older



b. Regional share of total population age 65 and older



Source: NESDC 2019.

There are several explanations for this geographic variation. In the now relatively youthful Bangkok, fertility rates declined more quickly than in other regions (UNFPA 2011). However, this effect was likely offset by higher rates of outmigration of younger people from the now relatively old North and Northeast, on the one hand, and higher rates of immigration to Bangkok, on the other (Fujioka and Thangphet 2009). Migration likely played a smaller role in the South. In the South, where women in the large Muslim population tend to have more children, fertility rates declined the slowest in Thailand, likely explaining the relatively youthful population (UNFPA 2011). The higher prevalence of human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) and changes in family support are also potential factors explaining the relatively older population in the North and Northeast (Fujioka and Thangphet 2009).

THE IMPLICATIONS OF POPULATION AGING

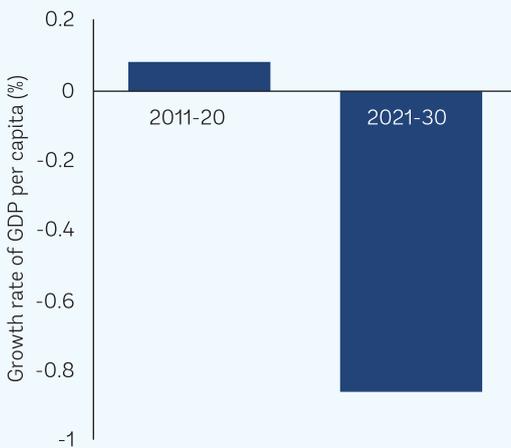
The increasing share of older people in Thailand could have a negative impact on economic growth and fiscal sustainability. Thailand's working-age population is projected to decrease, while the share of older people in the population is projected to increase. All else remaining equal, this change implies a mechanical decrease in growth in income per capita due to the smaller number of people

working relative to the total population and due to the decline in savings available for investment given older people's low savings rates (Bloom, Canning, and Fink 2010). This effect gives rise to concerns about the negative implications of aging for economic growth. Indeed, projections of the potential impact of this effect based on estimates of past demographic dividends suggest that Thailand may not benefit from its changing demographics. Park and Shin (2011) estimate that future changes in demographics will contribute negatively to economic growth in the 2020s (figure 2.17, panel a). The negative impact of -0.86 percent on growth of GDP per capita is smaller than in Korea (-1.45 percent) and Singapore (-2.52 percent) but larger than in China (-0.79 percent) and Vietnam (-0.28 percent) as well as in Malaysia, where demographics are estimated to have a positive contribution (figure 2.17, panel b).⁶ Thailand's changing demographics may even create the risk for a middle-income trap (Ha and Lee 2018). Notably, however, these projections do not take into account potential behavioral responses to population aging, which could counteract these negative impacts. At the same time, having more older people also implies more spending on social security, health care, and aged or long-term care.

⁶ Bloom and Finlay (2009) extend these projections further to estimate that demographics will contribute negatively to economic growth in Thailand between 2005 and 2050. Again, the impact is lower than in Korea and Singapore, but larger than in China and Malaysia (where the impact is positive).

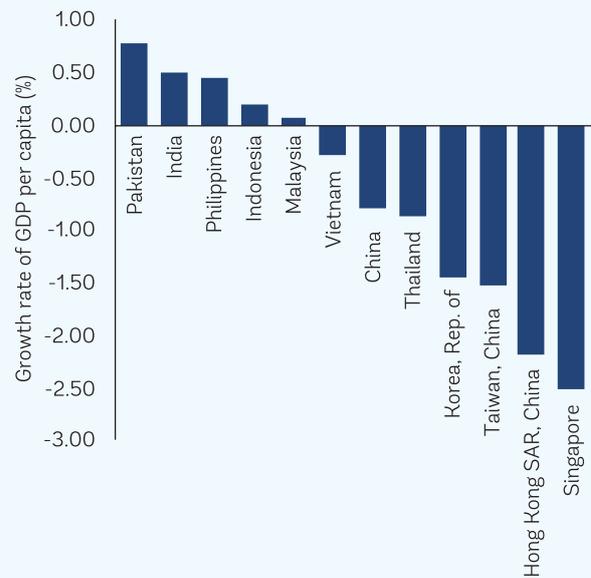
Figure 2.17 Impact of demographic change on growth of GDP per capita in Thailand and in East Asia and Pacific

a. Thailand, 2011–20 and 2020–30



Source: Park and Shin 2011.

b. East Asia and Pacific, 2021–30



The shrinking working-age population, combined with changes in the nature of demand, could result in occupational and skills shortages. The decline in the working-age population itself implies that shortages may arise as the number of potential workers shrinks. Ongoing developments related to automation, digitization, and other trends associated with Industry 4.0 may exacerbate these shortages. These technological advancements hold great promise for increasing productivity.⁷ However, they are shifting the nature of demand for skills. Demand for basic literacy and numeracy skills is already shifting to demand for socioemotional skills and higher-order cognitive and technical skills in the East Asia and Pacific region (Mason and Shetty 2019). Additionally, the aging of the workforce can create demand for certain types of workers, resulting in shortages if supply does not keep pace. For instance, the International Labour Organization (ILO) estimates that the formal sector in Thailand already has a deficit of more than 225,000 long-term care workers (Scheil-Adlung 2015).

However, behavioral responses could counteract these negative impacts. These behavioral responses include responses that affect the number of people working: population aging can incentivize increases in the number of working years as life expectancy increases (Bloom et al. 2007) and expansions in (female) labor force participation as fertility declines (Bloom et al. 2009). They also include responses that increase the productivity of the workforce: population aging can result in increases in per child investments in human capital as fertility rates decline (Bloom, Canning, and Fink 2010). Indeed, in Thailand smaller family size has been linked to a higher probability of attending secondary school (Knodel and Wongsith 1991). Finally, population aging can even lead to higher saving rates and capital deepening and to the adoption of labor-saving technologies that offset labor scarcity (Acemoglu

and Restrepo 2017; Mason and Kinugasa 2008). Adoption of these technologies may explain why no negative relationship is observed between population aging and economic growth.

Policy can reinforce, complement, and supplement these behavioral responses. Policy has an important role to play in responding to population aging (Bloom, Canning, and Fink 2010). Policies can reinforce behavioral responses by facilitating labor force participation or raising the retirement age; complement behavioral responses by expanding the availability of education and training opportunities or investing in the health of older people; and supplement behavioral responses by encouraging migration and adjusting pension systems to ensure fiscal sustainability. In Thailand, for example, simulations show that policies to increase the labor force participation of older people could increase GDP in a fiscally sustainable way (Phijaisanit 2016).

Much of the discussion in this part of the report has focused on changes in populations broken into different age groups. However, this focus arises because population ages are easier to project than labor force participation. Indeed, the consequences of changing demographics come from changes in participation in the labor force and from changes in dependency. This fact suggests that the negative consequences of population aging are not inevitable and highlights the mechanisms in the labor market that counteract negative impacts: engaging more people in the labor force and making present and future workers more productive.

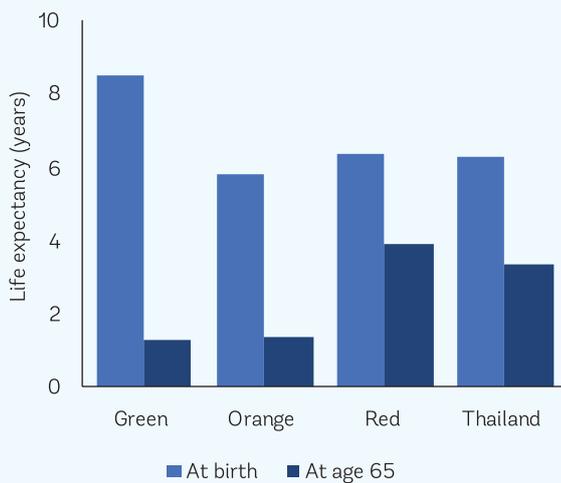
⁷In particular, these technological advancements could increase total factor productivity, the portion of economic growth not explained by inputs to production, which is generally thought to represent technological improvements.

Dependency and its impacts are the real concern with population aging, and age and dependency are not equivalent. Age does not automatically translate into dependency. Three factors explain this assertion. First, aging is typically defined by chronological age. However, this definition overlooks an important component of age, which is the number of years a person has left to live (Sanderson and Scherbov 2005; Spijker and MacInnes 2013). A 60-year-old in Thailand in 1960 was expected to live 17 years, while someone of the same age today is expected to live 23 years. This has implications for the distribution of population. But this so-called “age inflation” may also change the perception of who is old and a person’s ability to contribute and so could warrant policy changes (Shoven 2008). Recent research on Thailand shows that the proportion of the population with 15 or fewer years of life remaining will actually decrease from 80 percent in 2000 to 65 percent in 2050 (Prachuabmoh 2019). Second, people are not just living longer in Thailand; they are also living healthily for longer (figure 2.18), suggesting that older people may

be more capable of making economic contributions than in the past. Third, patterns of production and consumption vary over the life cycle. Understanding these patterns can indicate where “dependency”—consuming more than one produces—occurs in the life cycle. In Thailand, these patterns suggest that older people become net consumers at age 58, even younger than the age 65 cutoff typically used to define old age (figure 2.19). But even this is an oversimplification, as older people in Thailand are net providers of their time for support of their households (Phananimai 2011). These three factors are a reminder that aging is not a monolithic phenomenon and that thresholds used to define old age are not hard-and-fast rules that determine dependency.

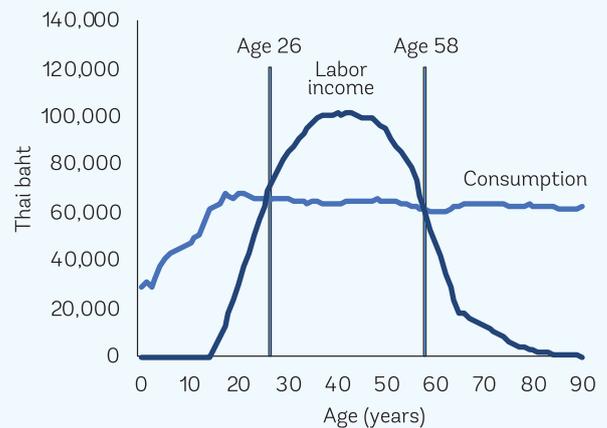
Part 3 of the report focuses on the channels through which the potential negative consequences of aging could be mitigated or reversed. In particular, it discusses the potential to increase participation in the labor market and to improve productivity and examines opportunities created by aging.

Figure 2.18 Change in health-adjusted life expectancy at birth and age 65 in East Asia and Pacific, 1990–2017



Source: GBD 2017 DALYs and HALE Collaborators 2018.
 Note: Green = young populations that will begin to age in the coming decades. Orange = populations that are aging quickly. Red = old populations that have the highest shares of people 65 or older. See the text for more detail.

Figure 2.19 Per capita labor income and consumption in Thailand, by age



Source: Flochel et al. 2014.
 Note: The vertical lines indicate the ages at which labor income is larger than consumption.

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PART 3:

POPULATION AGING'S CHANNELS OF IMPACTS

Part 3 discusses the channels through which aging will affect Thailand's labor market. The first section summarizes the main findings. The second section discusses the potential for changes in labor force participation and migration to offset Thailand's declining working-age population. The third section discusses how changes in productivity could influence the impact of aging. The final section investigates the opportunities created by population aging.

MAIN FINDINGS

Policy has an important role to play in how aging affects the labor market. Behavioral and policy responses will play a significant role in shaping how population aging affects labor markets and economic development. Three channels are important to consider in evaluating how population aging may affect the labor market in Thailand. First, how will the supply of labor evolve as Thailand ages? Second, how will labor productivity change as Thailand ages? And third, what opportunities does population aging create in the labor market?

Increasing labor force participation among older people and women and increasing international migration are viable options for expanding labor supply as Thailand ages. The longer, healthier lives of older people and their increasing education levels suggest that there is scope to increase the labor force participation of this group. However, barriers to doing so remain, including care responsibilities, health challenges, and discrimination. Pension benefits may have some disincentive effects, but they are not a significant concern given low coverage. A lack of skills to compete in a changing labor market is not a challenge uniquely for older people; rather it is an issue for all workers in Thailand. There is significant room for women to increase their labor force participation given the large gender gap in participation rates and improved education levels of women. However, women have greater care responsibilities than men and must contend with occupational

segregation. Migrants also can contribute positively to Thailand's labor supply because they are young and often migrate for work. High-skill migrants can fill skills gaps. Barriers to increased migration include potential negative effects on the employment and wages of locals, although these impacts seem to be modest.

Productivity improvements can offset the negative impacts of aging, and older people are not necessarily less productive.

Aging affects productivity through higher saving rates and capital deepening in a so-called second demographic dividend. Aging changes the incentives for investing in health and education, while technological innovation and diffusion can address characteristics like creativity and technological adoption that are correlated with aging. There is no strong evidence that older people are less productive than younger people, although the evidence on how productivity changes with an individual's age is inconclusive. Population aging seems to lead to greater automation, which could mean higher productivity. At the same time, technologies have the potential to make older workers more productive. The COVID-19 outbreak may hasten the adoption of alternative working arrangements that may be attractive to older workers who value flexibility.

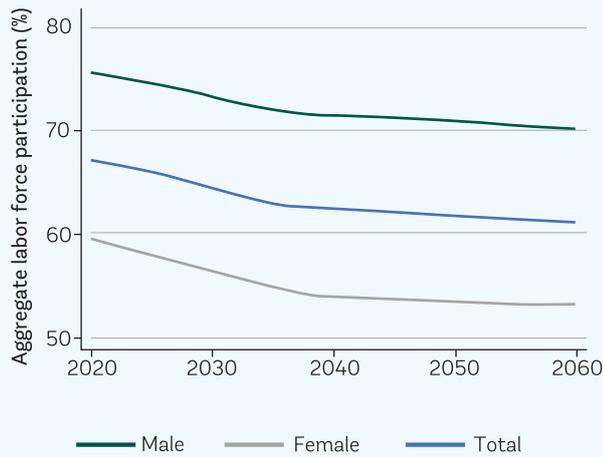
Population aging is creating new opportunities for economic growth.

Population aging is creating a need for more care work provided outside of the home. The growth in demand for care creates an opportunity to train new and current workers to fill these jobs. However, recruiting, deploying, and retaining qualified workers are challenging tasks, and care jobs are typically poor quality. Thailand faces an additional challenge, which is the aging of the health workforce itself.

EXPANDING THE LABOR SUPPLY

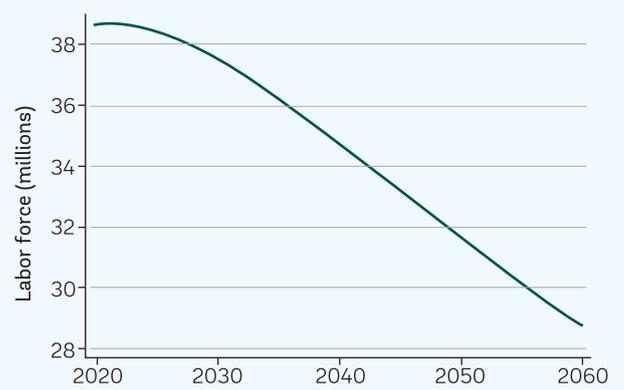
Thailand's demographics imply a decline in labor force participation rates in the coming years. Assuming constant labor force participation rates by age and gender, Thailand's projected demographic changes would lead to a reduction in the overall labor force participation rate of about 5 percentage points between 2020 and 2060 and a reduction in the overall size of the labor force of 14.4 million people (figures 3.1 and 3.2). However, the assumption of fixed labor force participation is a strong one. Part 1 showed that older people tend to have lower labor force participation rates than their younger peers, particularly in urban areas. It also showed that the labor force participation rate of women is significantly lower than that of men. Increasing the labor force participation of these groups has the potential to offset the projected decline in Thailand's labor force that will occur if participation rates remain at their current levels.

Figure 3.1 Projected labor force participation rate in Thailand, overall and by gender, 2020–60



Source: Thailand Labor Force Survey 2016–2018; UN 2019.
Note: Assumes constant age-specific labor force participation rates.

Figure 3.2 Projected labor force in Thailand, 2020–60

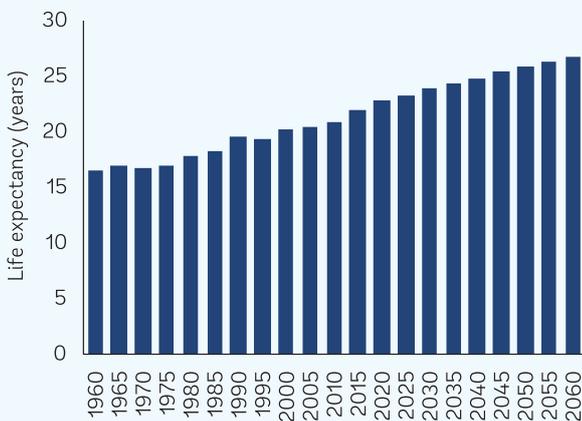


Source: Thailand Labor Force Survey 2016–2018; UN 2019.
Note: Assumes constant age-specific labor force participation rates.

There are several reasons to believe that an increase in the labor force participation of older people is possible. In the absence of incentives to retire at younger ages, the increased longevity that Thailand has experienced since 1960 should lead to longer working lives (Bloom et al. 2007). Most of Thailand’s future gains in life expectancy are likely to occur at older rather

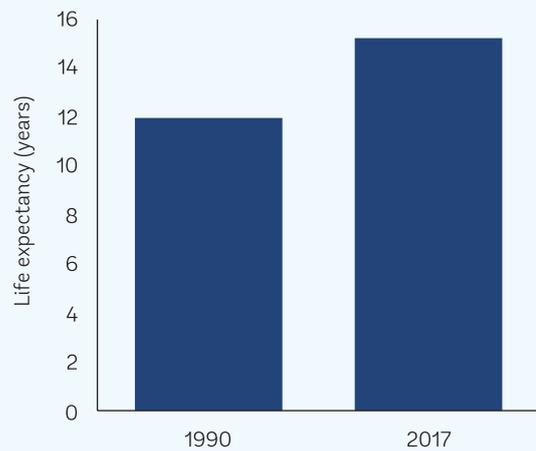
than younger ages—the so-called longevity transition—meaning that workers will have more years to work at the end of their lives (Eggleston and Fuchs 2012). Indeed, life expectancy at age 60 increased from 17 years in 1960 to 22 years in 2015 and is projected to increase to 27 years by 2060 (figure 3.3).

Figure 3.3 Life expectancy at age 60 in Thailand, 1960–2060



Source: UN 2019.

Figure 3.4 Healthy life expectancy at age 65 in Thailand, 1990 and 2017



Source: GBD 2017 DALYs and HALE Collaborators 2018.

The lengthening of working lives is made more likely by improvements in the health of older people. In Thailand as elsewhere, healthy older people are more likely to participate in the labor market (Adhikari, Soonthorndhada, and Haseen 2011). Older people have been getting healthier in recent years. The number of healthy years of life expectancy at older ages increased from 12 years in 1990 to 15 years in 2017 (figure 3.4). The Survey of Older Persons shows that the proportion of people 60 or older reporting poor or very poor health has declined significantly since the 1990s across genders and urban and rural areas (UNFPA 2019). This “healthy” aging is summarized succinctly in a new aging metric that incorporates health status: 73-year-olds in Thailand are found to have the same burden of age-related disease as the average 65-year-old globally (Chang et al. 2019). While, on average, older people are living longer, healthier lives, disparities in health remain.

Increasing education levels create an opportunity and an incentive for extending working lives. In Thailand, more education is associated with better health, which, in turn, can increase labor force participation (Loichinger and Pothisiri 2018). More education is itself generally associated with a higher likelihood of participation in the labor force; however, in Thailand more educated older workers have lower labor force participation rates, likely due to the necessity for less-educated workers to continue working (Blau and Goodstein 2010; Burtless 2013; Larsen and Pedersen 2017). While the education level of older people in Thailand is currently very low—84 percent of the employed had less than a primary school education in 2019—it has improved in recent years, increasing the ability of older people to continue participating in Thailand’s knowledge-based economy. A decade earlier in 2008, more than 90 percent of people ages 65 and older had less than a primary education. This trend is likely to continue. As figure 1.20 in part 1 shows, education

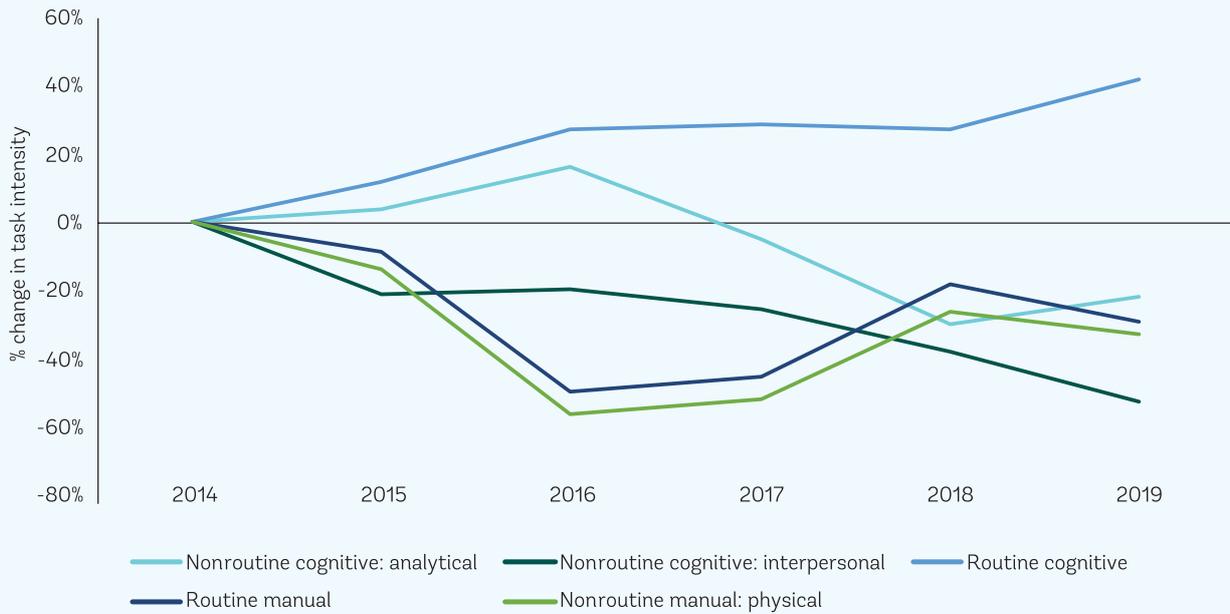
levels are higher among younger groups. It is true even within older age groups (Teerawichitchainan et al. 2019). Thus future older workers will have more education than current older workers. Projections of future trends in education in Thailand estimate that, by 2030, nearly two-thirds of the population will have at least a secondary education, rising to three-quarters by 2040 (Flochel et al. 2014).

Changes in the nature of work may also be favorable for keeping older people in the labor force, particularly in urban areas. Automation has increased in Thailand in recent years (Lipipatpaiboon and Thongsri 2018). With increased automation, work is becoming less manual and less physically demanding (ADB 2018b). In Thailand, jobs decreasingly require manual skills and increasingly require (routine) cognitive ones. Employment is now around 30 percent less intensive in both routine and nonroutine manual tasks than it was in 2014, while it is 40 percent more intensive in routine cognitive skills (figure 3.5).⁸ As a result, there are more jobs that older workers can do (Abeliansky et al. 2020). Increased job flexibility could also help to keep older workers in the labor force. Based on a methodology for estimating the number of jobs that could be done remotely, about one-fifth of jobs in Thailand in 2019 could be done via telework, given the appropriate access to technology.⁹ While the share of jobs that could be done remotely has not increased in Thailand in recent years, the COVID-19 outbreak demonstrated to many employers the possibility and benefits of remote work, which could accelerate its adoption in coming years. Finally, the increasing education level of older people could lead to longer working lives as these workers decide to remain in the labor market longer to increase the return to investments in their human capital.

⁸ Changes in the Labor Force Survey in 2011 and 2013 mean that a longer time period cannot be analyzed. However, the decline in manual skills is also apparent between 2001 and 2010.

⁹ See Dingel and Neiman (2020) for the methodology.

Figure 3.5 The task intensity of employment in Thailand, 2014–19



Source: Thailand Labor Force Survey 2014–19; based on Acemoglu and Autor 2011.

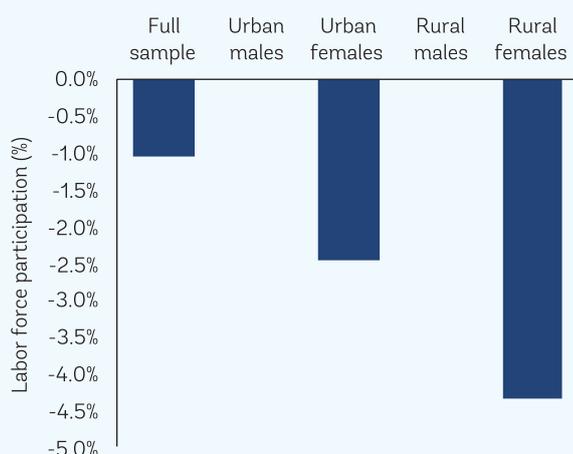
However, older people face several barriers to increasing their participation in the labor market. First, older people often have care responsibilities. About one-third of people 60 and older live in households with one or more grandchildren, and 14 percent live in “skip generation” households in which the parents of the grandchild are absent, typically due to migration (Teerawichitchainan et al. 2019). In one recent survey, nearly 30 percent of grandparents reported caring for grandchildren under the age of 10, with older women playing a more significant role in child care (World Bank 2018). Such care responsibilities can make working difficult and also have negative effects on health (Komonpaisarn and Loichinger 2019). Using the 2017 Household Socioeconomic Survey and controlling for other characteristics, having an additional child in the household reduces labor force participation, with the effect driven by women in urban and rural areas (figure 3.6).¹⁰ Still, the incidence of older people living with grandchildren has declined over time, as lower fertility rates mean fewer grandchildren. Second, despite living longer and healthier lives now than in the past, older people still face health challenges. A third of people 60 and over say that they have one of four functional limitations, and these limitations increase with age (Teerawichitchainan et al. 2019). Poor health has a substantial impact on the probability of working. Reporting a physical or intellectual disability in the Household

Socioeconomic Survey reduces the probability of labor force participation for older workers by more than 25 percent (figure 3.7). Noncommunicable diseases (NCDs) are also major contributors to disability among older people in Thailand and may lead to declines in labor force participation (Yiengprugsawan, Healy, and Kendig 2016). Third, older workers may face age discrimination. Although only qualitative evidence exists for Thailand,¹¹ laboratory and field experiments and a recent nonexperimental study in the European Union and the United States found fairly strong evidence of discrimination against older workers, particularly women (Neumark 2018, 2020). Research using online job postings in China and Mexico also found evidence of discrimination (Helleseter, Kuhn, and Shen 2016; Kuhn and Shen 2013). Finally, seniority-based compensation schemes can disincentivize the hiring and retention of older workers by increasing their cost relative to their productivity (OECD 2019). Although these schemes seem to be declining in popularity in Thailand, more research is needed to understand their current prevalence and impact.

¹⁰ See appendix C for a description of the methodology.

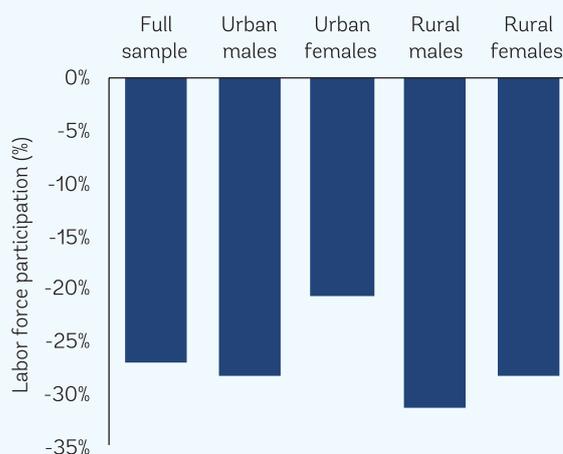
¹¹ A small qualitative study of American and Thai students found that Thai students agree more with both negative stereotypes (older workers are less comfortable with new technology, less flexible, and more cautious) and positive stereotypes (older workers are absent less, have a better attitude toward work, and have a higher level of commitment to the organization) (McCann and Keaton 2013).

Figure 3.6 Impact of an additional child on the probability of older people's labor force participation in Thailand, 2017



Source: Thailand Socioeconomic Survey 2017.
 Note: All results statistically significant at 5%. A blank column means a result is not statistically significant at 5%.

Figure 3.7 Impact of a physical or intellectual disability on the probability of older people's labor force participation in Thailand, 2017



Source: Thailand Socioeconomic Survey 2017.
 Note: All results statistically significant at 5%.

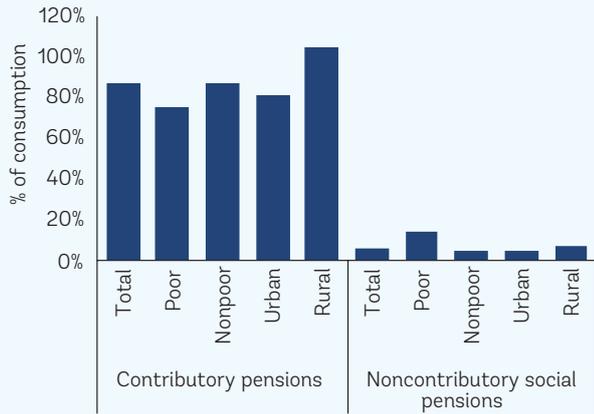
Thailand's contributory pensions have some disincentive effects on older people's labor force participation, but the currently low beneficiary coverage means that these effects are not of immediate concern.

The availability of a sufficiently generous pension has been shown to disincentivize labor force participation (World Bank 2015). Figure 1.12 in part 1 shows a drop in the labor force participation rate at age 60—the age of eligibility for the Old Age Allowance, a noncontributory social pension, and the retirement age for the contributory public sector pension scheme, but five years later than the retirement age for the contributory private sector scheme under the Social Security Fund. This drop provides suggestive evidence of a disincentive effect. The contributory public sector pension scheme is the likely culprit. Contributory pensions are significantly more generous than noncontributory pensions in Thailand: contributory pensions make up around 87 percent of beneficiaries' consumption versus just 7 percent for noncontributory social pensions (figure 3.8). The Labor Force Survey shows that the drop in labor force participation is more apparent in urban areas, where two-thirds of beneficiaries of contributory pensions are located, than in rural areas, where two-thirds of

beneficiaries of noncontributory social pensions such as the Old Age Allowance are located (figure 3.9). Once other factors are controlled for, receipt of a contributory pension is associated with a substantial negative effect on the probability of people older than age 45 participating in the labor force (figure 3.10). Although in this analysis contributory pensions cannot be disaggregated into public sector beneficiaries and private sector beneficiaries of the Social Security Fund, public sector beneficiaries make up most current beneficiaries of contributory pensions and their benefits are higher than those under the Social Security Fund.¹² Still, the coverage of contributory pensions is limited: the 2017 Socioeconomic Survey shows that only 11 percent of people 60 and over were covered (figure 3.11). This means that disincentive effects are limited to a small group and are not a significant concern right now. However, coverage under the Social Security Fund for formal private sector workers has been increasing, suggesting that these disincentive effects are important to keep in mind, although the generosity of benefits could also be diluted as coverage increases.

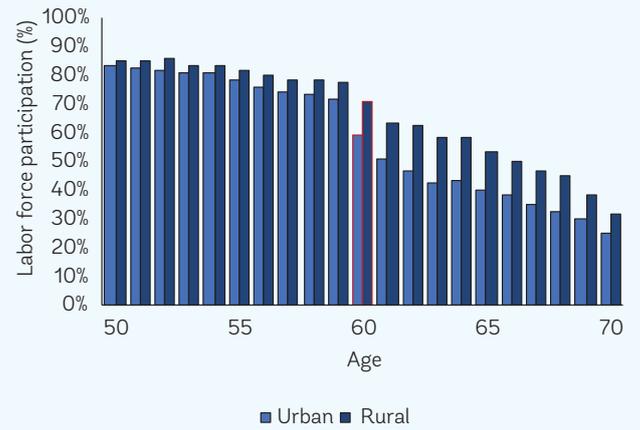
¹² The Social Security Fund scheme for the private sector was launched much later than the public sector scheme, and its first cohort of pensioners appeared only in 2014.

Figure 3.8 Adequacy of pensions in Thailand, 2017



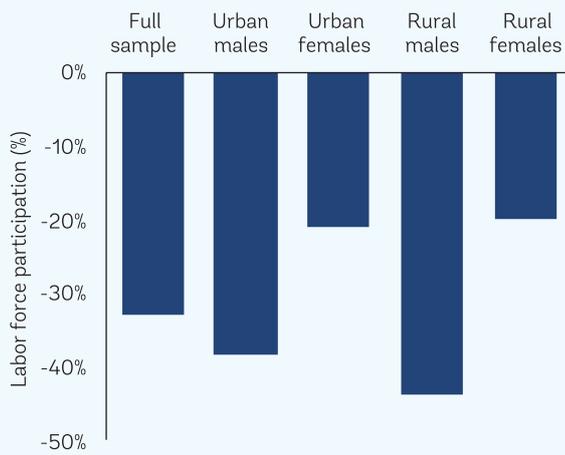
Source: Thailand Socioeconomic Survey 2017.

Figure 3.9 Labor force participation rate in urban and rural areas of Thailand, by age, 2019



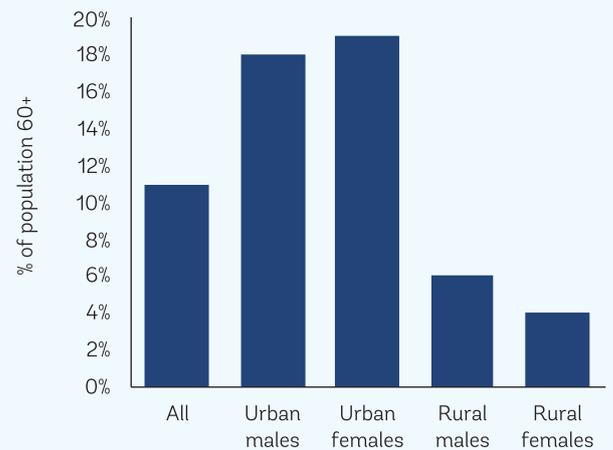
Source: Thailand Labor Force Survey 2019.
Note: The red outline indicates age 60.

Figure 3.10 Impact of receiving a contributory pension on older people's labor force participation in rural and urban areas of Thailand, by gender, 2017



Source: Thailand Socioeconomic Survey 2017.
Note: All results statistically significant at 5%.

Figure 3.11 Share of population 60 and older receiving a contributory pension in rural and urban areas of Thailand, by gender, 2017



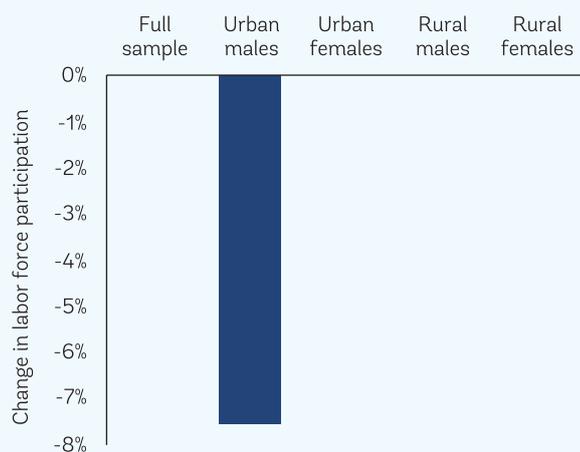
Source: Thailand Socioeconomic Survey 2017.

The Old Age Allowance social pension may also have some disincentive effects, but adequacy of the benefits is likely a greater concern. In contrast to contributory pensions, receipt of a non-contributory pension, either the Old Age Allowance or disability assistance, has no apparent effect on labor force participation except a small impact for men in urban areas (figure 3.12). This is despite broad coverage (figure 3.13). Still, previous research has found some evidence that the Old Age Allowance in particular, Thailand's social pension that is accessible to anyone 60 and over not enrolled in a public or private (contributory) pension plan, has disincentive effects on labor force participation rates in rural areas, perhaps by shifting older workers out of self-employment and into inactivity (Huang 2015; Paweenawat and Vechbanyongratana 2015). This is an area of concern not necessarily because of the impact on labor force participation itself, as labor force exit might be welfare improving for these rural workers. More concerning is that the pension may have these disincentive effects while also not improving well-being. Indeed, Huang (2015) finds that receipt of the

Old Age Allowance does not affect expenditures. This finding is consistent with the allowance's low benefit levels.

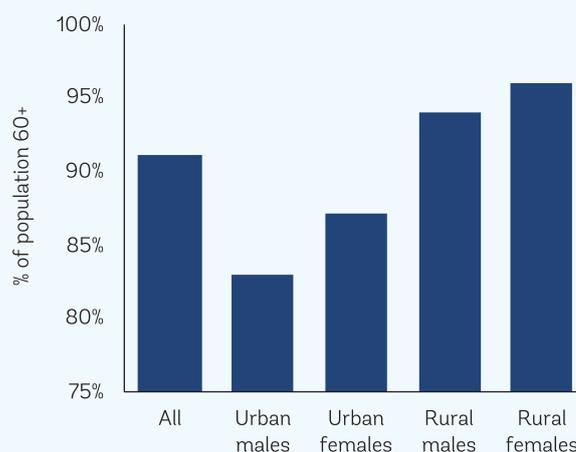
Older workers may lack the skills to participate in growing occupations. Although the education level of older workers is likely to be higher in the future, current and soon-to-be older people may lack the skills that are increasingly in demand and work in occupations that are susceptible to automation. In other words, technological change may be age-biased (Chomik and Piggott 2019). Analysis of the types of tasks done by different age groups shows that the shift away from jobs involving manual tasks and toward jobs requiring cognitive tasks has occurred primarily among younger age groups (figure 3.14). Indeed, the shift to employment requiring cognitive skills is much less apparent among people 55 and older. Uniquely for the older group, employment in routine and nonroutine manual jobs has not declined. Additionally, to the extent that the COVID-19 outbreak increases the use of digital technologies and the demand for digital skills at work, less-educated older people may struggle to keep up.

Figure 3.12 Impact of receiving a noncontributory social pension on older people's labor force participation in urban and rural areas of Thailand, by gender, 2017



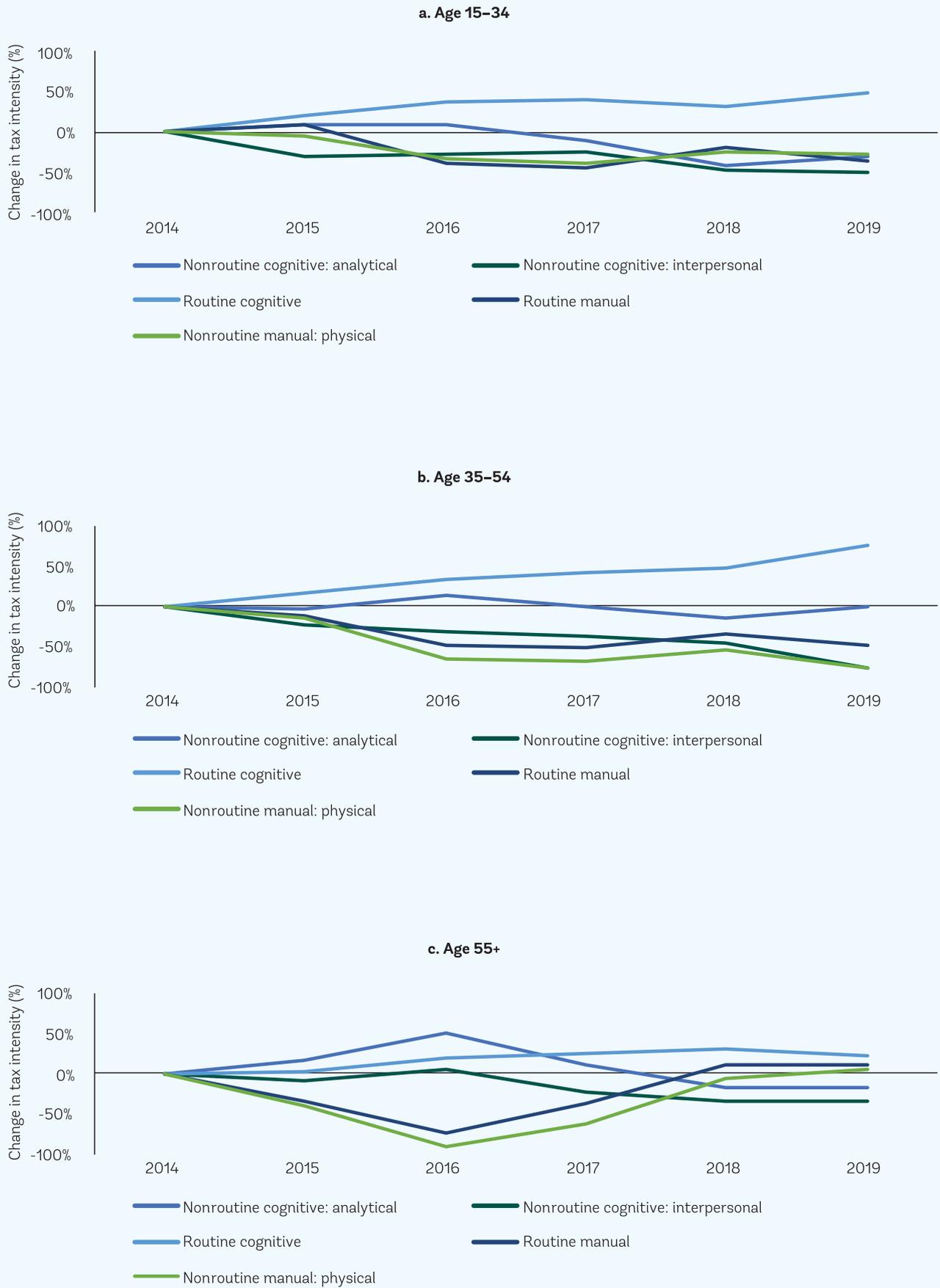
Source: Thailand Socioeconomic Survey 2017.
 Note: All results statistically significant at 5%. A blank column means a result is not statistically significant at 5%.

Figure 3.13 Share of population 60 and above receiving a non-contributory social pension in urban and rural areas of Thailand, by gender, 2017



Source: Thailand Socioeconomic Survey 2017.

Figure 3.14 The task intensity of employment in Thailand, by age group, 2014–19



Source: Thailand Labor Force Survey 2014–19; based on Acemoglu and Autor 2011.

The changes in task intensity of employment in Thailand provide evidence that, regardless of age, workers may not be prepared for the jobs of the future. In much of the East Asia and Pacific region, demand is shifting from basic skills in literacy and numeracy to socioemotional skills like teamwork and communication and higher-level cognitive and technical skills (Mason and Shetty 2019). This shift is consistent with the maturation of automation technologies associated with Industry 4.0. However, figure 3.14 shows that no age group in Thailand is moving toward the types of nonroutine cognitive and interpersonal skills that are associated with a knowledge-driven economy and that tend to be more resistant to automation. One possible explanation for the absence of a shift in task content is the availability of low-wage, low-skill migrants, which may disincentivize investment in labor-saving technologies (OECD and ILO 2017; Pholphirul, Rukumnuaykit, and Kamlai 2010). The increase in routine cognitive tasks is a common finding in the East Asia and Pacific region (Mason and Shetty 2019). One possible explanation is the growth of retail jobs, as occurred in China. While the growing importance of routine cognitive tasks is notable, these tasks tend to be automated fairly easily by computers, a trend that is being reinforced by artificial intelligence and machine learning.

Prime-age people—the older people of the future—work in routine-intensive, shrinking occupations. Some occupations may be “getting older” because occupation-specific skills make switching to faster-growing occupations more costly for older workers than for younger ones. Indeed, the average age in 2019 was 38 in the fastest-growing occupations compared to 42 in the fastest-shrinking occupations. Applying a methodology proposed by Autor and Dorn (2009) to test this more formally, an increase of 1

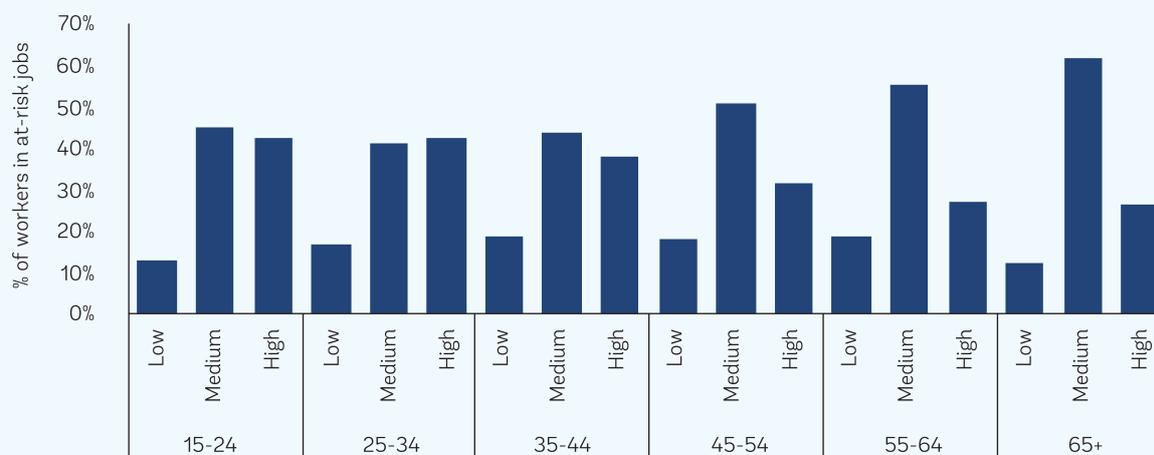
standard deviation in the routine task intensity of an occupation is found to be associated with an increase of more than a year in the average age of that occupation.¹³ This approach allows for an investigation of the drivers of this increase in mean age. Overall, young workers between age 15 and 34 are transitioning quickly out of occupations with higher routine task intensities and into growing occupations, while prime-age workers between age 35 and 54 remain in occupations with higher routine task intensities that are shrinking.

Automation could also change the nature of the jobs done by older workers. While there is concern that older workers may be more likely to work in occupations that can be automated, in Thailand these workers tend to be at somewhat less risk from automation technologies. Based on the framework for estimating the probability of automation of occupations in Frey and Osborne (2017), about one-quarter of people age 65 and older in Thailand work in occupations that are at high risk of automation (figure 3.15).¹⁴ This compares to around 40 percent of workers between the age of 15 and 44. Older workers are, however, more likely than any other age group to work in occupations that are at medium risk of automation. These results are consistent with the greater prevalence of older people in mid-skill relative to low-skill jobs, as low-skill jobs tend to be highly routine and easy to automate. Empirical research from the United States confirms that automation does not, in fact, hit the oldest workers the hardest. Instead, robots generally substitute the jobs of middle-age workers between 36 and 55 years old (Acemoglu and Restrepo 2018).

¹³ See appendix D for a description of the methodology.

¹⁴ Lekfuangfu and Nakavachara (2020) apply the Frey and Osborne (2017) methodology to Thailand, but do not investigate the prevalence of workers 65 and older in occupations at high risk of automation. See also Chang and Huynh (2016) and Lipipatpaiboon and Thongsri (2018).

Figure 3.15 The risk of automation of jobs, by age, 2019



Source: Thailand Labor Force Survey 2019; based on Frey and Osborne 2017.

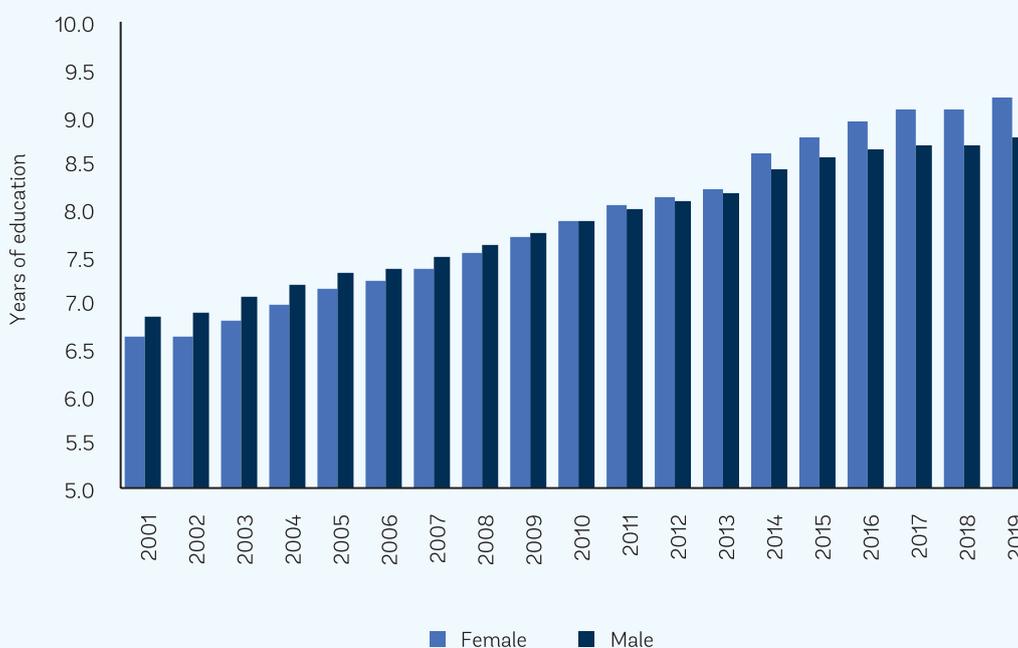
There is significant room for the labor force participation of women to increase.

As described in part 1, female labor force participation is significantly lower than male labor force participation. In 2019, the participation rate was 76 percent for men compared to just 59 percent for women. This gap is larger than that of several other countries in the region. Women tend to have more years of education, and younger women are more likely than younger men to have a university education, meaning that they should have better opportunities to access good jobs as employment shifts to require more advanced skills (figure 3.16). Improvements in women’s education are the most important factor in the decline of the gender wage gap since the 1980s (Liao and Paweenawat 2019). Additionally, declines in the fertility rate of the kind that Thailand has experienced in recent decades mean that providers of care in households, who tend to be women, may have more opportunities to enter the labor force. Bloom et al. (2009) find that lower fertility increases female labor force participation rates. This effect has been observed in Thailand, although the relationship is weakest among the six members of the Association of Southeast Asian Nations (ASEAN) studied (Hartani, Bakar, and Haseeb 2015).

However, women face barriers to participating in the labor market. Women’s greater care responsibilities can be a barrier to their labor force participation (Bauer and Sousa-Poza

2015). While a lower fertility rate implies spending less time caring for children, women in Thailand are still responsible for most household work. Informal care work has been shown to have a negative impact (ranging from small to large) on labor force participation in Germany in the short term and potentially larger effects in the longer term (Schmitz and Westphal 2017). Daughters are much more likely than sons to take care of older parents. In a recent survey, 50 percent of older people said that they receive care from a daughter versus 12 percent who receive care from a son (World Bank 2018). A recent analysis of time spent on household work, labor market activities, and leisure provides additional insight into the trade-offs facing the women who provide care in Thailand (Yokying et al. 2016). Nearly all women (96 percent) undertake household and care activities, while only half (47 percent) of men do so. Women’s household and care work is also more intensive, with women spending twice as much time on these activities each day as men. Gaps are much smaller for labor market activities. Notably, having children 11 or younger increases the household work and decreases the labor market activities of women in urban areas; it also increases the household activities of men but has no effect on their labor market activities. In rural areas, having younger children leads women to devote less time to leisure. Women may also face a risk of job loss if they become pregnant (UNFPA 2019).

Figure 3.16 Average years of education of employed men and women in Thailand, 2001–19



Source: Thailand Labor Force Survey 2001–19.

Several other factors also create barriers. Teenage pregnancy has increased in Thailand in recent years. Teenage pregnancy is linked to lower rates of school completion and educational attainment, which could affect longer-run outcomes like employment and earnings (World Bank 2019). The high rates of teenage pregnancy may also be linked to the high percentage of young women between 20 and 24 years old who are married (UNFPA 2019). Marriage leads some women to drop out of the labor force in Thailand (Liao and Paweenawat 2019). Indeed, labor force participation rates are substantially lower for married women throughout their working ages (figure 3.17). Older women have lower literacy rates

and higher levels of disability (UNFPA 2019; World Bank 2018). While the gender wage gap overall has declined in Thailand in recent years as a result of women’s increasing educational attainment, segregation of women into sectors with lower wage premiums such as education and health and social work creates a gap of about 6 percent between female and male wages once other factors are taken into account (Manachotphong 2019). There is preliminary evidence that this gender wage gap is more significant in the informal sector, where half of women work (Paweenawat, Vechbanyongratana, and Yoon 2017).

Figure 3.17 Female labor force participation rate in Thailand, by age and marital status, 2019



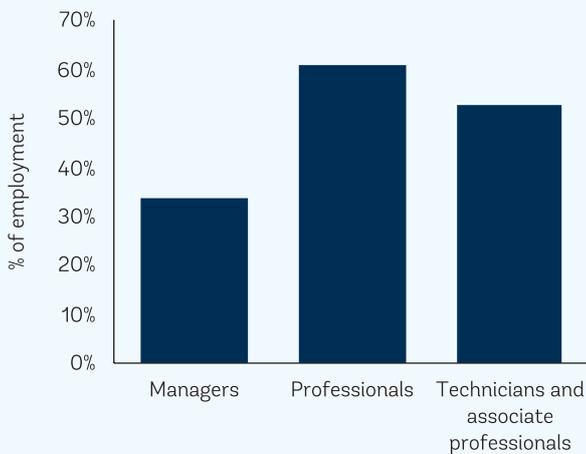
Source: Thailand Labor Force Survey 2019; based on Frey and Osborne 2017.

Women also face challenges finding good jobs despite their higher levels of education. Women are underrepresented in leadership positions. In 2018, women made up just one-third of management positions (figure 3.18). Socialization and gender stereotyping lead women into fields of study linked to lower-productivity jobs. In 2018, 37 percent of male workers had studied engineering while just 2 percent of women had (figure 3.19).

International migration represents a significant opportunity to increase the labor force in Thailand. Migrants can help to fill shortages of low- and mid-skill workers created by population aging. Population aging is likely to create labor shortages in low- and mid-skill work in manufacturing, agriculture, and services (OECD and ILO 2017). Migrants are already an important part of Thailand’s labor market. Formal and informal migrants make up around 10 percent of the labor force (Smith, Lim, and Harkins 2019). The vast majority of migrants to Thailand (around 80 percent) are low-skill workers from Cambodia, Lao PDR, Myanmar, and Vietnam (Smith, Lim, and Harkins 2019). Testaverde et al. (2017) show that in 2015 90 percent of Thailand’s migrants worked in low-skill elementary occupations. Migrants are more likely than locals to work in industry, perhaps reflecting the growth of export-oriented

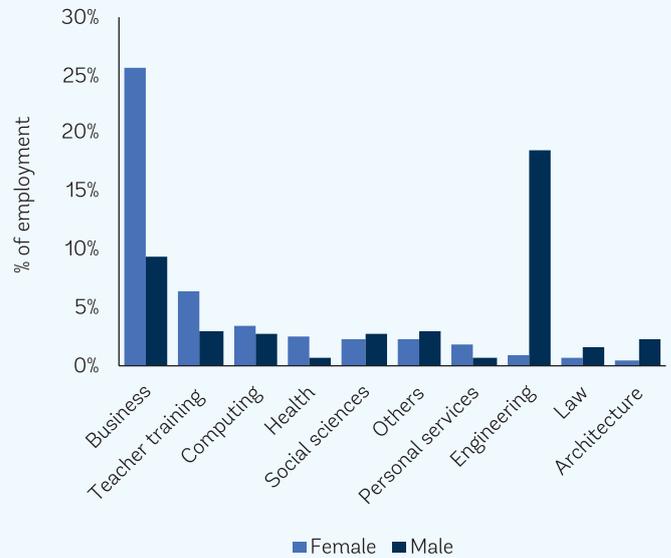
industries, and less likely to work in both agriculture and services (OECD and ILO 2017; Testaverde et al. 2017). Migrants were estimated to contribute between 4.3 and 6.6 percent of Thailand’s 2010 GDP (OECD and ILO 2017). Migrants have several unique characteristics that make them suitable for filling labor shortages associated with population aging. Migrants in Southeast Asia typically contribute positively to labor markets in destination countries because they tend to migrate for work (Testaverde et al. 2017). This is true in Thailand as well. While data on the employment status of international migrants in Thailand are limited, migrants have a higher employment-to-population ratio than locals (83 percent versus 74 percent) (OECD and ILO 2017). High-skill migrants can fill skills gaps in particular areas where local capacity has not yet been developed. There are more than 100,000 skill workers in Thailand (Smith, Lim, and Harkins 2019). Figure 3.20, panel a, provides an example of the types of skills gained from migration based on the migration of LinkedIn members to and from Thailand. Immigration can have positive impacts on other aspects of the labor market, as well. For instance, low-skill immigration to the United States increases the number of hours worked by high-skill women (Cortés and Tessada 2011).

Figure 3.18 Female share of employment in high-skill occupations in Thailand, 2019



Source: Thailand Labor Force Survey 2019.

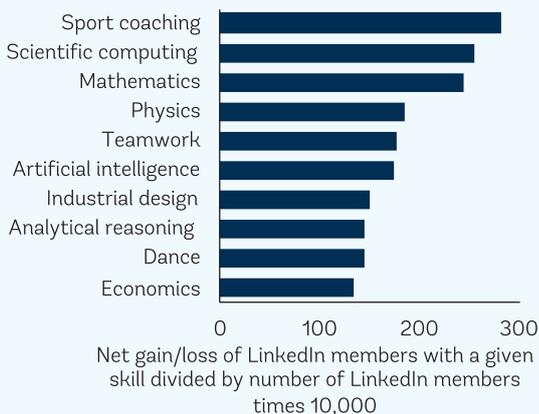
Figure 3.19 Share of employment in Thailand, by field of study and gender, 2019



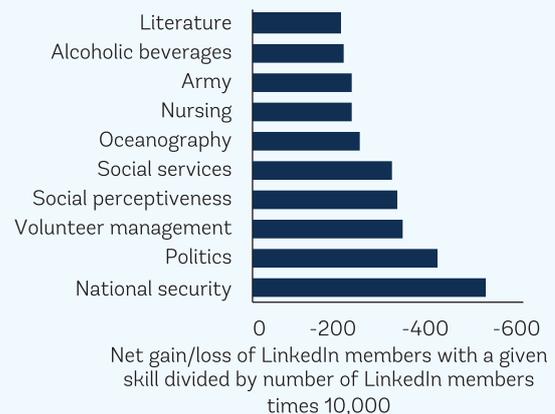
Source: Thailand Labor Force Survey 2019.
Note: Only fields of study representing at least 3 percent of female and male workers are shown.

Figure 3.20 Top 10 skills gained or lost in Thailand due to migration, 2019

a. Skills gained



b. Skills lost



Source: World Bank Group–LinkedIn Data for Development.

There are challenges to using migration to increase the labor force. There are concerns that migration may negatively affect the employment and wages of the local population. Summarizing the research on these effects in Thailand, OECD (2017) finds that foreign-born workers do not displace local workers at the national level, although some studies have found negative impacts on wages. This negative impact may be concentrated among lower-skill local workers, while workers with more education may experience wage gains (Testaverde et al. 2017). Concerns may also arise about the fiscal impact of migrants. As described in part 2, migrants to Thailand tend to be young. Younger people are less likely to use public services, suggesting that the fiscal impact of migrants should be modest (OECD 2013). Additionally, the COVID-19 outbreak has created significant uncertainty about exploiting international migration to fill labor market gaps, especially in the near term. While the ultimate impact of the outbreak on migration is not yet clear, the transmission control measures implemented in Thailand and neighboring countries have significantly disrupted migration flows and led to return migration from Thailand, potentially creating labor shortages. Finally, outmigration from Thailand is also a concern. In 2017, an estimated 1.1 million Thais were living abroad (Smith, Lim, and Harkins 2019). This raises concerns about talented Thai workers leaving the country and resulting in “brain drain.” The data on the migration of LinkedIn members are illustrative here as well. Figure 3.20, panel b, shows the top 10 skills that Thailand lost in 2019.

Simulations demonstrate the potential impact of different paths for labor force participation and international migration on Thailand’s labor force. A series of simulations is undertaken

to understand the potential impact of increases in the labor force participation rates of older people and women and increases in migration.¹⁵ The simulations are undertaken for Thailand and for several comparator countries in the East Asia and Pacific region. Four scenarios of the future evolution of the labor force in Thailand to 2060 are considered.

- **Base case.** Current age-specific male and female labor force participation rates are assumed to remain constant.
- **Scenario #1: increased old-age labor force participation.** The labor force participation rates of men and women in the age groups 55–59, 60–64, and 65 and older are assumed to converge to the 95th percentile of the labor force participation rate of high-income countries in the East Asia and Pacific region. In Thailand, this means substantial increases: an increase of 10 percentage points for men and 17 percentage points for women between the ages of 55 and 59; an increase of 19 percentage points for men and 24 percentage points for women between the ages of 60 and 64; and an increase of 8 percentage points for men and women older than 65.
- **Scenario #2: increased female labor force participation.** The labor force participation rate of women is assumed to converge linearly to the current labor force participation rate of men. In Thailand, this means that by 2060 the labor force participation rate of women (and men) is 77 percent.

¹⁵ These simulations update and elaborate on the methodology in World Bank (2015, 2016b). See appendix E for a description of the methodology.

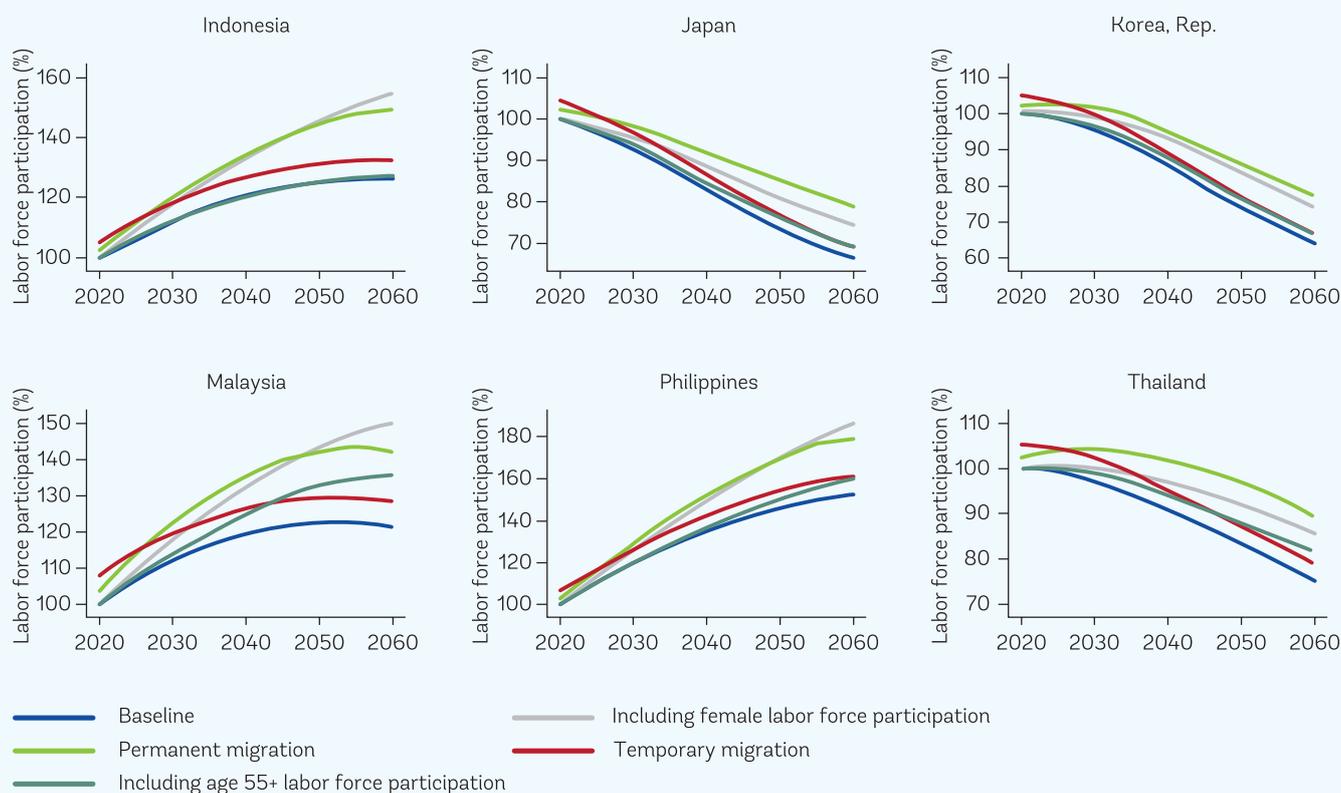
- **Scenario #3: increased temporary migration.** The labor force is shocked with migrants between the ages of 25 and 34 such that 20 percent of the labor force in that age group is composed of new migrants. In Thailand, this is slightly less than a tripling in the share of migrants in the labor force to around 28 percent. These migrants are assumed to arrive every 10 years, have no children, have identical mortality rates as locals, and leave after 10 years. The migrants are assumed to have entered the country to work, which yields a labor force participation rate of 100 percent.
- **Scenario #4: permanent migration.** The labor supply is shocked with migrants between the ages of 25 and 34 such that 10 percent of the labor force is composed of new migrants. In Thailand this is roughly a doubling in the share of migrants to around 18 percent of the labor force. However, in this scenario migrants are assumed to arrive more regularly (every five years) and to remain in Thailand throughout their lifetime. These migrants are assumed to have the same labor force participation and mortality rates as locals. A simplifying assumption is that migrants do not have children.¹⁶

of the scenario assuming a constant flow of young workers into Thailand every five years, who then remain and age in the same way as locals. Increased female labor force participation has the second-largest impact. While the impact is significant, the effect fades over time, as the increased female labor force participation rate (like that of older people) does not increase the pool of workers who can be drawn from but rather activates inactive ones. Temporary migration has the largest initial impact because it involves an immediate shock, but the effect fades quickly as the effect of the quickly aging local population takes over. Comparing Thailand's trajectory to that of other countries in the East Asia and Pacific region shows that Thailand is again similar to Japan and the Republic of Korea, where the impact of permanent migration is largest, followed by the impact of increased female labor force participation. The effect is reversed in Indonesia, Malaysia, and the Philippines, where female labor force participation rates are lower than in Thailand. Overall, the results show that increasing the supply of labor by increasing labor force participation and migration can counteract some of the effects of population aging. But no scenario can counteract these effects fully. The results point to the need to combine strategies and consider how to increase labor productivity. The next section turns to this channel.

The simulations show that the labor force would expand under each scenario, but no single action could prevent the labor force from shrinking. The simulations show that the permanent migration scenario would result in the largest increase in Thailand's labor force by 2060 (figure 3.21). This is the result

¹⁶ Testing this assumption in Thailand shows that assuming that migrants have no children results in a small downward bias in scenario #4's long-run impact on the size of the labor force.

Figure 3.21 Labor force projections to 2060 in Thailand under four scenarios



Source: Thailand Labor Force Survey 2016–18; UN 2019.

INCREASING PRODUCTIVITY

Aging affects productivity. Aging can affect productivity through several channels. First, aging may affect productivity through the accumulation of physical capital. This effect is described in part 2: aging may have a negative impact on economic growth due to the shrinking working-age population, but this effect may be offset by higher saving rates and capital deepening, producing a so-called second demographic dividend (Mason and Kinugasa 2008). Aging may also affect human capital by changing the incentives for investing in health and education, with the result that demographic changes are counterbalanced by behavioral adjustments (Lee and Mason 2010; Prettnner, Bloom, and Strulik 2013). Finally, aging may affect productivity through technological innovation and diffusion if characteristics like creativity and technological adoption are correlated with aging (Chomik and Piggot 2019).

There is no strong evidence that older people are less productive. Measuring productivity over a worker's lifetime is methodologically challenging. Empirical evidence generally finds that the age-productivity profile is an inverse U-shape, with productivity peaking around age 40 before declining somewhat. However, beyond methodological challenges, the relationship between age and productivity can depend on a large variety of factors, including the nature of work undertaken, how (older) workers adapt to technological changes, and whether an older person is working in a team, resulting in evidence that is generally inconclusive (Allen 2019; Flochel et al. 2014). A selection of studies summarized in Chomik and Piggot (2019) reports a range of peak-productivity ages from around 20 to around 55. One recent high-quality study of a large car manufacturer found that productivity in the plant studied does not decline to age 60 (Börsch-Supan and Weiss 2016). Evidence on the impact of aging on productivity in Thailand is both limited and mixed (Saiyut et al. 2017; Suphannachart 2017). In sum, while the evidence is inconclusive, at the very least aging does not seem to have a negative effect on productivity in all cases, and older workers bring positive attributes like experience (World Bank 2020).

Technology plays an important role in mediating the impact of aging on productivity. Recent research suggests that population aging may have productivity-enhancing effects. Population aging seems to lead to greater automation (Abeliansky and Prettnner 2017; Acemoglu and Restrepo 2018). Populations that are experiencing more rapid aging develop automation technologies more quickly. These technologies tend to substitute the jobs of middle-age workers whom demographic changes are making scarcer. As noted in part 2, the adoption of robots seems to be a key explanation for why a negative relationship between population aging and economic growth is not observed (Acemoglu and Restrepo 2017). This could mean that aging could actually improve productivity in industries in which automation is most feasible (Acemoglu and Restrepo 2018). At the same time, technologies have the potential to make older workers more productive by im-

proving health—and ultimately lengthening working lives—and by reducing physical strain at work (ADB 2018b).

However, Thailand faces several challenges to increasing worker productivity. Structural change has stalled in Thailand, as the shift from lower-productivity sectors to higher-productivity ones has stopped (World Bank 2016a). Labor productivity is particularly low in agriculture, the sector of employment for many older people in Thailand. Productivity growth also varies across regions, with lower growth outside of Bangkok and the Central region. Population aging also may lead to a less mobile population, reducing opportunities to reallocate labor across sectors and geographies (Karahan and Rhee 2014). Indeed, internal migration rates have declined in Thailand over time (UNFPA 2011). As shown in figure 3.5, workers in Thailand lack the type of nonroutine cognitive and interpersonal skills associated with the new technologies that can improve productivity in knowledge-driven economies. Still, Thailand's low labor productivity relative to other upper-middle-income countries and the dispersion of labor productivity across and within sectors suggest that there is substantial room for improvement.

EXPLOITING OPPORTUNITIES

Population aging is creating a need for more care work. At present, care for older people in Thailand is primarily undertaken informally at home—typically by children, especially female children, and spouses (Knodel and Chayovan 2011; World Bank 2018). In a recent survey, only 2 percent of people 60 and older reported receiving care from a care center staff member or a health specialist (World Bank 2018). However, care responsibilities are shifting with economic and demographic changes like smaller households and longer life expectancies. The percentage of older people living with a child has decreased significantly from 71 percent in 1995 to 52 percent in 2017 (Teerawichitchainan et al. 2019). As a result, not all care needs are being met. The same survey of older people found that about 16 percent of people 60 and older reported needing a caregiver versus 9 percent who actually had one, increasing the demand for services outside the home (ADB 2018a; World Bank 2018). Home-based care is also likely to play a role in elder care services, despite being uncommon at present. A survey by the Economic Intelligence Center at Siam Commercial Bank found that more than 90 percent of older people in Thailand would like to remain at home after retirement (Laosopapirom 2017). These trends are occurring at the same time as the population of older people in Thailand is growing, increasing the demand for these services.

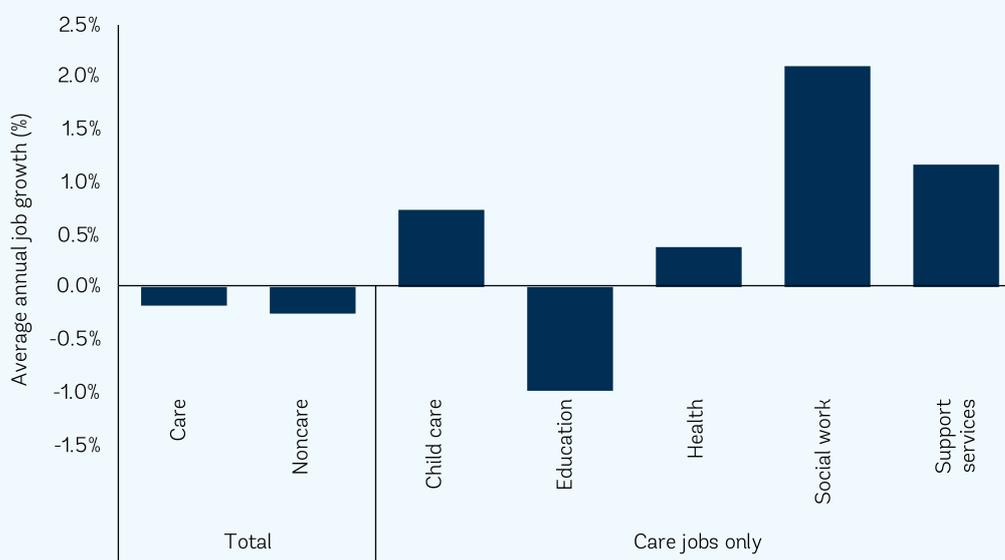
The growing demand for care in the domestic market is complemented by aging populations overseas who view Thailand as a potential destination for retirement and tourism. The growth in demand for care in Thailand coincides with Thailand's popularity as a tourist destination for older people, as a destination for older people to retire, and as a destination for tourists to seek out

medical care (“medical tourism”). Thailand is a popular and growing tourism market for older tourists from abroad, accounting for 19 percent of tourists in 2015, up from 16 percent in 2009 (EIC 2017). Popular destinations for older people include Bangkok, Chiang Mai, Hua Hin, Pattaya, and Phuket. People 50 and older can obtain a “retirement visa” (the Non-Immigrant OA-Long Stay Visa) that allows them to remain in Thailand for a year and renew their visa inside of Thailand. More than 70,000 people held such visas in 2017, up from less than 30,000 in 2009 (Huguet, Chamrathirong, and Richter 2011; Smith, Lim, and Harkins 2019). Many of these retirees first experienced Thailand as a tourist destination. Thailand’s strength in medical tourism is seen as a comparative advantage for attracting older tourists and retirees from abroad (EIC 2017). Indeed, older people from abroad are seeking out Thailand specifically for its care facilities (Hill 2020).

Care jobs have been a modest bright spot in Thailand’s recently weak labor market. Between 2014 and 2019, employment in Thailand declined overall, as did employment in care and noncare jobs. However, care jobs had a slightly better average annual rate of job creation (average annual growth of -0.2 percent in care jobs versus -0.3 percent in noncare jobs) (figure 3.22).¹⁷ Employment in all types of care jobs except education experienced average annual growth between 2014 and 2019. Table 3.1 shows the 10 care occupations (outside of education) that grew the fastest between 2014 and 2019. These care occupations include home-based personal care workers, other types of personal care workers in health services, and specialist medical practitioners, all occupations that are associated with caring for older people.

¹⁷ See appendix F for a description of jobs that are considered to be care jobs.

Figure 3.22 Average annual job growth in care and noncare jobs in Thailand, 2014–19



Source: Thailand Labor Force Survey 2014–19.

3.1 The 10 care occupations in Thailand with the fastest average annual growth, 2014–19

Occupation	Growth (%)
Medical and dental prosthetic technicians	55
Dietitians and nutritionists	15
Social work associate professionals	14
Domestic housekeepers	10
Home-based personal care workers	8
Personal care workers in health services not elsewhere classified	6
Specialist medical practitioners	6
Paramedical practitioners	3
Early childhood educators	3
Pharmacists	3

Source: Thailand Labor Force Survey 2014–19.

The growing demand for care services creates opportunities for job creation, but meeting existing and future demand will need to overcome several challenges.

The growing demand for care services creates many job opportunities, as the interpersonal nature of care work is challenging to automate. However, shortages in care work arise throughout the world, as recruiting, deploying, and retaining qualified workers are challenging tasks (ILO 2018). These challenges include poor working conditions, demanding work, low pay, unpredictable hours, lack of job security, and lack of access to social protection (ILO and OECD 2019). Based on the International Labour Organization's methodology for defining care work, Thailand has low levels of employment in care work relative to other countries around the globe and to other upper-middle-income countries (ILO 2018). In 2015 care workers in health and social work represented about 1.3 percent of employment, with an additional 0.6 percent made up of domestic workers and 0.4 percent of care workers in noncare sectors. This share compares to that of Japan, where care workers in health and social work make up 5.2 percent of total employment, with an additional 0.3

percent made up of domestic workers and 1.5 percent of care workers in noncare sectors. One recent study of 21 long-term care facilities in Thailand found that institutions lacked essential staff such as nurses, physiotherapists, and occupational therapists (Sasat et al. 2013). According to older estimates of care needs, more than 225,000 workers would be needed to fill the existing coverage gaps (Scheil-Adlung 2015). Thailand faces the additional challenge that the health workforce itself is aging (Sirisub et al. 2019). Finally, the skills necessary to fill shortages in care are not available. The study of long-term care facilities also found that facility staff lacked appropriate training (Sasat et al. 2013). These factors will challenge efforts to take advantage of the opportunities created by aging.

Part 4 of the report discusses policy options for mitigating or reversing the potential negative consequences of aging.

In particular, it discusses how to boost labor supply and labor productivity and how to take advantage of opportunities created by population aging.

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PART 4:

OPTIONS FOR POLICY REFORM

existing approach to addressing population aging and its implications. The third section offers specific policy recommendations responsive to the channels of impact described in part 3.

MAIN FINDINGS

A multipronged package of policies targeted throughout the life cycle will be needed to address the impacts of population aging on Thailand's labor market. Population aging creates complicated challenges for Thailand's labor force. Addressing these challenges will require more than policies targeted solely to older people. Table 4.1 summarizes policy recommendations to counteract the negative impacts and reinforce the positive impacts of population aging on the labor market in Thailand. Within this package of policies, two areas should be given top priority.

Part 4 discusses policy recommendations to mitigate the negative and reinforce the positive impacts of population aging in Thailand. While a multipronged package of policies is recommended, priority should be given to developing the skills demanded by Thailand's evolving economy and ensuring that older people are financially secure. The first section summarizes the main findings. The second section reviews the government's

Table 4.1 Summary of policy recommendations

Policy area	Recommendation
1. Extend working lives	• Leverage partnerships and use incentives to encourage flexible working arrangements and age-friendly workplaces
	• Study the influence of wage compensation schemes on the employment of older workers
	• Evaluate the effectiveness of the tax subsidy for employment promotion
	• Explore options for increasing the retirement age
	• Create upskilling and reskilling programs that are adapted to the needs of older people in urban areas
	• Promote healthy lifestyles throughout the life cycle
2. Increase female labor force participation	• Expand access to and decrease the cost of child care
	• Expand access to long-term care options
	• Ensure income security
	• Increase the generosity and coverage of parental leave policies, including providing for paternal leave
	• Deploy training programs targeted to and designed for women
	• Consider legal changes and undertake communications campaigns to influence gender norms
3. Use migration strategically to fill labor market gaps	• Develop a long-term national migration plan
	• Consider lengthening the duration of migration work permits including for low-skill workers
	• Simplify the memorandum of understanding migration process to encourage formal migration
	• Permit migrant workers to change employers
	• Expedite permit renewals perhaps through a trusted employer system
	• Create a package of interventions including streamlined admissions and incentives to promote high-skill migration
	• Engage Thailand's diaspora and incentivize their return
4. Invest in lifelong learning to increase productivity	• Explore alternative models of employer engagement in skills development
	• Consider performance-based financing models for training
	• Explore learner-centered approaches to training such as subsidies or vouchers
	• Adapt training programs to the learning needs of adult learners
	• Strengthen employment services, particularly the labor market information system, and link them to training
5. Leverage opportunities created by population aging	• Provide training in care work, particularly to unemployed and other vulnerable workers
	• Promote Thailand as a destination for older tourists, retirees, and medical tourists leveraging investments for local older people

First, ensuring that workers acquire new types of skills to fill labor market needs created by population aging will be a priority. These skills will require not only a good technical understanding of emerging digital technologies, but also soft skills like communication, critical thinking, and persuasion. If the shift to remote work prompted by COVID-19 continues, many or even most workers will need to have the basic digital skills that allow them to interact effectively with coworkers and clients both digitally and in person. This effort will require Thailand to focus intently on improving the skills of its workforce. Different strategies will be needed for different groups. The understanding of how to teach older people has evolved significantly in recent years, opening up new methods for re-skilling and upskilling older people. Vocational training, short-term re-skilling programs, and training linked to the receipt of social assistance will be critical components of preparing Thailand's workforce for ongoing technological change. Thus section 3 offers several policy recommendations for improving skills development:

- Create upskilling and re-skilling programs adapted to prime-age and older people in urban areas
- Explore alternative models of employer engagement in skills development
- Consider performance-based financing models for training
- Explore learner-centered approaches to training such as subsidies or vouchers
- Strengthen employment services and link them to training
- Provide training in care work, particularly to unemployed and other vulnerable workers.

Second, ensuring the financial security of older people will be a priority. Thailand has enacted significant policies related to older people in recent years, including expansion of the Old Age Allowance and various efforts to facilitate longer working lives. These policies should be coordinated with other policy areas, particularly pensions policy, to protect older people whose financial health is at risk. Many older people, particularly in rural areas, have to continue working well into old age. The Old Age Allowance is universal, but insufficient to support the livelihoods of older people, who still face high barriers to employment. Section 3 offers several policy recommendations focused on improving the financial security

of older people.¹⁸ The recommended policies include the following:

- Explore options for increasing the retirement age
- Expand access to long-term care options for older people
- Ensure income security for older people.

POLICY MAKING FOR OLDER PEOPLE IN THAILAND

Policy makers in Thailand have recognized population aging as a strategic challenge for several decades. Thailand has incorporated aging into strategic planning documents since the 1980s. Two National Plans for Older Persons have been developed, the first for 1982–2001 and the second for 2002–21. These plans provided guidance on policies to support older people. The second plan included the promotion of work, occupational training, and job advice for older people and established a framework for monitoring and evaluation. The Strategic Framework in the Preparation of Thai Society for an Aging Society, developed in 2005, included strategies related to lifelong learning, skills upgrading, and workforce development (Fujioka and Thangphet 2009). The Labor Development Plan 2007 mentioned employment and income generation for older people via skills development tailored to an individual's needs and age. Two recent National Economic and Social Development Plans recognized the challenges and opportunities of population aging (Fujioka and Thangphet 2009; Jitapunkul and Wivatvanit 2009). The Ninth National Economic and Social Development Plan (2002–06) identified population aging as a trend and recognized the need to provide for the health and welfare of older people. The Tenth National Development Plan (2007–11) identified population aging as a key national development issue and addressed the need to promote employment for all age groups, increase labor productivity, and encourage care for older people. The Eleventh National Economic and Social Development Plan (2012–16) gave a prominent place to the role of aging in Thailand's development, as did the 20-Year National Strategy (2017–36) (Teerawichitchainan et al. 2019). The Twelfth National Economic and Social Development Plan (2017–21) recognized the potential challenges that population aging might create in the labor market and promoted elder care services and employment and income-generating opportunities for older people.

¹⁸ A separate report discusses pension reforms in Thailand in more detail.

This recognition is also reflected in legislation and institutions devoted to older people. The 2003 Act on Older Persons included measures to enforce the rights of older people, established tax benefits for children caring for their parents, created the Elderly Fund, and laid out the principle that “an older person shall be entitled to protection, promotion, and support in various areas including appropriate occupation or occupational training” (Fujioka and Thangphet 2009). The act also created the National Commission on the Elderly to make policy related to older persons (Teerawichitchainan et al. 2019). Several institutions oversee issues related to aging. The Department of Older Persons in the Ministry of Social Development and Human Security (MSDHS) is responsible for carrying out programs to promote the welfare and rights of older people. The Ministry of Labor is responsible for promoting employment among older groups. The Ministry of Education and the Ministry of Culture are involved in creating educational opportunities for older people. The National Commission on the Elderly serves an oversight role. Decentralization has meant that older people receive some services, including employment promotion and income generation services, at community centers operating at the tambon (subdistrict) level (Fujioka and Thangphet 2009; Teerawichitchainan et al. 2019).

POLICY RECOMMENDATIONS TO SUSTAIN GROWTH AMID POPULATION AGING

Policy will play a key role in determining the ultimate impact of population aging on Thailand’s economic development.

Despite the mechanical negative impacts on economic growth implied by a shrinking working-age population, policy makers have significant scope to counteract the negative effects and reinforce the positive behavioral responses that will emerge as a result of declining fertility rates and longer working lives (Bloom, Canning, and Fink 2010). The potential role that government can play in such changes is a focus of the World Bank’s recent report on aging in the East Asia and Pacific region (World Bank 2015).

As Thailand continues to develop into a knowledge-based, globally integrated economy, a multipronged package of policies targeted across the life cycle will be necessary to address population aging. Thailand’s most recent Twelfth National Economic and Social Development Plan recognizes that addressing Thailand’s current challenges, including population aging, will require a package of policy actions that are imple-

mented across the life cycle and not targeted solely at older people. Building the skills of new and existing workers, improving the human capital of workers of all ages, and increasing labor productivity are all identified as important objectives. Policies to support these objectives will need to address the ability of older people to extend their working lives, but also the ability of women to deploy their human capital in the labor market and the potential for migrants to fill labor shortages. These policies will also need to increase productivity—in particular, by improving the development and deployment of human capital. Based on the opportunities and challenges identified in part 3 of this report, this section lays out recommendations for a package of policies to address challenges and exploit opportunities in the labor market that are likely to arise as a result of population aging in Thailand.

Policy area #1: Extend the working lives of older people

Thailand has taken actions to extend the working lives of older people by improving their human capital. To promote employment, the Department of Skill Development in the Ministry of Labor provides older people with occupational and skills training, including in information technology subjects like e-commerce. At the tambon level, nonformal and informal education centers run by MSDHS provide informal education. The Act on Older Persons created the Elderly Fund, administered by MSDHS, to protect, support, and promote older people. The fund sponsors elder-related projects and provides three-year personal (B 30,000 maximum) and group (B 100,000 maximum) occupation support loans with no interest. In fiscal 2019, 8,991 people received occupation support loans totaling B 225,195,000.

Thailand has also taken steps to activate the participation of older workers in the labor market. The retirement age for government workers and workers at state-owned enterprises has been raised to 63. The 2017 Labor Protection Act clarifies that age 60 is the default retirement age for workers whose contracts do not include a retirement policy. The government also introduced tax measures to promote elderly employment. In March 2017, the Thai government issued Royal Decree no. 639, which allows corporate income taxpayers to deduct from their income tax twice the amount of expenses incurred for employing people over 60 provided the expense is no more than B 15,000 per month, including contributions to a provident fund. This Senior Employment Promotion Program capped the total number of senior employees hired by a company at 10 percent of the total number of employees in a given month. The Ministry

of Labor created employment service centers for elderly workers and registration centers at provincial employment offices to provide older workers with labor market information and job search support (DOP 2019). The centers provide information about paid jobs and volunteer opportunities. The Department of Older Persons has sponsored efforts to understand business practices that empower older people.

These programs are fairly limited in size and scope. Uptake of these programs is low (Fujioka and Thangphet 2009). Just 10,000 older people have used the employment service centers for elderly workers and registration centers. Around 8,000 people have participated in the Department of Skill Development's training program. The community-level training seems to be mostly for entertainment rather than for employment.

Policies to extend working lives could be targeted to older people in urban areas, who tend to retire earlier than their rural peers. As shown in part 3, older people in rural areas work longer than older people in urban areas likely because they have a greater need to earn income to make ends meet. These longer working lives limit the scope for increasing participation in rural areas, as do the more limited job opportunities in rural areas, particularly in good jobs outside of agriculture. Older workers in urban areas, in contrast, tend to leave the workforce earlier (as early as age 55). They are also more educated than their rural peers, suggesting a possibility to take advantage of additional accumulated human capital. There is more scope for policy to activate this group. Several types of policies could be considered for different groups of older workers in urban areas. Policies affecting working arrangements and workplaces, compensation schemes, and tax incentives could encourage the employment of more highly educated urban workers in formal sector firms. As pension coverage expands, the incentives associated with pensions will influence the employment decisions of older workers, although still primarily among workers in urban areas. Upskilling and reskilling policies could be targeted to older urban workers of all skills levels. Ensuring that older

people are healthy will be important across urban and rural areas and across skill levels.

Flexible working arrangements and age-friendly workplaces can promote the hiring and retention of more highly educated older workers in urban areas. Job flexibility has been found to increase the willingness of older people to work. In the United States, 60 percent of nonworking respondents to a survey on the working preferences of older people said that they would return to work if given a flexible schedule and 20 percent said that they would do so even taking a 20 percent reduction in pay (Ameriks et al. 2020). Other important considerations for older people are the pace of work, amount of physical work, and level of autonomy (Maestas and Jetsupphasuk 2019). Flexible working arrangements have typically been rare in Thailand, but recent studies suggest that they hold promise for increasing working lives (Anell and Hartmann 2007; Sadangharn 2017; Sirisub et al. 2019). Firms have adapted to older workforces by adjusting working hours, permitting part-time employment and job sharing, and changing job responsibilities. Firms could also adapt to older workplaces by changing working conditions. These adjustments are likely most relevant for more highly educated workers in formal firms.

Existing government partnerships with the private sector could promote these arrangements. Existing collaboration between the Department of Older Persons and the private sector on business practices promoting elderly empowerment could stimulate efforts to encourage firms to adopt flexible working arrangements for older people and invest in age-friendly workplaces (international spotlight 4.1). The benefits and cost-effectiveness of such policies should be highlighted. For instance, BMW's investment in a package of health care, skills development, workplace environment improvement, and part-time work eliminated the differences in productivity between older and young staff (Loch et al. 2010) and required only a small investment.

International spotlight 4.1 Developing strategies to encourage the hiring of older workers

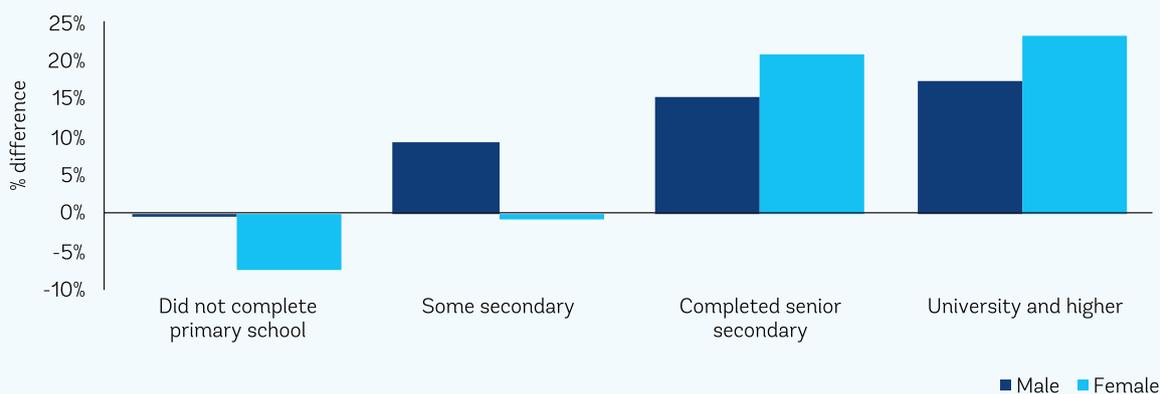
Government and nongovernment agencies in several countries around the world have developed "age management" strategies to provide guidance and support to employers for hiring and retaining older workers (OECD 2019a). For instance, in **Norway** the Center for Senior Policy advocates strategies to lengthen working lives, including disseminating good practices and training staff at public employment services offices (Sonnet, Olsen, and Manfredi 2014). The Department of Older Persons could use this engagement to undermine negative perceptions about the productivity of older people. Subsidies could also be offered to incentivize the adoption of flexible arrangements and age-friendly workplaces, although take-up of these programs has been limited. **Korea**, for example, has provided allowances for firms offering flexible work arrangements, shorter working hours, and reemployment after retirement (World Bank 2015).

The influence of compensation schemes on the employment of older workers should be examined. Research from Organisation for Economic Co-operation and Development (OECD) countries suggests that compensation schemes that reward workers based on age or service with a firm—seniority wage systems—can hinder the employment of older workers, who become unaffordable (OECD 2019a). These practices are deeply ingrained in compensation structures in some countries in the East Asia and Pacific region, particularly in Japan and the Republic of Korea. In Thailand, performance-related pay was introduced in the civil service in 2008 (World Bank 2014). The prevalence of performance-based pay in the private sector is less clear. Older evidence suggests a shift toward performance-based compensation amid a relatively high prevalence of seniority-based pay (Rowley 1998). Some evidence from the Labor Force Survey suggests that seniority-based pay may still be used in Thailand. figure 41 shows that older workers

earn more than younger workers with the same education. For example, both female and male older workers with a university education earn greater than 20 percent more than younger workers with the same education, indicating that these workers may be compensated based on characteristics other than skill (at least as proxied by education level).

More research is needed to understand the influence of compensation structures on the employment of older workers in Thailand. If strong negative effects are found, policy could seek to influence the transition away from seniority wage-setting schemes and toward performance-based schemes by advocating and—using the civil service’s scheme as an example—demonstrating the benefits of this approach. Some countries have taken a more direct approach (international spotlight 4.2).

Figure 4.1 Percentage difference in average monthly wage income between workers age 40–49 and workers age 50–59 in Thailand, 2019



Source: Thailand Labor Force Survey 2019.

International spotlight 4.2 Encouraging performance-based compensation

Japan has provided subsidies to assist small and medium enterprises to adopt performance into wage-setting and human resource practices (OECD 2019a). Korea introduced the “wage-peak system” in 2005, which publicized performance-based compensation for different sectors and provided allowances in exchange for its adoption (World Bank 2016a). Singapore has also provided incentives for such a transition.

The effectiveness of Thailand's tax incentives for employment of older people should be evaluated.

Like Japan, Korea, and Singapore,¹⁹ Thailand provides incentives to firms hiring older workers. Evidence of the effectiveness of these incentives is not available. However, based on international evidence, the impact of wage subsidies to support the hiring and retention of older people is questionable. Recent evidence finds that significant subsidies are needed to induce substantial employment effects and thus are unlikely to be cost-effective (Boockmann 2015). Other concerns are deadweight loss (subsidies are provided for hiring workers who would have been hired anyway) and reinforcement of stigmas and negative attitudes toward older workers (OECD 2006). Evaluating the effectiveness of Thailand's incentives is important for understanding whether these funds could be better directed to other employment promotion efforts.

Raising the retirement age could minimize the disincentives to work as pension coverage expands.

Thailand has undertaken efforts to raise the retirement age of public sector workers and workers at state-owned enterprises. The 2017 Labor Protection Act also includes provisions that seek to discourage early retirement. More efforts will be needed as pension coverage expands. As shown in part 3 of this report, Thailand's contributory pensions have some disincentive effects on older people's labor force participation. Coverage of contributory pensions is limited, meaning that these disincentive effects are not widely relevant

and not a significant concern at present. However, coverage under the Social Security Fund for formal private sector workers has been increasing, suggesting that the disincentive effects must be taken into account going forward. As coverage expands, policy makers could consider increasing the retirement age both to mitigate these disincentive effects and to adjust Thailand's retirement age to reflect its longer, healthier older ages (international spotlight 4.3). As figure 2.2 in part 2 shows, life expectancy has increased significantly in Thailand in recent years and is expected to increase further by 2060.

Upskilling and reskilling for older people of all skill levels in urban areas can play a role in extending working lives.

Digitalization, automation, and Industry 4.0 are changing the skills that are in demand in the labor market in Thailand. As described in part 3, there is evidence that these changes are age-biased—that is, older workers (particularly those in the prime ages) are less likely to work in the growing occupations that use the new skills that are in demand. There is evidence, though, that training programs can reduce (though not eliminate) the age bias of technological and organizational change (Behaghel, Caroli, and Roger 2014).

¹⁹ For example, Singapore's Special Employment Credit Scheme provides a subsidy to employers for up to 8 percent of the wages of workers over the age of 50, supplementing grants that promote firm-based initiatives to recruit, retain, or reemploy older workers (World Bank 2016a).

International spotlight 4.3 Linking returns and age to labor force participation

Age or longevity indexing—that is, tying the retirement age to life expectancy at retirement age—could better link retirement age to potential labor force participation while also ensuring that longer lifespans do not stress the financial sustainability of benefits (Piggott and Sane 2009). **Denmark, Greece, and Italy** have or soon will have such a link between pensions and life expectancy (OECD 2011).

Establishing effective and trusted implementation arrangements for undertaking this indexing is important to its success. **Japan** incorporates flexibility into its approach to delaying retirement. Japan's Act on Stabilization of Employment of Elderly Persons 2012 requires employers to do one of three things: raise their mandatory retirement age to 65, introduce a continued employment system to allow those employees who wish to work until age 65 to do so, or abolish their internal mandatory retirement age. The system for continuous employment provides an alternative contract to an employee after the "retirement age." **Singapore** has focused primarily on the reemployment of older workers. **Korea** has taken various approaches over time, including relying on monitoring of firm-specific retirement ages and ultimately mandating a minimum retirement age of 60.

Effective upskilling and reskilling for older people in Thailand will require increasing the attractiveness of these programs and broadening the age group targeted by these policies. Thailand has created several training programs targeting older people, but they have been relatively small scale, have suffered from limited take-up, and have tended to target workers 60 and older (for example, the Occupation Training Program for the Elderly). This situation is consistent with the fact that older workers tend to be less likely to participate in training, a global trend that may be especially severe in the East Asia and Pacific region (World Bank 2015). In China, for example, a 1 percent increase in age was found to correspond to a 27 to 35 percent reduction in the probability of participating in training (Mishra and Smyth 2012). Australia and Europe have responded to these challenges by subsidizing training for older workers. Several wealthier countries in the East Asia and Pacific region have taken similar steps (World Bank 2015). Korea, for example, subsidizes the costs of vocational training for workers over age 40 (up to ₩ 1 million per year). Thailand could consider similar subsidies to encourage older workers to participate in training programs. Additionally, as described in greater detail in the discussion on lifelong learning, upskilling and reskilling programs for older workers should target workers before the age of 60, as prime-age workers are facing the greatest possibility of job loss due to automation and could benefit from such programs before they reach older ages.

Extending working lives will also require ensuring that older people are healthy. As shown in part 3, health is an important determinant of labor force participation among older people in Thailand. While older people are generally healthier than in the past, maintaining and strengthening these improvements will be challenging in the context of Thailand's epidemiological transition. Noncommunicable diseases (NCDs) are the leading cause of death in Thailand and major contributors to disability among older people, likely leading many to work fewer hours or to drop out of the labor force altogether (Yiengprugsawan, Healy, and Kendig 2016). At the same time, NCDs are increasingly common in the younger population, which means that they will affect the labor force participation of older groups in the future (and are likely affecting labor force behavior now) (World Bank 2019b). A focus on preventing disease by encouraging healthy lifestyles throughout the life cycle is key to ensuring that people are sufficiently healthy to continue working later in life.

Policy area #2: Increase female labor force participation

Thailand has recently taken steps to improve female labor force participation. Thailand has identified expanding oppor-

tunities for women as a priority in recent strategic planning documents. The Twelfth National Economic and Social Development Plan (2017–21) emphasized the importance of creating economic and social opportunities for women. The 2015 Gender Equality Act laid out compensation for gender-based discrimination and created a Committee on the Promotion of Gender Equality to make policies, procedures, and programs (UNFPA 2019). In 2019, the Labor Protection Act (no. 7) increased maternity leave from 90 to 98 days, including weekends and holidays. In 2019, Thailand also increased the child allowance paid to workers who have up to three children and are enrolled in the Social Security Fund from B 300 to B 600 per month.

The Department of Women's Affairs and Family Development in MSDHS provides skills training to two groups of vulnerable women. The Center for Women and Family Development provides vocational training to help women lacking social opportunities to acquire professional skills in eight provinces. Two types of vocational training are provided: (1) center-based vocational training with job support services after successful program completion and (2) community-based vocational group training to promote women's community enterprise. The center-based training has resulted in the employment of more than 15,000 people each year. The program has also produced more than 140 groups of entrepreneurs each year. In addition, protection and occupation development centers provide support for the victims of human trafficking. Located in four provinces, these centers offer women skills training in craftsmanship and services.

Improving the accessibility, affordability, and quality of care options could promote employment by relieving women of the extra burden of care they often shoulder. Making child care more accessible and lowering its cost can increase maternal employment (international spotlight 4.4). A study of OECD countries found that the provision of formal child care services is more important for boosting female labor force participation than other policies (Thévenon 2013). In Indonesia, Halim, Johnson, and Perova (2019) found that access to public preschool increases the likelihood that mothers of age-eligible children will be employed. Research also suggests that reductions in child care provisions and subsidies were partially responsible for declines in female labor force participation in urban areas of Mongolia (World Bank 2013; World Bank and ADB 2005) and China (Chi and Li 2008; Du and Dong 2010; Maurer-Fazio et al. 2011). Improving the access of older people to quality long-term care options could have a similar effect. Complementing both of these policies could be efforts to promote flexible forms of work that permit female and male caregivers to balance work inside and outside of the home.

International spotlight 4.4 Improving accessibility, affordability, and quality of care to promote women's employment

There is evidence that making child care more accessible can change women's incentives such that both labor force participation and fertility increase, a phenomenon observed in several countries around the world, including **Japan** and **Korea** (Hwang, Park, and Shin 2018; Kinoshita and Guo 2015). Several countries in the East Asia and Pacific region subsidize child care to reduce the costs that mothers face when pursuing employment. For instance, **Singapore** subsidizes enrollment in child care centers for children under age seven whose mothers are working (World Bank 2015). **Malaysia** offers tax deductions to employers that supply child care centers or pay child care allowances to their employees and provides tax relief to workers who enroll their children in a nursery or preschool.

Improving old-age income security also has the potential to increase female labor force participation.

Within countries, coresidence rates typically decline as household income rises, suggesting that high coresidence rates are often the result of the elderly being unable to afford living alone (Evans and Palacios 2015). A consequence of this arrangement is that working-age family members—frequently women—may drop out of the labor force at younger ages in order to take on caregiving responsibilities. Age-based social assistance programs can directly address poverty among older people, reducing their reliance on informal family care and financial support (Evans and Palacios 2015). While impressive for its wide coverage, the small benefit level of the Old Age Allowance is unlikely to affect old-age poverty (World Bank 2016b). Its impact on caregiving responsibilities is also likely to be minimal. The possible positive impacts of Thailand's social pension on female labor force participation strengthen the arguments for evaluating its generosity in more detail.

More generous parental leave policies could support female labor force participation.

Although increased recently, maternity leave is relatively short in Thailand—98 days or 14 weeks. This is the same as in China and Japan, but shorter than in Singapore (16 weeks), Vietnam (26 weeks), and the average in OECD countries (18 weeks). Maternal leave policies can increase female employment. An analysis of maternity leave policies in a cross section of countries found that each additional week of paid maternity leave is associated with a 3.6 percent rise in the share of workers employed in a given firm who are women, an impact that grows when the leave is funded by the government rather than the employer (Amin and Islam 2019). Increasing men's role in child care is also an important means of supporting

women's employment. Men working in the private sector in Thailand are not entitled to paternity leave, in contrast to their counterparts in eight countries in the East Asia and Pacific region (World Bank Group 2019).²⁰ Public sector workers have access to 15 days of leave (Liao and Paweenawat 2019). Indeed, paternity leave is becoming more common in the region, although these policies remain limited in scale (international spotlight 4.5).

Training programs can improve women's labor market outcomes.

Overall, increasing access to training, providing labor market information, and providing job search and career guidance support and mentoring can help to improve the labor market outcomes of women. However, women face barriers to using both formal and informal training to improve their labor market outcomes (Beegle, Matulevich, and Carolina 2020). These barriers include lack of child care, barriers to mobility, and disproportionate enrollment in female-dominated training that perpetuates occupational segregation. These barriers can undermine the benefits of training programs. Thus training programs have to be tailored to the barriers that women face. Such tailoring means considering operational features such as the availability of child care options and the accessibility and safety of training locations; incorporating components addressing information, aspirations, and norms; and providing assistance to overcome financial constraints, which often limit the participation in or the benefits of training programs for women. Encouragement to train in nontraditional occupations and built-in mechanisms to prevent, respond to, and report cases of sexual harassment and abuse are all necessary.

²⁰ China, Indonesia, the Lao People's Democratic Republic, Myanmar, the Philippines, Samoa, Timor-Leste, and Vietnam all offer paternity leave.

International spotlight 4.5 Engaging fathers in child care to boost women's employment

Fathers in the **Philippines** and **Vietnam** are allowed up to 14 days of paid leave, while public servants in **Indonesia** are allowed one month (Baird, Hill, and Gulesserian 2019). As in other parts of the world, take-up of paternity leave policies is often low. In 2015 in **Japan**, for example, only 2 percent of fathers took advantage of policies allowing them to take one year of leave to care for their children (Heilman et al. 2017).

Legal changes and communications to influence gender norms are also important. While the Gender Equality Act was a step forward, the law does not promote and protect equal opportunity and gender equality (World Bank 2016a). Stronger communication about gender norms, discrimination, and harassment is also necessary. Such communication could include publicizing female and male role models who share care responsibilities, promoting public discussion of norms and values related to gender and the labor market among labor market stakeholders, and widely advertising the availability of government and nongovernment support for persons experiencing discrimination or harassment (World Bank 2019a). Enforcement of existing laws against discrimination and harassment is also key.

Policy area #3: Use migration strategically to fill labor market gaps

Migration to Thailand occurs through three main channels.

Thailand has signed memorandums of understanding (MOUs) with Cambodia, the Lao People's Democratic Republic, Myanmar, and Vietnam that provide a legal route for low-skill workers from these countries to migrate to Thailand.²¹ The MOUs govern the entire migration process, including admissions, employment, and return home. The steps involved require significant documentation and administrative procedures in Thailand and in migrants' countries of origin (Testaverde, Moroz, and Dutta 2020). This migration channel has become increasingly popular in recent years: in 2017 nearly 600,000 migrants entered Thailand under MOUs compared to just over 200,000 in 2014 (Smith, Lim, and Harkins 2019). Migrants can also enter Thailand informally without obtaining the required documents. This is the most common form of migration to Thailand. A recent survey of migration to Malaysia and Thailand found that 73 percent of migrants from Cambodia, Lao PDR, Myanmar, and Vietnam used irregular channels (ILO and IOM 2017). Thailand has periodically opened the so-called nationality verification (NV) process to regularize the status of these informal migrants (Grimwade and Neumann 2019). In 2017, approximately 2.1 million migrants underwent the NV process (Smith, Lim, and Harkins 2019). Finally, Thailand has a formal process for admitting high-skill workers. In 2017, around 140,000 professional and skilled migrants were working in Thailand, primarily from China, Japan, and the Philippines (Smith, Lim, and Harkins 2019).

Migration policy in Thailand suffers from several weaknesses, although improvements have been made in recent years.

Thailand has struggled to formulate a long-term strategy for migration and instead has undertaken periodic crackdowns on informal migrants and regularizations of their status as a de facto policy (Moroz 2017; Testaverde et al. 2017). Twice in

recent years (once in 2014 and again in 2017), announcements related to the enforcement of migration laws led to the sudden large-scale departure of migrants. In both cases, labor shortages quickly emerged, leading to policy reversals and registration campaigns. The unpredictable nature of policy has made it difficult for employers to plan for and respond to economic needs. Informal migration to Thailand remains significant despite the availability of the legal MOU channel. Migrants often prefer informal routes because formal routes are more costly and time-consuming. A survey of migration to Malaysia and Thailand found that informal migration channels are on average US\$616 cheaper and 71 days faster than formal ones (ILO and IOM 2017). The higher costs and longer duration of formal migration result from the significant administrative procedures involved in the process (Testaverde et al. 2017). Other challenges include weaknesses in labor protections for migrants and lack of access to social protection and financial services (Grimwade and Neumann 2019). Recent improvements include revisions to the Royal Ordinance on the Management of Foreign Workers Employment, which eliminated recruitment fees for migrants, improved the regulation of private recruitment agencies, and formed a tripartite committee on migration policy (Harkins 2019).

Thailand could improve the ability of its migration system to fill gaps in the labor force by developing and implementing a predictable migration policy. Thailand could make its migration policy more predictable by developing a national migration plan or strategy that sets out short- and long-term goals for migration. Such a plan would provide guidance to employers and other labor market stakeholders about the path of migration policy (Testaverde et al. 2017). Such guidance would help employers to plan for future workforce development needs. The strategy could acknowledge the potential negative effects of migration and define plans to mitigate them.

Thailand could also consider allowing migration of longer duration. Permitting longer-term migration would not only increase predictability but also allow migrants who gain experience in Thailand's labor market to continue using this experience in Thailand. In Korea, the productivity of migrants has been shown to increase from 50 percent of a local's productivity in the first year of employment to 80 percent in the second year and 100 percent in the third (Chung, Choi, and Lee 2015). Employment terms could be used to differentiate migrants by skill and productivity. Singapore, for instance, has developed a tiered system of temporary migration that allows some migrants to remain in the country for longer periods. Korea allows low-skill workers to update their employment pass to a semiskilled pass that does not limit the employment period.

²¹ The MOU with Vietnam has not been implemented.

These same productivity gains might occur if formal migration were a more attractive option. Incorporating additional migrants into the formal migration system would mean greater protection and job stability for migrants and could potentially lead to greater investments in training by employers and more learning-on-the-job by migrants, resulting in more productive workers. Reducing the administrative procedures involved in the formal MOU process is an important first step toward disincentivizing informal migration.

The migration system could also be adjusted to be more responsive to labor market demand. Allowing more flexibility for migrant workers to change employers could improve matches between workers and firms. Migrant workers in Thailand are currently quite restricted in their ability to change employers, which means that they cannot fill needs in other parts of the economy if their employer does not need them and cannot switch employers if they are mistreated. Korea's Employment Permit System allows migrant workers to switch jobs up to three times. The renewal process for employment passes could also be expedited because renewal is a sign of continued demand. This process could be facilitated through a trusted employer program that allows firms without migration infractions to go through fewer steps for renewal.

The high-skill migration system could also be improved to fill knowledge gaps and stimulate innovation. High-skill migration can fill skill gaps that arise as Thailand transitions to a knowledge-driven economy. High-skill migration generally has a positive impact on innovation and skills and potentially increases productivity (Peri 2014). High-skill migration has been increasing in Thailand in recent years (OECD and ILO 2017). However, Thailand is not using this channel to its full potential. Indeed, Thailand scores behind Singapore, Malaysia, China, Indonesia, and Korea on the capacity to attract talent as measured in the World Economic Forum's 2017–18 global competitiveness index. Thailand's admissions process for high-skill workers is complex and involves multiple visas and work permits (Moroz 2017). High-skill workers are also excluded from working in 39 high-skill occupations. Thailand's rules regarding high-skill migration have also weakened the effectiveness of measures by the Association of Southeast Asian Nations (ASEAN) Economic Community to promote the mobility of high-skill labor. For instance, the occupational restrictions include three occupations (engineering, accounting, and architecture) for which mutual recognition arrangements (MRAs) have been developed. Knowledge of the MRAs is also limited. A study of firms listed on the Thai stock exchange found that 60 percent had no understanding or knowledge of the MRA on accounting (Pichayasupakoon 2014). Additionally, Thailand does not have a system for recognizing foreign professional qualifications (Ducanes 2013).

Thailand could consider a complementary set of measures to encourage high-skill migration. High-skill migrants are concerned with the ease of migration and compare the costs and benefits of skilled and other migration paths (Testaverde et al. 2017). These measures include streamlining the process of renewing immigration and

employment passes, which is currently complex. These changes could be complemented by efforts to develop a qualifications recognition system and to publicize the MRAs and align domestic policy with their goals, which could help to facilitate high-skill migration (Papademetriou et al. 2015). Indeed, the recognition of qualifications has been shown to be associated with increased high-skill migration, although the relationship is not causal (Czaika and Parsons 2017). In Thailand, the tourism MRA holds particular promise, providing an opportunity for migrants from Myanmar and the Philippines to migrate to Thailand (Batalova, Shymonyak, and Sugiyarto 2017). Thailand could consider coupling these changes with incentives that promote the immigration of high-skill workers. Malaysia's Residence Pass-Talent (RP-T) program provides an example. The RP-T allows high-skill expatriates to live and work in Malaysia for 10 years, allows them to change employers, and offers employment passes to their spouses. Encouraging student migration could further complement this package. Thailand is an emerging destination for international students and is ASEAN's third-largest destination after Malaysia and Singapore (ADB, ILO, and OECD 2014). As host countries have more information about their knowledge, abilities, and qualifications, these students could be a source of high-skill labor during and after their education (Testaverde et al. 2017).²²

Thailand could also activate its diaspora abroad. In 2010, more than 615,000 Thai migrants were living abroad, around a quarter of whom are highly educated (ADB, ILO, and OECD 2014). About one-quarter work in highly skilled occupations and two-thirds work in mid-skill occupations. In 2012, tens of thousands of students from Thailand were attending school abroad. This population represents a significant opportunity both for filling gaps at home if return migration can be incentivized and for transferring capital and knowledge if members of the diaspora remain abroad. Return migrants can bring with them savings accumulated abroad that can facilitate business creation and self-employment (McCormick and Wahba 2001; Wahba and Zenou 2012). Overseas migrants can make transferring knowledge, ideas, and capital cheaper and have been shown to increase bilateral trade, stimulate foreign domestic investment flows, and facilitate the diffusion of technology (Testaverde et al. 2017). Thailand could explore several policies to improve this so-called "brain circulation." These policies could build on Thailand's good-practice Reverse Brain Drain project run by the Ministry of Science, Technology, and Environment, which has created opportunities for sharing knowledge between Thais overseas and Thais at home. These efforts could include the creation of return migration policies that help to incentivize return through tax, citizenship, and residency benefits (Dickerson and Özden 2017). Although the evidence of effectiveness is limited, a recent impact evaluation of TalentCorp Malaysia's Returning Expert Programme found that the incentives created by the program increased the probability of return by 40 percent for program applicants with an existing job offer (Del Carpio et al. 2016). The impact on government finances was limited.

²² Kruanak and Ruangkanjanases (2014) show that adjustment to life and study, social support, and career perceptions are predictors of undergraduate and graduate students' intention to remain in Thailand after completing their studies.

Policy area #4: Invest in lifelong learning to increase productivity

Improvements in human capital have the potential to offset the impacts of population aging. As described in part 2, population aging can have behavioral effects beyond its predicted negative impacts. For instance, lower fertility may result in higher investments in education and health that compensate for the impacts of population aging on economic growth (Prettner, Bloom, and Strulik 2013). This relationship is confirmed in simulations showing that low fertility induces human capital accumulation, which can raise per capita consumption (Lee and Mason 2010).

Tapping into these beneficial offsetting effects of human capital accumulation will require shifting to a model of learning that occurs throughout the life cycle. Technological developments are changing the human capital that is valued in workplaces in Thailand and across the East Asia and Pacific region. Recent research from the United States shows that rapid technological change has quickly generated new requirements in science, technology, engineering, and math (STEM) jobs (Deming and Noray 2018). The implication is that graduates with high-skill vocational preparation may transition easily into the labor market, but often find that the skills they learned have become obsolete. This is confirmed in cross-country research finding that vocational education facilitates the transition from school to work but can actually reduce a worker's adaptability to technological changes later in life (Hanushek et al. 2017). The changing skills requirements associated with new technological developments mean that the skills that the current workforce learned in traditional schooling will likely need to be updated throughout their working lives through upskilling and reskilling. As a result, the settings in which learning is recognized will have to be broadened to include formal, nonformal, and informal settings alike.

The concept of lifelong learning is not new in Thailand, but the components of the lifelong learning system could be improved to meet the needs of the changing world of work. The 2017 Constitution emphasizes the importance of lifelong learning, and the Twelfth National Economic and Social Development Plan lays out how skills can be developed throughout the life cycle (UNFPA 2019). Still, progress remains to be made in improving access to and quality of education throughout people's lives in Thailand. The need to strengthen primary and secondary education, particularly through improvements in the quality of education, is covered in the World Bank's recent Thailand Economic Monitor: Inequality, Opportunity, and Human Capital (World Bank 2019b). A previous World Bank report outlines some of the challenges facing higher education in Thailand and

their implications for policy (World Bank 2010). The following recommendations focus on improvements that can be made to Thailand's technical and vocational education and training (TVET) system and to nonformal training programs to continue building human capital throughout the life cycle. These recommendations focus on how these programs can meet new demands related to digitization, automation, and Industry 4.0.

Thailand sees vocational education and training as a tool to fill skills gaps. In recent years, the government has emphasized improving the TVET system through its Dual Education System. However, employers still frequently cite skills gaps as an obstacle to doing business. Skills gaps have been particularly apparent in occupations that require workers with technical and vocational education (Song and Tang 2016). Despite efforts to increase the number of TVET graduates, the share of TVET workers among Thailand's employed population has grown slowly—from 7 percent in 2006 to 10 percent in 2019. TVET graduates actually declined as a share of employed upper-secondary and tertiary graduates during this period. Recent assessments of Thailand's TVET system have identified several weaknesses, including lack of coordination across ministries and agencies involved in TVET; poor-quality instruction, particularly in math, technology, and information and communication technology (ICT); lack of strong linkages with the private sector; lack of accountability mechanisms for monitoring and evaluating results; and poor perceptions of TVET despite past evidence of higher returns (ILO 2016, 2019; Moenjok and Worswick 2003; World Bank 2012).

Thailand will need to develop a TVET system that is driven by demand and oriented toward results. The TVET system will need to be updated to meet the human resource needs of a knowledge-based economy so that Thailand can take advantage of the new opportunities created by Thailand 4.0 and the Eastern Economic Corridor. Updating the TVET system will require several adjustments to ensure that training is demand-driven and results-oriented.

First, linkages with the private sector will need to be strengthened. Employers can be engaged in skills development in three main ways: they can provide training directly, they can shape the governance and management of training, and they can fund training (World Bank 2020a). Each type of employer engagement manifests in many ways, and approaches can vary across sectors and firms. In each case, though, the government will need to build trust in industry so that their actions are valued and identify win-win areas in which both the private sector and the government can benefit (international spotlight 4.6).

International spotlight 4.6 Improving linkages with the private sector

A recent analysis of employer engagement in skills development defines three categories of engagement, with several types in each category (World Bank 2020b).

First, employers can provide training. In this case, employers are involved directly and actively in providing training. For example, small and medium enterprises in **Moldova** frequently assign a more senior employee to mentor new employees in technical areas, internal regulations, and health and safety. Google's "Whisper Course" sends e-mails to new managers with simple suggestions for interacting with staff. Some companies provide leave for training as part of their benefits package.

Second, employers can shape and define the governance and management of the skills development system. For example, in **Chile**, the Mining Skills Council regularly collects survey data from mining companies and their suppliers, such as information about the labor force and upcoming large investment projects. The council also analyzes and disseminates data (for example, it produces forecasts of skills shortages that are then used to design and determine the provision of training and retraining programs, increase technical and vocational education and training (TVET) capacity, improve qualification and accreditation frameworks, and improve the labor market information system covering the mining sector. In **Senegal**, TVET institutions have boards of directors chaired by a representative of the private sector. Microsoft's Professional Certifications involve training and examinations that can be done online. The certifications are globally recognized as indicators of mastery and are used in hiring and promotion decisions.

Third, employers can fund training by providing third parties with resources to procure, provide, or improve training. For example, in **Malaysia**, the Human Resources Development Fund imposes a 1 percent payroll levy on firms to finance training. The levy funds an account specific to each employer that the employer can then use to train its employees. In South Africa, the National Skills Fund (NSF) is funded by a portion of the country's training payroll levy on formal sector enterprises. The NSF supports projects that form part of the National Skills Development Strategy, which includes equity targets. In **Nigeria**, Samsung provides equipment and training-of-trainers to ensure that the training meets its needs.

Second, Thailand could explore a transition to performance-based financing that creates accountability and a culture of results.

Doing this would incentivize the production of TVET graduates with

skills that match labor market needs. Ultimately, the system should move from one that finances inputs to one that finances outcomes (international spotlight 4.7).

International spotlight 4.7 Developing a mechanism for performance-based financing

In **Australia**, the Employment Services System (ESS) uses a contestable training market to place job seekers into work (World Bank 2020b). The ESS uses tenders, awards, and sanctions based on comparative performance and outcomes-based payments to create incentives for a focus on results. The system's Star Rating System is a key component of this contestable training market, providing a tool to enforce performance-based accountability, which is also assured through registration, audits, and sanctions. The Star Rating System monitors the employment outcomes of job seekers, including hard-to-place job seekers, 26 weeks after graduation.

In **Malaysia** the Human Resources Development Fund also uses a Star Rating System to monitor its training providers. While the indicators are oriented primarily to inputs and processes, the system is a step in the direction of providing transparency about training providers.

Third, a strong labor market information system is a critical backbone of these reforms. This system would collect relevant information about supply and demand, analyze this information, and tailor it for dissemination to a variety of labor market stakeholders. A strong labor market information system underlies the monitoring and evaluation that is necessary for performance-based financing to work (international spotlight 4.8).

Thailand will need to deploy upskilling and reskilling programs particularly for prime-age workers. Skills training programs can help people to update their skills or learn new skills throughout their working lives in response to changes in the skills demanded by employers. As shown in part 3, prime-age workers are especially vulnerable to automation, which will necessitate training programs that can help them to reskill and upskill. Programs that

improve the capabilities of workers or potential workers can take many forms, including traditional vocational training courses and self-employment and entrepreneurship training. These programs have had mixed success; the most effective have had lower costs, been targeted to specific groups, and adapted training to labor market demands (Betcherman and Moroz 2018). In the United States, a training program that was targeted to unemployed people in sectors in demand increased income after two years (Hendra et al. 2016). Combining training with additional services such as job search assistance, financial support, and program design that accounts for specific barriers such as those facing young women can also increase effectiveness (Kluve et al. 2019; Stöterau 2019). Upskilling and reskilling could be incorporated into the short training courses provided as part of several of Thailand's social protection programs.

International spotlight 4.8 Creating strong systems to provide labor market information

WorkNet began in **Korea** in 1998 as a publicly managed job search portal but has evolved to become a full-service labor market information portal that provides job matching, career and skills guidance, government support, and labor market information and analysis services (World Bank 2020b). WorkNet offers (1) job matching based on information on job seekers; (2) career guidance linked to information systems on education, training, and government programs; (3) government support including help with job placement, identification of suitable employment programs, and assistance with counseling activities related to career guidance; and (4) analysis of labor market trends integrated with national statistics and other databases for research and policy input.

WorkNet has several areas of strength, including (1) data collection from multiple sources for both job vacancies and job seekers; (2) rigorous validation of job postings based on a four-step process; (3) prioritization of the user experience; (4) aggressive marketing; (5) interoperability with other employment-related systems; (6) links between its labor market information collection and analysis function and its job matching, career and skills guidance, and government support functions; (7) investment in the appropriate level of human resources; and (8) deployment of reliable information technology infrastructure with strong data management and security. WorkNet has also invested in leveraging new advancements in big data and artificial intelligence to improve the services it provides; for example, it uses artificial intelligence to improve job matching and customizes employment information (for example, training, certifications, employers) to each job seeker.

In **Colombia**, the Sistema Nacional de Información de la Educación Superior (SNIES, National System for Information on Higher Education) is an information system with an online web portal that provides comprehensive information about higher education. The portal provides information about higher education institutions and academic programs such as location, students, fees, and instructors. The system also links to the Labor Observatory for Education, a portal that contains specific information on graduates such as offers of employment, graduate profiles, and average income. SNIES targets higher education institutions, higher education students, higher education managers and teachers, professional counselors, high school students, parents, entrepreneurs and employers, researchers, and government and nongovernment organizations. The portal seeks to facilitate management, planning, and decision making; help higher education institutions to improve their processes based on the identification of best practices; assist with the self-regulation of the sector; simplify the information reporting process; and serve as a frame of reference.

Two examples are notable. First, vocational training has been made available to welfare cardholders to promote employment and reduce poverty. Courses are divided into two categories: (1) fast-track handyman training (community handymen), a 60-hour training course available to cardholders nationwide, and (2) vocational training of three different lengths (18-hour, 30-hour, and 60-hour courses). According to the NESDC's 2018 poverty and inequality report, more than 3 million welfare cardholders participated in the government-provided career training in 2018 (NESDC 2018). A follow-up survey in 2018 revealed that 80 percent of respondents received a higher income. Second, the National Village and Urban Community Fund (1-Million Baht Village Fund) is a fund for village and urban community members who lack access to financial institutions. The program offers vocational training and funds for infrastructure development projects such as building community barns, agricultural warehouses, and water storage facilities. A loan fund for degree studies, organized in collaboration with university partners, provides successful graduates with immediate work opportunities. These measures aim to create career opportunities and raise household income at the village level. In 2018, there were 79,595 village funds covering 13 million members.

Learning, financing, and delivering training programs will need to focus on meeting the needs of adult learners. The rapid pace of change in skills requirements coupled with the growth of free-lancing and self-employment mean that human capital development provided by large, stable organizations through on-

the-job training is relevant to fewer and fewer workers. In this context, learners are likely to need to take greater control of their own skills development and to benefit from learner-centered approaches to training. Many different instruments can be used to support learner-centered lifelong learning, including individual learning accounts that may or may not be tax advantaged and individual subsidies or vouchers. Singapore has perhaps the most notable learner-centered approach to lifelong learning (international spotlight 4.9).

Learner-focused approaches to training also involve innovations in delivery that can help adults to learn flexibly. As the costs of technology fall, e-learning approaches are becoming increasingly viable alternatives for individuals and employers, including smaller ones. These approaches allow for flexibility, customizability, and real-time assessment. The training can also be cheaper and faster. Employers benefit from being able to customize their training across locations while saving on travel and trainer costs, and workers benefit from being able to access low-cost training inside and outside of the workplace. Simulation, augmented reality, and virtual reality technology create opportunities for more engaging, more effective training. Gaming is also being incorporated into workplace training because of its emphasis on interactive learning and decision making (without real-world consequences). Thailand has begun to explore the potential to deploy these innovations with the Thailand Cyber University project, which is a portal for online learning.

International spotlight 4.9 Singapore's SkillsFuture Credit

The SkillsFuture Singapore Agency encourages workers to attend accredited skills courses using financial incentives including the SkillsFuture Credit, which provides S\$500 to all workers above age 25 for skills development and lifelong learning (World Bank 2020b). The S\$500 training voucher does not expire. A top-up of S\$500 was recently provided to Singaporeans who are 25 and older by December 31, 2020. The top-up expires at the end of 2025. An additional top-up (over the first one) of S\$500 is provided to every Singapore citizen between the ages of 40 and 60 to improve their access to career transition programs. This top-up expires at the end of 2025. There were 146,000 participants in 2018, representing 4 percent of the labor force. Singapore's overall skills development approach prioritizes lifelong learning over the provision of industry-specific skills. While this approach to individual training is promising, good design and implementation are keys to success (OECD 2019b).

Training programs need to recognize that adult learners face different challenges than children and youth learners. Challenges to adult learners include reduced neurological plasticity and increased entrenchment, which make adult brains less adept at noticing and learning from certain types of information, such as written letters or characters (Bendini, Levin, and Oral-Savonitto 2019). However, these challenges can be addressed by adapting learning strategies to the needs of adults—for example, repeating new information across multiple sessions (spaced learning) or in different contexts (multi-modal learning). Adult learners also respond well to lessons that are engaging, relevant to their lives, and based on their personal learning goals as well as lessons that include rewards and positive feedback. Reviews have found that adult literacy programs are most likely to succeed when they target emerging literacy skills, while more research is needed on why programs targeting higher literacy levels struggle to succeed. Mexico’s NEUROALFA reading program is a notable exception. The program used an understanding of adult neurology to design a curriculum that adjusted its teaching method as adult learners progressed and succeeded in advancing students beyond emerging literacy to full reading comprehension. Research on training programs targeted to older people also has found that programs should value and use experience, recognize the diversity of the older people being trained, and prioritize the use, not just the acquisition, of skills (Field and Canning 2014). In addition, programs for older people need to recognize that many older people have low levels of education and may need to acquire foundational skills (international spotlight 4.10).

To be effective, upskilling and reskilling systems need to be informed by labor market information and linked to employment services. Adapting training to labor market demand is a critical factor of successful programs. As described in the context of formal TVET, a labor market information system that can reveal skills needs and provide this information to training institutions, students, and other labor market stakeholders is a key element of adapting training programs in this way. A particularly promising approach to revealing and communicating labor market demand is the creation of occupational or skills shortage lists. These lists typically collect new and gather existing information on the labor market, use this information to identify occupational and skills gaps, and then communicate these gaps to the training and educational institutions that can help to fill them (international spotlight 4.11). Job matching and placement services can build on the foundation of labor market information to guide beneficiaries of training programs to jobs that are in demand. These services can be particularly important for helping less-skilled workers to find better jobs. Less-skilled workers frequently rely on friends and family during job search. Research on Thailand has shown that relying on social networks reduces the duration of job search but also funnels internal migrants into agricultural jobs (Swee 2017). Advances in the collection and processing of data and the spread of digital technologies have led to advances in the ability to collect up-to-date, detailed labor market information and to deliver employment services to hard-to-reach populations (international spotlight 4.12).

International spotlight 4.10 New approaches to building skills in adults

Several countries in the East Asia and Pacific region have implemented adult literacy programs that are consistent with best practices for teaching adult learners (Bendini, Levin, and Oral-Savonitto 2019). For example, in **Vietnam** community learning centers offered literacy and “postliteracy” classes as part of a national literacy campaign targeting women and ethnic minorities. Teachers in these programs were trained in adult learning methods, and clear goals were set for different learning levels. Furthermore, assessments were made of the needs of local communities and the aspirations of individual participants; classes were offered in both Vietnamese (Kinh) and ethnic minority languages.

In **Cambodia**, Oxfam supplied pink phones to rural women who attended adult literacy programs, in part to give them an opportunity to practice their literacy skills through text messaging outside of the classroom.

International spotlight 4.11 Using Critical Occupations Lists to identify demand

The government of **Malaysia** formed a Critical Skills Monitoring Committee to create a Critical Occupations List (COL) that would identify occupations that are skilled, in shortage, and strategic (CSC 2019). The COL is created through a “top-down” approach that uses objective evidence to determine whether an occupation is sought-after by employers. This evidence is then combined with evidence from a “bottom-up” approach that uses subjective evidence from labor market stakeholders such as employers and industry associations to build the evidence based on occupational shortages and provide context about occupations and why shortages have emerged. Engagement with industry is key for success of the “bottom-up” approach, which involves a large-scale, but not representative, survey of employers and in-depth consultations with employers and industry associations. **Indonesia** has recently created a similar COL.

International spotlight 4.12 Improving labor market information and employment services with technology

Real-time labor market information complements data collected from traditional sources. Traditional labor market information (LMI) is collected through government-administered censuses and surveys. This information tends to be reliable and representative, but it often lacks detail and is produced only infrequently. Real-time labor market information, in contrast, is collected from many sources, including online job postings, résumés posted online, Twitter feeds, and Google searches. Real-time LMI is generated constantly and typically produces detailed data about job openings and worker skills. The constant updating and detail of real-time LMI thus complements the reliability and representativeness of traditional LMI.

Many countries in the East Asia and Pacific region and throughout the world use real-time labor market information to improve their insight into the labor market. **Australia** and **New Zealand** have created vacancy indexes based on online job advertisements to monitor demand in hundreds of occupations. **Malaysia** has incorporated real-time labor market information into its Critical Occupations List (COL), which identifies occupations that are in demand in the labor market. Online job postings data are incorporated into the COL to indicate demand but also to provide detailed insights into the skills required for each occupation in high demand. In **Singapore** SkillsFuture Singapore uses a wide range of labor market information, including online job postings, to identify key skills needed and to inform training programs for lifelong learning.

Technology is increasingly being incorporated into employment services, particularly as concerns about skills mismatches grow. The changing demand for skills associated in part with new and more quickly evolving technologies is accompanied by a more challenging search environment for job seekers, who need to understand how demand is changing. Emerging tools are using technology to improve the delivery and the quality of information provided to job seekers. A field-in-the-lab experiment in the **United Kingdom** provided a web-based tool that displayed relevant alternative occupations and associated jobs to job seekers at computer facilities (Belot, Kircher, and Muller 2019). The tool expanded the jobs considered and increased the number of job interviews, particularly for participants who had been unemployed for a few months. In **Peru**, text messages that informed job seekers about job opportunities matching their profiles had a positive impact on employment (Dammert, Galdo, and Galdo 2015).

Policy area #5: Leverage opportunities created by population aging

Thailand could also leverage opportunities created by population aging by investing in its care workforce. As described in part 3, the aging of Thailand's population will create additional opportunities for care work. But filling these opportunities may be challenging given the typically difficult conditions of jobs that provide care services. Raising the skill level of care providers through formal and nonformal training could be a first step in professionalizing care. Such training could target low-skill, unemployed workers, given the availability of employment opportunities after training—for instance, home-based care is one of the fastest-growing care occupations. Investments in ICT could improve working conditions and be coupled with training in digital skills to allow care workers to complement new technologies (ILO and OECD 2019). Efforts to expand social protection coverage could focus on care jobs. Specialized skills will also be increasingly in demand as NCDs such as Alzheimer's, dementia, and Parkinson's are becoming more prevalent. These diseases require skilled care workers. Finally, the migration of care workers could be facilitated to meet the growing demand for certain types of work that cannot be filled domestically. This effort may require changing regulations that make it difficult for overseas care workers to work in Thailand, such as the requirement for nurses to be proficient in the Thai language (Natali, McDougall, and Stubbington 2014).

These efforts could be linked to the promotion of Thailand as a destination for older tourists, retirees, and medical tourists. Since the late 1980s, the government has promoted Thailand as a destination for retirees from abroad (Niyomsilpa 2020). Since

the early 2000s, the government has also promoted medical tourism through the Center of Excellent Health Care of Asia initiative and tax exemptions for investments in health facilities for medical tourists (Noree, Hanefeld, and Smith 2016). Investments being made in the domestic market for older local people could also be promoted for older people from abroad. Indeed, "medical cities" targeted to both Thai and foreign retirees have already been created (Setboonsarng and Thepgumpanat 2018). Tourism opportunities for older people could be linked to care and wellness activities, stimulating demand for care work for short-term stays and potentially for longer-duration stays given the potential to attract older people back to Thailand for retirement (EIC 2017). Improving the availability and skill level of the workforce of caregivers would help Thailand to improve its attractiveness as a destination for older people from abroad. Foreign language skills would be particularly important for care workers serving this population.

Other opportunities in the so-called silver economy will also create opportunities in Thailand. As older people live longer, they will have additional opportunities to consume. For example, demand for senior housing and care facilities will increase. The Thailand Board of Investment identifies growth opportunities in medical devices, medical food and food supplements, smart devices to facilitate "aging at home," telemedicine, and real estate, among others (Thailand Board of Investment 2019). Investments in these areas will generate additional employment opportunities as a result of Thailand's aging population. Assessments of the types of skills in demand in these potential growth sectors will be important to ensure that a qualified workforce is in place to meet the demand as it arises.

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APPENDIX A

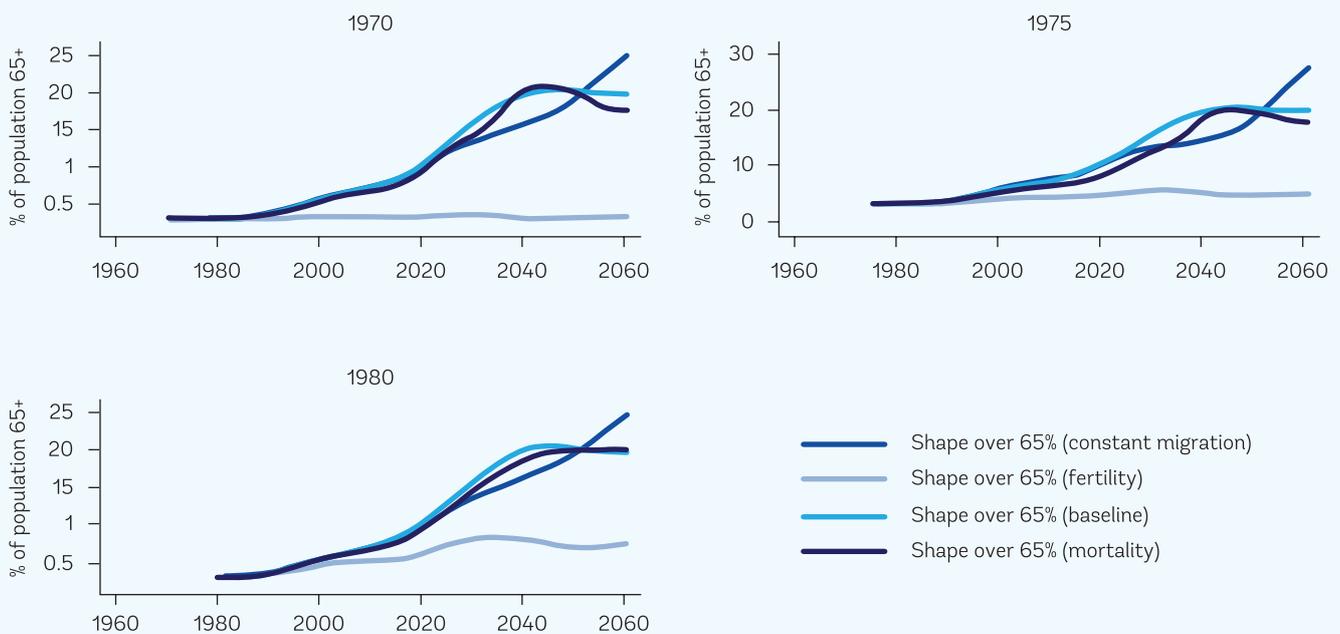
DECOMPOSITION OF THE DEMOGRAPHIC DETERMINANTS OF AGING IN THAILAND

The demographic determinants of aging in Thailand are assessed using counterfactual projections of population. This involves comparing actual outcomes with results when controlling for fertility, mortality, and migration. Although alternative methods are available, such as the Preston, Himes, and Eggars (PHE) method, the

data intensiveness of the PHE approach means that it cannot be used for Thailand (Preston and Stokes 2012). Simulations are run using the DemProj module in the Spectrum Model from Avenir Health.²³ All projections use demographic data from the United Nations World Population Prospects Revision 2017 (UN 2017). The scenarios compare actual population aging to what would have occurred if fertility, mortality, and migration had remained constant. The results of counterfactual population projections have the unattractive property of being sensitive to the year chosen to start the simulations (Murphy 2016, 2017). To show robustness, projections are undertaken for three different start years (1970, 1975, and 1980). Projections are also undertaken using three different measures of population aging: share of the population 65 and older (figure A.1), average age (figure A.2), and old-age dependency ratio (figure A.3).

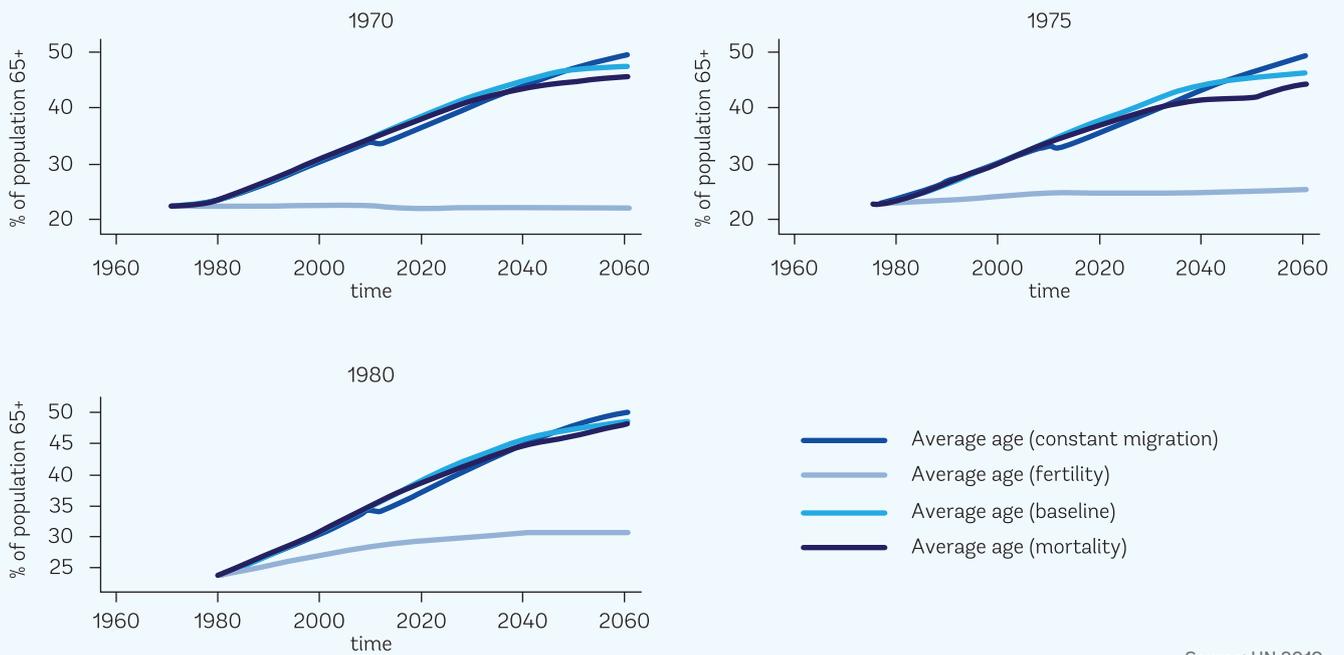
²² See <https://www.avenirhealth.org/software-spectrum.php>.

Figure A.1 Share of population 65+ in Thailand under different demographic scenarios, 1970, 1975, and 1980



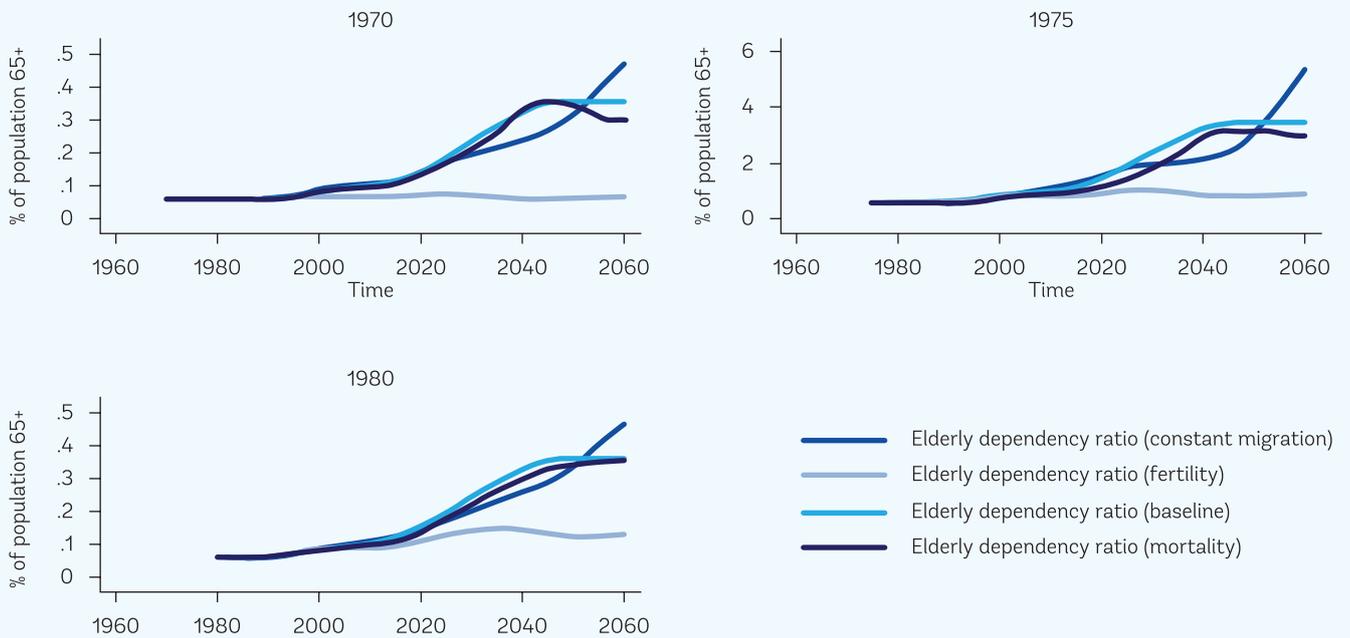
Source: UN 2019.

Figure A.2 Average age of population in Thailand under different demographic scenarios, 1970, 1975, and 1980



Source: UN 2019.

Figure A.3 Elderly dependency ratio in Thailand under different demographic scenarios, 1970, 1975, and 1980



Source: UN 2019.

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APPENDIX B

CREATING THE JOB QUALITY INDEX

We follow Del Carpio, Gruen, and Levin (2017) to create an index of job quality. We select seven indicators of job quality: being underemployed, being self-employed, working in a second job, working in the informal sector, being overqualified, being hurt at work, and having issues at work (for example, feeling unsafe or being overworked). These measures are all directly available from the 2019 Labor Force Survey except for being overqualified. To determine how qualified a worker is for an occupation, we find the median years of education attained by workers in an occupation-sector cell and code workers as overqualified if they have more education than this median value. We also test using the 75th percentile and find similar results.

Traditional principal component analysis (PCA) is conducted on the Pearson correlation matrix of the variables. All variables are assumed to be continuous and normally distributed. If the variables are discrete, the Pearson correlation matrix likely underestimates the correlation between the variables biasing the subsequent PCA. All of our variables of interest are indicators that represent a dimension of an individual's job quality. Thus we conduct the PCA on a polychoric correlation matrix. Polychoric correlation techniques find the correlation between the latent variables that produce the observed indicators. The results from the PCA can be found in table B.1. Eigenvalues represent the variances of the principal components; therefore, it is common practice to use only components with variances greater than unity. In our case, only the first component meets this selection criteria. Table B.2 shows how this component correlates with each variable. It is noteworthy that it is positively correlated with all of the variables we assume to be indicators of lower-quality jobs. To make the index easier to interpret, we standardize the first component over each year and multiply by -1. Therefore, an index value of 1 indicates having a job that is 1 standard deviation above the mean job quality in a year. Figure B.1 presents the jobs quality index.

Table B.1 Results of principal component analysis

Factor	Eigenvalue	Difference	Proportion
Factor 1	1.81	1.10	0.78
Factor 2	0.71	0.53	0.31
Factor 3	0.18	0.18	0.08

Source: Thailand Labor Force Survey 2019.

Table B.2 Correlation of selected components of principal component analysis with each job quality indicator

Variable	Correlation
Underemployed	0.23
Self-employed	0.84
Work in informal sector	0.92
Overqualified	0.06
Hurt at work	0.35
Issues at work	0.27

Source: Thailand Labor Force Survey 2019.

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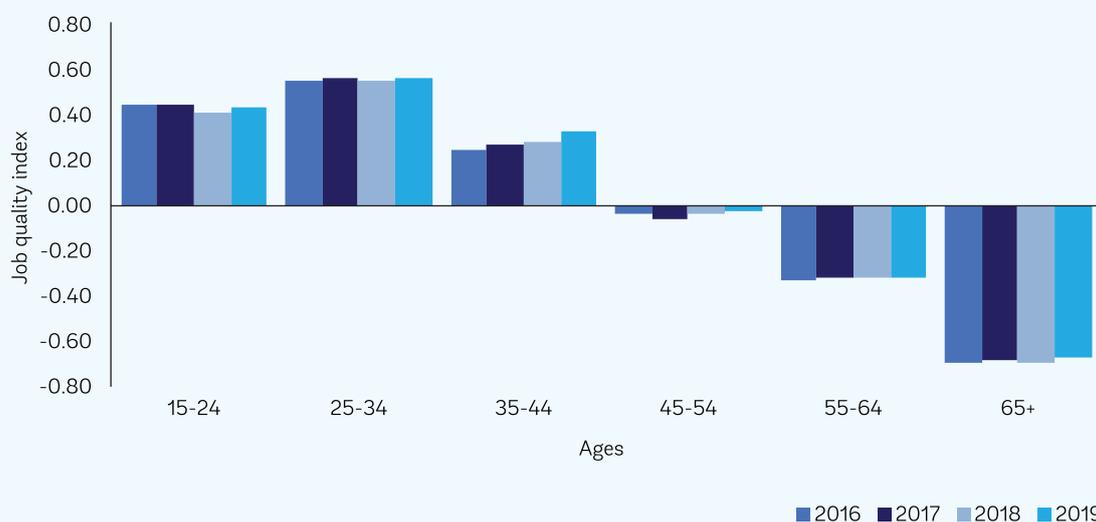
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Source: Thailand Labor Force Survey 2019.

Figure B.1 Job quality index for Thailand, by age, 2016–19



Source: Thailand Labor Force Survey 2016–19.

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APPENDIX C

THE DETERMINANTS OF LABOR FORCE PARTICIPATION AMONG OLDER PEOPLE

$$L_{ihp}^S = \beta_1 X_{ihp} + \beta_2 H_{hp} + \eta_p + u_{ihp}, \quad (C.1)$$

where X_{ihp} is a vector containing the following characteristics for individual i , in household h , located in province p : age, age squared (as a proxy for years of completed education), a dummy for marital status, and health status indicators. The following household-level variables are included in H_{hp} : coverage by private pension, coverage by government pension and/or government disability assistance, number of children (less than 15 years old) in the household, and daily per capita consumption (logged).²⁴ To control for unobserved characteristics at the province level, we include province-level fixed effects that isolate variation between households within a province. To investigate any heterogeneous effects over urban/rural and male/female dimensions, we estimate the model over four subsamples, which are listed above each column in table C.1. As our goal is to investigate the labor supply decisions of older people, we follow the previous literature and restrict our sample of interest to household members age 45 or older. The coefficients reported in the table are marginal effects.

²⁴ Any relationship between labor force participation and household consumption in this noncausal analysis most likely runs in both directions and would be difficult to disentangle into clear causal channels. However, omitting consumption would likely introduce bias into the main variable of interest: access to pensions. Regardless, when reestimating all models omitting consumption, the results are not affected.

A linear probability model with province-level fixed effects is used to study the determinants of labor force participation in Thailand. In order to control for pension coverage and other income-related covariates, we use data from the 2017 round of Thailand's Household Socioeconomic Survey. As discussed in Giles, Wang, and Cai (2012), education, health, pension coverage, and various household-level covariates play influential roles in explaining the labor supply decisions of older people. Following Giles, Wang, and Cai (2012), we estimate the following model to investigate the marginal effects of each of these attributes:

Table C.1 Regression results of determinants of labor force participation in Thailand

Variable	Full sample (1)	Urban males (2)	Urban females (3)	Rural males (4)	Rural females (5)
Receive contributory pension	-0.330*** (0.0250)	-0.383*** (0.0340)	-0.210*** (0.0295)	-0.439*** (0.0299)	-0.199*** (0.0362)
Receive noncontributory pension	-0.0359* (0.0185)	-0.0755*** (0.0216)	-0.0414* (0.0235)	-0.0127 (0.00835)	0.0168 (0.0141)
Age	0.0188** (0.00841)	0.00261 (0.0111)	-0.0101 (0.0102)	0.0454*** (0.00596)	0.0252*** (0.00810)
Age sq.	-0.000317*** (6.73e-05)	-0.000201** (8.77e-05)	-9.80e-05 (8.23e-05)	-0.000520*** (5.09e-05)	-0.000393*** (6.81e-05)
Years of education	-0.000429 (0.00124)	-0.00488*** (0.000934)	-0.00138 (0.00206)	-0.00162* (0.000937)	-0.000516 (0.00163)
Married=1	0.0213 (0.0219)	0.0481 (0.0363)	-0.0879*** (0.0187)	0.0993*** (0.0240)	-0.00114 (0.0235)
# of children in HH	-0.0106*** (0.00397)	0.00560 (0.00520)	-0.0246*** (0.00545)	0.00534 (0.00534)	-0.0433*** (0.00720)
Ln daily consumption	0.0206*** (0.00591)	0.0274*** (0.00660)	0.0208* (0.0118)	0.0484*** (0.00955)	0.0178 (0.0118)
Can you take care of yourself?	-0.0436 (0.0341)	-0.0780 (0.0525)	-0.0857* (0.0486)	0.0139 (0.0511)	0.0906 (0.0764)
Can you go out w/o assistance?	0.184*** (0.0257)	0.199*** (0.0279)	0.0990*** (0.0339)	0.202*** (0.0390)	0.137*** (0.0446)
Physical/intellectual disability	-0.270*** (0.0180)	-0.282*** (0.0323)	-0.206*** (0.0496)	-0.314*** (0.0274)	-0.284*** (0.0353)
Observations	20,759,585	4,502,707	4,366,216	6,173,198	5,717,464
R-squared	0.331	0.481	0.273	0.458	0.280
Overall LFP	.73	.74	.60	.82	.71
Province FE	YES	YES	YES	YES	YES

Source: Thailand Socioeconomic Survey 2017.

Note: Robust standard errors are in parentheses. Errors are clustered by province.

*** p<.01 ** p<.05 * p<.1

Consistent with previous literature, pension coverage is associated with a decline in labor force participation. The estimated coefficients imply that access to a private pension has an outsized effect on labor supply. For example, on average, receipt of a private contributory pension decreases the probability of participating in the labor force by 33 percent, while access to a government-sponsored pension decreases participation by only 3.6 percent. This is driven by the fact that private pensions dwarf government pensions in terms of financial support provided.²⁵ However, the marginal effects are somewhat misleading, as the coverage of private pensions is low in Thailand. In the full sample, only 5 percent of the population has access to a private pension. Conversely, government pensions have much more universal coverage, at 67 percent of the sample. Thus, in aggregate, a small number of labor supply decisions are ultimately changed due to private pension coverage.

Poor health and care obligations also affect labor force participation. We use responses to three individual-level questions to investigate the effects of health on labor supply decisions. Estimated coefficients on two of the three dummies representing these questions imply that if respondents can go out without assistance and do not have any disabilities, they are more likely to participate in the labor market. An interesting heterogeneous effect is that the presence of children in the household has a disproportionately negative effect on female labor supply. Additionally, an increase in children decreases the labor supply of women more in rural areas than in urban areas.

²⁵ In the full sample, the median amount of annual government and private pensions is B 12,000 and B 288,000, respectively.

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APPENDIX D

THE ROUTINE INTENSITY, AGE STRUCTURE, AND AUTOMATABILITY OF OCCUPATIONS

In their seminal paper, Autor, Levy, and Murnane (2003) hypothesize that occupations requiring routine, programmable skills would be at risk of being automated. Conversely occupations that use non-routine cognitive, analytical, and interpersonal skills would be “safe” from automation. Acemoglu and Autor (2011) build on this work by identifying 16 task-skill measures from the United States O*NET database of occupational characteristics and then use them to construct five categories of routine and nonroutine tasks: nonroutine cognitive analytical tasks, nonroutine cognitive interpersonal tasks, and nonroutine manual physical tasks, which are less susceptible to automation, and routine cognitive and routine manual tasks, which are more susceptible to automation.

We replicate this methodology for Thailand by applying task intensity scores from O*NET to Thailand’s labor force structure. We translate the United States Department of Labor’s Standard Occupational Classification (SOC) codes to the International Standard Classification of Occupations (ISCO) occupational coding scheme used in Thailand’s Labor Force Survey. Crosswalks provided by Wojciech Hardy from the Institute for Structural Research and Faculty of Economics, University of Warsaw²⁶ are used to merge SOC-10 measures to ISCO-08 codes. Where multiple SOC-10 occupations map to a single ISCO-08 occupation, a simple average is taken to obtain a single score. Where multiple ISCO-08 occupations map to a single SOC-10 occupation, the task score for the single SOC-10 occupation is mapped to all corresponding ISCO-08 occupations. To ensure that a shift in survey sampling undertaken between 2013 and 2014 is not driving our results, we also run all models presented in this section using end dates that vary from 2010 to 2019. We find that none of the coefficients of interest change qualitatively, suggesting that our estimates are not a result of the change in survey design.

We are most interested in how the intensity of these five categories of tasks vary by age. To show that some occupations attract younger workers more than others, we follow the methodology proposed in Autor and Dorn (2009) and create a routine task index (RTI):

$$RTI_i = \ln \left(\frac{R_i}{M_i} \right), \quad (D.1)$$

where R_i is the summation of occupation i ’s routine manual and routine cognitive task scores and M_i is the summation of occupation i ’s nonroutine manual and nonroutine cognitive task scores. The index is then standardized to have a mean of 0 and a standard deviation of 1 in 2001. Therefore, any coefficient in front of RTI can be understood as the effect of a job increasing 1 standard deviation in the distribution of the routine task index.

The results show that the labor force in occupations favoring routine over nonroutine skills is getting older due to younger workers disproportionately entering occupations favoring non-routine skills. Table D.1 shows that a 1 standard deviation increase in the RTI score of an occupation increases the average age of that occupation by 1.14 years from 2001 to 2019. This increase in average age can be attributed to a decrease in the attractiveness of these occupations to younger workers entering the labor force. This claim is supported by the fact that an increase in RTI in 2001 decreases the share of younger workers entering that occupation in 2019 compared to 2001, but increases the share of prime-age and older workers entering that occupation. Young workers who entered more routine jobs in 2001 are now aging into their prime years, thus explaining the increase in the share of prime-age workers found in these occupations (table D.1). As an example, the three occupations with the highest RTI scores—woodworking-machine tool setters and operators (ISCO-08 7523), hand launderers and pressers (9121), and printers (7322)—experienced increases in average age of 3.46, 6.07, and 6.85 years, respectively, between 2001 and 2019. This substantial increase in average age is driven by younger workers not entering these occupations. These results are robust to controlling for contemporaneous changes in occupations’ shares of employment (second row of table D.1).

²⁶ See <https://ibs.org.pl/en/resources/occupation-classifications-crosswalks-from-onet-soc-to-isco/>.

Table D.1 Regression results of age structure and routine intensity of occupations in Thailand, 2001–19

Variable	Δ mean age (1)	Δ share of workers in age bracket		
		Young 16–34 (2)	Prime 35–54 (3)	Older 55+ (4)
Occupation’s routine task intensity in 2001	1.14*** (0.26)	-5.61 *** (1.40)	4.41*** (1.34)	1.21 (1.01)
Δ occupation’s share of total employment (percentage points)	0.07 (0.14)	0.0749*** (0.83)	0.93** (0.40)	-1.00 (0.90)
Observations R-squared	211 0.20	211 0.18	211 0.11	211 0.20

Source: Thailand Labor Force Survey 2001 and 2019.
 Note: Robust standard errors are in parentheses.
 *** p<.01 ** p<.05

We also investigate the automatability of occupations using Frey and Osborne (2017), who construct the probability of automation for 702 detailed occupations in the United States. They argue that the calculated probabilities are a better measure of automation in the future than the task intensities defined in Autor, Levy, and Murnane (2003) because tasks that were previously seen as non-routine—and therefore not automatable—have been made automatable by recent advances in big data and machine learning algorithms. While these measures are more forward looking, we also run the same regressions above but replace an occupation’s RTI with its

probability of automation. The results are qualitatively the same.

By using data from O*NET, this methodology relies on the assumption that occupations in Thailand use the same set of tasks as occupations in the United States because the task intensities from the United States (that is, from O*NET) are applied to occupations in Thailand. There is some evidence that the skills needed in occupations are different in low-income countries than in the United States. However, this evidence is for poorer countries than Thailand (Dicarlo et al. 2016).

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APPENDIX E

SIMULATIONS OF THAILAND'S LABOR FORCE UNDER DIFFERENT SCENARIOS OF LABOR FORCE PARTICIPATION AND INTERNATIONAL MIGRATION

To illustrate the effectiveness of three main classes of policy response to a decrease in labor supply due to an aging population, we construct a series of simulations. To increase the comparability across policies, we show simulated effects not only for Thailand but also for comparator countries in the East Asia and Pacific region. Data for Thailand are from the Labor Force Survey 2016–18. Data for all other countries are from the International Labour Organization (ILO). Four scenarios are undertaken: increasing the old-age labor force participation rate, increasing the female labor force participation rate, expanding temporary migration, and expanding permanent migration.

INCREASING THE OLD-AGE LABOR FORCE PARTICIPATION RATE

One way to dampen the effects of population aging on the labor supply is to delay retirement to shift the drop-off in labor force participation at age 55 to a later age. To simulate this effect, we assume that the labor force participation rates of male and female age groups 55 to 59, 60 to 64, and 65+ converge linearly to 2060 to the 95th percentile of the corresponding labor force participation rate in high-income countries in the East

Asia and Pacific region. Countries with labor force participation rates above this target are left unchanged. For context, table E.1 shows the simulated increases in labor force participation rates by age group and gender in Thailand.

INCREASING THE FEMALE LABOR FORCE PARTICIPATION RATE

There is a large gender gap in Thailand. Policies could help to close this gap by encouraging more women to enter and remain in the labor force, thereby counteracting some of the negative effects of population aging on labor supply. To simulate this, we allow the labor force participation curve of women to converge to the labor force participation curve of men in all countries. To put this in context, the smallest prime-age (40–44) gender gap in upper-middle-income countries in the East Asia and Pacific region is 10 percent. We allow convergence to occur in a linear fashion from 2020 to 2060.

EXPANDING TEMPORARY MIGRATION

As international migrants tend to be younger and to work at higher rates than locals, they can provide a positive shock to labor supply. To simulate the effect, we shock the domestic labor supply with temporary migrants ages 25–34 who arrive every 10 years, have no children, adopt identical mortality rates as natives, and then leave after 10 years. We assume that after the shocks occur, 20 percent of the labor supply in the 25–34 age group is made up of new migrants. We assume that these migrants entered the country to work and therefore have labor force participation rates of 100 percent during their stay. This implies that the fraction of the labor supply that is migrant workers is allowed to fluctuate in the years between shocks depending on the change in the labor force participation behavior of locals as they age: migrants die at the same rate as locals, so if the labor force participation of locals is higher in the next period, the fraction of migrants will be lower than 20 percent.

Table E.1 Increases in labor force participation rates under scenario #1, by age and gender

Increase in labor force participation rate	Male	Female
55-59	10	17
60-64	19	24
65+	8	8

Source: Thailand Labor Force Survey 2016–18; UN 2017.

EXPANDING PERMANENT MIGRATION

Permanent migration could represent a positive shock to labor supply in the same way as temporary migration, but would do so over a longer period and with migrants who age. To simulate this, we shock the domestic labor supply. The medium variant of the United Nations World Population Prospects (UN WPP) 2019 includes projected international migrants by 10-year age groups in 5-year periods. Unlike in the temporary scenario, the assumed shocks persist through the whole lifetime of the migrants. To simulate this permanent “churn” of migrants, we multiply the labor force by sex and for the appropriate age group by a constant fraction to get a shock that constitutes 10 percent of the labor force. This simulation can fail if the growth rate in international migration varies dramatically from year to year. To simplify the simulation, these migrants are assumed not to have children but to age at the same rate as the local population. This implies that any increases in labor supply caused by this shock should be seen as a lower bound, as it is likely that migrants would have children that would eventually supply a secondary youth shock to the labor force. A discussion

with some suggestive evidence about this secondary shock is presented next.

ROBUSTNESS CHECKS OF PERMANENT MIGRATION ASSUMPTIONS

To show the impact of this assumption, Table E.2 shows the shock and the resulting labor force for a cohort that ages one period where X , I , s , and l represent the local population, projected international migration, survival rate from period to period, and the labor force participation rate, respectively. Period 1 and period 2 rows represent the population at age group 1 and 2, respectively.

This results in an “extra” $0.11\ell_t I_t$ in every period. The growth rate in the migration shock from period 1 to period 2 is written as follows:

$$g_m = \underbrace{\frac{(s_1 - 1)}{X_1 + I_1}}_{\text{decay of current pop}} + \underbrace{\frac{I_2}{X_1 + I_1}}_{\text{migration as frac of current pop}} \quad (\text{E.1})$$

Table E.2 Increases in labor force participation rates under scenario #1

a. Migration shock

Cohort	UN WPP population	Migration shock	Total labor force
Period 1, age group 1	$X_1 + I_1$	$0.11(X_1 + I_1)$	$\ell_1(X_1 + I_1) + 0.11(X_1 + I_1)\ell_1$
Period 2, age group 2	$s_1(X_1 + I_1) + I_2$	$0.11(s_1X_1 + s_1I_1 + I_2)$	$\ell_2(s_1X_1 + I_2) + 0.11(s_1X_1 + s_1I_1 + I_2)\ell_2$

b. Ideal migration shock

Cohort	UN WPP population	Migration shock	Total labor force
Period 1, age group 1	$X_1 + I_1$	$0.11(X_1 + I_1)$	$\ell_1(X_1 + I_1) + 0.11(X_1 + I_1)\ell_1$
Period 2, age group 2	$s_1(X_1 + I_1) + I_2$	$0.11(s_1X_1 + s_1I_1)$	$\ell_2(s_1X_1 + s_1I_1 + I_2) + 0.11(X_1 + I_1)\ell_2s_1$

Note: UN WPP = United Nations World Population Prospects.

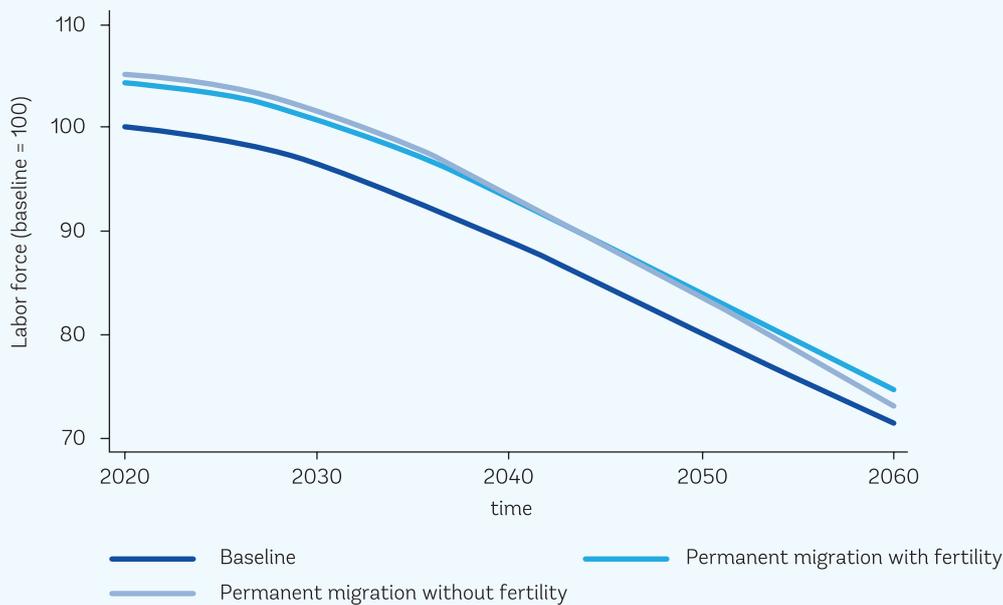
In order for our simulations to be consistent with the experiment of a permanent shock that decays with the mortality of the current population, we need the projected migrant shock in the next period-age group to be a small fraction of the current population. This assumption is most likely satisfied. For example, using United Nations data on net migration and the local population, we can roughly calculate the second term in the g_m equation. Dividing the number of migrants age 30–34 in 2019 by the sum of migrants age 25–29 in 2018 and the local population age 25–29 produces a figure of 0.6 percent.²⁷ This addition to the growth rate makes our simulated labor force larger than the labor force if the migrant shock had been simulated such that the migrant population declines at the same rate as the local population.

To test the effect of migrants having children on the future labor force, we use software provided by Avenir Health. The Spectrum software allows users to modify the initial population used in projecting future population by gender and age. The software comes preloaded with the UN WPP 2017 revision, while the rest of the simulations use the 2019 revision. Given that the underlying data are different, these robustness simulations should

not be compared to the other simulations in this section. We run three simulations on Thailand. To begin, we run the Demproj module with the preloaded UN WPP 2017 data for Thailand and compute baseline projections of the labor force using the average labor force participation rates from the 2016–18 Thailand Labor Force Survey. We then simulate a one-time permanent migration shock that constitutes 20 percent of the 2020 labor force and assume that migrants adopt identical mortality and labor force participation rates as locals, but have no children. Finally, we simulate the same permanent migrant shock, but now migrants not only adopt the mortality and labor force participation behavior of locals, but they also adopt the same fertility rates. Figure E.1 shows the percent change in total labor force from the baseline labor force in 2020 (that is, the baseline labor force in 2020 is set to 100). As the figure shows, as the migrant stock with no children ages out of the labor force, the labor force returns to the baseline. The migrant stock with children supports a larger labor force, which begins to emerge in 2060.

²⁷ The age groups 30–34 and 25–29 were selected because they produce the largest growth rate, providing somewhat of an upper bound on the error.

Figure E.1 Robustness simulation of expanded permanent migration with migrants adopting the fertility patterns of locals



Source: UN 2017.

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APPENDIX F

DEFINING CARE JOBS

The International Labour Organization (ILO) defines a methodology for identifying care jobs based on its definition of care work as “activities and relations involved in meeting the physical, psychological, and emotional needs of adults and children, old and young, frail and able-bodied” (ILO 2018, 6). With access to more detailed occupational data, we adjust this methodology to rely only on a

worker’s occupation to define whether the worker is employed in care work. Facing data constraints to working with data from multiple countries, the ILO uses a combination of occupation and sector to define care jobs. Focusing on occupation alone allows us to focus specifically on whether an occupation involves care-type responsibilities and avoids including individuals working in care sectors but not in care occupations. The ILO’s definition of care work is fairly broad, encompassing both health and education. We disaggregate these types of services to provide a more detailed view of the care sector. Table F.1 shows the occupations that are defined as care jobs.

Table F.1 Care jobs

ISCO-08 code	ISCO-08 title	Type
1341	Child care service managers	Child care
1342	Health service managers	Health
1343	Aged care service managers	Health
1344	Social welfare managers	Social work
1345	Education managers	Education
2211	Generalist medical practitioners	Health
2212	Specialist medical practitioners	Health
2221	Nursing professionals	Health
2222	Midwifery professionals	Health
2230	Traditional and complementary medicine professionals	Health
2240	Paramedical practitioners	Health
2261	Dentists	Health
2262	Pharmacists	Health
2263	Environmental and occupational health and hygiene professionals	Health
2264	Physiotherapists	Health
2265	Dieticians and nutritionists	Health
2266	Audiologists and speech therapists	Health
2267	Optometrists and ophthalmic opticians	Health
2269	Health professionals not elsewhere classified	Health
2310	University and higher education teachers	Education
2320	Vocational education teachers	Education
2330	Secondary education teachers	Education
2341	Primary school teachers	Education
2342	Early childhood educators	Child care
2351	Education methods specialists	Education
2352	Special needs teachers	Education
2353	Other language teachers	Education
2354	Other music teachers	Education
2355	Other arts teachers	Education
2356	Information technology trainers	Education
2359	Teaching professionals not elsewhere classified	Education
2634	Psychologists	Health
2635	Social work and counselling professionals	Social work
3211	Medical imaging and therapeutic equipment technicians	Health
3212	Medical and pathology laboratory technicians	Health

ISCO-08 code	ISCO-08 title	Type
3213	Pharmaceutical technicians and assistants	Health
3214	Medical and dental prosthetic technicians	Health
3221	Nursing associate professionals	Health
3222	Midwifery associate professionals	Health
3230	Traditional and complementary medicine associate professionals	Health
3251	Dental assistants and therapists	Health
3252	Medical records and health information technicians	Health
3253	Community health workers	Health
3254	Dispensing opticians	Health
3255	Physiotherapy technicians and assistants	Health
3256	Medical assistants	Health
3257	Environmental and occupational health inspectors and associates	Health
3258	Ambulance workers	Health
3259	Health associate professionals not elsewhere classified	Health
3412	Social work associate professionals	Social work
5152	Domestic housekeepers	Support services
5162	Companions and valets	Support services
5311	Child care workers	Child care
5312	Teachers' aides	Education
5321	Health care assistants	Health
5322	Home-based personal care workers	Health
5329	Personal care workers in health services not elsewhere classified	Health
9111	Domestic cleaners and helpers	Support services

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WORLD BANK GROUP
Social Protection & Jobs



World Bank Group, Siam Piwat Tower, 30th Floor, 989 Rama I Road, Pathumwan, Bangkok 10330

Email. thailand@worldbank.org | Tel. 0-2686-8300



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