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THAILAND MANUFACTURING FIRM PRODUCTIVITY REPORT

BANK OF THAILAND WORLD BANK GROUP

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Abbreviations

AFC	Asian Financial Crisis
BOI	Board of Investment
BTI	Transformation Index Indicators
CAK	Competition Authority of Kenya
CCP	Central Committee on the Price of Goods and Services
CCSA	Competition Commission of South Africa
EEC	Eastern Economic Corridor
EGAT	Electricity Generation Authority of Thailand
FDI	Foreign Direct Investment
FY	Fiscal Year
GDP	Gross Domestic Product
GFC	Global Financial Crisis
LTGM	Long-Term Growth Model
ICOR	Incremental Capital-Output Ratio (ICOR)
MOC	Ministry of Commerce
MRPK	Marginal Revenue Product of Capital
PCT	Patent Cooperation Treaty
PICS	Productivity and Investment Climate Survey
SME	Small and Medium Enterprises
SOE	State-Owned Enterprise
TCC	Trade Competition Commission
TEP	Total Factor Productivity
TFPQ	Output-based Total Factor Productivity
TFPR	Revenue-based Total Factor Productivity
UMIC	Upper Middle-Income Country
WDI	World Development Indicators
yoy	year-on-year

Preface

The Thailand Manufacturing Firm Productivity Report is a joint research product of the World Bank and the Monetary Policy Department of the Bank of Thailand.

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Executive Summary

Thailand's 20-year national development strategy targets a transition from upper-middle-income to high-income status by 2037.

Thailand is an enduring development success story. Between the late 1960s and mid-1990s, strong and sustained economic growth propelled the country from low-income to upper-middle-income status. To achieve high-income status by 2037, the authorities will need to draw on the experiences of other upper-middle-income countries that have successfully completed the transition, as well as those that continue to struggle.[1]

In the wake of the 1997 Asian financial crisis (AFC), Thailand's long-run economic trajectory has diminished, and productivity growth remains weak.

Thailand's economy grew at an average rate of 7.7 percent from 1980-1996, supported largely by capital accumulation and a manufacturing-focused, export-oriented growth model. During this period, labor shifted from agriculture to manufacturing, and structural economic transformation enabled Thailand to rapidly converge with upper-middle-income comparator countries while achieving important gains in poverty reduction. However, the AFC abruptly halted Thailand's progress; between 1998 and 2008, the economy stabilized and slowly recovered, but the average annual growth rate fell to 4.8 percent. Following the 2008 global financial crisis (GFC), Thailand's growth rate slowed further to an average of 3.3 percent between 2008 and 2018. Investments in physical capital halved as a share of GDP, dropping from close to 40 percent in 1996 to just under 20 percent in 2018. Total factor productivity (TFP) growth also decelerated, sliding from an average annual rate of 3.0 percent between 1999 and 2008 to an average of 1.4 percent between 2009 and 2017.

[1] Only 12 middle-income countries—Antigua and Barbuda, Chile, Hungary, the Republic of Korea, Malta, Oman, Poland, Portugal, the Seychelles, St. Kitts and Nevis, Trinidad and Tobago, and Uruguay—transitioned to upper-income status between 1987 and 2015.

This challenge is further exacerbated by COVID-19 in the short term...

The COVID-19 outbreak has severely impacted growth in Thailand, with the economy expected to contract in 2020 amid heightened uncertainty surrounding the path of the pandemic**.** The forecast is subject to future revisions given heightened uncertainty surrounding the outbreak trajectory, globally and domestically. In the baseline, a sharp contraction estimated at about 5 percent is led by a deterioration in both external and domestic demand in the context of COVID-19, the ongoing downturn in 2019 and a difficult external environment impacting global trade and tourism as the economy reopens. The economy is projected to recover to pre COVID levels in the next two years, but the recovery path is also uncertain, with domestic demand drivers such as consumption likely to pick up as Thailand starts to ease mobility restrictions, but remaining international travel restrictions, trade and supply chain disruptions, will continue to impact the economy, particularly through reduced tourism.

..and in the long-term through an impact on investment and on productivity growth.

The COVID-19 outbreak is also likely to have longer term economic impacts, including through an adverse impact on productivity.[2] Since 2000, there have been several large-scale disease outbreaks, including SARS (2002-03), swine flu (2009-10), MERS (2012-13), Ebola (2014-15), and Zika (2016). These affected over 115 EMDEs and advanced economies. Evidence from these major epidemics suggest a large adverse effect on productivity estimated at an average 6 percent lower labor productivity in the affected countries after five years. This largely reflects a significant erosion in capital deepening: investment was, on average, about 11 percent lower five years after these events, amid heightened risk aversion and uncertainty. The greater global spread and death toll of COVID-19 than these previous epidemics suggest it could have even more costly long-term consequences for productivity.

To achieve high income status by 2037 and respond to the COVID-19 outbreak, Thailand must accelerate structural reforms to boost investment and productivity growth.

The LTGM exercise concluded that for Thailand to achieve high-income status by 2037, it would need to sustain a long-run average growth rate of over 5 percent beyond 2025. Achieving this growth rate would require nearly doubling the rate of both public and private investment while maintaining a TFP growth trajectory similar to that of South Korea when it was at Thailand's level of GDP per capita.[3]

This report provides an in-depth look at firm-level productivity growth in the manufacturing sector, which is pivotal to the achievement of Thailand's development objectives.

While complementary analyses of constraints in the services and agricultural sectors will be necessary to inform a comprehensive productivity-enhancing policy agenda, this report focuses on manufacturing, due to its key role in job creation and structural economic transformation. It builds on a framework that emphasizes the microeconomic and macroeconomic linkages of the sources of productivity growth (highlighted in Figure 1). The report acknowledges the importance of **structural transformation**, i.e. labor movement from the agricultural sector to higher-productivity industries. However, given the firm-level focus of the report, the main analysis and focus of the recommendations is on **improving productivity of manufacturing firms** through more efficient use of inputs; and creating **dynamism in the manufacturing sector**, with less efficient firms being replaced by more efficient firms.

Economic openness and skills development are critical to accelerate

An analysis of firm-level productivity data reveals that firms in export-oriented industries tend to experience faster rates of productivity growth. Moreover, firms that receive foreign direct investment (FDI) tend to be more productive than those that do not. Firms that use more skilled labor and that invest in research and development

[2] Discussion drawn from World Bank Global Economic Prospects, June 2020.

[3] In 2014, South Korea's TFP growth rate was the fastest in East Asia and the Pacific.

within-firm productivity growth. (R&D) tend to be both more productive and more innovative than their peers. The analysis also finds that numerous small, productive firms are not growing, implying the presence of constraints to firm expansion.

Strengthening and enforcing the new legal framework for competition will be crucial to enhance market dynamism. The previous competition framework suffered from many weaknesses, including generous carve-outs for many industries and weak regulatory enforcement. The Trade Competition Commission established under the 1999 Competition Act did not successfully prosecute a single case of anticompetitive behavior, due to its lack of independence. The new 2017 Competition Act aims to address the shortcomings of its predecessor by, inter alia, reestablishing the Trade Competition Commission as an independent regulatory agency, setting merger-control thresholds, barring anticompetitive agreements, and limiting exemptions. However, key challenges remain, including the need to clarify the legal treatment of SOEs, address price controls and other quasi-fiscal policy interventions, and incentivize reporting of cartel behavior.

A policy agenda targeting increased productivity growth should focus on openness, competition, and innovation. The findings of the analysis underscore the importance of: (i) increasing economic openness; (ii) enhancing competition in the domestic economy; and (iii) creating a more conducive environment for firm innovation. Easing restrictions on FDI and on the employment of skilled expatriate professionals, particularly in the services sector, by implementing the Association of South East Asian Nations (ASEAN) framework agreement on services, would enhance economic openness.[4] Fully implementing the recently passed competition law and strengthening the enforcement capabilities of the Trade Competition Commission would promote more competitive markets. Workforce skills are critical to innovation and productivity growth, and creating a list of skilled occupations facing worker shortages could help meet the needs of new, innovative industries. Finally, strengthening intellectual property protections and building the capacity of the Department of Intellectual Property would support the development of the R&D ecosystem.[5]

Table ES.1 Summary of key findings and policy options

Findings	Policy recommendations
Limited competition in domestically oriented industries slows creative destruction and inhibits productivity growth.	Fully implement the new 2017 Competition Act and establish clear guidelines governing SOE policies, the use of price controls, and the regulation of cartel behavior.
Firms that are more integrated with the global economy tend to be more productive.	Promote economic openness by relaxing FDI limits and restrictions on the employment of skilled expatriate professionals in line with the ASEAN framework agreement on services.
Creating a more conducive environment for innovation will require increasing the supply of skilled labor and boosting R&D investment.	Craft a human-capital development policy designed to support the innovation ecosystem, including a list of skilled occupations facing worker shortages, and strengthen intellectual property protections.

[4] See ASEAN Services Integration Report (2015). World Bank and ASEAN.

[5] See discussion on innovation eco-system in World Bank Thailand Economic Monitor: Beyond the Innovation Paradox, April 2018.

Introduction

This report analyzes constraints on productivity growth in the manufacturing sector.

This report focuses on the manufacturing sector[6] builds on a framework that emphasizes the microeconomic and macroeconomic linkages of the sources of productivity growth (highlighted in Figure 1). The key linkages are: (i) **Firm-level productivity gains** can come from strengthening skills, technical capacity and innovation within firms. (ii) Firm-level productivity gains and removal of barriers to entry and exit could lead to **less efficient firms exiting the market**, and the exit of less productive firms could release resources **for more productive new entrants**. This process of "creative destruction" – as coined by economist Joseph Schumpeter – that reallocates resources to more efficient firms can fuel productivity gains within a sector and enable that industry to grow. (iii) At a macro level, this can support a process of **structural transformation** as factor inputs (e.g., labor, capital, land) shift to more productive and rapidly growing sectors.

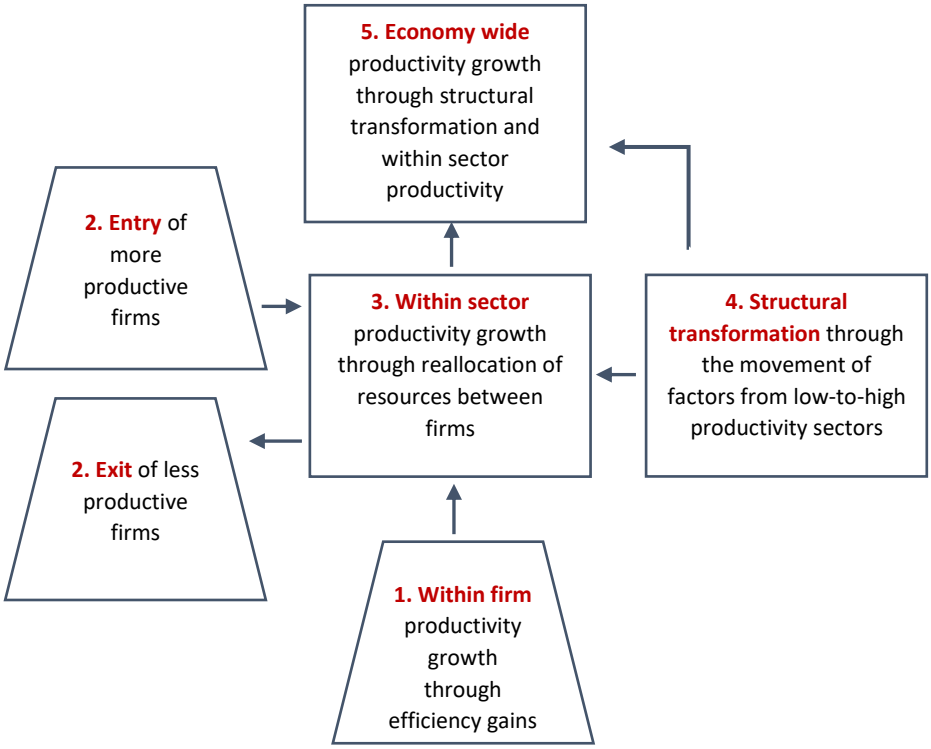
In line with this framework, Chapter 1 begins with an overview of Thailand's productivity dynamics at the macroeconomic level and identifies the causes of its slowing GDP growth rate.[7] Chapter 2 analyzes the characteristics of Thai manufacturing firms and sub-sector productivity dynamics, revealing the drivers of firm productivity and distinguishing the relative contributions of within-firm effects, between-firm effects, and market dynamism. Chapter 3 evaluates the impact of competition on firm productivity by comparing market entry and exit indicators with price markups. Chapter

[6] It should be noted that analysis of constraints in the services and agriculture sector, although not the focus of this analysis, are also needed to create a comprehensive productivity enhancing policy agenda.

[7] The analysis of macroeconomic productivity dynamics is guided by the key constraints identified in the World Bank's 2017 Thailand Systematic Country Diagnostic, which highlighted the importance of restarting structural transformation, reviving investment growth, increasing competition, expanding access to workforce skills, and encouraging R&D.

4 concludes with a set of policy recommendations designed to boost firm productivity in Thailand's manufacturing sector.

Figure 1: Sources of productivity gains and their micro-macro links



Source: Inspired from Maloney et al (2017)

Chapter 1: Long-Run Growth Dynamics in Thailand

Thailand needs to revive investments and boost productivity to reach high income status by 2037.

The focus of this chapter is to show that achieving this goal requires significant increase in investments together with a substantial boost in productivity at the economy-wide level and the firm level. The chapter begins by highlighting the weaker growth performance of Thailand since the Asian Financial Crisis in 1998, compared to its structural peers. The chapter then analyses the macroeconomic drivers of decelerating growth specifically slowing physical and human capital accumulation and slower pace of structural change. The chapter ends by highlighting the necessity of boosting investment and productivity to achieve the high-income goal, using growth scenarios modeled using the World Bank's Long-Term Growth Model (LTGM).

i. Thailand's trend economic growth has slowed since the Asian Financial Crisis

Thailand's economy grew strongly in the 1980s.

Fundamental economic reforms and trade openness put the Thai economy on a high-growth trajectory in the 1980s. The economy grew around 9 percent annually during 1986–95 (Figure 2) and this period of growth corresponded with a structural shift in the Thai economy, with a shift in labor from agriculture particularly towards the more productive manufacturing sector. Thailand's per capita income converged rapidly with upper middle country comparators and the country also made impressive gains in reducing extreme poverty. It should be noted that a part of the growth was fueled by high levels of debt-driven capital investments during the 1980-96 boom years, which led to inflated property and equity markets (IMF 1998).

Growth has stalled since the Asian Financial Crisis in 1997 and the Global Financial Crisis in 2008, marked by slowing capital accumulation and weak productivity growth…

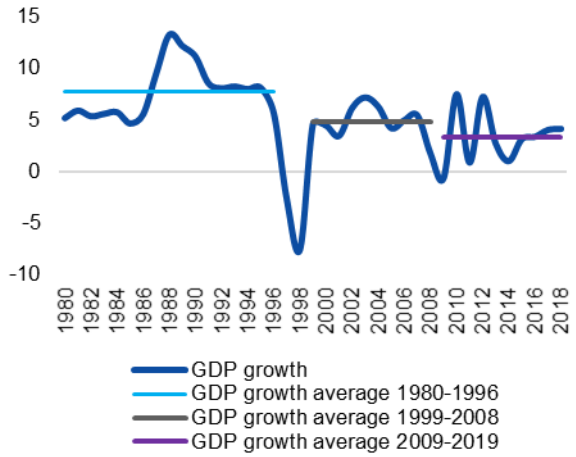
The economy was hit hard by the AFC in 1997 with a severe foreign exchange and banking crisis leading to a sharp economic contraction. The decade since the AFC saw recovery and stabilization, but with a trend decline in economic growth. This has been marked by a sharp fall in physical capital accumulation with gross fixed capital formation remaining well below pre-1997 levels (Figure 3) reflecting in part a correction from the pre-crisis boom years. Capital accumulation has thus not contributed significantly to growth in the last two decades, in comparison to Thailand's structural peers (Figure 4)[8]. This was compensated until the GFC by productivity growth, but in the last decade, productivity growth has fallen to 1.3 percent over 2010-2016 from 3.6 percent over 1999-2007.

…in line with a general global and regional slowdown in TFP growth, which began before the GFC in advanced countries and spread to EMDEs post GFC.

The source of the post-GFC global productivity slowdown has been attributed to several factors. Some authors have suggested that the slowdown is a statistical artifact, driven by a mismeasurement of TFP (Aghion et al, 2017, Bils et al, 2017). At the macroeconomic level, slower investment growth, population aging and increasing regulations have played a role[9]. At the firm level, the slowdown has been linked to the loss of dynamism associated with rising frictions, creative destruction and lack of reallocation of resources (Decker et al, 2017a; Decker et al, 2017b; Gopinath et al, 2017) and the lack of ideas (Gordon, 2016; Bloom et al, 2017).

Figure 2: Trend growth has slowed in Thailand…

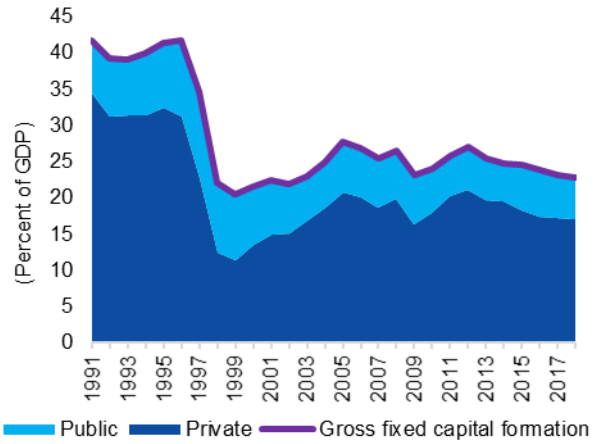
(% change, year-on-year)



Source: World Development Indicators (WDI)

Figure 3: …marked particularly by declining investment…

(Gross fixed capital formation, percent of GDP)

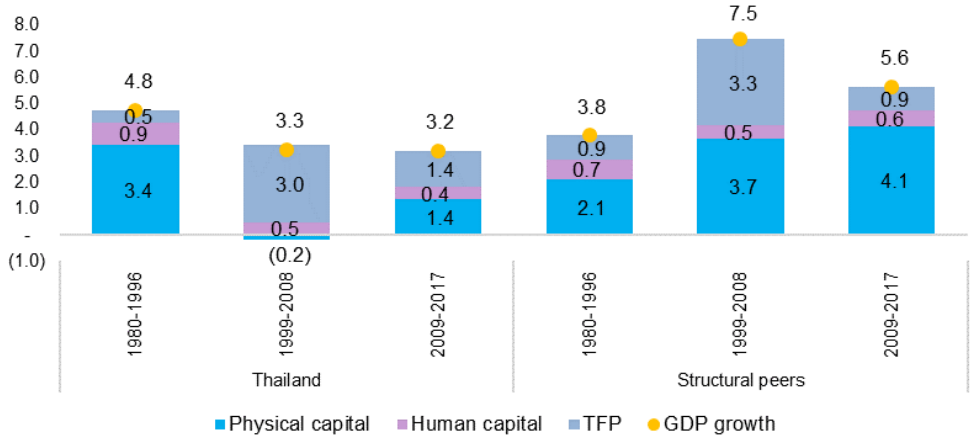


Source: WDI

[8] The peer selection follows the Thailand Systematic Country Diagnostic prepared in 2016, and includes countries that adhere to three criteria: (i) Upper middle-income countries; (ii) Countries with a strong track record in macro-economic management (identified as scoring at or above the 70th percentile in WEO's Global Competitiveness Index third pillar (macro environment); and (iii) Economies not driven by exports of natural resources (identified by excluding economies in the 20th percentile of the indicator "natural resource as a share of GDP 2006-12"). The structural peers that fulfill these three criteria and thus selected are: **Bulgaria, China, Colombia, Malaysia and Mexico**.

[9] World Bank Global Economic Prospects, January 2018.

Figure 4: ...which has led to diminished contribution of capital accumulation to growth
(% contribution to GDP growth)



Source: World Penn Table (pwt 9.1); WDI, World Bank staff estimates

ii. Slowing physical capital accumulation has been a major driver of lower trend growth.

Private and public investments decreased significantly after the AFC and have yet to recover to their pre-crisis levels.

Private investment in Thailand fell from 32 percent of GDP in 1995 to less than 12 percent of GDP in 1999 and has since recovered to 21 percent of GDP in 2018. Thailand's investment levels remain well below its structural peers (Figure 5). Public investment has declined sharply from 10 percent of GDP in 1997 to less than 6 percent of GDP in 2018, and private investment has halved from close to 30 percent of GDP in 1997 to less than 15 percent of GDP in 2018. Foreign direct investment (FDI) inflows have been comparable to peers, but FDI inflows to Thailand are more volatile, and net inflows have been slowing since 2014 (Figure 6).

Lower investment levels partly reflect over-investment pre-AFC, weak investor sentiment and public investment management (PIM) weaknesses.

Lower investment levels partly reflect high, misallocated levels of capital investments during the 1980-96 boom years. This is reflected in declining returns to investment and a sharp drop in capacity utilization, which remained well below the pre-AFC level of about 68 percent until 2011 (Figure 7). Continued political and policy uncertainty in the last decade since the GFC has also taken a toll on investor sentiment and impacted investment plans[10]. Despite ambitious investment plans, including large-scale investments planned under the flagship Eastern Economic Corridor (EEC), public investments have been unable to compensate for and stimulate depressed private investment. This reflects both heightened political uncertainty and long-standing public investment management (PIM) weaknesses, including fragmented institutions, limited multi-year budgeting and constrained ability to plan, appraise and execute large infrastructure projects.[11]

Returns to investments declined sharply after the AFC and further after the GFC.

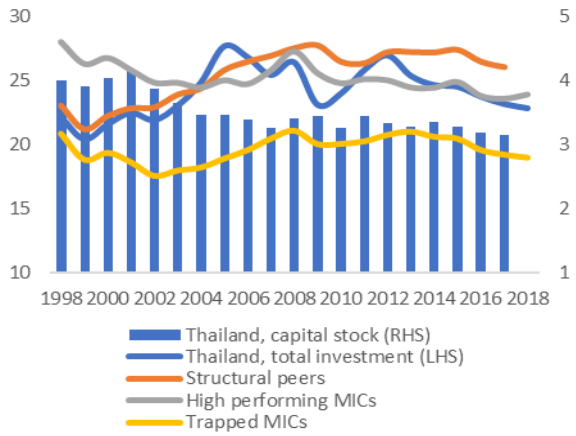
Efficiency of investment is equally important for economic growth as volume. A widely used indicator for capital productivity is the incremental capital output ratio (ICOR), which shows the amount of additional capital required to generate an additional unit of output or the elasticity of output to capital. A high ICOR implies low efficiency of investment as more investment is required to generate a unit of output. After the AFC,

[10] The sluggishness in private investment reflecting heightened uncertainty is highlighted in several editions of the Thailand Economic Monitor, the World Bank's bi-annual publication of Thailand's economy, since 2011.

[11] "Thailand Systematic Country Diagnostic", World Bank (2017).

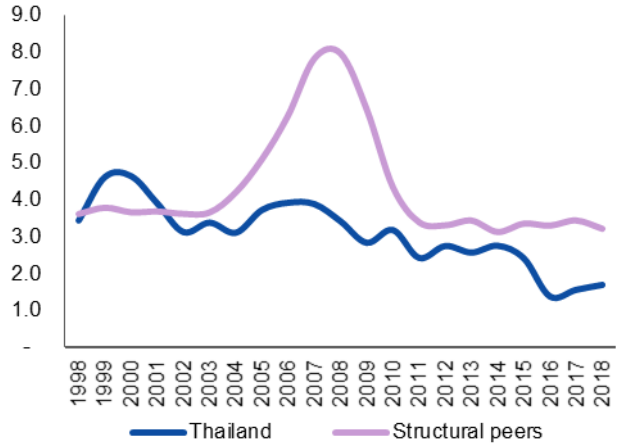
the ICOR increased to an average of around 10 from 1998-2008 (reflecting low growth rates as investment rates remained around 22 percent of GDP) from pre-crisis levels of around 4. The ICOR increased steadily post the GFC and remain elevated compared to structural peers (Figure 8).

Figure 5: Thailand's investment levels remain below structural peers…
(percent of GDP)



Source: IMF Infrastructure and Capital Stock database, WDI, WB staff estimates

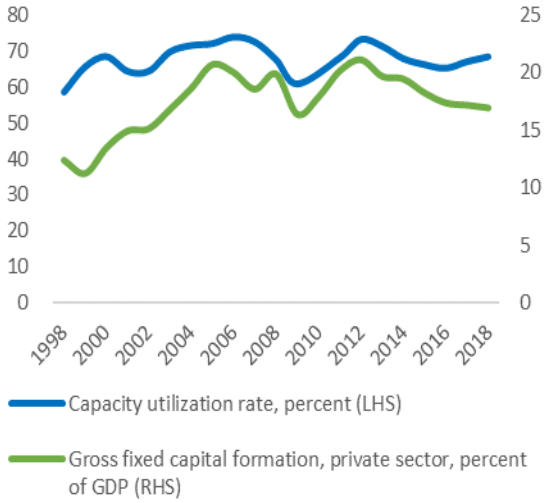
Figure 6: …and FDI inflows are also markedly lower than peers, and declining
(percent of GDP, 3 year moving average)



Source: WDI

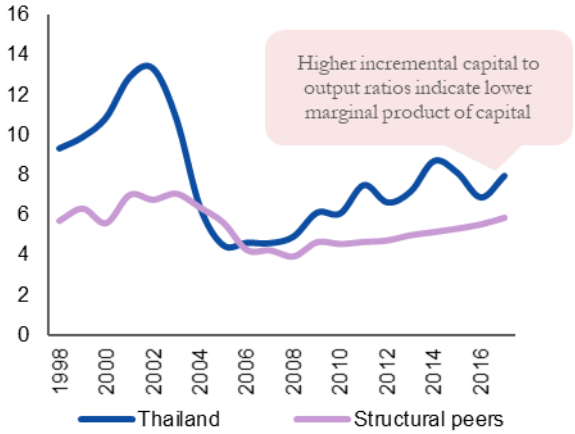
Figure 7: Capacity utilization rate is also declining…

(percent)



Source: Thailand Office of Industrial Economics

Figure 8: …as is investment efficiency, measured by the Incremental Capital to Output Ratio (ICOR)
(percent, median, 7 year moving average)



Source: WDI, WB Staff Estimates

iii. ..and human capital accumulation has also been weak.

The number of employed people and

Thailand's demographic structure positively affected the country's economic performance pre-AFC, as illustrated in the positive contribution of human capital to

the labor force participation in Thailand grew at a slower pace from 1998 to 2013 and has been declining since 2013.

growth in 1980-1996 (Figure 3). Thailand experienced a demographic dividend[12] throughout period from 1986 to 2013, when the working age population (between 15-65 years of age) grew vastly from 30.7 million in 1986 to 47.6 million in 2013, and its labor force increased from 26.1 million to 37.8 million over the same period[13]. However, the pace of increase of labor force participation – the share of the working-age population that is either employed or actively looking for employment – slowed since 1998 and has declined since 2013 (Figure 9).

Thailand is experiencing a challenging demographic transition.

Over the next 30 years, Thailand will experience one of the world's sharpest demographic transitions, where the favorable demographic structure is giving way to an aging society in which the proportion of retirees are growing at an unprecedented rate[14]. By 2040, elderly people will account for more than one quarter of Thailand's total population—the highest share of elderly of any developing country in East Asia and the Pacific. This will likely affect the country's ability to generate growth and create shared prosperity since the economy will have to work harder for each percentage point of growth.

Economic growth will thus have increasingly to come from improvements to labor productivity growth to compensate for the declining labor force.

A strong human capital base with a well-educated and skilled labor force is critical to Thailand's economic growth prospects in the light of the demographic transition. Human capital can be defined as the accumulated knowledge (from education and experience), skills, and expertise that the average worker in an economy possesses. Thailand is lagging its peers in human capital (Figure 10).[15] The World Bank's Human Capital Index (HCI) measures the actual and potential productivity levels for the next generation of workers. While Thailand scores in the upper half of the various indicators compared to its ASEAN and other upper-middle income country peers[16], it lags structural peers and high performing MICs, with substantial room for improvement.

Addressing unequal economic opportunities can help people to be more productive and contribute to a prosperous society.

While Thailand's level of inequality as measured by the Gini coefficient is comparable to peers, inequality remains an issue that has become a national priority. In addition, over the past few years, household incomes and consumption growth have stalled nationwide, with declines among households at the bottom of the income distribution. Between 2015 and 2018, the poverty rate in Thailand grew from 7.21% to 9.85% and the absolute number of people living in poverty increased from 4.85 million to more than 6.7 million.[17] Income inequality can harm development in two major ways: unequal economic opportunities lead to wasted productive potential, and it typically also results in impaired institutional development which in turn is bad for investment, innovation, and risk-taking.[18] Narrowing the inequality experienced by children today is important

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[12] The Demographic Dividend is referred to as the favorable effect of a rapid increase in the share of working aged population on economic growth. It is measured by demographic dependency ratios, that is, the number of children (aged 0-14), working-age adults (aged 15-64) and the elderly (aged 65 and older).

[13] World Bank (2016). Thailand Systematic Country Diagnostic. Getting back on track: reviving growth and securing prosperity for all.

[14] The working-age population will decline by approximately 10 million (from 48.8 million in 2016 to 37.9 million in 2045, Figure 51) while the number of elderly people (age 65 and older) will increase by about 10 million (from 7.1 million in 2015 to 18.3 million in 2045).

[15] Penn World Table version 9.0. The human capital index is based on the average years of schooling and an assumed rate of return to education.

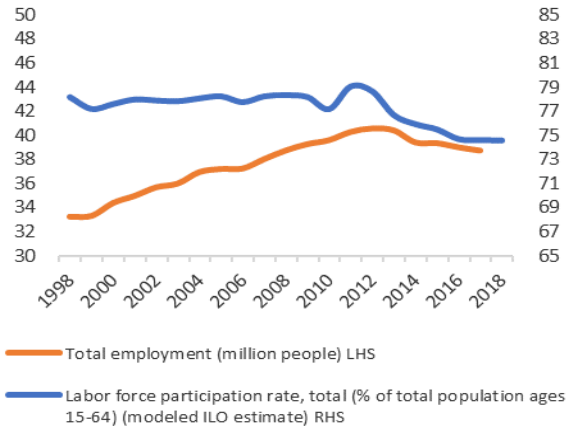
[16] World Bank (January 2019). Thailand Economic Monitor. Inequality, opportunity and human capital. Thailand scores an HCI of 0.60 out of a possible score of 1 in 2017. This means a child born today in Thailand can expect to be only 60 percent as productive as a future worker compared to if she enjoyed complete education and full health.

[17] Taking the Pulse of Poverty and Inequality in Thailand (World Bank, 2020)

[18] Riding the Wave: An East Asian Miracle for the 21st Century (World Bank, 2017)

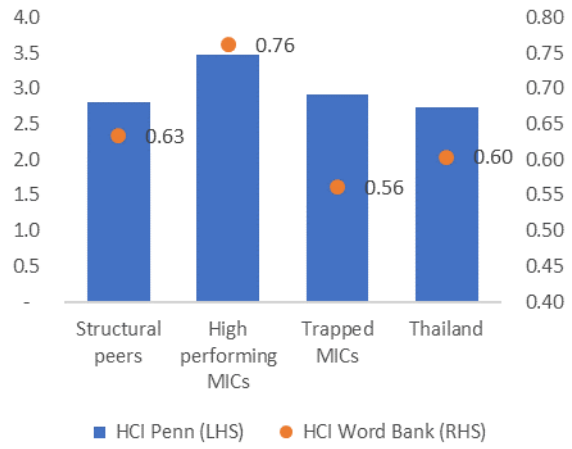
to allow all children to reach their full potential, be productive in society, and help the economy grow.

Figure 9: Labor force participation rate has declined as Thailand ages
(percent of total population)



Source: World Penn Table, WDI

Figure 10: Thailand lags its structural peers in the performance on the Human Capital Index
(0-1 Human Capital Index Score)



Source: World Bank Human Capital Project

iv. Given weak trend growth, Thailand will not achieve its target of reaching high-income status by 2037 unless it boosts productivity and revives the investment cycle

If current growth trends continue, Thailand will fail to achieve high-income status by 2037.

The Long-Term Growth Model (LTGM) developed by the WBG's research group is used to project Thailand's long-term growth. More details on the LTGM model used in provided in Annex 1.[19] The model is a standard Solow-Swan growth model where the key building blocks include saving, investment and productivity.[20] The model uses long-run demographic data from the United Nations World Population, which reflects Thailand's shrinking labor due to aging.[21] Under the baseline (or business-as-usual) scenario, the key assumptions are that Thailand TFP growth rate is constant and equal to the average TFP growth rate between 2005 and 2014. A summary of all the assumptions under the baseline are in Table A1.1 in Annex 1. Under the baseline, Thailand's long-run GDP per capita growth rate is projected to remain below 3 percent and decline to 2 percent by 2050. As a result, Thailand is projected to remain an Upper Middle-Income Country (UMIC) past 2050, if current trends continue.

Thailand needs to significantly boost productivity and revive the investment cycle to achieve its high-income target.

The long-term growth modeling exercise considered alternatives scenarios of growth paths to assess Thailand's possibility of achieving high-income status by 2037. A key finding is that improving TFP growth and raising investments alone will be insufficient to propel Thailand into high-income status by 2037. According the LTGM projections, Thailand will only become a high-income economy by 2050 (Figures 11-14) if (i) TFP grows at the rate as Korea's TFP did between 1985 and 2014; (ii) aggregate investment

[19] The Annex presens a summary of the model as found in Devadas, S., and S. M. Pennings. 2019. ""Assessing the Effect of Public capital on Growth: An Extension of the World Bank Long-Term Growth Model"." *Journal of Infrastructure, Policy and Development* 22-55.

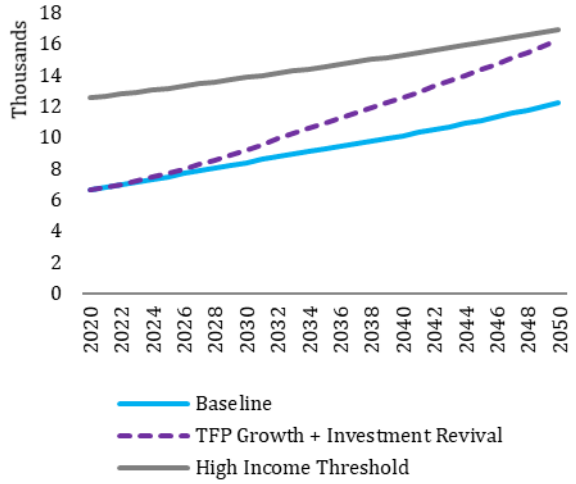
[20] The LTGM with various extensions can be found here: https://www.worldbank.org/en/research/brief/LTGM

[21] By 2040, elderly people will account for more than one-quarter of Thailand's total population, the highest share of elderly of any developing country in East Asia and the Pacific.

is revived from 25 percent of GDP (below the 75th percentile of investment-GDP ratio among UMICs) to 34.5 percent of GDP, which is the 90th percent of investment-GDP ratio among UMICs; and (iii) human capital growth is significantly boosted.[22] For Thailand to become a high-income economy by 2037, the revival of investment and human capital growth would need to be complemented by an unprecedented annual TFP growth rate of 3 percent.[23]

Figure 11: Thailand will not become a high-income economy by 2050 even with TFP growing at the same rate as that of Korea in the last three decades and investment-GDP ratio rising to amongst the highest levels in UMICs…

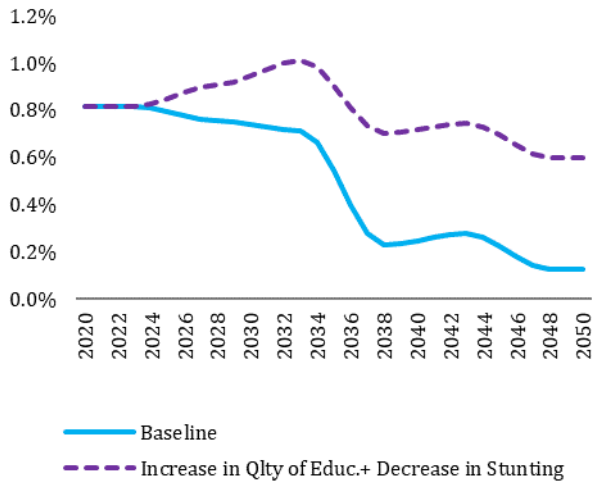
(GNI per capita, based on Atlas Method)



Source: World Bank staff calculations

Figure 12: …but if TFP growth and a rise in investment is coupled with a boost in human capital …[24]

(Human capital growth, from Human Capital Extension of LTGM)



Source: World Bank staff calculations

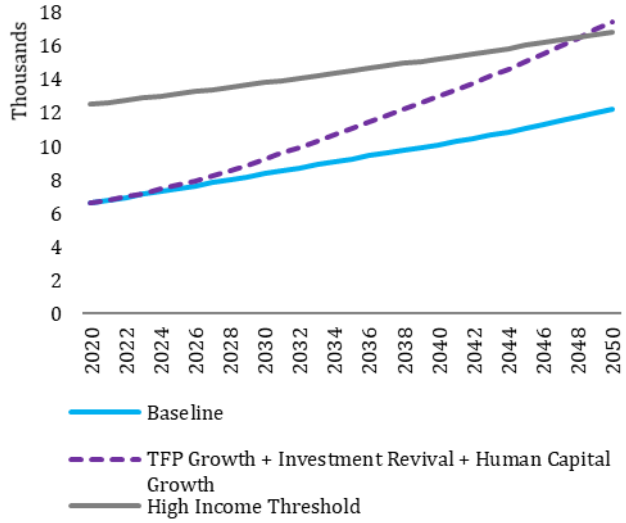
[22] The calculations of the TFP paths can be found in Kim, Young Eun; Loayza, Norman V. 2019. Productivity Growth: Patterns and Determinants across the World (English). Policy Research working paper; no. WPS 8852. Washington, D.C.: World Bank Group. And the percentiles of investment-GDP rations are from the World Development Indicators.

[23] Although their data covers the period of 1965 to 1995, Bernanke and Gurnayak (2002) document that only 5 percent of countries in the world achieved a 2 percent TFP growth rate: Bernanke, B. S. and R. S. Gurnayak 2002. "*Is Growth Exogenous? Taking Mankiw, Romer, and Weil Seriously*", Handbook of Economic Growth, Philippe Aghion and Steven N. Durlauf, eds. Volume 1A: 473 – 552, Amsterdam: North-Holland.

[24] The baseline projections are from the Human Capital extension of the LTGM and based on the World Bank Human Capital index. The increase in the HC growth captures an increase (to the 90th percentile of UMICs) in the expected years of schooling, the harmonized test score and a decrease in the stunting rate among children below 5, also to the 90th percentile of UMICs. The delay in human capital growth is due the fact that the reforms to raise quality and lower stunting rate affect children today that will be of working in future years. The oldest children to benefit from these reforms will join the labor market around 2025 and the majority by 2033, hence the peak in human capital growth in 2033.

Figure 13: ... then Thailand will achieve high-income status by 2050

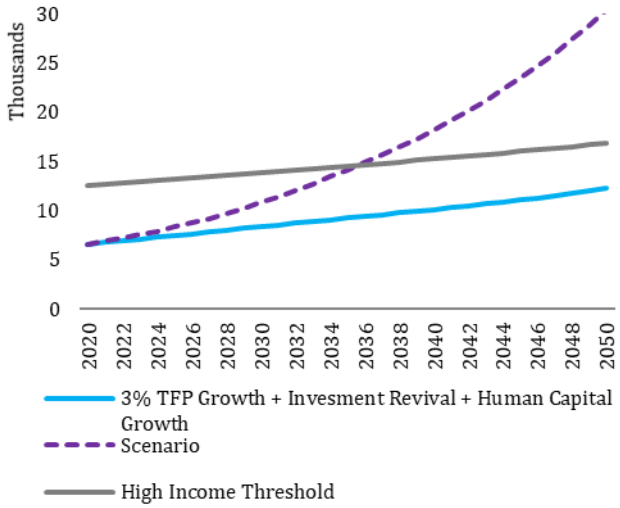
(GNI per capita, based on Atlas Method)



Source: World Bank staff calculations

Figure 14: In an ambitious scenario, Thailand can attain high-income status by 2037 if TFP grows at the unprecedented rate of 3 percent annually on top of an investment revival and boost in human capital growth

(GNI per capita, based on Atlas Method)



Source: World Bank staff calculations

v. To boost productivity, Thailand needs to reverse the stall in structural transformation...

Thailand's economy underwent a significant structural transformation in the 1980s until the AFC.

Economy-wide productivity can increase through (i) productivity gains within a sector and (ii) a reallocation of resources, notably labor, between sectors, from low to high productivity sectors. The latter is also referred to as structural change or structural transformation. Thailand's productivity gains from 1980-96 were driven mainly by structural transformation. In this period, Thailand experienced a large-scale shift of labor away from low-productivity agriculture towards high productivity activities in the industry and services sector, causing the employment share of agriculture to fall and those for manufacturing and services to rise.[25]

...but structural transformation has slowed since the AFC...

Since the AFC, structural change has continued but at a much slower pace, and productivity growth has tended to come more from gains within sectors than from the movement of labor between sectors (Figure 15). An indication of slow structural transformation is the continued high-share of agricultural employment in Thailand compared to its structural peers (Figure 16).

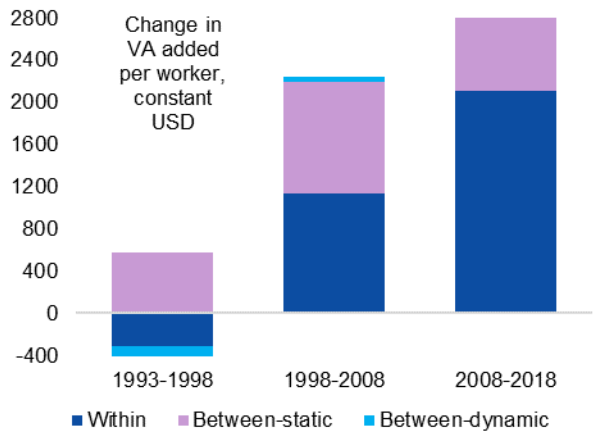
...with a major role played by agricultural support policies, rising global agricultural prices and skills mismatch.

In a comprehensive review of structural transformation in Thailand, Klyuev (2015) highlights the following key factors slowing the move of labor away from lower productivity agriculture towards manufacturing: growing skills mismatch between the skill set of agricultural workers and the skill set demanded in the modern sector; rising agricultural subsidies and high global agricultural prices in the 2000s. The impact of one of the more controversial agricultural support programs – the paddy pledging scheme—is highlighted further in Box 1.

[25] Warr (2009) estimates sectoral TFP contribution to aggregate TFP in Thailand and concludes that TFP growth in agriculture allowed factors of production to relocate to other more productive sectors without causing a slowdown in agriculture production.

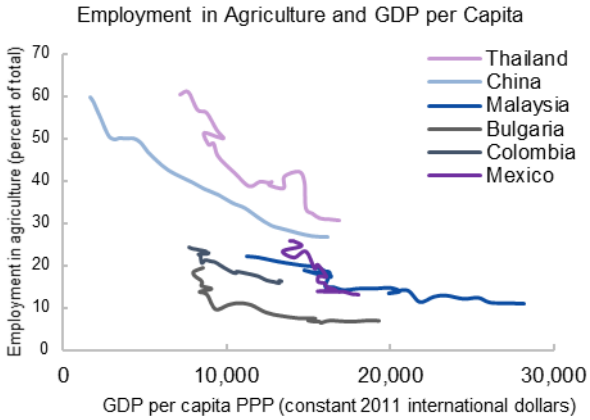
Figure 15: Productivity gains are increasingly coming from within sectors than movement of labor between sectors…

(Change in value added per worker, constant 2010 USD)



Source: WDI, World Bank staff estimates

Figure 16: …even as the share of workers in agriculture in Thailand remains well-above its peers



Source: WDI World Bank staff estimates

Box 1: Paddy pledging, farmers and structural transformation

Agriculture accounts for 30 percent of the total labor force but only 10 percent of GDP, with structural transformation slowing. Agricultural sector generated the lowest value added per worker compared to manufacturing and services. Despite the lower value added, movement away from agriculture to other higher value-added sectors has stalled since the mid-2000s.

Subsidies to rice production slowed the needed transformation of the Thai agriculture sector and overall structural transformation towards higher value-added manufacturing and services sectors. The Thai government implemented the controversial Paddy Rice Pledging Program (2011-2013) to support farmers facing low global rice prices by purchasing rice at above world prices. The Pledging Program for 2011/2012 had 1.3 million rice farming household participating out of a total of 3.6 million rice farming households in the country. Of the households that participated in the program, most are small to medium-size farming households. Market mechanisms as the relationship between farmgate and export prices for rice weakened (Attavanich, W. et al., 2019). Labor flowed from manufacturing to agriculture during the Paddy Pledging Program. As a result of the excessive land use, Thailand's rice productivity was one of the lowest among major rice producers in the world then. (World Bank, April 2016).

The agricultural price support schemes—perhaps among the most direct interventions aimed at helping poor farmers—may not be as pro-poor as planned and are fiscally costly. The sustained increase in agricultural prices was among the major contributors to poverty reduction (World Bank, November 2016), but a closer look at the price-support schemes reveals several inefficiencies which have reduced their effectiveness. Research suggests that the rice pledging scheme, although well-intentioned, was biased in favor of richer farmers (net rice sellers) and created hardship for the poor (net rice purchasers. The take-up has been found to favor large farms (Duangbootsee and Myers, 2014) and to not induce greater investments in farm modernization (Attavanich, 2016). According to the Thailand Development Research Institute (TDRI), 63 percent of the funds spent on the pledging program went to merchants and millers, with the rest going to farmers. Only 5 percent of funds spent went to poor farmers (TDRI 2015). The program had unclear, but potentially large, fiscal cost as the Government bore the cost of pledging, storage, milling, operation costs, and interest, and revenues from the sale of milled rice fell short of the costs, given that the global rice prices were lower than those under the Pledging Program (World Bank, December 2012).

Box 1: Paddy pledging, farmers and structural transformation

Raising labor productivity and deepening capital in agriculture can facilitate structural transformation. Labor productivity can benefit from improvements in agricultural policy, including: (i) the development of a better-functioning land rental market, (ii) increased efficiency and sustainability of irrigation investments, and (iii) more and better funding of agricultural research and extension programs, along with moving away from commodity support programs toward broad-based agricultural and food policy. As a result, labor will be freed up to move to other sectors.

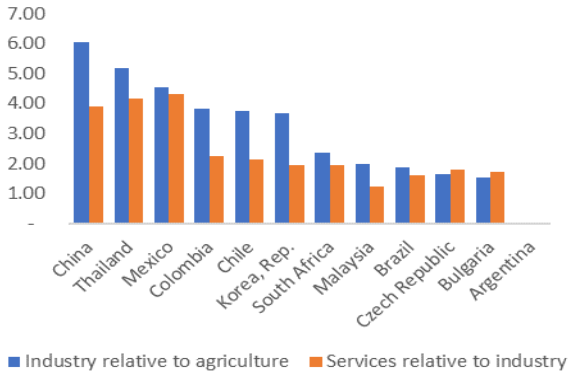
vi. ...and increase productivity in the manufacturing sector

Productivity growth will also require boosting sector and firm productivity in the industrial manufacturing sector.

On a positive note, Thailand performs well vis-à-vis its structural peers when comparing manufacturing productivity to agriculture and services (Figure 17). The difference in productivity is a factor of 4 and 6 between agriculture and services and industry, respectively. However, this does not reflect a healthy growth in Thailand's industrial and manufacturing sector productivity, but rather weak growth in services and agriculture productivity growth. Industrial sector productivity growth has halved from an average annual growth rate of 2.1 percent in 1998-2008 to 1.1 percent in 2009-2018 following the Global Financial Crisis (GFC). Labor productivity in the industrial sector, measured in terms of value added per worker, grew at an average rate of only 0.5 percent in 2008-2018 as compared to 3.4 percent from 1998-2008 (Figure 18). This indicates that Thailand still has significant scope to increase aggregate productivity through further within-sector gains in the industrial sector.

Figure 17: Thailand performs well when compared to peers on industrial sector versus agriculture and services...

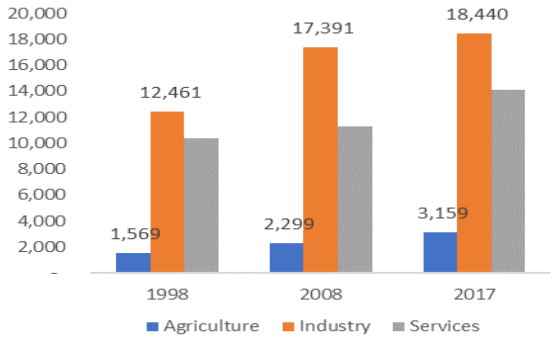
(Labor Productivity of Industry relative to agriculture and services)



Source: WDI, World Bank staff calculations

Figure 18: ...but growth in value added per worker has stagnated for the industrial sector

(Value Added per Worker in Mio-Constant 2010 USD)



Source: WDI, World Bank staff calculations

The next chapter highlights the drivers and constraints to improving manufacturing sector productivity, based on analysis of firm level data from the Thailand's Manufacturing Industry Census.

Chapter 2: Trends and Drivers of Manufacturing Firm Productivity in Thailand

Credit photo: Tesco-Engineers Co., Ltd

The focus of this chapter is to analyze the trends and drivers of productivity of manufacturing firms in Thailand.

The chapter begins with an overview of the trends in firm productivity in the manufacturing sector in Thailand since 2006. The micro data used for this analysis is drawn from the Thailand's Manufacturing Industry Census, which is a panel dataset over three waves (2006, 2011 and 2016) with more than 50,000 firms representative at the national level in each wave.[26] The chapter then analyses the drivers of firm productivity, highlighting the relative importance of within firm improvements, entry of productive firms and exit of unproductive firms.

[26] Each wave contains more than 100,000 firm establishments. However, the panel data reduces the sample to approximately 50,000 firms. Most establishments, about 80 percent, are individual proprietorships. Government-owned establishments, state-enterprises, cooperatives and others account for 10 percent. The remainder is accounted for by company limited and public company limited juristic partnership and (about 7.0 percent) and juristic partnerships (about 2.6 percent). The statistical methodology using for manufacturing establishments with 1 – 10 persons engaged were a sample survey and establishments with 11 persons engaged and above were completely enumerated. The food, apparel, textiles, and wood industries account for more than half of the establishments. Metal, printing and media, machinery and equipment, and others accounted for the remainder. Each wave is quite representative of the macroeconomy in terms of GDP, capital stock and employment (Paweenawat et al. 2017).

i. Productivity of manufacturing firms fell from 2006 to 2011 and has since picked up.

Firm productivity measures how efficiently combine inputs to produce goods and services.

Firm level productivity measures how efficiently firms combine various inputs, labor and capital mainly, to produce goods and services. The estimation of productivity entails specifying a production function and fitting it with firm level data on inputs such as capital and labor and of output.

Researchers use either a revenue-based or quantity-based measure of firm productivity.

A key challenge often faced in estimating productivity is that prices and wages are not available at the firm level. As a result, industry level prices and wages are used to calculate production in physical units. This approach assumes perfect competition at the industry level and that all the firms are identical – which is a significant limitation. Productivity (TFP) derived from industry level prices and wages is referred to as Revenue TFP (TFPR). When firms level surveys include prices and wages, researchers can derive physical TFP (TFPQ). Both these measures of TFP are not free of accuracy issues and concerns, which are highlighted in Annex 2.

This report uses a revenue-based measure given the absence of data on firm level prices.

The report follows De Loecker (2013) in estimating firm productivity using the following steps: first, by calculating nominal value added by firms; second, by deflating nominal value added by 2-digit sectoral deflators to measure real-value added by firms; and third, by specifying a firm production function and calculating TFP as the residual of that function. Box 2 provides a further technical description of the approach used.

Box 2: Technical note on firm productivity estimation

The estimation of total factor productivity (TFP) from estimating the residual of the production function via the Ordinary Least Square (OLS) method faces a problem of endogeneity. To avoid this problem, this study, exploits the richness of firm-level data along with the dynamic characteristics to use the Generalized Method of Moments (GMM) along with various sets of instrumental variables.

The first step is to estimate the first-stage estimation of the following panel-data model with OLS method for each industry j of 2-digit ISIC (International Standard Industrial Classification):

$$y_{it} = \beta_j^1 + \beta_j^l l_{it} + \beta_j^k k_{it} + \beta_j^m m_{it} + Export_{it} + Year_t + \varepsilon_{it},$$

where y_{it}, l_{it}, k_{it} and m_{it} is logarithm of firm i in period t's value added, wage bills, capital and intermediate inputs, respectively. All nominal variables are deflated by Consumer Price Index. ε_{it} captures a standard i.i.d. error term. As the Thai manufacturing sector is intensive in exports, whether firm exports is correlated with firm value added and productivity. Therefore, the export dummy variable $(Export_{it})$ and year dummy variable $(Year_t)$ of firm i in period t are included as a control variable following De Loecker (2013).

Then, the second-stage estimation is to estimate TFP: $\omega_{it} = \hat{y}_{it} - \hat{\beta}_j^l l_{it} - \hat{\beta}_j^k k_{it}$ with four specifications of instrumental variables including the polynomial terms of TFP lag, export dummy lag, and investment (inv_{it}) lag as conducted in De Loecker (2013):

1. ω_{it-1}, ω_{it-1}^2 and ω_{it-1}^3,
2. ω_{it-1}, ω_{it-1}^2, ω_{it-1}^3, $\omega_{it-1}Export_{it-1}$, $\omega_{it-1}^2 Export_{it-1}^2$, $\omega_{it-1}^3 Export_{it-1}^3$, and $Export_{it-1}$,
3. ω_{it-1}, ω_{it-1}^2, ω_{it-1}^3, $\omega_{it-1}Export_{it-1}$, $\omega_{it-1}inv_{it-1}$, $\omega_{it-1}Export_{it-1}inv_{it-1}$, $Export_{it-1}$, inv_{it-1} and $Export_{it-1}inv_{it-1}$,
4. ω_{it-1} and $Export_{it-1}$.

The results across four different specifications are not much different. The study's baseline model is the first specification, which is more generally used in literature.

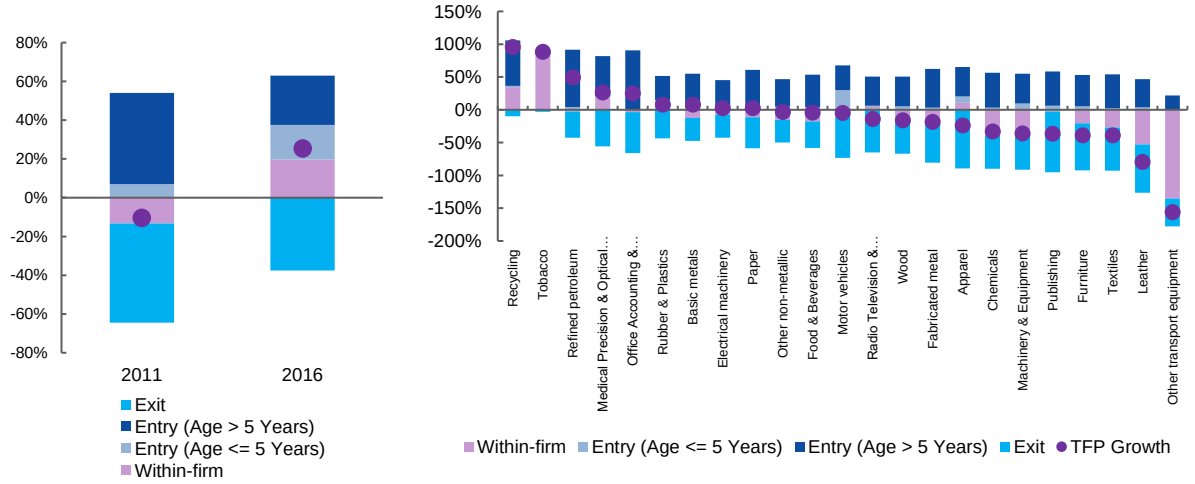
The analysis highlights a decline in firm level TFP growth in Thailand from 2006 to 2011…

Manufacturing firms became less productive in Thailand between 2006 and 2011, with firm-level TFP falling by an average of 10 percent (Figure 19). This coincided with a period of the post-GFC stabilization and recovery and of elevated political uncertainty in Thailand. Average firm productivity declined sharply for domestically oriented industries[27] including transport equipment, leather, furniture and machinery and equipment. Some key export-oriented industries[28], such as textiles and apparel and motor vehicles also registered a marginal decline in firm productivity (Figure 19). Firms in key export-oriented industries such as computer parts, rubber and plastics, and electrical equipment became marginally more productive on average.

…followed by a pick-up in productivity from 2011 to 2016, led by export-oriented industries.

Despite the worst flooding in several decades that affected several manufacturing areas in Thailand in 2011 (see regression analysis in Annex 3), manufacturing firms became more productive in Thailand between 2011 and 2016, with firm TFP increasing by an average of 20 percent (Figure 20). Average firm productivity increased for key export-oriented industries including refined petroleum, apparel, computer parts and motor vehicles. Average productivity declines were concentrated in domestically oriented industries such as tobacco, wood, recycling and other transport equipment (Figure 20).

Figure 19: Manufacturing firms became less productive from 2006 to 2011, with domestically oriented industries performing poorly…

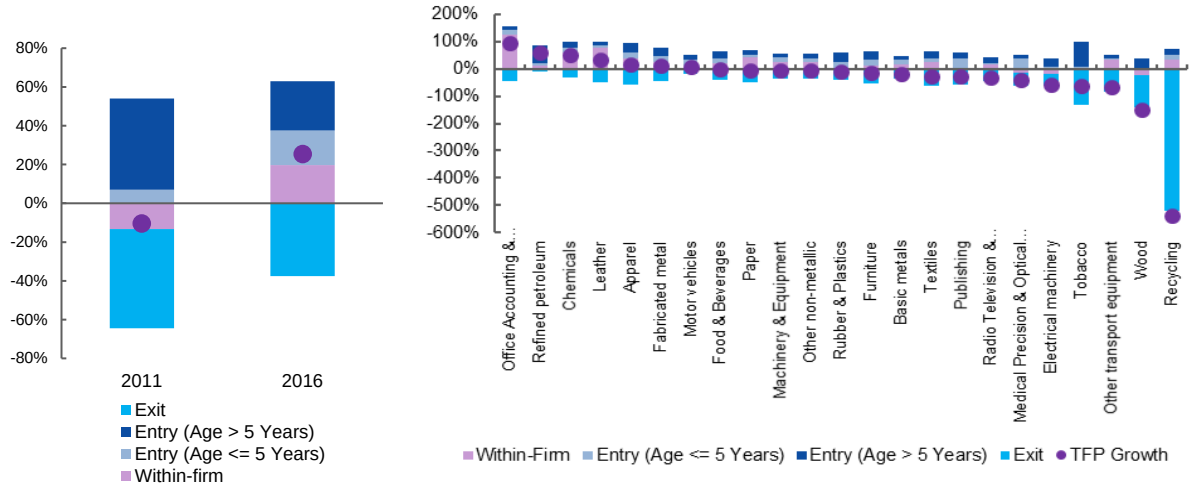


Source: World Bank, Bank of Thailand estimates from manufacturing firm census

[27] This is defined as industries that have an average export share of less than 30 percent of sales.

[28] This is defined as industries that have an average export share of greater than 60 percent of sales.

Figure 20: ...but productivity picked up from 2011 to 2016, particularly in more export-oriented industries like apparel and motor vehicles



Source: World Bank, Bank of Thailand estimates from manufacturing firm census

ii. Productivity growth has been driven by within-firm improvements rather than through creative destruction

There are three key drivers of overall productivity in an industry: within firm improvements, reallocations of factors between firms, and entry of productive firms and exit of unproductive firms.

The drivers of productivity growth can be grouped into three categories: within firm, between firm, as well as entry and exit (Cusolito and Maloney (2018). **Within firm drivers** refer to how firms become more productive by internally upgrading workforce and managerial skills, expanding innovation and raising their capacity to absorb technological advances. **Between firm drivers** refer to how productivity rises through the reallocation of capital and labor away from low productivity firms towards high productivity firms within an industry. Finally, **the entry of highly productive firms** into an industry and the **exit of low efficiency firms** greatly contribute to the rise in productivity. Together, the between firm and the entry/exit drivers of firm productivity, can be thought as part of the process of "**creative destruction**" – as coined by economist Joseph Schumpeter –can also productivity gains within an industry and enable that industry to grow.[29] Box 3 summarizes some findings from global literature on these drivers of firm productivity growth.

There is an extensive literature in Thailand documenting high capital misallocation and weak creative destruction.

Paweenawat (2015) examines data from Thailand's manufacturing industry census in 1997 and 2007, and finds that Thailand's capital allocation is inefficient compared to China, India and the U.S. If Thailand were to increase its allocative efficiency to the U.S. level in 1997, aggregate productivity level would increase between 70-80 percent. Limjaroenrat (2016) finds that capital misallocation, as proxied by dispersion of MRPK, has increased over time across firms within the same 1-digit ISIC industry. Small firms face supply-side constraints to credit while larger firms do not. Amarase, Chucherd and Paweenawat (2017) find that size-dependent policies could contribute to the factor misallocation and that market concentration, foreign investment, and financial deepening could help alleviate the misallocation problem at the sector level. Finally,

[29] Due to data limitations, the analysis in this chapter of creative destruction focuses on entry of productive firms and exit of less productive firms. The reallocation of resources of more productive firms, although important, could not be studied in depth.

Amarase, Apaitan and Ariyapruchya (2013) find evidence of creative destruction in Thailand in export-oriented, but not domestic industries.[30]

..but there is a gap in the literature on studying within-firm drivers of productivity and the relative contribution of each channel to overall productivity growth.

The existing literature in Thailand on firm productivity has some significant gaps. Firstly, the literature does not examine the relative importance of each channel – within firm improvements, between firm allocations, and entry/exit – in driving productivity growth at the industry and economy level. Second, the literature on within-firm drivers of productivity growth in Thailand is not extensive – for example, the literature does not establish the extent to which firm size or export status is linked to overall productivity growth. The analysis presented in the rest of this chapter attempts to fill these gaps.

Box 3: Literature review of drivers of firm productivity growth

Several studies have documented how within-firm improvements drive firm productivity growth. Firms' R&D expenditures have been documented to play a significant role in the evolution of the firms' productivity over time, as highlighted in literature reviews by Doraszelski & Jaumandreu (2013) and Hall et al. (2010). In addition to R&D spending, investment in information technology (IT) has also been associated with labor and overall productivity growth (Doms, Jarmin & Klimek, 2004). Various studies show that innovation at the firm level – vertical product innovation, technological and non-technological innovation – tend to positively impact productivity growth. For instance, Mohnen & Hall (2013) reviewed the literature on the impact of innovation on firms' productivity and concluded that innovation leads to higher firm productivity. Furthermore, Aghion & Howitt (1992) develop a (theoretical) growth model in which the average growth rate of the economy is an increasing function of the amount of vertical product innovations.

There is substantial international evidence that creative destruction – both reallocations of factors between firms and entry/exit of firms – drives overall productivity growth. Most of the empirical research has focused on factor reallocation, labor flows and job creation, as a proxy of creative destruction. Job creation and destruction flows tend to be large and persistent and take place within as opposed to between narrowly defined sectors of the economy, suggesting that innovation often takes place at the narrow sectoral level. Davis, Haltiwanger and Schuh (1996) report such findings for the US economy. Foster, Haltiwanger and Krizan (2001) find that labor reallocation between plants accounts for half of manufacturing productivity growth. Bartelsman, Haltwanger and Scarpetta (2004) reports similar evidence in 24 countries. Caballero, Cowan and Micco (2004) finds that labor regulation and protection can hamper creative destruction process based on a panel data of 60 countries.

Recent global research has focused on the efficiency of physical capital allocation. Well-functioning markets should allocate capital so that the marginal revenue product of capital (MRPK) is equated by the market interest rate. In addition, the dispersion of MRPK should be small. That is, capital should flow from low productivity to high productivity firms until returns to capital are broadly aligned. In reality, this is not the case. Certain firms have high MRPK but for some reason are not able to obtain resources to expand. Conversely, certain firms with low marginal product of capital have too much capital. Hsieh and Klenow (2009) and Gopinath et al (2015) find considerable variation in the distribution of MRPK across a wide range of countries.

There is also significant global evidence that entry and exit dynamics, supported by competition, drive overall productivity growth at the industry and economy level. Competition lowers firm profit margins and incentivizes firms to innovate to survive. New entrants can also learn from or imitate incumbent firms that have innovated ahead. Ariyapruchya, O-lanthansate and Karnchanasai (2006) finds that firm productivity is highest when firms face goods markets competition, as proxied by firm rents, industry concentration, ease of entry and exit, and export share. Klapper, Laeven and Rajan (2004) find that stringent barriers to entry inhibit industry growth in European data. Cusolito & Maloney (2018) highlight that entry and exit of firms can account for up to 25 percent of productivity growth in certain countries.

[30] The authors find that flows of capital associated with factor reallocation from low productivity firms to high productivity firms occur in narrowly defined sectors, particularly in electronics or those with high export shares. As a result, aggregate productivity growth is boosted. Second, new firms undergo a selection process whereby innovative firms survive, grow in size and become industry leaders. However, protected or less competitive sectors show less flows of capital as well as less firm entry and exit. The forces of creative destruction are not prevalent throughout all sectors, suggesting that the economy is bifurcated

iii. Firms that are open to foreign investment, invest in skills and in R&D are more productive

Overall productivity growth is driven more by within-firm improvements rather than through a process of creative destruction.

As highlighted in Figures 19 and 20, firm productivity increases for manufacturing firms are driven by increase in productivity of long-standing incumbents ("stay" productivity) and firms older than 5 years of age. This is consistent with global research (Aghion et al, 2001) that the threat of entry of firms may raise incumbents' efforts to boost productivity to escape from competition.

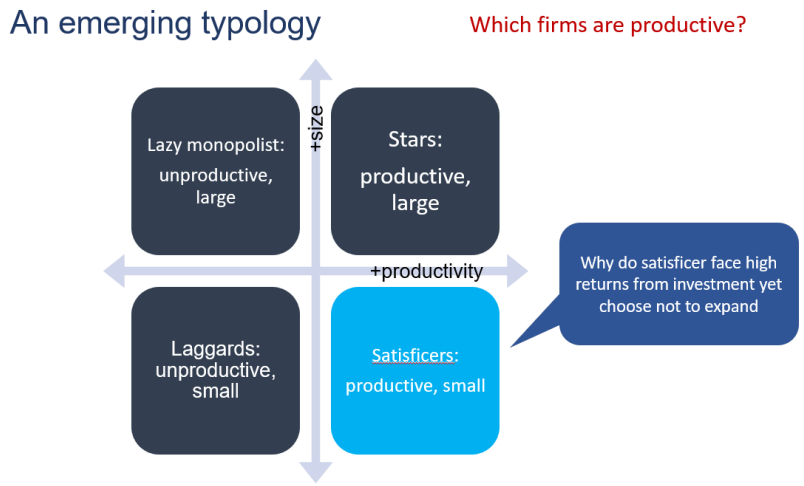
Within firm productivity dynamics highlights, firstly, that openness matters for firm productivity.

Regression analysis of firm TFP growth with firm characteristics (Annex 3) allows for a closer study of within-firm drivers of productivity. The most significant factor driving firm productivity improvements are factors associated with economic openness. This includes whether firms are recipients of FDI; the extent to which the firm is exporting and importing; foreign ownership share interacted with FDI; and whether the firm is a recipient of Board of Investment permits. These factors point to the benefits for firms of exposure to global competition and knowledge spillovers.

Secondly, the relationship between firm size and productivity is more complex, with a significant sample of small, productive firms not growing…

Another key finding is related to firm size and productivity. The regression analysis highlights that firm size is not directly correlated with firm productivity growth. However, closer analysis of firm productivity highlights a potential *typology of firms* in Thailand (Figure 21). This includes: (i) ***Superstar firms*** that are large in size (above 200 employees), tend to be export-oriented (more than 50 percent), integrated in global value chains and show rapid growth in firm productivity. Close to half make use of FDI and Board of Investment privileges. Average firm age is 18 years. Foreign ownership is about 20 percent, on average. This category includes large businesses active in food processing, airbag industry and in construction, for example. None are government owned. (ii) ***Large monopolists*** are large, largely domestically oriented and do not show a pick-up in firm productivity. These include firms active in transportation, pharmaceuticals, and energy sectors. Foreign ownership is low at typically 10 percent. (iii) ***Satisficers*** are defined as SMEs that hire less than 200 employees, exhibit high productivity and positive returns to investment yet choose not to or are unable to expand. These firms tend to be formally registered (60 percent) and are found across a wise swathe of industries. Interestingly, these firms exhibit bunching at around 50 and 100 in terms of number employees possibly due to size-related regulations such as labor and safety regulations. Only 10 percent of firms export and import. Firms with FDI and foreign ownership are very few. (iv) ***Laggards*** are SMEs that exhibit low productivity and low returns to investment. Only 30 percent are formally registered. Less than 5 percent export and import. As part of healthy market churning, these firms will be forced to eventually exit if they do not upgrade productivity.

Figure 21: Typology of firms in Thailand's manufacturing sector



..with differential access to finance potentially playing a significant role.

SMEs in Thailand have difficulty accessing loans and rely more on equity unlike large corporates which can access longer-term financing. Access to credit is ranked as the second most significant challenge faced by SMEs[31], and Thailand scores below its peers on getting credit indicator in the World Bank's Ease of Doing Business 2020 assessment.[32] A key driver of weak access is that the current legal framework privileges credit transactions using immovable assets as collateral, while SMEs tend to hold a majority of assets in movable form.[33] This differential access to finance puts SMEs at a disadvantage over larger firms. As a result, (i) Small firms tend to be less leveraged than large firms—the debt-to-asset ratio of firms in the top size decile is over five times larger than that of firms in the third decile.[34] (ii) While most firms do not have long-term liabilities, and those that do are likely to be the very large firms—the median firms in the first eight size deciles have no long-term liabilities at all; large firms tend to have advantage in managing working capital, especially inventory—cash conversion cycle, i.e., the number of days that a firm need to finance its short-term capital, is 100 day shorter for the firms in the top size decile when compared to firms in the fourth decile.[35]

Firms benefit from a combination of skilled labor with research and development spending, while each factor in isolation

Firms consistently cite access to skilled labor as a key constraint to operations in Thailand, second only to political instability (See Box 4). The 2015 Productivity and Investment Climate Survey (PICS) found that between 2007 and 2015, the time it took to fill a vacancy for a skilled worker increased from 5.2 weeks to about 8 weeks. Box 4 also highlights findings from the World Bank Enterprise Survey that highlights the difficulties faced by Thai firms in acquiring foreign language, technical and IT skills. This makes it surprising that the results indicate that firms with an increased share of skilled

[31] Source: SME Poll of the Federation Thai SME,

[32] Thailand scores 70 out of 100 in getting credit indicator with significant room for improvement in the area of legal framework for movable assets to support access to finance for SME sector.

[33] 78% of SME operators' asset are in the form of movable asset such as account receivable, inventory, raw material, machine, equipment, vehicle, etc. while the rest are in the form of land and real estate.

[34] Source: TMB Analytics

[35] Source: Paweenawat et al. Bank of Thailand 2016

does not appear to have an impact.

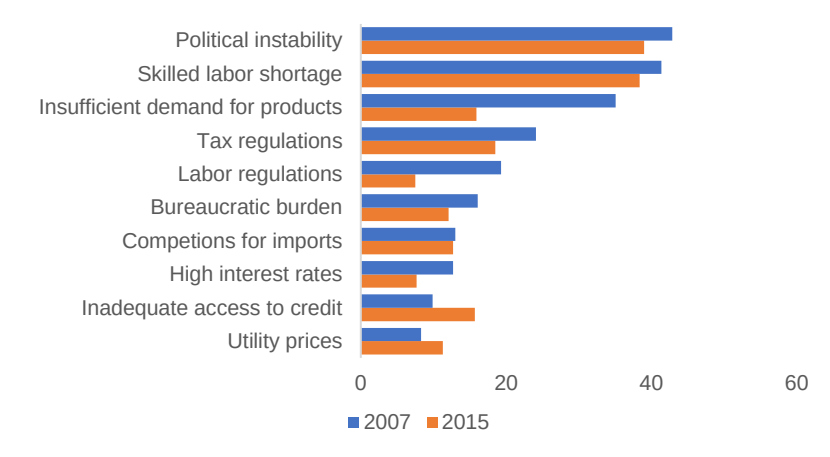
labor payments in their operating budget do not have significantly higher productivity (Annex 3 for regressions). This paradox is, however, resolved when considering skilled labor together with increased R&D spending by firms. Firms that spend more of their operating budget on R&D payments and have higher share of skilled labor payments show a significantly higher TFP growth than other firms. This suggests that innovative technologies are not useful for firms unless the workers have the requisite skills.[36]

Box 4: Shortage of skilled labor and limited innovation as key constraints for firms – findings from World Bank Enterprise Survey

The World Bank Enterprise Survey (WBES) contains a question asking firms to list their top three obstacles from a list of 15 possible constraints. Firms are shown a list of 15 constraints from which they must choose the top three obstacles they face in their operation. Then for each obstacle, the WBES reports the percentage of firms surveyed that indicated it as one of the top three obstacles they face.

Political instability and shortage of skilled labor were cited the most by firms surveyed in Thailand as one of top three obstacles they faced in 2007 and 2015. In 2007, the top three obstacles included political instability, skilled labor shortage and insufficient demand for goods. And 2015 the top three obstacles included tax regulations in addition to political instability and skilled labor shortage. The percentage of firms citing most obstacles as a constraint has declined in 2015, compared to 2007, except for access to credit and utility prices.

Figure B4.1: Percentage of firms identifying each issue as an obstacle/constraint



Source: World Bank Enterprise Survey (2007 and 2015)

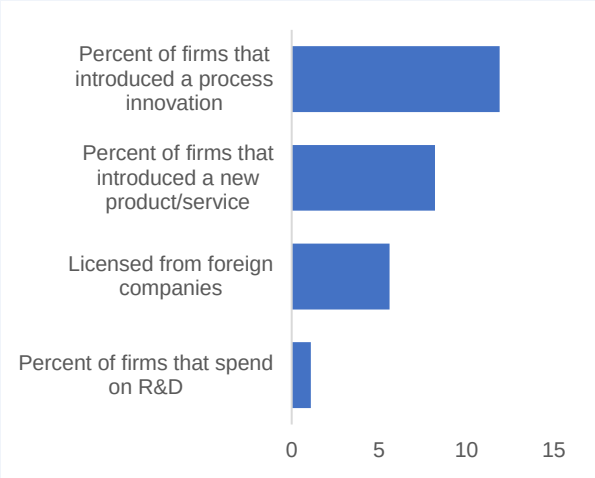
Thai firms are lagging firms in EAP and structural peers in terms of innovation (Figure B4.2 and B4.3). Over 40 percent of firms in Thailand's structural peers introduced a process innovation, compared to just 12 percent of Thai firms. In addition, more firms in the structural peer countries spend on R&D (22 percent of firms in structural peers, compared to just 1 percent of Thai firms). More firms in the structural peer countries also license technology from foreign companies. The same observation is true when comparing Thai firms to firms in EAP and UMICS.

Figure B4.2: Percentage of firms that engage in each innovation activity (2016)

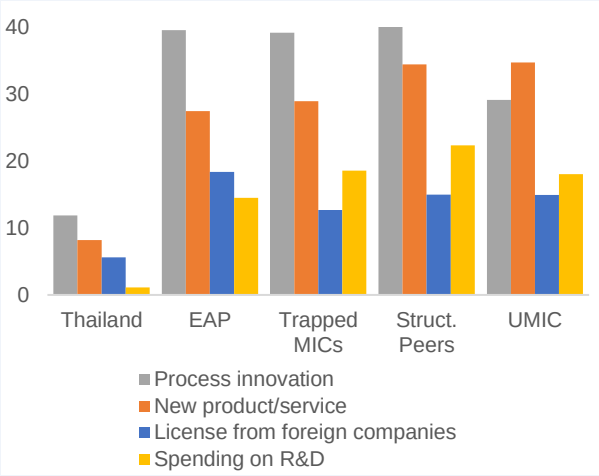
Figure B4.3: Percentage of firms that engage in each innovation activity (2016)

[36] This is consistent with the findings in Maloney et al (2018) and the Thailand Economic Monitor: Beyond the Innovation Paradox (2017).

Box 4: Shortage of skilled labor and limited innovation as key constraints for firms – findings from World Bank Enterprise Survey



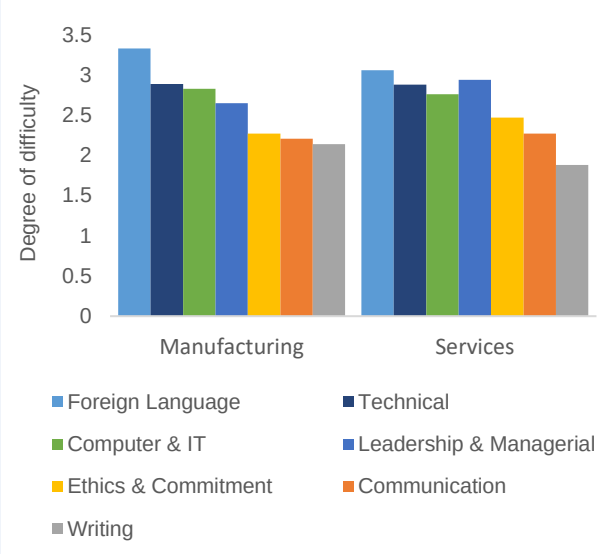
Source: World Bank Enterprise Survey (2016)

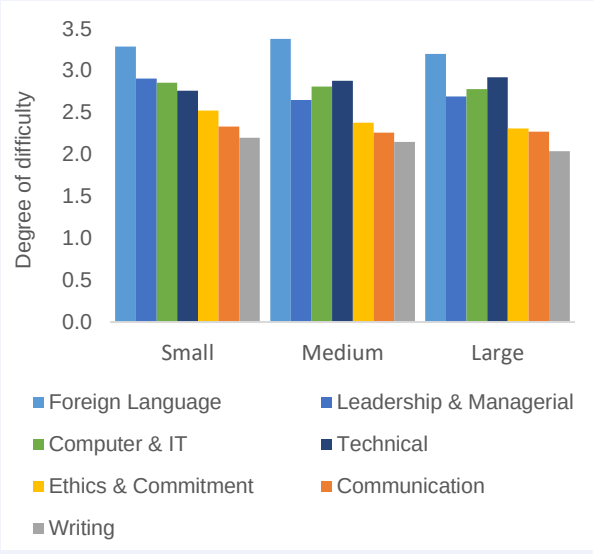


Source: World Bank Enterprise Survey (2016)

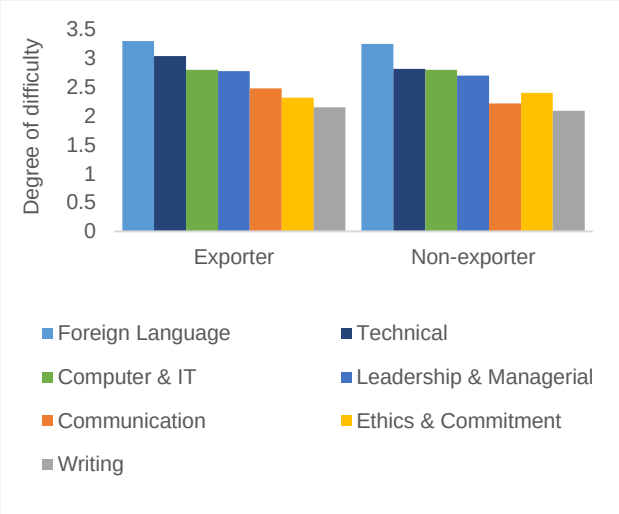
Access to skills plays a major role in this sluggish innovation outcomes. Firms in Thailand find it difficult to find workers with foreign language skills, technical skills and computer skills. Firms were asked to rate the degree of difficulty finding workers with certain skills such foreign language, technical (not computer), computer and IT skills on a scale of 0 (not difficult) to 4 (most difficult). Figure B4.4 depicts the degree of difficulty for different types of firms. Foreign language skill is the most difficult to find in job seekers followed closely by technical and IT skills. These constraints are common across firms in manufacturing and services, across firms of different sizes, across exporters and non-exporters and across foreign and domestically owned firms.

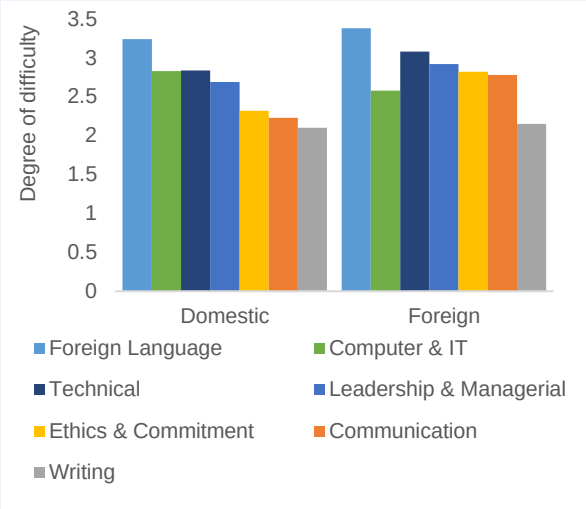
Figure B4.4: Degree of difficulty faced by firms in acquiring skills





Box 4: Shortage of skilled labor and limited innovation as key constraints for firms – findings from World Bank Enterprise Survey





Source: World Bank Enterprise Survey (2016)

iv. Weak entry and exit dynamics and high-markups point to weak competition

Entry and exit dynamics are weak in Thailand, with a possible impact of high market power and concentration in domestically oriented industries.

Creative destruction, in the form of entry and exit dynamics, contributes negatively to overall economy and manufacturing industries' productivity (as highlighted in Figure 19 and 20). In particular, the negative exit related dynamics are particularly pronounced for domestically oriented industries such as tobacco, wood, recycling, other transport equipment, furniture and basic metals. This could be driven by either the "wrong" (more productive) firms leaving an industry or an insufficient number of unproductive firms leaving an industry.[37] These findings are consistent with earlier papers, that show that these creative destruction related dynamics are present only narrowly in export-oriented manufacturing sectors in the economy. What could drive this? Global literature (see Box 3) points to the importance of competition, and, conversely, the absence of significant market power exerted by incumbents. In the presence of market power, new entrants could be discouraged as these new firms will not able to charge prices significantly above marginal costs and generate enough profits.

An important, but imperfect, measure of market power is firm mark-ups, which have been rising since the GFC in advanced economies.

Firm mark-ups measure the extent to which prices are above marginal costs. This is often seen as a measure of market power, which, in turn, may reflect reduced competition **but could also be driven by firms being more innovative and capturing the market.** If mark-ups are correlated with higher firm productivity, then the rise could more likely be associated with higher innovation. **Markups have been rising across advanced countries since the GFC as documented in several papers.**[38]

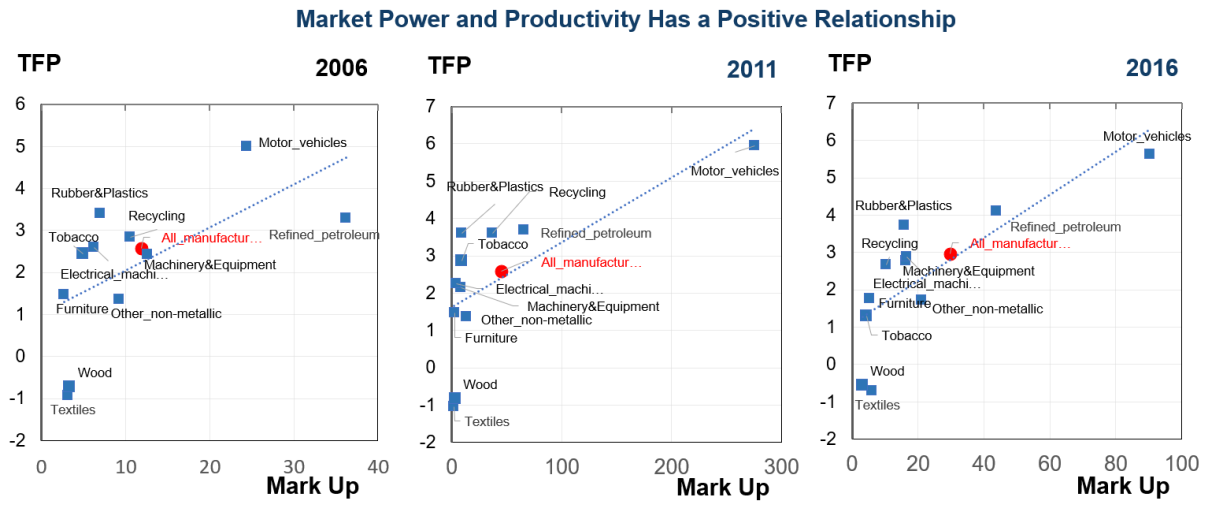
[37] Data on firms leaving the sample was not available, and, as a result, it could not be conclusively established if the wrong firms exited or insufficient number of unproductive firms exited an industry.

[38] Following De Loecker and Warzynski (2012), researchers have been estimating markups for a wide range of firms in the economy. One of the first papers that use this method to analyze the markup of the whole economy is De Loecker and Eeckhout (2017), which shows that markups of firms in the United States have increased by 40 points between 1980 and 2016. Since then, several studies have shown rising markups trends in U.S. and other advanced

Mark-ups are less studied in other economies. This report showcases the earliest estimates of mark-ups in Thailand, but the results need to be interpreted with caution.

The picture is more nuanced for Thailand's manufacturing sector. Firm mark-ups on average have declined since 2006-16, but this masks considerable variation across industries. Industries with high dominance of state-owned enterprises, such as tobacco and petroleum industries have seen in an up-tick in mark-ups but not a commensurate increase in average TFP, which is suggestive of increased market power. These industries have also experienced an increase in overall profits. On the other hand, motor vehicles have also seen an increase in mark-ups but higher aggregate TFP, which is suggestive of more innovative firms in this industry. In general, mark-ups are positively correlated with productivity (Figure 22), suggestive of market power driven by innovation. However, the correlation is not statistically significant so needs to be interpreted with caution.

Figure 22: Firm mark-ups are slightly positively correlated with firm productivity, but the result masks significant variation across industries



Source: Industrial Census 2006, 2011 & 2016 surveyed by NSO and calculated by authors

Another aspect of global concern when it comes to rising mark-ups is the commensurate decline in share of firm revenues that is accruing to labor…

There is global concern over the secular decline of the once-stable share of firm revenues going to labor ("labor share" of income) particularly in the context of sluggish productivity growth (Karabarbounis and Neiman 2013; Dao et al. 2017; Autor et al 2017). This decline has been attributed to foreign competition, structural transformation, and market power. In general, if market power is increasing, firms can command a markup which directly results in a lower share of the bottom line accruing to labor.[39] Structural transformation, in the form of a shift towards less labor-intensive form of production can also reduce the labor share of income.

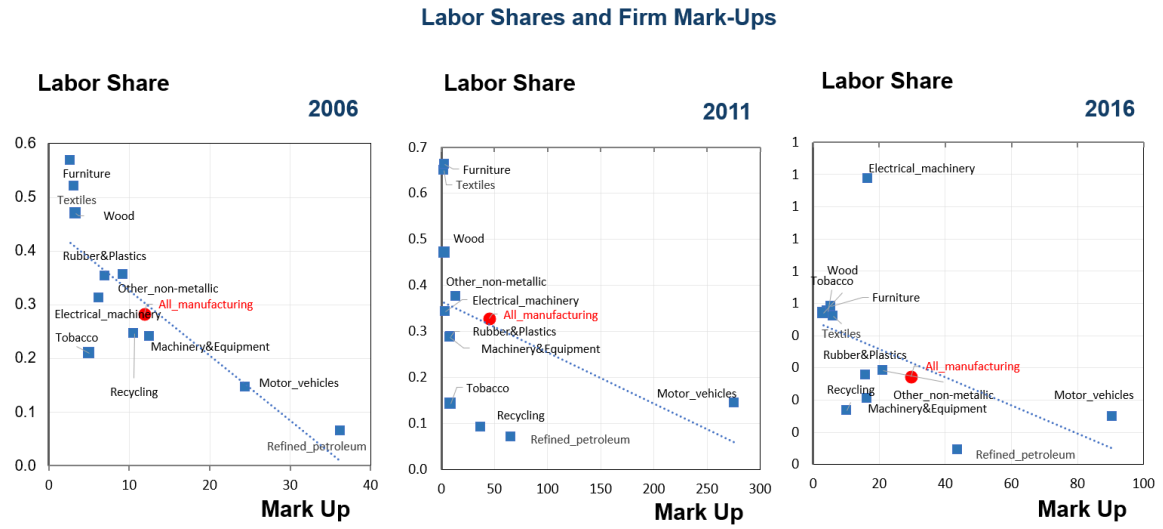
economies (e.g. Cavalleri et al., 2019; De Loecker and Eeckhout, 2018; De Loecker, Eeckhout, and Unger, 2018; Díez, Leigh, and Tambunlertchai, 2018; Díez, Fan, and Villegas-Sánchez, 2019; and Haldane, 2018).

[39] Formally, this can be expressed by defining the share of labor of firm i as $\frac{wL_i}{VA_i} = \frac{\alpha^L}{\mu_i} + \frac{wF}{VA_i}$, where VA_i is firm-level value added and μ_i is a firm-level markup. Wages, w, are set at the market level, for both variable labor and a fixed amount of labor, F, which is required for production. The elasticity of labor is α^L. Note that for labor share to increase, the comparative statics of wages, fixed labor, and the elasticity of labor are upward; they are downward for value added and markups. Thus, increased labor intensity either through wages, the labor requirement F, or α^L would be consistent with an increasing labor share. See Autor et al (2017) for a framework.

..but in Thailand, labor share of revenues appears to be stable but this result also needs to interpreted carefully.

In Thailand, rising mark-ups have been associated with declining labor share of income consistent with the global literature (Figure 23). However, in contrast to trends in high-income countries, labor share of revenue has risen modestly over the past decade for manufacturing firms in Thailand. This result does not imply, though, that market power is declining as it could also be driven by the structural reallocation of labor from low to high productivity activities.

Figure 23: Labor shares are negatively correlated with rising firm mark-ups



Source: Industrial Census 2006, 2011 & 2016 surveyed by NSO and calculated by authors

The next chapter delves deeper into the competition landscape in Thailand, which is a key driver of market power.

As noted in the literature review (Box 3), market power is closely linked to issues of degree of competition in the economy. The next chapter delves deeper into an analysis of the drivers of competition in Thailand, including some critical constraints such as statutory monopolies, price controls, services sector restrictions and unequal treatment of private and public firms.

Chapter 3: Barriers to a Competitive Landscape in Thailand

Effective competition is essential to ignite productivity growth.

The economic benefits of competition are well documented globally. The balance of the available theoretical and empirical work suggests that opening domestic markets to greater competition can enhance aggregate productivity. Effective competition induces positive changes in work practices (e.g., reduced managerial and non-managerial slack) and makes firms more productive, forces less efficient firms to exit the market and allows more efficient firms to gain market share, leading to a better reallocation of resources, and fosters innovation and entrepreneurship activity (Aghion and Griffith 2005; Acemoglu et al. 2007; Bassanini and Ernst 2002; Bloom et al. 2011). Competition policies and laws also boost investment (Alesina et al. 2005) and ensures that firms can interact on a level playing field.

The first step is to review product market regulations and other government interventions that distort competition

Product markets entails markets for production inputs and final goods and services. While market characteristics and behaviors of firms do affect product market competition, so do government interventions. As such, leading competition authorities and regulators look for better ways to achieve the policy objectives of regulation with the least possible harm to competition. Figure 24 provides a comprehensive framework,

which highlights minimizing distortive interventions at the sectoral and economy level and enforcing competition related regulations such as anti-trust regulations.[40]

Figure 24: Comprehensive competition policy framework

Fostering competition in product markets		
Minimizing distortive government interventions		**Enforcing and improving antitrust regulations**
Sectoral regulation	**State aid, SOE presence, etc.**	
Reform policies and regulations that strengthen dominance: restrictions to the number of firms, statutory monopolies, bans towards private investment, lack of access regulation for essential facilities.	Control state aid to avoid favoritism and minimize distortions on competition	Tackle cartel agreements that raise the costs of key inputs and final products and reduce access to a broader variety of products
Eliminate government interventions that are conducive to collusive outcomes or increase the costs of competing: controls on prices and other market variables that increase business risk	Ensure competitive neutrality including vis-a vis SOEs	Prevent anticompetitive mergers
Reform government interventions that discriminate and harm competition on the merits: frameworks that distort the level playing field or grant high levels of discretion		Strengthen the antitrust and institutional framework to combat anticompetitive conduct (abuse of dominance)

Source: WBG-OECD (2017). Adapted from Kitzmuller M. and M. Licetti, "Competition Policy: Encouraging Thriving Markets for Development" Viewpoint Note Number 331, World Bank Group, August 2012

The chapter plan follows the competition policy framework.

The rest of this chapter follows the framework outlined in Figure 24. The chapter starts with an assessment of the current degree of competition in Thailand's product markets compared to its peers. The chapter then moves towards an assessment of distortive government interventions that may be contributing to these outcomes – in particular, barriers to entry and exit and state involvement in business operations. Finally, the chapter ends with an assessment of the competition law in Thailand with recommendations on improving design and enforcement.

i. Thailand's product markets are less competitive than its peers

While Thailand has become a more open economy since the AFC, the degree of competition in Thai

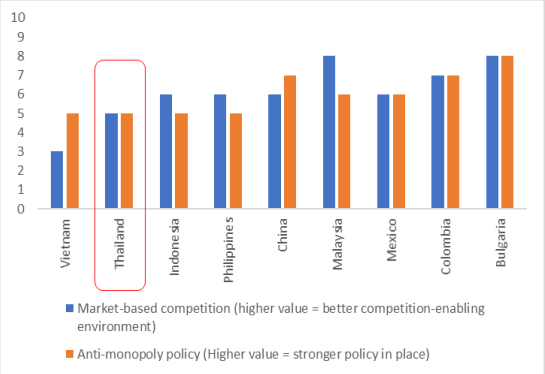
According to the latest Bertelsmann Stiftung's Transformation Index indicators (BTI, 2018), the fundamentals of market-based competition – i.e. regulatory interventions that enables competition – are perceived to be less developed in Thailand compared to

[40] Interventions by anti-trust authorities can translate into tangible benefits at economy, sector, and market levels. For example, the implementation of Australia's National Competition Policy Reforms contributed to its productivity surge and boosted Australia's GDP by 2.5 percent during the 1990s (Productivity Commission, 2005). In Ukraine, various episode of services liberalization between 2001 and 2007 boosted total factor productivity in the manufacturing sector (Shepotylo and Vakhitov, 2012), and the dismantling of the trucking cartel on the Bangkok–Vientiane route in 2004 and opening it to more Thai truckers reduced logistics costs by 30 percent (Arnold, 2005).

markets is still perceived to be weak.

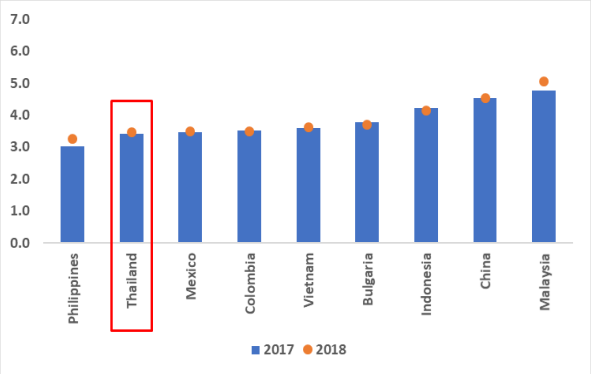
its peers [41] and competition laws to prevent structures and conduct that thwart competition also appear to be weak and lack effective enforcement (Figure 25). There is also a greater extent to which business activity in Thai markets is perceived to be dominated by relatively few players compared to peers (Figure 26), with little progress made over the 2017-2018 period.[42] Globally, Thailand ranks 96th out of 140 countries in terms of the extent of market dominance according to the Global Competitiveness Report 2018.

Figure 25: Organization of the market and competition



Source: Authors' elaboration based on data from the Bertelsmann Stiftung's Transformation Index BTI, 2018 (the responses reflect the situation in the country at the end of January 2017)
Note: The BTI is a perception indicator based on in-depth assessments of countries and is managed by the Bertelsmann Stiftung

Figure 26: Extent of market dominance, 1–7 (best)



Source: Authors' elaboration based on data from the Global Competitiveness Report (GCR), World Economic Forum, 2017-2018

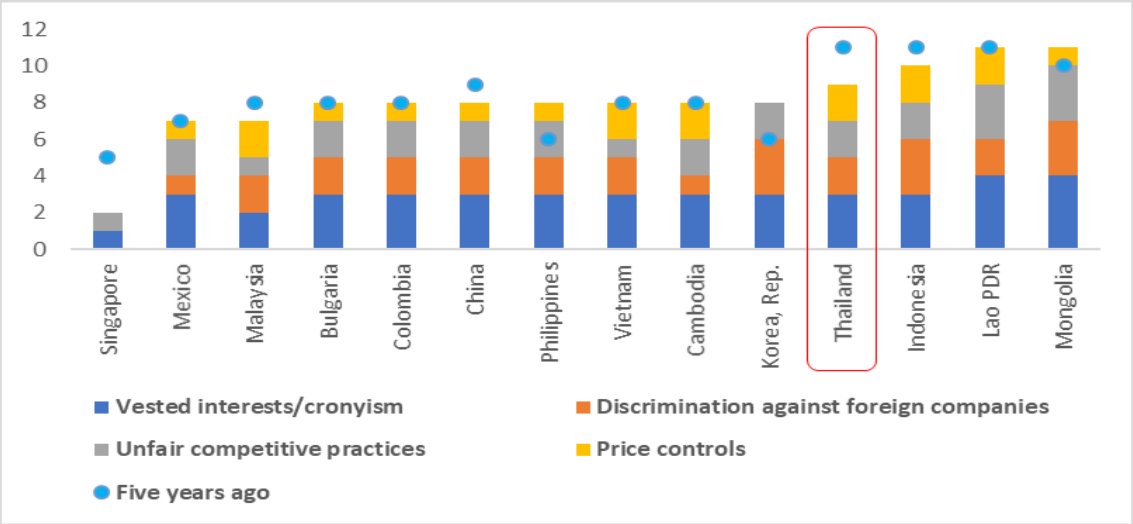
Government regulations and interventions in markets may be affecting perceived business risks for the private sector in Thailand.

Government regulations and interventions in markets that increase business risks and harm competition can adversely affect the ability of firms to compete in markets. According to the latest Economist Intelligence Unit (EIU) data (July 2019), investor perceptions relating to risks in doing business in Thailand are relatively high compared to Thailand's peers (Figure 27). While the perceived level of operational business risk caused by vested interests and favoritism, discrimination against foreign companies, unfair business practices, and prices controls have reduced over the last five years, the aggregated level appear to be high in Thailand compared to its peers.

[41] In this note, whenever possible, the set of comparator countries for Thailand will include the following regional and structural peers: Bulgaria, China, Colombia, Indonesia, Malaysia, Mexico, Philippines, and Vietnam. These comparators have been used in previous SCD for Thailand.

[42] The indicators of the Bertelsmann Stiftung's Transformation Index (BTI) answer the following questions based on expert judgment: (i) to what level have the fundamentals of market-based competition developed (including the low importance of administered pricing, currency convertibility, no significant entry and exit barriers in product and factor markets, freedom to launch and withdraw investments, and no discrimination based on ownership (state/private, foreign/local) and size, (ii) to what extent do safeguards exist to prevent the development of economic monopolies and cartels, and to what extent are they enforced (including the existence of antitrust or competition laws and enforcement)?; and (iii) to what extent has foreign trade been liberalized (including conditions, tariff and non-tariff measures for market access, import licensing and customs valuation, export subsidies and "countervailing duties" on allegedly subsidized imports, import quotas and export limitations, contingency trade barriers (anti-dumping procedures, "safeguards" – restrictions of imports to protect a specific domestic industry from serious injury), replacement of non-tariff with tariff measures, and information on the country's participation in the WTO)?.

Figure 27: Business risks related to weak competition policies (component score, 0-4, with 4 = worst)

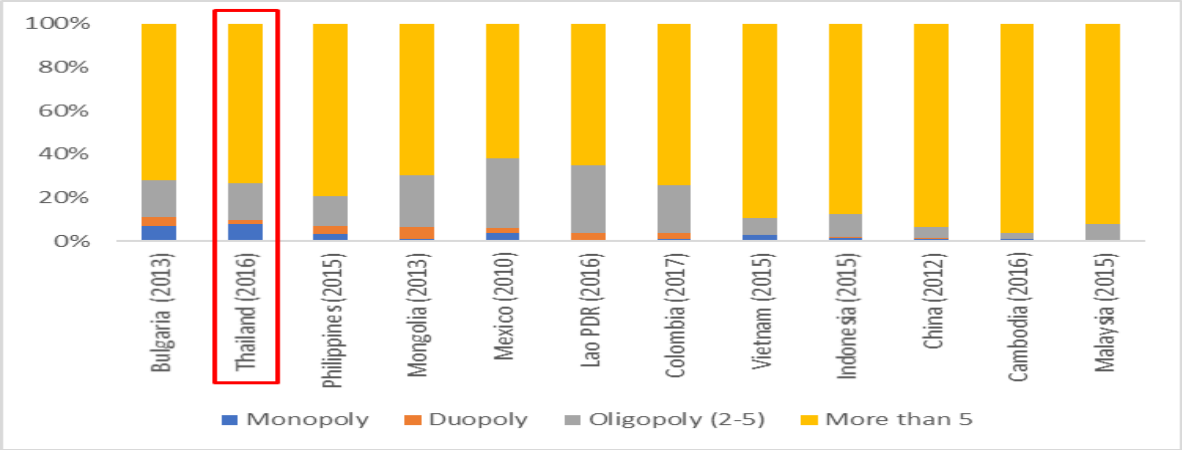


Source: Authors' elaboration based on data from the Economist Intelligence Unit (EIU) Risk Tracker, July 2019.
Note: The EIU Risk tracker is a perception indicator as reflected by the Economist Intelligence Unit.

Lack of effective competition appears to have made Thai markets more concentrated than in pee countries.

The perceived business risks related to weak competition appear to hinder market dynamics in Thailand. Market concentration in Thai manufacturing sectors appear to be high relative to comparator countries (Figure 28). The latest Enterprise Survey data confirms a large presence of monopoly or duopoly market structures in industries that are typically characterized by low market concentration such as those in manufacturing. The proportion of Thai manufacturing firms that consider that they operate in monopoly or duopoly markets appear to be relatively high (≈ 10%) when compared to regional and structural peers. Although concentrated market structures may be consequences of natural barriers, small market size, or firms being more efficient because of scale economies, government regulations and interventions that disrupt the marketplace by limiting entry, facilitating dominance, or un-leveling the playing field may also cause market structures to be relatively more concentrated.

Figure 28: Manufacturing sector market structures



Source: Authors' elaboration based on data from the World Bank's Enterprise Survey data for most recent years.
Note: The shares reflect the percentage of responding establishments that answered "None", "One", "2-5" or "More than 5" to the question "For fiscal year [indicated in parenthesis], for the main market in which this establishment sold its main product, how many competitors did this establishment's main product/product line face?", respectively. E.g. "None" was coded as "Monopoly" and "One" as "Duopoly". Establishments with no answers to the question and establishments whose main market for its main product line is international are excluded.

ii. Distortive government interventions appear to be impacting competition adversely

Distortive government policies and interventions can contribute significantly to making markets more concentrated and depress productivity gains.

Restrictive regulations and interventions, discretionary application of the regulatory framework, unequal treatment of market players, and ineffective enforcement of competition policy can all disrupt the marketplace and adversely affect competition by limiting entry, facilitating dominance, and un-leveling the playing field. This can adversely affect the ability of firms to compete in markets, hamper private sector development, and cause market structures to be relatively more concentrated. Three such restrictive policies are highlighted below: barriers to market entry and exit, which is closely linked to the limited creative destruction highlighted in Chapter 2; price controls; and state involvement in business operations.

Barriers to market entry and rivalry

A more effective and efficient business regulatory environment can unlock productivity growth

Better designed and more agile regulations that effectively deal with new business challenges and opportunities and facilitate the entry of new firms, while ensuring the exit or restructuring of weak or non-viable firms. On the other hand, more stringent, ineffective, and costly firm entry and exit regulations can impede the dynamism of the private sector.

Thailand has made substantial improvements in several aspects of

Several key initiatives introduced in 2015 and beyond – e.g. the Royal Decree on Review of Law B.E. 2558 (2015) and the Licensing Facilitation Act B.E. 2558 (2015) – have made the regulatory landscape more business-friendly and have enhanced regulatory quality and streamline implementation. Some of the initiatives have made the registration process more transparent and less discretionary by making available to the public

business regulation since 2015.

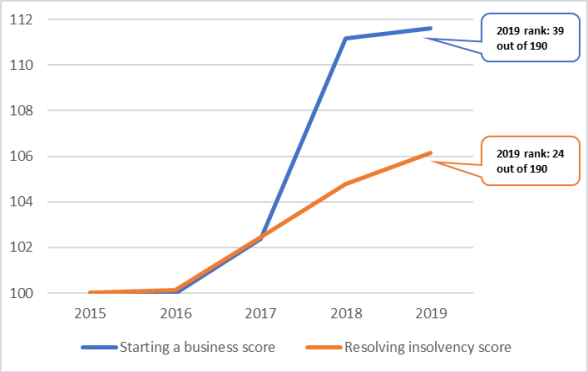
registration procedures manuals detailing the procedures, requirements, costs, and time for licenses. Other measures such as streamlining provisions relating to company liquidation and introducing new restructuring for small and medium-size businesses have all enhanced the business environment. Thailand's effort is reflected in the recent 2019 World Bank Ease of Doing Business (DB) ranking, where it is ranked 39th (out of 190 economies) in the ease of starting a business and 24th (out of 190 economies) in resolving insolvency (Figure 29). The country has made considerable year-on-year improvement since 2016 (Figure 30).

Figure 29: Doing Business indicators for Thailand in 2019

Topic	Ranking (out of 190 economies)	Distance to Frontier (0-100, Global Best Practice)
Ease of doing business score global	27	78.45
Starting a business	39	92.72
Dealing with construction permits	67	71.86
Getting electricity	6	98.57
Registering property	66	69.47
Getting credit	44	70
Protecting minority investors	15	75
Paying taxes	59	77.72
Trading across borders	59	84.65
Enforcing contract	35	67.91
Resolving insolvency	24	76.64

Source: Doing Business database, 2019

Figure 30: Evolution of selected DB indicators, (2015=100)



Source: Doing Business database, 2019

Notwithstanding the progress, there are product market regulations at the economy wide and sectoral levels that seem to impede or discourage entry

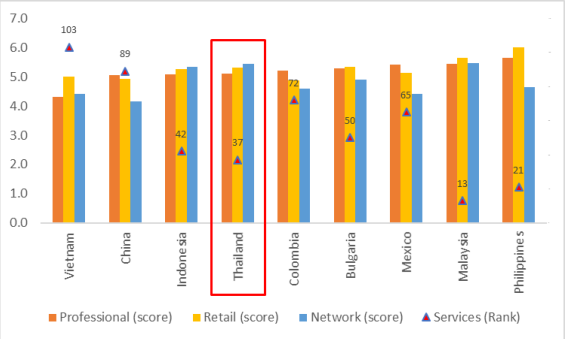
A key example is policies and restrictions that impede foreign participation in key sectors of the economy. Thai laws prohibit foreigners from engaging in certain business activities and from acquiring majority ownership. Under the Foreign Business Operations Act, B.E. 2542 (1999), business activities such as land trading, newspaper, radio broadcasting, television, rice and livestock farming, fisheries, forestry and timber processing from a natural forest, and extraction of Thai medicine herbs are prohibited to foreigners. In addition, business activities such as mining, firearms, trading in antiques, wood carvings, production of wood furniture and utensils, sugar from sugar cane, rock salt, salt farming, manufacturing of gold-ware, silverware, nielloware, bronzeware, or lacquerware, accounting, legal, architecture, and engineering services, and some construction activities are also prohibited to foreigners unless permission is granted by a designated government agency. Some of these business activities (e.g., provision of accounting services, legal services, architecture, and engineering services, advertising activities, trading activities, and other kinds of services) are de-facto prohibited to foreigners because the government consider that Thai businesses are not yet ready to compete.

Thailand has a more restrictive professional services market on average compared to peers such as Malaysia and Philippines.

Though Thailand seems to fair well relative to the selected peers on competition in network services (11th/140, GCR 2018), it scores below comparator average on competition in professional services (Figure 31 and Figure 32) and ranks relatively low on competition in professional and retail services (59th/140 on each, GCR 2018). Many Thai government regulations restrict foreigners and majority foreign-owned firms from engaging in certain professional services businesses such as accounting, legal, architecture, engineering, and management consulting. While the government has

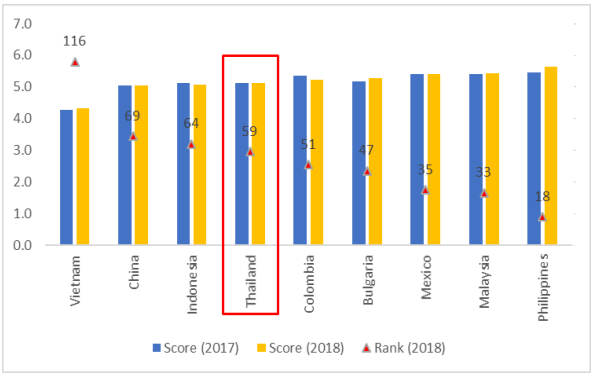
recently lifted restrictions and allow foreign firms to provide consultancy services relating to management, marketing, human resources, and information technology (in addition to the provision loans and lease of office space) to their affiliates and subsidiary entities, limitations on foreign equity on commercial presence in several services industries still exist.

Figure 31: Competition in services 2018, score 1-7 (best), rank 1-140 (worst)



Source: Authors' elaboration based on data from the World Economic Forum's Global Competitiveness Report (GCR), World Economic Forum, 2017-2018

Figure 32: Competition in professional services, score 1-7 best), rank 1-140 (worst)



Source: Authors' elaboration based on data from the World Economic Forum's Global Competitiveness Report (GCR), World Economic Forum, 2017-2018

In practice, these restrictions can also be in the form of prohibitive capital and other regulatory requirements.

Thailand imposes several capital requirements for participation of foreign firms in professional services. For example, Thai government regulations require foreign firms to have a minimum capital of 500 million baht (≈ USD 16.4 million) for certain construction businesses and 100 million baht (≈ USD 3.3 million) for certain brokerage or agency businesses. Moreover, a company is required to have a minimum of 100 million baht (≈ USD 3.3 million) to be able to open one shop in the wholesale sector and up to five shops in the retail sectors. Finally, other regulatory barriers may also exist. For example, to be able to provide financial advisory services in Thailand, the professional is required to obtain a license for which the test can only be taken in Thai language.[43]

Easing these restrictions can provide a welcome boost to productivity.

As noted in Chapter 1, labor productivity in Thailand's service sectors lags that of the manufacturing sector by about 30 percent. Services has the potential to become a new driver for growth in Thailand and easing these restrictions, in line with Thailand's regional commitments, is an important step in this regard. Although not the focus of this report, services sector liberalization is covered in brief in Box 5.

Box 5: Services sector liberalization – an important but unfinished agenda

The service sector can serve as a new driver of growth by harnessing domestic and global competitive forces. Services is becoming increasingly important to growth due to its complementarity with manufacturing, criticality in

[43] This restriction has been relaxed slightly. The sector regulator has, as of 16 July 2019, allowed licensed, registered or authorized professionals from Malaysia, the Philippines, and Singapore to provide general investment advisory services to Thailand-based investors, provided they obtain an authorization from the sector regulator.

Box 5: Services sector liberalization – an important but unfinished agenda

the global value chain, and rising tradability given technological advances. However, in Thailand, services accounts for approximately half of output, uses a substantial 40 percent of the labor force, and lags behind manufacturing productivity by 30 percent. Unlike many peers, Thailand's service sector share has not grown, is dominated by lower-productivity industries employing lower-skilled workers, and boasts a low share of services exports, which tend to be in "traditional" sectors.

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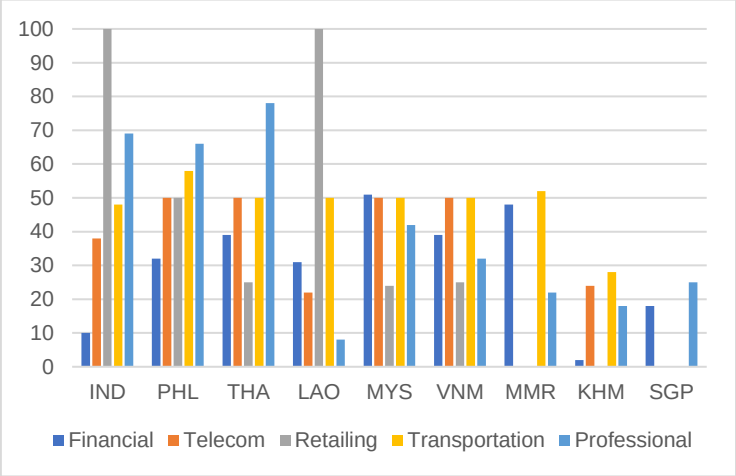
Thailand has on average a more restricted service market, particularly in professional services compared to ASEAN peers and other regions in the world. Examples of successful services liberalization in ASEAN highlight how the combination of private sector initiative and government support can increase service output and exports (for example, Singapore: financial services; Malaysia: higher education; the Philippines: telecommunications-based services). A global World Bank study finds that Thailand has a more restricted service market on average compared to ASEAN peers such as Malaysia and other regions of the world, particularly in professional services such as accounting, legal, architecture, engineering, and management consulting.

Integration in services can be deepened considerably by implementing the commitments laid out within the ASEAN Economic Community (AEC) framework agreement on services. The regional economic integration of AEC, a large potential market of 620 million people, offers opportunities for using services and services trade to generate growth in productivity and income. While services contribute between 40 and 70 percent of the gross national income of ASEAN, ASEAN's trade in services represents only 5 percent of world trade in commercial services. Thailand is a signatory to the AFAS commitment to liberalize services, but this has not resulted in significant additional liberalization on the ground. ASEAN has a roadmap to pursue implementation of service sector reforms.

Figure B5.1: Services trade restrictiveness index by industry



Source: World Bank ASEAN Services Integration Report 2015

Price controls

Administered prices (floor and ceiling prices) can have unintended negative effects on markets.

Minimum and maximum prices can both dampen the incentives for firms to seek efficiency improvements and compete along price or quality dimensions. When ceiling prices are administered, profit margins are restrained as production costs rise and firms may lack the incentives to invest because of dampened profitability. In addition, maximum prices can act as a focal point for firms to collude on prices or quantities by creating shortages. Thus, price controls can adversely affect firm productivity

enhancements, the efficient allocation of resources across firms and sectors, and the innovation activities of firms.

Price controls in Thailand may potentially be restraining and distorting competition in key markets of the economy, thus limiting productivity gains…

An earlier study from the Bank of Thailand shows that the total factor productivity (TFP) was lower for firms in Thai industries that were subjected to price control (Ariyapruchya et al., 2006). Thai agricultural producers benefit substantially from government price support programs (see Box 1). In addition, there is significant presence of price controls in key consumer product markets, with prices of key goods and services that are administered in some form by the government accounting for roughly one-third of the consumer price index (CPI) basket.[44] The Central Committee on Prices of Goods and Services (CCP)[45], under the Price of Goods and Services Act B.E. 2542 (1999), is empowered to issue notifications prescribing certain goods or services as controlled goods or services. The list of controlled goods and services continue to increase and there are currently 46 goods and 6 services on the list, including staple food products.[46] In addition, the prices of over 200 products on the *watch list*, *priority watch list*, and *sensitivity list* are monitored, and manufacturers of products on the *watch list* must first notify the Committee before changing prices.

An example is the food market, where despite price controls, prices in Thailand seem to be higher than peers

Notwithstanding the fact that the Thai government regulates the prices of some basic food products considered to be socially important, preliminary results of a price comparison across countries show that prices of certain food products are on average higher in Thailand compared to some comparator countries, even after controlling for proxies of potential demand and cost factors impacting prices such as income per capita, logistics performance, and applied tariff rates (see Annex 4, Table 1 and Table 2).[47] Although these results can be explained by diverse factors, weak competition can be a driver. Specific market and value chain assessments needs to be conducted to understand whether there are competition issues affecting these markets.

Limiting price controls can

Promoting competition in markets – through regulatory reforms that increase contestability and enhance antitrust enforcement - is the ideal way of fighting against

[44] In general, prices of goods and services administered in some form account for roughly 35% of the CPI basket, with items in the energy and public transportation categories alone forming about 13% of the CPI basket (Direkudomsak, 2016).

[45] Under the Ministry of Commerce's Department of Internal Trade.

[46] The products on the price control list include consumer food items (e.g. garlic, rice, corn, eggs, fresh cassava and tapioca chips, coconuts, onions, wheat flour, yoghurt, milk, sugar, oil, and pork), transport equipment (e.g. motorcycle, car, truck, tires, and batteries), school uniforms, and medical fees), agricultural inputs (e.g. fertilizers, pesticides, animal feed, tractors, and rice harvesters), construction materials (e.g. cement, structural steel, iron plates, steel rods, and electric wires), paper and paper products (e.g. pulp, crepe, parchment, and writing/typing papers), petroleum (e.g. diesel fuel), and medicines. As of January 2019, the CCP has added medical supplies for the treatment of diseases (e.g. gauze, IV tubing, and medical needles) and medical treatment services to the list of controlled goods and services but eliminated price controls on sugar as of July 2, 2019.

[47] Preliminary OLS estimates based on 2010-2018 Economist Intelligence Unit (EIU) and Numbeo data for following comparator countries: Colombia, Vietnam, China, Indonesia, Philippines, Mexico, and Malaysia countries and the following products: Numbeo – apples (1kg), banana (1kg), beef round (1kg or equivalent back leg red meat), chicken breasts (boneless, skinless, 1kg), eggs (regular, 12), lettuce (1 head), loaf of fresh white bread (500g), local cheese (1kg), milk (regular, 1 liter), onion (1kg), oranges (1kg), potato (1kg), tomato (1kg), and white rice (1 kg); and EIU – apples (1 kg), bananas (1 kg), beef: roast (1 kg), cheese, imported (500 g), chicken: fresh (1 kg), eggs (12), lettuce (one), milk, pasteurized (1 l), onions (1 kg), oranges (1 kg), potatoes (2 kg), tomatoes (1 kg), white bread (1 kg), and white rice (1 kg), based on data downloaded as of January 15, 2019. Estimates rely on accuracy of EIU and Numbeo price data.

stimulate aggregate productivity growth in industries subjected to significant controls

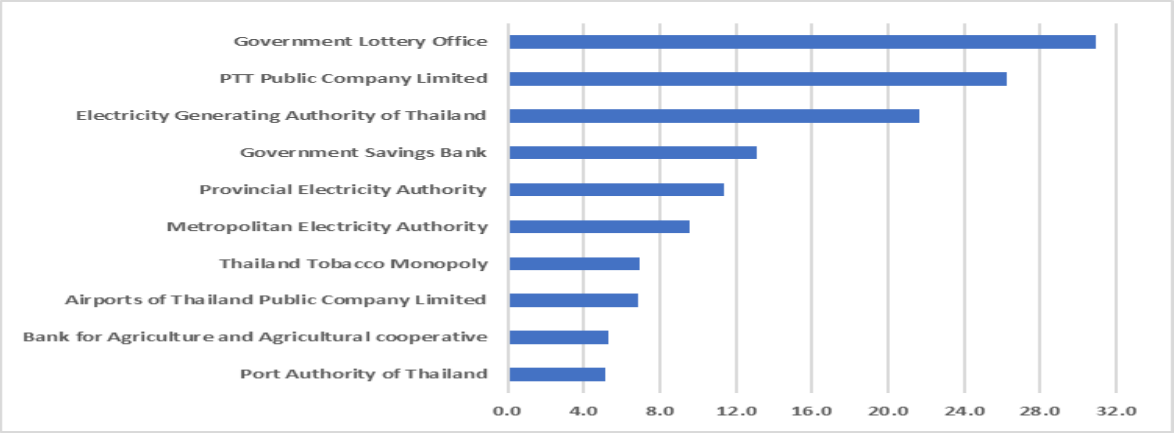
higher prices. Competitive forces unleash unremitting pressure that compels firms to innovate and achieve efficiency gains and to pass some of the productivity gains to consumers in the form of reduced prices.

State involvement in business operations

State involvement in commercial activities in industries where there is active private sector participation can impede the development of competitive markets and limit productivity gains.

Thailand's state-owned enterprises (SOEs) have a large footprint in the Thai economy. They play an important role in the Thai economy, contributing substantially to Thailand's gross domestic product (GDP) and employment. As at the end of 2018, the number of SOEs in Thailand stood at 56 – of which 43 are wholly-owned and the remaining 13 are majority-owned – with over 300 subsidiaries operating across several segments of value chains. Their combined assets, as of September 2017, stood at 14.3 trillion baht (≈ USD 468.6 billion) and contributed contributing substantially to government revenue (see Figure 33) (www.sepo.go.th), and they employ around 270,000 people, representing about 12% of government workforce or 0.7 percent of the Thai labor force (www.sepo.go.th).

Figure 33: Top 10 SOEs by contributions to Thai government coffers in 2017 (billion baht)



Source: Authors' elaboration based on 2017 data from Thailand's State Enterprise Policy Office (SEPO), www.sepo.go.th

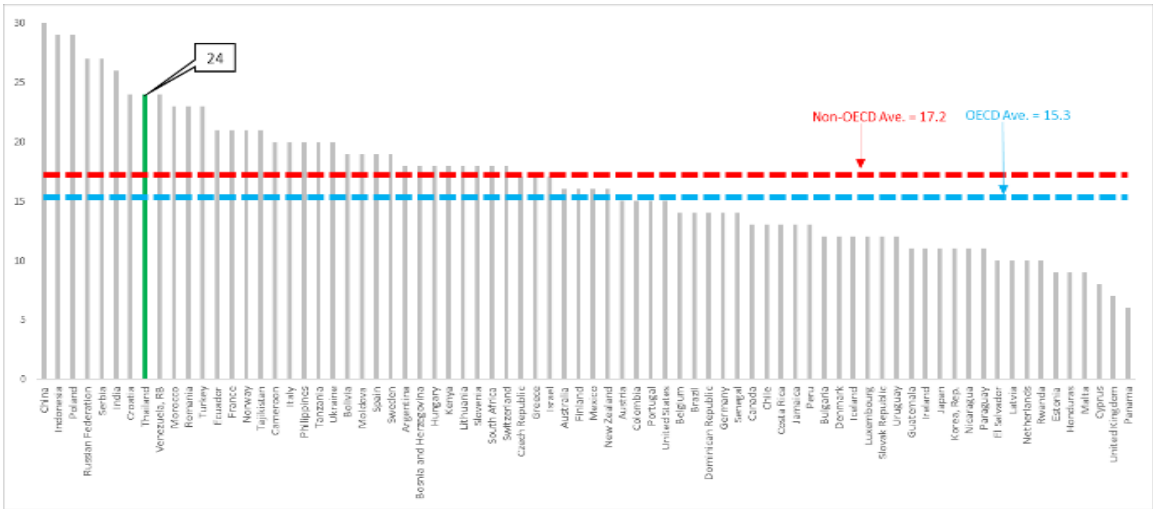
Thailand's SOEs operate in more sectors or subsectors than in the average OECD, non-OECD, or other upper middle-income countries

Thailand's SOEs operate in several sectors (or subsectors) but are particularly prevalent in the energy, transport, telecom, and financial subsectors, with some being designated monopolies in their sectors of operation (e.g. in energy – Petroleum Authority of Thailand (PTT) and Electricity Generation Authority of Thailand (EGAT) and in transport – Bus Company Limited). Thailand features SOEs in at least 24 sectors (Figure 34) compared to an average of 15 in OECD countries, 17 in non-OECD countries, and 18 in other upper middle-income countries. Although government involvement is sometimes necessary in certain network sectors because the of the large capital outlays required (e.g. electricity transmission and transport and road infrastructure), the Thai government is also present in other sectors where there is either active private sector participation or private sector participation is viable (e.g. accommodation, manufacturing, and banking).

Ensuring that SOEs compete with the private sector based on competitive neutrality is critical

Ensuring that Thai government policies conform with the principle of competitive neutrality may enable private enterprises to compete with SOEs on a level playing field and this can crowd in (or avoid crowding out) private businesses to improve competitive pressures in markets. When SOEs receive financial support and access to favorable policies from the government (such as tax breaks, preferential interest rates on loans from state-owned financial institutions, debt guarantees and exemptions, exemptions from certain regulations, and preferential treatment for public procurement) to the exclusion of private enterprises, the playing field becomes unlevel. At present, unincorporated SOEs are treated as state departments and so are exempted from paying corporate tax and, until recently, SOEs were fully shielded from the competition law.

Figure 34: Number of sectors/subsectors with a SOE presence



Source: Authors' elaboration based on data DROM Thailand's State Enterprise Policy Office (SEPO) as the end of 2018 and OECD-WBG Product Market Regulation database 2013 – 2017

iii. Improving and enforcing the new competition framework is a priority

Effective competition policies and laws are critical for well-functioning markets.

Addressing key bottlenecks in Thailand's competition policy and law can deter anti-competitive business practices, ensure efficient and competitive operation of markets, and strengthen the country's competitive position in global markets. Thailand's new competition law substantially alters the 1999 Act and strengthens competition to promote fair, efficient, and competitive market practices. The first competition law – Trade Competition Act B.E. 2542 (1999) – excluded many entities, including state-owned enterprises (SOEs), farmers, and cooperatives, from competition scrutiny and was inconsistently enforced.

Thailand's new competition law – Trade Competition Act B.E. 2560 (2017) is a significant improvement and

The new law makes tackling anti-competitive business practices easier, limits carve outs to SOEs and strengthens the institutional enforcement framework. The Act has created an independent enforcement agency – the Trade Competition Commission (TCC), supported by the Office of Trade Competition Commission (OTCC). The Commission can impose administrative penalties in cases which do not require the initiation of criminal proceedings and has issued secondary legislation on dominance, cartels, and unfair

brings Thailand's competition regime closer to international standards.

trade practices. The first enforcement case was decided in August 2018, finding a fruit wholesaler in breach of the Act by imposing exclusivity obligations on farmers and abusing its bargaining power with farmers (Baker McKenzie, 2018).

Some concerns remain with the new competition act.

These concerns are highlighted in depth in Box 6. The key concerns include: (i) The new act maintains several exclusions not only for certain SOEs entrusted with public services such as public utilities but also for government agencies, businesses with competition provisions in their sectoral regulatory laws (i.e. energy, telecom, broadcasting and television, and insurance)[48], farmers' groups, cooperatives recognized by law, and others such as non-for-profit organizations are exempted from competition scrutiny; (ii) Merger control also appears to be challenging due to a combination of multiple merger notification methods or tests, which are paired, in some cases, with low fines for lack of notification; (iii) The act lacks specific obligations to apply a competition filter to state aid and other quasi-fiscal incentives that may distort market outcomes; (iv) The act is not comprehensive enough to deal with competition issues relating to the digital economy that can affect sectors that are excluded from the competition law; (iv) it The act does not provide for a leniency program, an effective tool for successful enforcement common in many jurisdictions, including in peers like Malaysia and The Philippines.

Box 6: Key elements of the Trade Competition Act (2017) in Thailand

The new Trade Competition Act incorporates several positive features, for instance:

- It limits the (former general) carve outs for SOE to those that provide for national security, public interest, the interests of society, or the provision of public utilities; (although this could be interpreted broadly, it seems that the intention is to maintain a narrow interpretation)
- It supports the advocacy role of the Commission to embed competition in business regulation;
- It strengthens the prohibition to hard core cartels and limits the burden to firms considered dominant; (formerly with market shares as low as 30 %)
- It raises the level of fines to the 10% of the violator's turnover following most international examples;
- It enables the Commission to order remedies to redress market conditions after a competition violation or merger;
- It covers private damages as a mechanism to further incentivize compliance.

However, some concerns remain:

I. **The new Act maintains several exclusions from its scope of application.** First, the exclusion of sectors with specific competition provisions in their laws, creates either fully exempted sectors or, at best, different treatment among operators in different sectors as well as enforceability problems, especially given the lack of independence of sector regulators that should oversee prosecuting anticompetitive conducts in their respective sectors. This seems to be the case, at least, for telecom, energy and insurance. Other exclusions include farmers and cooperatives as well as those based on the narrow definitions of Section 5, such as the exclusion of non-for-profit organizations from the scope of application of the law. Businesses associations may play a critical role in enabling anticompetitive agreements among their members and constitute a recurrent element in many cartels.

II. **Moreover, tackling anticompetitive behavior will remain challenging due to broad prohibitions -even for legitimate business practices-, the possibility to grant individual exemptions for anticompetitive behavior and the maintenance suboptimal sanctions, among other factors.**

[48] This either fully exempt the sectors or allows the sector operators to be treated differently and create enforcement problems, especially given the lack of independence of sector regulators responsible for prosecuting anticompetitive conduct in their respective sectors. This seems to be the case, at least, for telecom, energy, and insurance (Ariyapruchya et al., 2018).

Box 6: Key elements of the Trade Competition Act (2017) in Thailand

- *Market operators can request/obtain permission to carry any prohibited anticompetitive practice (including hard core cartels and abuses of dominance) in order to "facilitate business operations."* In responding to these requests, the Commission can only order measures to limit anticompetitive effects in the case of abuses of dominance but not in case of collusory agreements. (Section 59)

- *Certain prohibitions included in the Act account for fully legitimate business practices and non-competition related behavior.* This is the case of the prohibition of exclusive distribution agreements either domestic (Section 55.3) or for the purpose of importing goods (Section 58). Similarly, Sections 50.4 and 57 prohibit conducts that do not typically constitute competition violations. The former qualifies "intervening in the business operation of others without any appropriate reason" as an abuse of dominant position and the latter refers to unfair commercial practices.

- *The new Act fails to introduce a leniency policy to uncover cartels.* Leniency for the first member that provides information on the existence of a cartel has become a critical tool for anticartel policy with some countries getting most of their convictions following leniency applications. An effective leniency program could help collecting the necessary evidence to build solid antitrust cases, especially in a setup of criminal enforcement where the standard of proof required is high.

- *The use of market shares to determine a dominant position might chill competition on the merits.* While some of the harshness of the previous Act against dominant firms has been eliminated, the new Act still proposes the use of a market share threshold to define dominance. (Section 5)

- *Suboptimal penalties may limit the effectiveness of the Act.* While the fines for hard core cartels and abuses of dominance have increased to a maximum of 10% of the annual turnover they are criminal in nature which requires a higher standard of proof and cannot be accorded by the Commission but have to be ordered by a tribunal. Moreover, jail time (up to 2 years) is possible instead of a fine. Typically, this is reserved for hard core cartels only while the Act includes also abuses of dominance. (Section 72). Therefore, the powers of the Commission itself regarding antitrust violations are limited to cease and desist orders and remedies.

III. **Merger control also appears to be challenging due to a combination of multiple notification methods/tests paired, in some cases, with low fines for lack of notification.** Section 51 of the Act divides mergers and acquisitions among those that may significantly lessen competition (which require post-merger notification, i.e. this creates the problem of unscrambling the egg) and those that may result in the creation of a monopoly of dominant position (which require pre-merger notification). First, the difference between these 2 categories is somehow blurry. Typically, those transactions that may significantly lessen competition are those that create/strengthen a dominant position. Second, lack of post-merger notification only entails an administrative fine of USD 5000. To a large extent, the effectiveness of the Thai merger policy will depend on how the Commission will develop its merger control powers through guidelines.

IV. **Finally, the absence of specific obligations to apply a competition filter to state aid and other quasi-fiscal incentives may further distort market outcomes.** The government of Thailand systematically subsidizes several sectors, either directly or indirectly and price controls are common across sectors. No matter how worthy the goals that the government intends to promote through subsidies/fiscal/quasi-fiscal measures, the implementation of a comprehensive competition policy in Thailand would require to minimize their potential distortions through systematic application of a pro-competition analytical framework. This type of analysis calls to understand 4 elements: 1) whether the measure is granted by the state or through a state entity; 2) to an economic agent performing economic activities; 3) creating a selective advantage; 4) which has an impact on competition. However, these elements are typically toned down by some caveats such a de minimis amount under which the measure will be considered non-significant. For instance, the categories covered by quasi-fiscal measures in Thailand-such as subsidies to farmers, aid to SMEs or start-ups-are those where an individual analysis on a case by case is not typically required. Instead, developing a framework to assess the transparency of schemes, including clear requirements to access aid and cost allocation could ensure that the quasi-fiscal measures achieve their goals while do not incur into ancillary restrictions/market distortions.

Source: WBG Markets and Competition team elaboration based on the Trade Competition Act B.E. 2560

Finally, it will also be important to strengthen Thailand's competition commission

An improved framework will only be effective if coupled with effective enforcement by the newly established Competition Commission. In this regard, the experiences of other competition authorities can provide valuable insights for future amendments to Thailand's Competition Act. Box 7 provides examples of successful interventions by competition authorities of South Africa and Kenya that can provide a useful guide for Thailand.

Box 7: Strengthening the impact of competition commissions: international experience

South Africa

The South African (SA) competition authorities – the Competition Commission of South Africa (CCSA), the Competition Tribunal, and the Competition Appeals Court - have a sound framework to promote competition granted by the South African Competition Act of 1994. Having been in existence for the past 20 years, the authorities have grown immensely and are ranked as the most active in Africa. In the last five years alone, CCSA has had a 55% budgetary increase and an increase of its total staff from 186 in 2014/15 to 220 in 2018/19. Since 2014/15, the CCSA has completed 1897 merger reviews, 195 cartel investigations along with 72 investigations relating to abuse of dominance, vertical restrictions or horizontal restrictions (excluding cartels) have been finalized and 16 dawn raids conducted in various industries. The leniency program initiated in 2004 has been a key tool in tackling cartels, having received over 600 application to date.

The impact of CCSA's enforcement actions has been far reaching and contributed significantly to poverty reduction. For example, collusive practices identified in several basic food products and commodities which made up to 15.6% of the consumption basket of the poorest 10% of the population led to overcharges of up to 42% (a cartel in wheat flour overcharged by an estimated 7-42%, a poultry cartel by an estimated 25% and a pharmaceuticals cartel by 10 -15%). The total reduction in overall poverty from tackling the four cartels was estimated to be 0.40 percentage points, which is equivalent to lifting around 202,000 individuals above the overall national poverty line (Purfield et al., 2016).

The Competition Act was amended in 2013 and 2018. The amendments to the Act in 2013 gave CCSA powers to conduct market inquiries on the state of competition in any industry. These have enabled the commission to look into industry and firm conduct to identify potential competition concerns, taking into consideration multi-stakeholder views and providing recommendations that have informed policy decisions and enforcement actions. The CCSA has initiated market inquires, either ex-officio or under direction from the relevant minister, in banking, private healthcare, liquefied petroleum gas, retail sector, public passenger transport, and data services. Its banking market inquiry led to 28 recommendations, most of which were implemented by the banks and embedded into the Code of Banking Practice, earning the CCSA an International Competition Network (ICN)-World Bank Group (WBG) Competition Advocacy Special Honorable Mention for its advocacy efforts.

Kenya

The Competition Authority of Kenya (CAK) was established by the Competition Act No.12 of 2010 and operationalized in August 2011. CAK has grown rapidly with its staff increasing from 24 in 2013/14 to 60 in 2017/18 and budget increasing from Kshs. 119 million to over Kshs. 560 million in the same period.

Overall, Kenya has a strong framework to address anti-competitive conduct and is continuously updated to effectively perform its mandate, including actions to strengthen the CAK. The Competition Act was amended in December 2016 to increase maximum fines for cartels, improve merger control, address buyer power, and empower market enquiries. Additionally, CAK launched the leniency program in 2017 to facilitate the detection of cartels among competitors.

Despite being a younger competition agency, CAK has completed numerous antitrust cases to stop anticompetitive behavior and provided advisory opinions to other government entities to enable competition in key markets leading to significant impact in the market. In the last five years (2013/14 – 2017/18), it has handled 687 merger applications and 118 restrictive trade practices investigations and evaluations of exemptions. Since June 2014, 3 price-fixing agreements in retail, insurance, and outdoor advertising have been sanctioned by the CAK and down raids in agriculture and construction inputs have been conducted.

Box 7: Strengthening the impact of competition commissions: international experience

The authority also introduced a special compliance program which resulted in 7 business associations in the financial and agriculture sectors disclosing practices that could facilitate collusion and artificially raise prices. These interventions have resulted in considerable savings for the government and consumers alike. Stopping abuse of dominance in the mobile money transfer market through agent exclusivity resulted in higher profitability of agents (10% overall and 45% in rural areas) and an estimated annual consumer savings of USD 33.2 million. Furthermore, an advocacy action in the agriculture sector increased incomes to green leaf tea farmers (farmers received more than 70% higher prices per kilo of tea) and enabled the creation of a purple tea industry with now seven new entrants. The authority's advocacy actions in healthcare led to an award in the ICN-WBG advocacy competition for preventing the enactment of a 20% price increase in health care services, thus potentially saving consumers over USD100 million in medical expenses over a 3-year period.

Chapter 4: Policy Agenda to Boost Productivity of Firms

Credit photo: Science in HD on Unsplash

The focus should be on improving competition, more openness to FDI and building the ecosystem for innovation.

The analysis of drivers and constraints to productivity of manufacturing firms highlights some key findings: (i) *manufacturing firm productivity growth has been higher* for firms that export more; (ii) *competition in domestically oriented industries is weak*, contributing to lower entry of productive firms and less exit of unproductive firms, driving down overall productivity; (iii) *firms that receive FDI are more productive;* (iv) *there are number of small, productive firms that are not growing in size;* and (v) *skills and R&D together matter for firm productivity.* These findings point towards a productivity agenda that focuses on enhancing competition in the domestic economy, increasing openness to FDI and promoting an ecosystem for firm innovation (see Table 1).

Table 1: Summary of Key Findings and Related Policies

Findings	Policy recommendations
Competition and market churning are weak in domestically oriented industries	Implement the new Competition Act with clear critical guidelines related to state-owned enterprises, price control and cartel behavior.
Firms that are integrated with the global economy are more productive	Promote openness by relaxing FDI limits and services restrictions as envisioned in the ASEAN framework agreement on services.
Skilled labor complements R&D investments	Introduce a human capital policy to support the innovation ecosystem. Consider creating a skilled occupation shortages list in the short term.

Enforcing the new competition act will be critical for domestic competition.

Thailand's 2017 Competition Act is aimed at raising competitiveness through greater competition. The act touches on many important aspects such as governance of the competition agency, merger control thresholds, anticompetitive agreements, and exemptions. However, the most important aspect is implementation. The previous Competition Act was created in 1999 to replace the ineffective 1979 Anti-monopoly Act by strengthening enforcement. Although 100 complaints were filed, the 1999 act resulted in only one successful prosecution. The 2017 Act is an improvement, but it remains to be seen how the commission will develop critical guidelines called for in the new act that will determine the effectiveness of the new regulatory framework. For example, implementation can be further strengthened by legal clarification of treatment of state-owned enterprises and quasi-fiscal measures such as price control as well as incentivizing reporting of cartel behavior.

Thailand should consider reducing FDI restrictions in non-strategic industries to encourage openness…

Foreign direct investment (FDI) is often linked to transfer of knowledge and productivity increases and is especially important for services, which requires the movement of capital, labor and know-how and is a crucial input in manufacturing. However, Thailand has been losing market share of FDI within ASEAN for at least two decades. FDI in Thailand is primarily regulated by the Foreign Business Act 1999 (FBA) which remains restrictive particularly for services. Thailand can consider lifting restrictions on FDI in non-strategic industries. In addition, the framework by which the coverage of industries and services, including precising definitions, are reviewed can be clarified and made more transparent.

…in addition to opening up the services sector.

Integration in services can be deepened considerably by implementing the commitments laid with the AEC framework on services. In telecommunications, for example, foreign-owned companies may only provide services on a re-sale basis. Education and health facilities must be held by nationals. Thailand could consider progressively lifting the restrictions of foreigners to perform professional services. Other measures could include lifting the minimum capital requirement of 100 million baht for foreign subsidiaries to operate in the retail sector, lifting the limits on foreign ownership in a "local bank", and introducing clear and objective criteria for the granting of licenses to foreigners in automobile and life insurance.

Thailand should consider workforce development policies to shape a human capital pool to meet the needs of an innovative knowledge-based economy.

Workforce development policies could include the following areas, each one with a specific set of objectives: (a) education—creates the next generation of workers; (b) training—targets skills development for current labor market needs; (c) upskilling—helps current workers adapt to the changing labor market; and (d) migration and talent attraction—can fill skills gaps in the short term. Coordination among these policies will be crucial to build the skills and human capital needed for the shift to the knowledge-based economic model envisioned as part of the Thailand's high-income aspiration.

In this regard, skills monitoring systems are especially important. These systems can be designed to address skill shortages are often applied to training, education, and migration policy. In the United Kingdom and Australia, occupations and skills imbalances monitoring procedures, and the structures for formulating regularly published "skilled occupation shortages lists" have been established and are continuously maintained. These procedures combine "top-down" analysis of key labor market data with "bottom-up" input from and validation by industry. In both countries skills imbalance monitoring is used to inform and prioritize a broad range of human capital policies, from the curriculums standards that have to be met by academic and technical-vocational education providers to scholarships, apprenticeships, public employment programs, and fiscal and immigration incentives used to tap the international supply of skills. Recently, Malaysia has also introduced a similar tool—the Critical Occupations List—to inform both immigration and human resource development policies.

...and strengthening intellectual property protections.

Thailand ranked 69 in number of patent applications filed under the Patent Cooperation Treaty (PCT) per million population in 2016, and Thai nationals file fewer patents than in structural peers. This reflects a lower number of firms with R&D capacity and a decreased institutional capacity to submit patent applications accompanied by solid claims of originality. Moreover, the low rate of granted patents in Thailand shows that the Department of Intellectual Property (DIP) may have a low rate of efficiency in processing such claims, which seems to be masked by the significant backlog in patents pending.

A comprehensive intellectual property reform program could include the following actions:

- Amendment of the existing intellectual property (IP) regulatory framework to ensure compliance with a Trans-Pacific Partnership (TPP) like regime.
- Further streamline and automate procedures and processes at the DIP, the Food and Drug Administration (FDA), and other institutions mandated to support innovation.
- Provide the DIP with enhanced financial autonomy, enabling it to retain stronger competencies to implement its mandate.
- Enhance the institutional capacity of all IP-related agencies, including all relevant enforcement agents, ranging from judges and personnel of the Intellectual Property and International Trade Court, to police and custom officials, and private and public sector lawyers.
- Improve IP teaching and training in the country.
- Launch a comprehensive awareness-raising program aimed at improving the public understanding of the link between IP and National Strategy.

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Annexes

Annex 1: The World Bank's Long-Term Growth Model (LTGM)

The LTGM used in our long-term projections is an extension of the Solow-Swan growth model where the key building blocks include saving, investment and productivity. The model is developed and maintained by the Macroeconomics and Growth Team of the Development Research Group at the World Bank Group. In addition to saving, investment and productivity, the model also takes into consideration TFP, human capital, demographics, labor participation and the country's external environment (FDI and external debt). Solving the model requires data on three key parameters: the labor share in production, the depreciation rate of capital and the initial capital to output ratio, which are all provided by the Penn World Table. TFP growth is either pulled from the Penn World Table or can provided by the user from other sources. For instance, in the alternative scenario we consider, the path of TFP growth is pulled from a companion LTGM with TFP extension that allows for calibration against other countries. Data on Human capital is also provided by the PWT. Demographic changes and projections (population growth and working age population ratio) are sourced from the World Bank Human Development Network.[49]

Our projections are based on the following base model as found in (Devadas & Pennings, 2019) and (Devadas, Guzman, Kim, Loayza, & Penning, 2020).

The production function

Production follows a Cobb-Douglas specification, where the public and private capital stocks have unitary elasticity of substitution. The production function at time, t is as follows:

$$Y_t = A_t\, S_t (K_t^P)^{1-\beta} (h_t L_t)^{\beta} \qquad (1)$$

Where A_t is total factor productivity (TFP), and S_t is public services, both of which are taken as given by each firm. K_t^P is the stock of private capital, $h_t L_t$ is effective labor, with h_t , as human capital per worker and L_t, the number of workers. $1-\beta$ and β are respectively the shares of private capital and labor in the production process.

Public services S_t is specified as follows:

$$S_t = \left[\frac{G_t}{K_t^{P\zeta}}\right]^{\phi} \qquad (2A)$$

Where $G_t$is the efficient physical public capital stock, which means that public capital is an input in the production function. ζ is a measure of public capital congestion and ϕ is the *usefulness* of public capital (can also be defined as the elasticity of output to efficient public capital). Furthermore, it is assumed that only a fraction $\theta_t \leq 1$ of public capital ends up being used for production due to corruption and mismanagement. In that sense θ_t captures the average *efficiency/quality* of the public capital stock. The public capital stock G_t is specified as:

$$G_t = \theta_t K_t^{Gm} \qquad (2B)$$

[49] Population estimates can be found at: https://databank.worldbank.org/source/population-estimates-and-projections

Where K_t^{Gm} is the recorded capital stock in international statistical databases, obtained through the perpetual inventory method.

Combining equations (1), (2A) and (2B) can be written in a more conventional production function as:

$$Y_t = A_t(\theta_t K_t^{Gm})^{\phi}(K_t^P)^{1-\beta-\zeta\phi}(h_t L_t)^{\beta} \qquad (3)$$

Equation (3) is translated into per worker terms by dividing both sides by the total number of workers L_t:

$$y_t \equiv \frac{Y_t}{L_t} = A[\theta_t(L_t)^{1-\zeta}k_t^{Gm}]^{\phi}(k_t^P)^{1-\beta-\zeta\phi}{h_t}^{\beta} \qquad (4)$$

where y_t is output per worker, k_t^P is private capital per worker and k_t^{Gm} is public capital per worker.

The number of workers is just a fraction of the working-age population, which is in turn a fraction of total population: $L_t = \varrho_t\omega_t N_t$, where N_t is the total population, ω_t is the working age-population ratio and ϱ_t is the labor participation rate.

Then the growth rates of output per worker from time t to $t+1$ can be expressed as:

$$\frac{y_{t+1}}{y_t} = \left[\frac{\omega_{t+1}}{\omega_t}\frac{\varrho_{t+1}}{\varrho_t}\frac{N_{t+1}}{N_t}\right]^{(1-\zeta)\phi}\left[\frac{A_{t+1}}{A_t}\right]\left[\frac{\theta_{t+1}}{\theta_t}\right]^{\phi}\left[\frac{k_{t+1}^{Gm}}{k_t^{Gm}}\right]^{\phi}\left[\frac{k_{t+1}^P}{k_t^P}\right]^{1-\beta-\zeta\phi}\left[\frac{h_{t+1}}{h_t}\right]^{\beta} \qquad (5)$$

Equation (5) rewritten in terms of growth rates from t to $t+1$ takes the form:

$$1 + g_{y,t+1} = [(1+\Gamma_{t+1})^{(1-\zeta)\phi}](1+g_{A,t+1})(1+g_{\theta,t+1})^{\phi}(1+g_{k^{Gm},t+1})^{\phi}(1+g_{k^P,t+1})^{1-\beta-\zeta\phi}(1+g_{h,t+1})^{\beta} \qquad (6)$$

where $g_{x,t+1}$ is the growth rate of a variable x from t to $t+1$, and Γ denotes the growth rate of the number of workers, which is a function of population growth and the rate of change in working age-population ratio labor participation rate:

$$1 + \Gamma_{t+1} = (1+g_{\varrho,t+1})(1+g_{\omega,t+1})(1+g_{N,t+1}) \qquad (7)$$

Output per capita y_t^{PC} is defined as $y_t^{PC} \equiv \frac{Y_t}{N_t} = \frac{Y_t}{L_t}\varrho_t\omega_t$ or in terms of growth rates as:

$$1 + g_{y,t+1}^{PC} = (1+g_{y,t+1})(1+g_{\varrho,t+1})(1+g_{\omega,t+1}) \qquad (8)$$

We can then express aggregate output growth as a function of output per capita growth and population growth as (by multiplying (8) with population growth):

$$1 + g_{Y,t+1} = (1+g_{y,t+1}^{PC})(1+g_{N,t+1}) \qquad (9)$$

Public and private capital accumulation, and changes in the efficiency/quality of public capital

Public capital in any period is the sum of the undepreciated stock $(1-\delta^G)K_t^{Gm}$ (where δ^G is the public capital depreciation rate) from the previous period and the public investment made that period I_t^G:

$$K_{t+1}^{Gm} = (1-\delta^G)K_t^{Gm} + I_t^G \qquad (10)$$

The gross growth rate of aggregate public capital is calculated as:

$$K_{t+1}^{Gm}/K_t^{Gm} = (1-\delta^G) + \frac{I_t^G/Y_t}{K_t^{Gm}/Y_t} \qquad (11)$$

And the growth rate of public capital *per worker is calculated as:*

$$1 + g_{k^{Gm},t+1} \equiv \frac{K_{t+1}^{Gm}}{K_t^{Gm}} / \frac{L_{t+1}}{L_t} = \frac{(1-\delta^G)+\frac{I_t^G/Y_t}{K_t^{Gm}/Y_t}}{(1+g_{\varrho,t+1})(1+g_{\omega,t+1})(1+g_{N,t+1})} \quad (12)$$

The efficiency-adjusted stock of public capital (which is actually used in production) is the sum of the efficiency-adjusted undepreciated stock from the previous period and efficiency-adjusted new investment $\theta_t^N I_t^G$:

$$G_{t+1} = (1-\delta^G)G_t + \theta_t^N I_t^G \quad (13A)$$

θ_t is the average efficiency of existing public capital (rather than the efficiency of new public investment) and evolves as a weighted average of the quality of existing public capital θ_t, and the quality of new investment θ_t^N:

$$\theta_{t+1} = \theta_t \frac{(1-\delta^G)K_t^{Gm}}{(1-\delta^G)K_t^{Gm}+I_t^G} + \theta_t^N \frac{I_t^G}{(1-\delta^G)K_t^{Gm}+I_t^G} \quad (13B)$$

It then follows that the quality of the stock of public capital only changes when the quality of new public investment projects is different from the quality of the existing public capital stock: $\theta_t^N \neq \theta_t$. From equation (13B), the growth in can be written as follows:

$$1 + g_{\theta,t+1} \equiv \frac{\theta_{t+1}}{\theta_t} = \left[(1-\delta^G) + \frac{\theta_t^N}{\theta_t}\frac{I_t^G/Y_t}{K_t^{Gm}/Y_t}\right] / \left(K_{t+1}^{Gm}/K_t^{Gm}\right) \quad (14)$$

The private capital stock follows the same accumulation process as public capital and the growth rate of private capital stock per worker is:

$$1 + g_{k^P,t+1} = \frac{(1-\delta^P)+\frac{I_t^P/Y_t}{K_t^P/Y_t}}{(1+g_{\varrho,t+1})(1+g_{\omega,t+1})(1+g_{N,t+1})} \quad (15)$$

where δ^P is the private capital depreciation rate, and I_t^P is new private investment.

Analysis of the drivers of growth

To shed light on the various drivers of growth, we take a log-linearize equation (6) with equations (12), (14) and (15) substituted in. Using the approximation $\ln(1+g) \approx g$ (for small g), future output per capita growth can be expressed as:

$$g_{y,t+1}^{PC} \approx g_{A,t+1} + \beta\left(g_{\varrho,t+1} + g_{\omega,t+1} + g_{h,t+1}\right) - (1-\beta)(g_{N,t+1}) + \phi\left[\theta_t^N \frac{I_t^G/Y_t}{\theta_t K_t^{Gm}/Y_t} - \delta^G\right]$$
$$+(1-\beta-\zeta\phi)\left(\frac{I_t^P/Y_t}{K_t^P/Y_t} - \delta^P\right) \quad (16)$$

Implementation

1- Exogenously determined variables include:
   a. The future growth rates of the labor participation rate ($g_{\varrho,t+1}$)
   b. The working age-population ratio ($g_{\omega,t+1}$), population ($g_{N,t+1}$)
   c. TFP ($g_{A,t+1}$), are exogenously determined.

2- The endogenous variables are:

a. The growth rate of measured public capital per worker ($g_{k^{Gm},t+1}$) given by equation (12), using the growth rate of the public capital stock (equation (11)) as an intermediate step.
b. Private capital per worker growth ($g_{k^{P},t+1}$) is given by equation (15).
c. The growth rate of the efficiency of public capital ($g_{\theta,t+1}$) is given by equation (14) using the growth rate of the public capital stock (equation (11)) as an intermediate step.

3- Finally, the model is closed by updating public capital-to-output using equation (17) and the private capital-to-output ratio using equation (18) (with the growth rates in per-worker terms):

$$\frac{K_{t+1}^{Gm}}{Y_{t+1}} = \frac{K_t^G}{Y_t}\frac{(1+g_{k^{Gm},t+1})}{1+g_{y,t+1}} \qquad (17)$$

$$\frac{K_{t+1}^{P}}{Y_{t+1}} = \frac{K_t^P}{Y_t}$$

Calibration and summary of assumptions

Table A1.1: Summary of assumptions under continuity/business-as-usual/baseline

	Calibration	Source
Labor Share	64%	PWT 9 from 2014
Depreciation rate	6.6%	PWT 9 from 2014
Capital-output ratio	2.6	Steady state value
Public capital-output ratio	0.9	PWT 9 from 2014 (Based on public share of total capital from IMF, 36%)
Private capital output ratio	1.7	PWT 9 from 2014
Human capital growth	0.8%-0.1%	Calculated using LTGM Human Capital Extension
TFP growth	1.2%	PWT 10-year avg
Investment-GDP ratio	25%	WDI 5-year avg
Public investment-GDP ratio	6%	Based on public investment share of total investment from IMF, 24%
Private investment-GDP ratio	19%	WDI 5-year avg
Population growth	0.2% - 0.5%	UN Population projections
GDP growth in 2021	2.7%	World Bank TEM forecast (January 2020 before Covid-19 outbreak)
Atlas GNI per capita	USD6610	WDI, estimate from 2018

Table A1. 2: Summary of assumptions under reform scenarios

	Baseline	Reform Scenarios	Explanation/Source
TFP growth	1.2%	1.23%-1.25% (peaks at 1.72% in 2030)	Korea's TFP path from the TFP extension of the LTGM
Investment-GDP ratio	25%	34.5% by 2030	The 90th percentile of investment-ratio ratio in UMICs from WDI.
Public investment-GDP ratio	6%	10.8% by 2030	The 90th percentile of investment-ratio ratio in UMICs from WDI.
Private investment-GDP ratio	19%	23.7% by 2030	The 90th percentile of investment-ratio ratio in UMICs from WDI
Human Capital growth	0.8%-0.1%	0.8%-0.6%	The 90th percentile expected years of schooling, harmonized test score and stunting rate from World Bank Human Capital Index Database.

Annex 2: Estimating firm productivity[50]

Data source and coverage: The firm-level dataset used in this report is the Thailand's Manufacturing Industry Census covering 2006, 2011 and 2016 data with more than 50,000 observations.

Productivity measure: A revenue-based measure (TFPR) is used to estimate firm productivity, as the firm's nominal output is deflated by an industry wide price deflator. This is necessary as Thailand lacks economy-wide information on firm-level input and output prices. See Box 1 for technical discussion on the estimation approach used.

Challenges with revenue-based TFP (TFPR) measures: Deflating a firm's nominal output or value added with an industry wide deflator poses several difficulties. Firms within an industry might produce similar goods but may charge different prices for that good depending on a firm's market power or product quality. Industry wide deflators cannot control for these differences. For firms producing near identical products in a highly competitive market, this is less of an issue. But in other cases, the extent and quality of design, craftsmanship, raw materials, and other inputs might differ, making the final product quite different. TFPR then overestimates the productivity of firms producing high price (quality) products and underestimates the productivity of firms producing low price (quality) product as revenues of two types of firms are deflated by using the same deflator at the industry level.

An alternative quantity-based TFP (TFPQ) measure: The availability of product-level price data can help address shortcomings of TFPR measures of productivity. Firm-level input and output prices can help disaggregate firm performance by its physical efficiency, market power, and product quality. The residual in the production function (namely TFPQ) therefore gives a more precise estimate of firm productivity relative to market power and product quality.

TFPR vs. TFPQ: Haltiwanger (2016) argues that researchers should not inherently prefer TFPQ measures over TFPR as the latter "have the virtue that they will reflect idiosyncratic profitability factors beyond TFPQ". In other words, TFPQ is a good measure of technical efficiency. However, if one would like to compare firms in terms of their capacity to earn profits or create value either through producing high quality products or exerting market influence, TFPR seems as a better measure.

[50] Discussion and methodology drawn from World Bank's Country Economic Memorandum for Turkey, published in 2019.

Annex 3: Firm regression

A pooled cross-section ordinary least squares regression of firm TFPR on key variables of interest such as proxies for global integration and openness (dummies for export and import, export and import shares), skilled labor, R&D, state enterprises (government ownership), formality (firm registration) while controlling for industry (2 digit ISIC) and the great flood of 2011. The firm-level dataset used in this report is the Thailand's Manufacturing Industry Census covering 2006, 2011 and 2016 data with 162,804 observations.

	Coefficient	Standard Error	t-statistic	p-value
Age	0.00822**	0.00611	13.55	0.000
Age2	-0.00009**	0.00001	-8.89	0.000
Government dummy	-0.16217*	0.07647	-2.12	0.034
BOI permit dummy	0.08633	0.01218	1.06	0.287
Export dummy	0.06804**	0.01324	5.14	0.000
Import dummy	0.08708**	0.01170	7.44	0.000
R&D dummy	-0.01868	0.01889	-0.99	0.323
Registered	0.374**	0.00641	58.34	0.000
Export share	-0.0001	0.0001	-0.90	0.370
Import share	0.0009**	0.0002	4.14	0.000
R&D*Skilled labor	0.00185**	0.0003	6.31	0.000
Skilled labor	-0.0021**	0.0007	-30.57	0.000
Great flood 2011	-0.2489	0.0091	-27.30	0.000

Annex 4: Competition and prices of basic food products

The prices of basic food products that form a significant portion of the food consumption basket appear to be higher in Thailand against comparison across countries. Notwithstanding the fact that the Thai government regulates the prices of some basic food products considered to be socially important, preliminary results of a price comparison across countries show that prices of certain food products are higher in Thailand compared to some comparator countries, even after controlling for proxies for potential demand and cost factors impacting prices such as income per capita, logistics performance, and applied tariff rates (see Table 1 and Box 1 for further details). When prices are compared among key cities that are usually more expensive, the results still indicate that residents of Bangkok, Chiang Mai, Pattaya, and Phuket in Thailand pay more on average for these basic food items than residents of similar cities in peer countries (see Table 2). The results appear to be reasonably robust to the inclusion of additional control variables such as corporate tax rate and standard indirect tax rate. It is worth noting that although the finding of higher prices can be explained by diverse factors, including regulatory constraints, specific market characteristics or other cost factors, a lack of effective competition can be a driver. However, given that not all potential factors can be accounted for in this cross-country empirical analysis, this may need further investigation to understand root causes and whether they are associated to competition restrictions.

Table A4.1: Price comparisons analysis: Thailand vs. peer countries

	Number country-level data comparing prices in Thailand to peer countries		
	(1)	(2)	(3)
Thailand	0.099***	0.117***	0.109*
	(0.026)	(0.031)	(0.053)
Log of GDP per capita, PPP	0.025	0.014	0.023
	(0.077)	(0.068)	(0.071)
Tariff rate applied	-0.026*	-0.025*	-0.027
	(0.012)	(0.012)	(0.017)
Corporate tax rate (%)	0.213**	0.253**	0.213**
	(0.090)	(0.080)	(0.085)
Indirect tax rate (standard, %)		0.005	
		(0.007)	
Aggregated LPI score			0.002
			(0.009)
No. of observations	822	822	822
R-squared	0.881	0.881	0.881
Product fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Notes: Results are from an OLS regression using 2010-2018 data from Numbeo. The dependent variable is the logarithm of market prices (USD/kg) of the following products: apples (1kg), banana (1kg), beef round (1kg or equivalent back leg red meat), chicken breasts (boneless, skinless, 1kg), eggs (regular, 12), lettuce (1 head), loaf of fresh white bread (500g), local cheese (1kg), milk (regular, 1 liter), onion (1kg), oranges (1kg), potato (1kg), tomato (1kg), and white rice (1 kg). Standard errors clustered at the country level are in parentheses. ***, **, and * indicate significance at 1 percent, 5 percent, and 10 percent. The sample includes the following comparator countries: Colombia, Vietnam, China, Indonesia, Philippines, Mexico, and Malaysia

Table A4.2: Price comparisons analysis: cities in Thailand vs. cities in peer countries

	Numbeo city-level data comparing prices in Thai cities (Bangkok, Chiang Mai, Pattaya, and Phuket) to cities in peer countries			EIU city-level data comparing prices in Bangkok to cities in peer countries		
	(1)	(2)	(3)	(4)	(5)	(6)
Thailand	0.098*	0.178***	0.161*	0.120***	0.127***	0.091**
	(0.041)	(0.038)	(0.082)	(0.006)	(0.017)	(0.032)
Log of GDP per capita, PPP	-0.103	-0.135*	-0.107	-0.098**	-0.102***	-0.096***
	(0.090)	(0.059)	(0.078)	(0.026)	(0.023)	(0.022)
Tariff rate applied	-0.023	-0.015	-0.033	-0.008	-0.008	-0.004
	(0.016)	(0.008)	(0.023)	(0.008)	(0.009)	(0.010)
Corporate tax rate (%)	0.440**	0.626***	0.455***	0.257***	0.268***	0.275***
	(0.150)	(0.077)	(0.113)	(0.020)	(0.015)	(0.028)
Indirect tax rate (standard, %)		0.021**			0.002	
		(0.008)			(0.005)	
Aggregated LPI score			0.010			-0.004
			(0.012)			(0.004)
No. of observations	1454	1454	1454	2998	2998	2998
R-squared	0.792	0.797	0.793	0.817	0.817	0.817
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Store type effects	–	–	–	Yes	Yes	Yes

Notes: Results are from an OLS regression using 2010-2018 city-level data from Numbeo and Economist Intelligence Unit (EIU). The dependent variable is the logarithm of market prices (USD/kg) of the following products: Numbeo – apples (1kg), banana (1kg), beef round (1kg or equivalent back leg red meat), chicken breasts (boneless, skinless, 1kg), eggs (regular, 12), lettuce (1 head), loaf of fresh white bread (500g), local cheese (1kg), milk (regular, 1 liter), onion (1kg), oranges (1kg), potato (1kg), tomato (1kg), and white rice (1 kg); EIU – apples (1 kg), bananas (1 kg), beef: roast (1 kg), cheese, imported (500 g), chicken: fresh (1 kg), eggs (12), lettuce (one), milk, pasteurized (1 l), onions (1 kg), oranges (1 kg), potatoes (2 kg), tomatoes (1 kg), white bread (1 kg), and white rice (1 kg). Standard errors clustered at the country level are in parentheses. ***, **, and * indicate significance at 1 percent, 5 percent, and 10 percent. The sample includes cities from: Colombia, Vietnam, China, Indonesia, Philippines, Mexico, and Malaysia

Box A4.18: Methodology for comparison of food prices

The analysis assessing whether food prices are statistically significantly higher in Thailand relative to comparator countries uses data from two sources: (1) Numbeo[51] – an online global database of user contributed data on cost of living with information on consumer prices and (2) Economist Intelligence Unit (EIU)[52] – a survey-based database of consumer prices at supermarkets and mid-priced stores. The sample is restricted to products where price information is available in each database for Thailand or its cities sampled. The final sample covers yearly

[51] Numbeo collection method relies on user inputs and manual collection from other sources (e.g., supermarkets' websites, governmental institutions, newspapers, other surveys, etc.). Country-level data is an average of city-level data, while city price data are averages "in a recent time span" after discarding the top and bottom 25% of the data as outliers. Prices already include Goods and Services Tax (GST) and VAT. Periodically, Numbeo discards data which most likely are statistically incorrect.

[52] The prices are what the paying customer is charged (and are not the recommended retail prices or manufacturers' costs).

Box A4.18: Methodology for comparison of food prices

information on prices of 14 products in the Numbeo database and 14 in the EIU database from 2010 to 2018. Both databases apply a common methodology in gathering price data across countries, thus strengthening the comparability of price information used in this analysis.

The following is the baseline empirical specification for the price comparison analysis:

$$ln(Price_{ijt}) = \beta_1 Thailand + \beta_2 ln(GDP_{jt}) + \beta_3 ln(X_{jt}) + \eta_i + \delta_t + \varepsilon_{ijt}$$

where for each product i in country j in year t, ; $Price$ is the price of the product (USD/kg), $Thailand$ is dummy variable which equals one for observation in Thailand and zero otherwise, GDP is as gross domestic product per capita (at purchasing power parity, constant 2011 international USD) – as a proxy for income levels, X is a vector of potential cost drivers such aggregated logistics performance index (LPI) – to account for the quality of domestic logistics services that may impact domestic prices such as customs, infrastructure, international shipments, tracking and tracing, and timeliness –, applied tariff rates, corporate tax rate, and standard indirect tax rate. The variables η_i and δ_t are product fixed effects and year fixed effects to capture unobserved time-invariant product-specific characteristics and temporal global shocks that are common to all countries, respectively. When using EIU data, store type fixed effect is also included. The estimated coefficient on the Thailand dummy variable (when exponentiated given the specification of the model) captures the average price differential in Thailand relative to the average across comparator countries after adjusting for the differences in income levels, logistics issues, tariffs, tax rates, product type, and macroeconomic effects.

The variables GDP, tariff, and logistics performance are from the World Bank's World Development Indicators (WDI), cost of import is from the Trading Across Border dataset, aggregated LPI is from https://lpi.worldbank.org/, and corporate and standard indirect tax rates are from KPMG, Deloitte, and other web sources. For countries that import a significant share of these basic food products, a variable capturing transport costs (oversees shipping) between origin and destination of each product may be import driver of price differences. Such a variable is not consistently available. In the case of Thailand, many of these goods come from domestic production.

The food products were selected based on availability across databases, their relevance in the Thai consumption basket and product characteristics. For example, the products selected are relatively similar (or homogeneous) across countries to minimize the differences associated with product differentiation. To the extent that there may exist potential distortions in the markets of comparator countries, the results should be interpreted with caution.

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