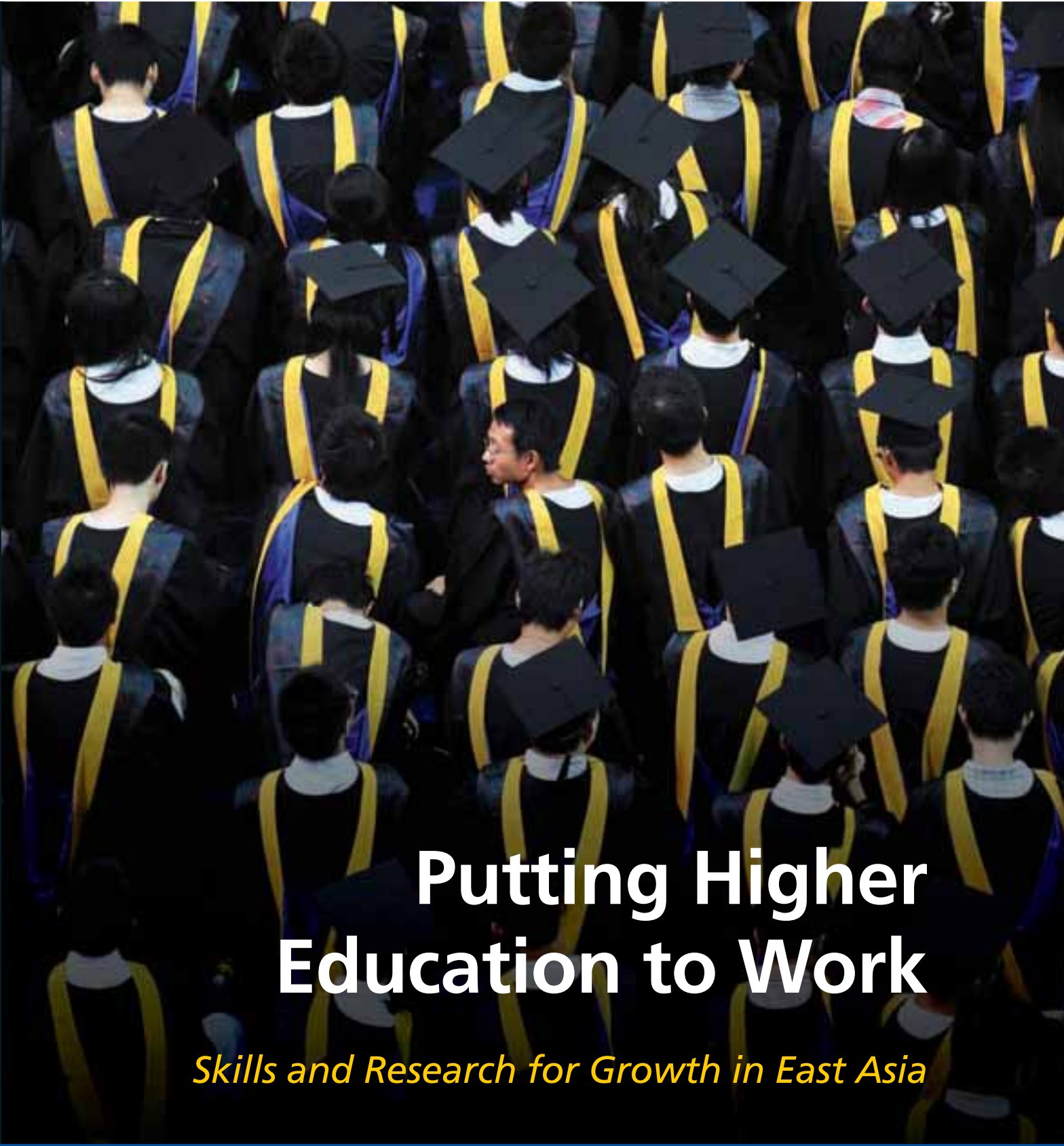

Putting Higher Education to Work

Skills and Research for Growth in East Asia

WORLD BANK EAST ASIA AND PACIFIC
REGIONAL REPORT

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Overview

WORLD BANK EAST ASIA AND PACIFIC REGIONAL REPORTS

Well known for their economic success and dynamism, countries in the East Asia and Pacific region must tackle an increasingly complex set of challenges to continue on a path of sustainable development. Learning from others within the region and beyond can help identify what works, what doesn't, and why, in the search for practical solutions to these challenges. This regional report series presents analyses of issues relevant to the region, drawing on the global knowledge and experience of the World Bank and its partners. The series aims to inform public discussion, policy formulation, and development practitioners' actions to turn challenges into opportunities.

World Bank East Asia and Pacific Regional Report

OVERVIEW

Putting Higher Education to Work

Skills and Research for Growth in East Asia

THE WORLD BANK
Washington, D.C.

This booklet contains an Overview of the forthcoming World Bank book, *Putting Higher Education to Work: Skills and Research for Growth in East Asia*, along with a list of contents of that book. To order copies of the full-length book, published by the World Bank, please use the form at the back of this booklet.

1818 H Street NW
Washington, DC 20433
Telephone: 202-473-1000
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Cover photo: Graduates attend the 2009 bachelor's degree commencement ceremony at the Huazhong University of Science and Technology, Wuhan, Hubei province, China. © Feature China / European Pressphoto Agency.

Cover design: Naylor Design, Inc.

Contents

Acknowledgments

The overall preparation of *Putting Higher Education to Work: Skills and Research for Growth in East Asia* was led by Emanuela di Gropello, under the guidance of Emmanuel Jimenez and Eduardo Velez Bustillo. The manuscript was written by Emanuela di Gropello, Prateek Tandon, and Shahid Yusuf. Sonali Ballal and Eleanor Wang provided outstanding research and technical assistance during its preparation and production. The final publication benefited from the excellent comments of several World Bank experts, including Andreas Blom, Alberto Rodriguez, Jamil Salmi, and Jee-Peng Tan, as well as from East Asian policy makers through numerous consultation events. Finally, this volume also benefited from many commissioned background papers written by international and regional experts outside the core World Bank team. These papers are available at the official website for the book: http://www.worldbank.org/eap/highered.

Contents of *Putting Higher Education to Work*

Abbreviations

GDP	gross domestic product
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
SAR	special administrative region
SMEs	small and medium enterprises
STEM	science, technology, engineering, and mathematics
TIMSS	Trends in International Mathematics and Science Study
TVET	technical and vocational education and training

Overview

The Cambridge classical scholar and poet F. M. Cornford, in his 1908 satirical guide to university life, *Microcosmographia Academica*, famously summarized the basic principle of Great Britain's university reform as "Nothing should ever be done for the first time."[1] Cornford was frustrated with the reluctance by the University of Cambridge to teach relevant subjects and promote research in science and technology.[2] He noted that the university's institutional conservatism not only prevented it from playing a more vital role in the changing economic and social landscape but also inhibited links between the university and the broader society. In his view, the university overlooked the essential connection between research and teaching, failed to adequately emphasize science, and had rigid disciplinary boundaries and ineffective governing boards.

About a century later, Cornford's claims are still relevant to many East Asian higher education institutions. The current economic circumstances of low- and middle-income East Asian countries call for many of their higher education institutions to be more widely engaged with the world around them. These institutions typically focus on teaching with limited regard to using knowledge spillovers as a vehicle for economic growth. As a result, only a few of them have strong formal or informal ties to firms and labor markets, and very few conduct basic research that can contribute to technological development and assimilation. Even when these institutions provide skills to their graduates, these skills often do not meet the demands of the labor market.

This book, *Putting Higher Education to Work: Skills and Research for Growth in East Asia*, diagnoses higher education in East Asia, defined broadly to include all public and private formal institutions of learning beyond upper secondary education.[3] This overview summarizes its main messages.

The book's context, motivation, and objectives

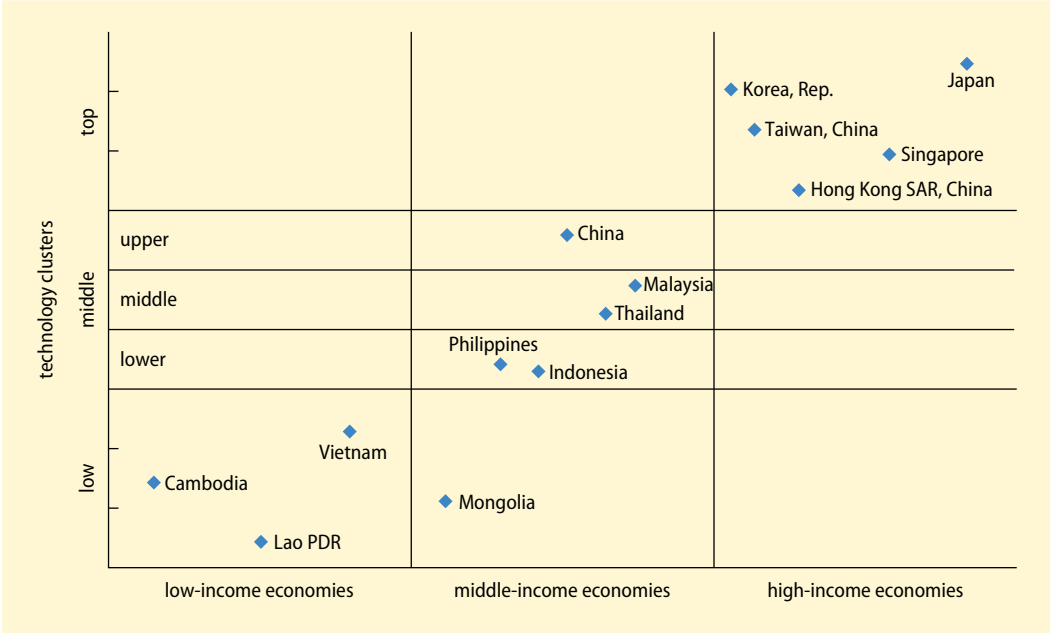
To understand the need for an improved higher education system, it is important to understand the economic context in East Asia, home to a highly heterogeneous group of economies. These economies can be divided into three income groups on the basis of their gross domestic product (GDP) per capita (and productivity) and into three technology clusters on the basis of the skill and technological intensity of their products

and exports. The technology cluster approach can gauge science and technology development and innovation as a driver of productivity (figure 1). There is not a one-to-one match between income and technology; several economies display varying levels of income and technology in their group. Hong Kong SAR, China; Japan; the Republic of Korea; Singapore; and Taiwan, China have the highest GDP per capita in the region, placing them in the upper-income group. They are also technological leaders as displayed in their use of high-level skills and research for increasing innovation, productivity, and growth. So, they form the top technology cluster in East Asia.

In the middle-income group, China, Indonesia, Malaysia, Mongolia, the Philippines, and Thailand[4] are becoming more open and follow their upper-income counterparts by promoting industrialization and infrastructure development through high levels of investment. Except for Mongolia, their technological similarities place them in the middle technology cluster. To reach upper-income status, they strive to compete better in export markets, move up the value chain, and increase the productivity of their industries. To reach the top technology cluster, their primary challenge is to move from being countries of assemblers and processors to countries of innovators with high technological capability in manufacturing and to introduce new technologies in their service (and agriculture) sectors. China is comfortably in the forefront of this technology cluster thanks to its rapidly maturing manufacturing capabilities and strengthening grasp of production technologies across sectors.

The lower-income group comprises Cambodia, the Lao People's Democratic Republic, and Vietnam.[5] With the lowest GDP per capita in the region, these countries are late starters but have made good gains in income and technology in the past decade. They also form the lower technology cluster, which Mongolia also joins because of its weak technological capacity. The main challenge for these economies is to increase productivity

FIGURE 1 Income groups and technology clusters in East Asia, 2009



Source: Authors' elaboration.
Note: An economy's position in the table reflects its ranking by income and technology.

in all sectors and to break into manufacturing. They should also start to climb the technology ladder in all sectors. Indeed, for all countries in the lower and middle technology clusters, the benefits of using high-tech knowledge cross all sectors—services, manufacturing, nonmanufacturing industry, and agriculture—to increase both firm and worker productivity.

Given this economic context, how can low- and middle-income East Asian countries increase productivity in the short run? And how can they develop the technological capacity they need to increase productivity in the medium run? Two key drivers will be skills and research. This book shows how higher education can provide the skills and produce the research these countries need to develop their economies. Although primary and secondary education provides individuals with their basic skills for life, higher education builds on these skills to provide high-level academic, technical, behavioral, and thinking skills. Economies need these skills to increase their human capital and produce a strong labor force to apply the technology of today to reach higher productivity. At the same time, math, science, and technological knowledge and skills—such as the ability to think critically and spur creativity—improve countries' capacity to assimilate, adapt, and develop new technology. Universities can also directly contribute to research and development. These two processes increase productivity through innovation.

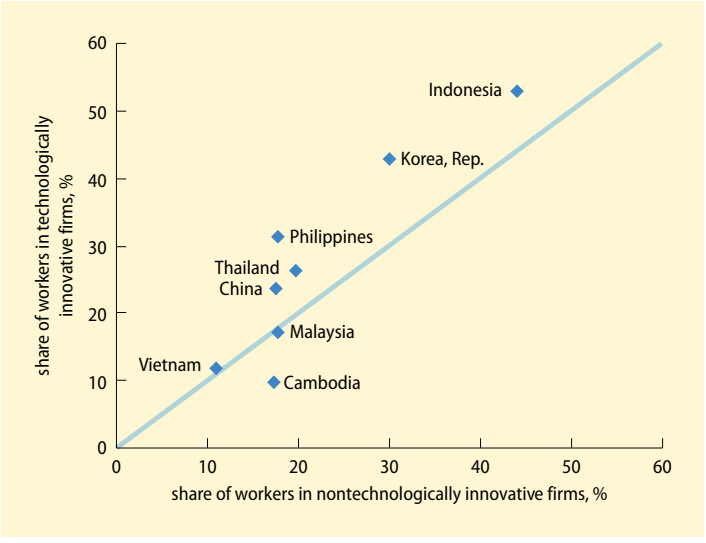
But higher education in low- and middle-income East Asian countries often fails to deliver such skills and research. This book introduces a conceptual framework of the role of higher education, broadly defining higher education to include all public and private formal institutions of learning beyond upper secondary education.[6] Awarding formal academic degrees, diplomas, or professional certificates, these institutions include but are not limited to universities, two-year and four-year colleges, institutes of technology, religious-based educational institutions, online and distance learning, foreign branch campuses, and other collegiate (vocational, trade, and career) institutions.

The book begins with a diagnosis of the current state of higher education in East Asia. Although higher education provides several noneconomic benefits, such as nation building and socialization, the book focuses on the economic benefits of higher education as they relate to skills and research. It then argues that the failure of higher education to deliver skills and research is a result of the fact that higher education institutions have been managed as disconnected individual institutions. In other words, higher education is failing as a result of widespread disconnects between higher education institutions and the users and providers of skills and research. These disconnects are due to information, capacity, and incentive constraints that have been poorly addressed. The book concludes with an analysis of three public policies that can have a profound effect on higher education outcomes by tackling the disconnects: financing higher education, managing public higher education, and providing stewardship for higher education.

Higher education for growth through skills and research

There is much evidence of the positive relationship between higher education and economic development. Countries with high tertiary enrollment tend to have high GDPs and high labor productivity. Individuals with more years of higher education score higher on measures of skill competencies than individuals with few or no years of higher education, and skills and productivity are positively related. Several indicators of innovation also support the need for higher education: technologically innovative firms have higher shares of workers with higher education (figure 2), and countries that have more science and engineering graduates and that engage in more higher education research tend to have better innovation outcomes, such as patents and journal articles. These relationships clearly hold for upper-income East Asian countries. Higher education thus

FIGURE 2 Share of tertiary-educated workers in technologically and nontechnologically innovative firms in East Asia, various years



Source: Almedia 2009b, based on World Bank IC (Investment Climate) Surveys, various years.

provides the skills and produces the research that countries need to strengthen their labor force and to compete in an increasingly global economy.

Higher education as a provider of skills

A well-trained and highly educated workforce underpins growth: skilled labor can be deployed flexibly, achieve high levels of productivity, apply existing technologies, and engage in innovation. That is why low- and middle-income countries throughout East Asia are assigning greater importance to higher education as a source of the scientific, technical, and analytical skills needed for higher productivity and technological catch-up. As technology becomes more skill based and competitive pressures intensify, entrepreneurs and managers need more than a secondary education. And they must employ larger numbers of skilled workers, some with higher degrees. The region's rising wage premiums for tertiary graduates relative to primary graduates are evidence of the market's demand for high-level skills and tertiary education, especially for low- and middle-income countries in the past decade. For example, from the 1990s to 2000s, tertiary wage premiums nearly tripled in Cambodia, increased nearly tenfold in Vietnam, and increased about 50 percent in Mongolia.

Higher education as a producer of research

In addition to skills to better apply current technologies and engage in innovation, low- and middle-income countries in East Asia are increasingly looking to research universities as sources of technology and innovation for their business sectors. Research universities contribute to innovation through basic and applied research: basic research generates ideas, while applied research and technology transfer initiate the process of transmuting knowledge and ideas into useful applications. For all incomes, economies of scope between research and teaching and economies of scale in research make the dual skill and research objective important at a few universities in all countries, though the research potential will typically be higher in middle-income countries.

Universities and other tertiary entities can help firms adapt and upgrade technology. If faculty members and researchers can comprehend the latest technologies, they can advise firms on the availability of such technologies. Qualified faculty members and researchers can also work with firms to harness relevant technologies, to adapt them to local use, and to introduce improvements. This role is relevant also to lower-income–lower-technology cluster countries that wish to move to a higher cluster—particularly by having universities support technological upgrading in small and medium enterprises (SMEs) and in agriculture. However, low demand for innovation from firms in this cluster is a constraint.

The various conditions facing the different income and technology groups dictate slightly divergent immediate priorities. Low-income–lower-technology cluster countries should focus their immediate attention on higher education as skill producers to develop their human capital base. And to enhance

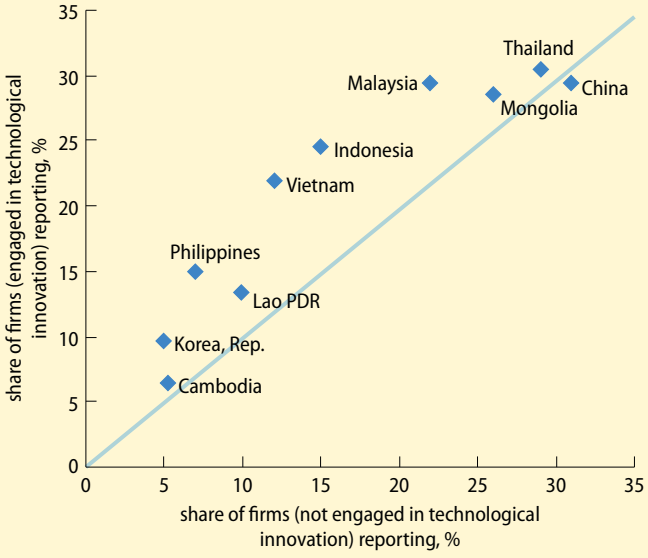
innovation, their second goal must be to start building some research capacity in higher education. Middle-income countries should focus on both further developing the skills of their labor force and fostering research through higher education as a research provider. How much they should aim to achieve in relation to technology and innovation will depend on their position in the technology cluster. For instance, developing the technological and engineering capacity of workers and building some research capacity for technology upgrading in a couple of universities may be sufficient at this stage for countries like Indonesia and the Philippines, but not for China.

Is higher education meeting its promises?

Employer surveys point to skills as becoming a constraint in East Asia. In most of the region, more than 30 percent of firms cite skills as at least a moderate obstacle to growth. This increases to 40 percent for low-income countries. This situation places East Asia as the second-largest region—after North Africa and comparable with Latin America and Sub-Saharan Africa—to report skills as an obstacle to business. And there is some evidence that these skill bottlenecks may be increasing. Firms in East Asia are also more likely to report skills as a constraint if they are more technologically intensive (figure 3) and export oriented. The generally substantial frequency of higher education graduates in these firms suggests that many of the skill gaps relate to higher education.

This section examines how much higher education is producing skills for productivity and innovation by producing a sufficient number of graduates who meet industry's proficiency standards and have higher order training, research, and entrepreneurial skills to deepen domestic technological capabilities. It also examines how much higher education is supporting innovation through providing research and technology. The poorer performance of low- and middle-income countries highlights the shortcomings of higher education in failing to match what employers demand and what employees supply and to conduct the research needed for an innovation-driven economy.

FIGURE 3 Share of firms reporting skills as a bottleneck by technological intensity in East Asia, various years



Source: Almedia 2009b, based on World Bank IC Surveys, various years.

Quantity of higher education graduates

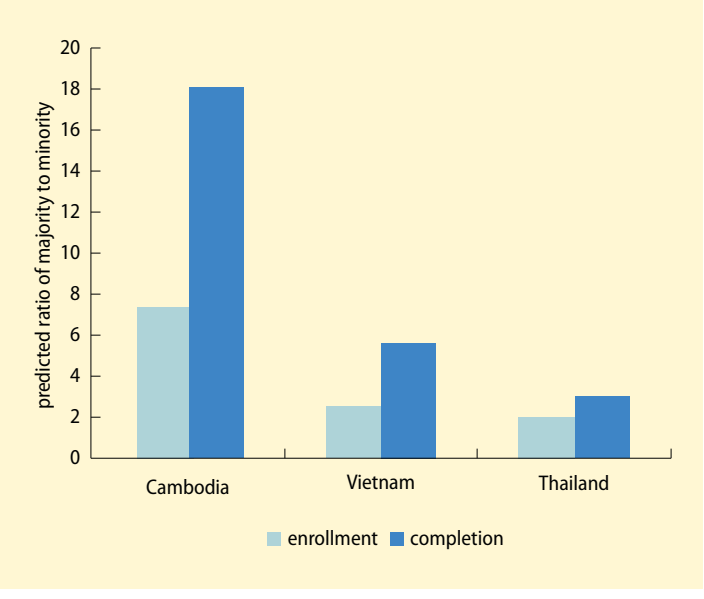
Overall, East Asia's tertiary gross enrollment rates are below Organisation for Economic Co-operation and Development (OECD) levels. Within the region, low-income countries have the lowest enrollments, followed by middle-income countries.

Tertiary enrollments are on the rise in all countries, however, with low-income countries showing the highest increases. Furthermore, enrollment rates for low- and middle-income East Asian countries are broadly on par with enrollment rates of other countries at similar incomes. An analysis of demand and supply factors in each country also shows that an insufficient supply of tertiary graduates is not an immediate cause of skill gaps everywhere. Thus, the overall quantity of

higher education in low- and middle-income East Asian countries is not the main constraint to skills development.

However, it is important to address higher education's lack of inclusiveness in relation to socioeconomic status, gender, race, ethnicity, religion, and rural residence. Across the region, ethnic minorities consistently show the highest disparities in higher education (figure 4). These disparities do not correlate with ability: capable and talented students are being excluded, and the overall talent pool and the quality of graduates are being compromised.

FIGURE 4 Predicted ratio of majority to minority enrollments and completions, in tertiary education in Cambodia, Vietnam, and Thailand, most recent year



Source: Sakellariou 2010 on the basis of labor force and household surveys, most recent year by country.

Quality of higher education graduates

The need for retraining tertiary graduates and the coexistence of employment vacancies and unemployed tertiary graduates are two indicators of skill gaps. Although labor market failures in matching skill demand and supply may also be a factor, this book explores higher education's failure to develop adequate skills to meet employer demand, improve productivity, and foster innovation.

Results of employer and employee surveys highlight the need for greater skills. Across low- and middle-income East Asian countries, employers expect workers—particularly those with higher education—to possess the technical, behavioral, and thinking skills to increase their productivity and spur growth (table 1). Employers want workers who possess the ability to think, adapt, undertake continuous learning, and even be creative.

Employers also expect additional skills in leadership (including management and entrepreneurial skills), industry experience, a "big picture mindset," and the ability to "think outside the box."

Employers highlight gaps in creative thinking and problem solving; in behavioral skills such as communication, negotiation, and work attitude; and in technical skills, including gaps in practical knowledge of one's job, information technology,

TABLE 1 Critical skills for professionals in East Asia

Skill	Vietnam	Cambodia	Indonesia	Malaysia	Philippines	Thailand	Mongolia	Average
Technical	7	4	5	7	7	5	5	5.7
Communication	6	5	7	5	5	4	4	5.1
English language	5	5	3	4	3	7	7	4.9
Problem solving	—	7	5	4	6	4	3	4.8
Leadership	—	6	4	4	6	4	4	4.7
Information technology	—	3	4	6	3	6	6	4.7
Creativity	—	—	6	5	4	4	4	4.6
Work attitude	7	5	6	4	4	3	3	4.6

Source: di Gropello, Kruse, and Tandon 2011; di Gropello, Tan, and Tandon 2010; World Bank IC Surveys, various years.
Note: Ranking is from 0 to 7, of the relative importance of each skill for employers within each country; — = not available.

and computer skills. The use of English appears to be a primary weakness throughout the region. Although not all gaps are the responsibility of higher education, many of the skills needed to perform well at the professional level are developed during tertiary studies.

Employers are increasingly constrained by their employees' inability to think creatively and spur innovation. The experience of upper-income East Asian countries also suggests that developing technological capabilities will require a significant share of quality university graduates in science and engineering. To support indigenous technological capacity, one-third of university graduates or more should hold science and engineering degrees. But many countries in the lower and middle technology cluster have low shares of science and engineering graduates. Firms also point to serious concerns about the effectiveness of their science and engineering workers.

As countries become richer and move up the value chain, the types of skills demanded will continue to change, with a sharper focus on more sophisticated technical and high-level generic skills. In East Asia, services will likely become a stronger driver of skill demand, but international competitive pressure and the need for a higher-value-added manufacturing sector will also require a constant push for innovation. Workers will increasingly be expected to have the science, technology, engineering, and mathematics (STEM); problem-solving; and creative skills to support higher-value-added manufacturing and the business, thinking, and behavioral skills for a higher productivity service sector. These latter skills will become even more important if countries move more quickly to service-based economies (technology fields will also remain very relevant).

Research in higher education

Beyond simply providing skills, governments are urging universities to support innovation through research and technology. International rankings and research output indicate that low- and middle-income East Asian higher education systems are not providing adequate quality research. Indicators of innovation—such as patents and scientific and technical journal articles—are lower in these countries. Several of them also produce at lower levels than countries of similar incomes outside East Asia.

Even university involvement in technology adaptation and upgrading is limited in low- and middle-income East Asian countries, with the possible exception of China. In Malaysia, Mongolia, and Thailand, only 1 or 2 percent of firms mention that universities are taking the lead in technological innovation (in a broad sense) (figure 5). In Vietnam only a marginal percentage of firms use universities or research centers as sources of product innovation. Strong engagement of universities in technology upgrading also remains a challenge in some upper-income countries in East Asia and elsewhere, but the university contribution is higher.

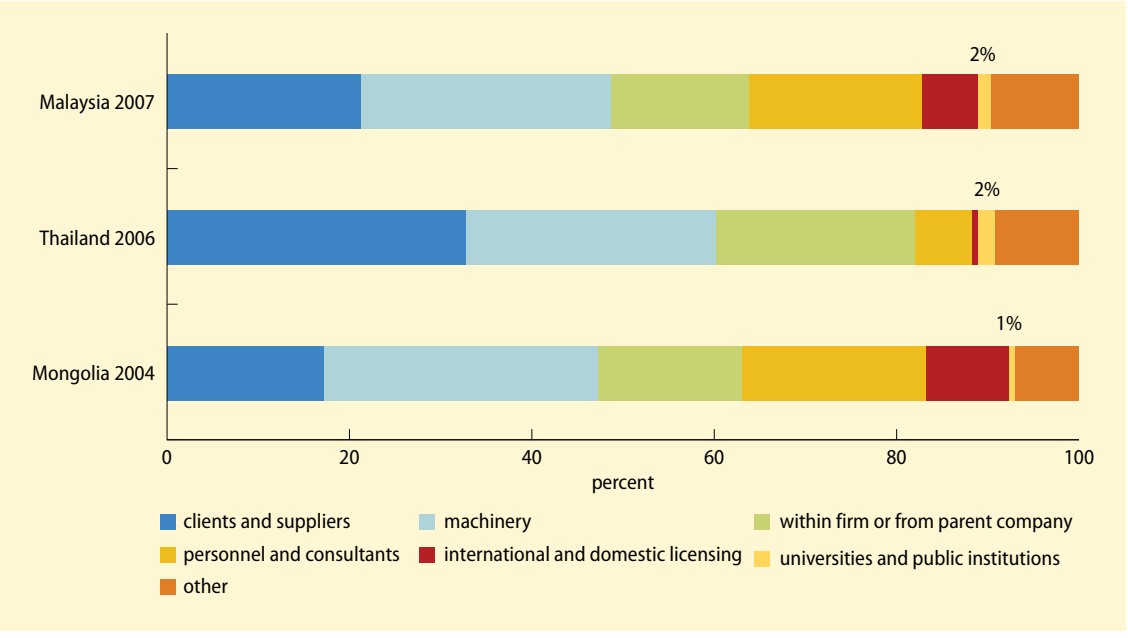
The precise challenges and priorities vary by income group and country. Challenges are deeper and more widespread in lower-income countries. China's better performance from the perspective of research and development (R&D) for innovation is aligned with its lead position in the middle technology cluster, but skill-related gaps persist. Hence, low- and middle-income East Asian countries need to better understand why their higher education systems are underperforming.

Disconnects in higher education

Higher education graduates often do not have the skills required by the labor market, and universities and other institutions frequently do not provide the research to support technological development in firms. By not satisfying the needs of end users, higher education is not fulfilling its role. Why is this happening?

The book postulates that the main reason for this failure is that higher education

FIGURE 5 Leading ways of acquiring technological innovation in firms in Malaysia, Mongolia, and Thailand, various years



Source: World Bank IC Surveys, various years.

in low- and middle-income East Asian countries is being managed not as a "system" but as separate disconnected institutions. Systems include actors, their means for interacting, and the policies to support both actors and their interactions. In higher education, actors include not only the higher education institutions but also the skill and research providers and users that interact with these institutions. For provision of skills, earlier education institutions (largely primary and secondary education institutions) pass on students to higher education and informal postsecondary institutions, and firms provide skill development. For provision of research, the main actors are nonteaching research institutions, which together with the higher education institutions and firms constitute the innovation system. For the users of skills and research, the main actors are firms. All these actors are interrelated, and higher education outcomes are the product of their interactions. For instance, the level and type of skills developed in higher education are the result of skills acquired in earlier education levels and of the requirements of firms.

Policies are needed to support strong systems in which higher education institutions interact effectively with all the other actors to produce the expected results given the market failures (lack of information and failures in capital markets for the poor), the externalities (research and science have many positive externalities), and the various capacity constraints. The evidence for low- and middle-income East Asian countries shows that higher education systems are not working properly and do not produce the expected results because higher education institutions are disconnected from the other actors at the core of the system as a result of information, capacity, and incentive constraints, which remain poorly addressed.

At least five (interrelated) disconnects are evident in low- and middle-income East

FIGURE 6 **Five disconnects in higher education**

Source: Authors' elaboration.

Asian higher education systems. They are ranked roughly in order of importance for higher education outcomes (figure 6).

The first disconnect: Between higher education and employers (skill users)

The first—and most important—disconnect is between the characteristics of higher education institutions (pedagogy, curriculum, and degrees) and the skill needs of the end users (employers). Pedagogical and curricular approaches are generally not suited to East Asia's labor markets. Teaching methods and practices are often ineffective, outdated, and teacher centered. In most cases, curricula are not competency based. Most tertiary systems in low- and middle-income countries have an uneven distribution of students across disciplines and a scarcity of differentiated education institutions. For instance, in Cambodia, Indonesia, and Lao PDR, more than half their students are pursuing degrees in social science, business, law, or humanities, while far fewer students are studying in other fields. Many graduates do not meet labor market needs, with higher education undersupplying critical areas for growth, such as science and engineering. In other countries, such as Mongolia, Cambodia, and Vietnam, the number of colleges may be insufficient to provide the intermediate skills required by the labor market.

The second disconnect: Between higher education and companies (research users)

The second disconnect is a weak nexus between higher education institutions and companies as the ultimate users of research. Higher education institutions in low- and middle-income East Asian countries contribute very little to technology adaptation and upgrading in firms. This fact suggests a disconnect between firms and universities in research and technology. Firms often engage in research and development alone or with other groups, but they have very limited collaboration with universities and very few formal university-industry links. With the possible exception of China, examples of collaboration in the lower and middle technology clusters remain not only scarce but also far behind the practice in some OECD countries and in Japan, Singapore, and Taiwan, China. In Indonesia and the Philippines, faculty members have, at best, informal relationships with firms, mainly consulting and providing occasional technical assistance and training. Even in Thailand, firms have very limited cooperation with universities in R&D activities.

The third disconnect: Between higher education and research institutions (research providers)

The third disconnect is an institutional separation between higher education institutions and research institutions. The majority of research takes place in separate research institutes such as government research institutes, public research institutes, and technical institutes. In Malaysia, for instance, only 17 of the 254 research and development agencies are within universities. There is also limited interaction between research institutes and universities, and the benefits of research are not always shared with universities.[7]

The fourth disconnect: Among higher education institutions themselves and between these institutions and training providers (horizontal disconnects across skill providers)

The fourth disconnect is the widespread lack of coordination and integration among higher education institutions themselves as skill providers and between higher education institutions and training providers (in some way, this disconnect combines two subdisconnects). Among higher education institutions, there is a lack of horizontal coordination and integration—such as barriers to student mobility across higher education institutions. There are also weak links and poorly aligned curricula between universities and vocational education, making it difficult for students to pursue multiple pathways to acquire skills. The weak link between skills provided in higher education and those provided in firm training also shows that there is too little emphasis on exploiting complementarities between skill providers.

The fifth disconnect: Between higher education and earlier education (schools) (vertical disconnects across skill providers)

Skills are acquired along the schooling and life cycle, so the quality of higher education graduates is conditioned by the quality of earlier education and experience. The disconnect between higher education institutions and earlier levels of education means that poor preparation in earlier levels of education constrains outcomes in higher education. Although only illustrative, the low TIMSS (Trends in International Mathematics and Science Study) scores for Indonesia and the Philippines constrain these countries in achieving higher STEM enrollments in tertiary education. Low completion rates and the lack of inclusive education in earlier years also constrain enrollments in higher education, and the low transition from secondary to tertiary education further depletes the talent pool.

These disconnects are pervasive throughout East Asia, but their intensity varies across income and cluster groups (table 2). They tend to be most severe in low-income countries. China and Malaysia, in the middle to upper part of their technology cluster, perform better than average for their income group. The intensity of the various disconnects within each country will also vary, beyond some of the highlighted differences within China and Malaysia, giving rise to a more complex picture of what is depicted below and more diversified diagnostics by country.

Causing these disconnects are information, incentive, and capacity constraints that have been addressed poorly or not at all. Limited mechanisms to channel inputs from firms to curriculum design and implementation or to provide information on the labor market have hampered the match between what employers want and what higher education institutions offer. Universities may also not be fully aware of the research and technology needs of industries. Even more crucial, information is lacking about which university-industry links modalities are most realistic and effective in particular economic settings.

Institutions may also lack the capacity to provide quality teaching or undertake meaningful research. Faculty constraints are widespread in low- and middle-income East Asian countries. In some countries, student-faculty ratios are very high, following high school age population growth that is not matched

TABLE 2 **Intensity of disconnects by income and technology cluster group**

Disconnect	Lower income	Middle income				Upper income
	Lower technology cluster	Lower technology cluster	Lower middle technology cluster	Middle technology cluster	Upper middle technology cluster	Top technology cluster
Disconnect 1: higher education institutions and employers						
Disconnect 2: higher education institutions and companies in research and technology						More advanced in Japan; Taiwan, China; Singapore
Disconnect 3: higher education institutions and research institutions						Less advanced in Korea, Rep.
Disconnect 4: higher education institutions among themselves and with training providers						
Disconnect 5: higher education institutions and earlier education institutions (schools)					Incomplete evidence	

Source: Authors' elaboration.
Note: The darker the shading, the larger the disconnect.

by faculty increases; these high ratios can be a constraint for teaching and for diversifying the higher education system. In other countries, the proportion of faculty with a PhD is very low, thereby hampering research. And in some countries, the two constraints coexist (table 3). In addition, firms may not be able to identify and use the knowledge available at universities. Other constraints are the weak capacity of both national administrators to manage a complex interrelated system and university management to deliver high-quality skills and research.

Finally, the lack of incentives for public institutions to produce graduates with the skills that firms need may hamper all attempts to improve relevance. Without adequate incentives, universities and faculty may not be interested or even able to relate to enterprises, and universities and research institutes may be unwilling to collaborate on common projects. Some of these issues suggest market failures, others policy failures.

TABLE 3 **Student-teacher ratios and share of faculty with a PhD in East Asia, latest year available**

Student-teacher ratio	Percentage of faculty with a PhD			
	> 30	20–30	< 20	
> 28		Thailand, Mongolia	Vietnam	
23–28			Cambodia	Philippines
17–22		Malaysia,[a] China[a]		
< 17	Japan; Taiwan, China; Korea, Rep.		Indonesia	

Source: Authors' elaboration.
Note: No shading indicates upper income; light shading indicates middle income; dark shading indicates lower income.
a. Estimates are used for PhD ratios.

From diagnoses to policy: What should public policy do?

Public policy can improve higher education outcomes by tackling the disconnects. Most disconnects point to market and policy

failures, and public policy can address them. Not all the policies are strictly related to higher education,[8] and not all actors and interactions at the core of higher education systems will be amenable to higher education policies. But these policies clearly have a big role. Figure 7 shows a simplified picture of the potential effect of three pillars of higher education policy—financing, management, and stewardship of higher education—on the five disconnects through higher capacity, stronger incentives, and better and more information. Critical policy levers will be associated with every policy pillar. Policy pillars and levers are reviewed below.

Better financing of higher education and more efficient spending

Many of the disconnects are related to financing. For instance, disconnects in research and from secondary to tertiary education suggest that too few financial resources are available for research and scholarships. Low enrollment in STEM fields in several countries, a dimension of the disconnect with skill users, similarly suggests underspending in these fields. In part, this underspending occurs because public financing goes to institutions regardless of whether they are providing public goods (like research) and externalities (like STEM fields) or addressing equity concerns. Public financing can help tackle the disconnect with earlier education by supporting student transitions from secondary to tertiary education through scholarships and loans (which address the capacity constraint). It can also, for instance, help tackle the disconnects between universities and firms in research and technology and between teaching and research provision by supporting higher funding for research in universities combined

FIGURE 7 Higher education policies and disconnects

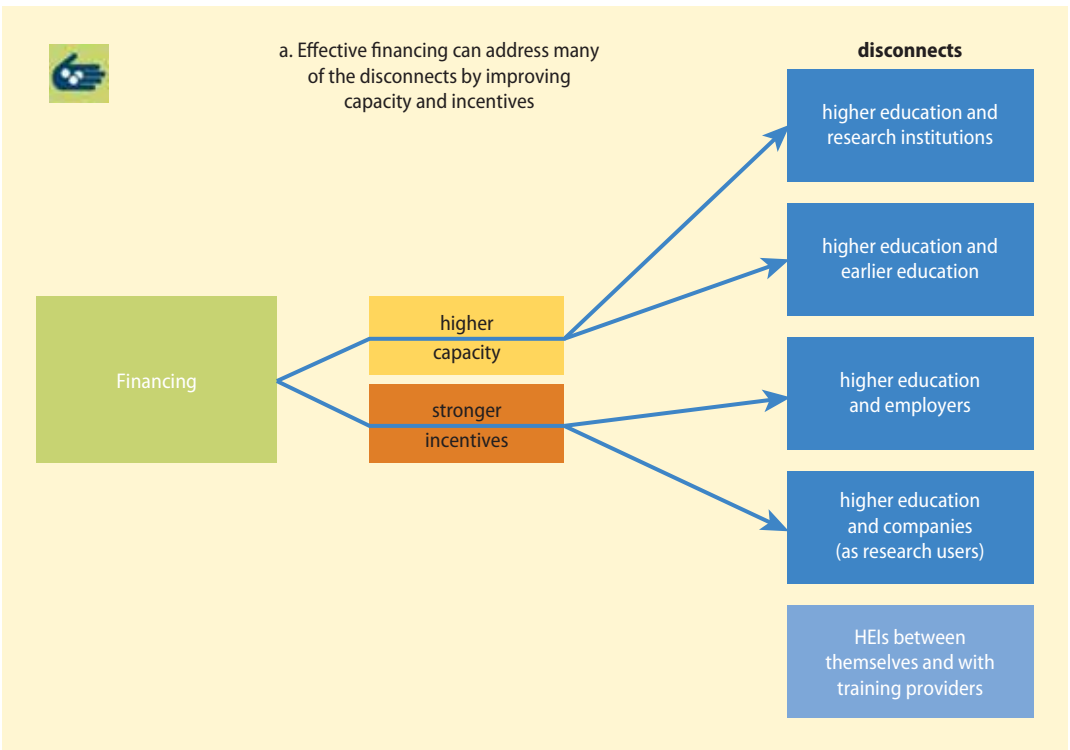


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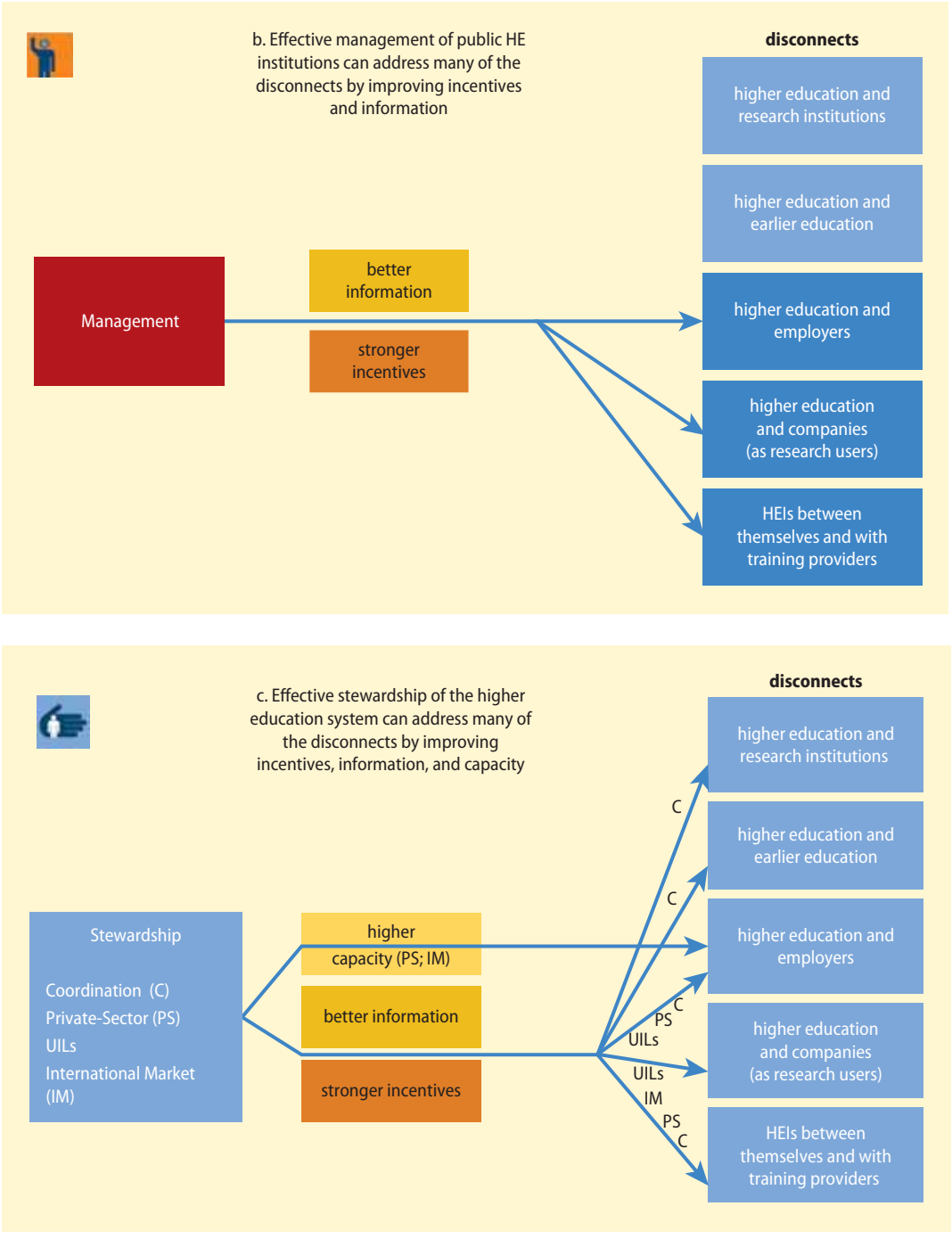
FIGURE 7 (continued)



Source: Authors' elaboration.
Notes: Only stronger relations shown; the intensity of shade indicates intensity of impact. HE = higher education; HEI = higher education institution; UILs = university-industry linkages.

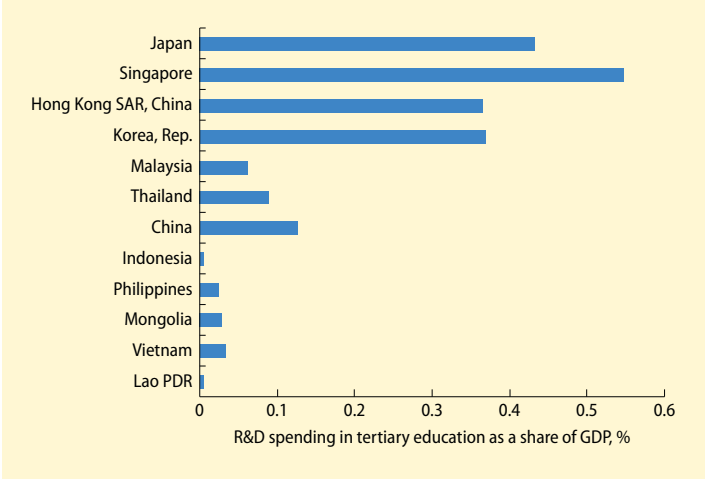
with performance-based funding (addressing capacity and incentive constraints).

The share of R&D spending in relation to GDP is extremely low for low-income countries and for Indonesia and the Philippines and is about 0.1 percent for China, Malaysia, and Thailand. This share is in sharp contrast with the shares spent on R&D in countries in the top technology cluster (figure 8). Low- and middle-income countries also spend less than other low- and middle-income countries outside the region.

Cost constraints are real for the poor and disadvantaged. Higher education costs represent about 30 to 40 percent of average household income in China, Indonesia, and Vietnam and much more for lower-income families. Although there are differences across countries, fee deductions, scholarships, and loans help cover only some of the costs.

In some countries, the underfunding of priority activities may reflect low overall public spending on higher education (table 4). Although private funds are an important source of higher education financing in the region, public funding is very relevant for its potential to address externalities and market failures. Most important, in many countries, weak prioritization and inefficiencies in allocation and use mean that there are fewer public resources for priority activities. Examples of these issues are low shares of tertiary budgets allocated to research and scholarships, resources spread too thinly across institutions, and funds allocated according to historical costs rather than competitively or for performance.

FIGURE 8 **R&D spending in tertiary education as a share of GDP in East Asia, latest available year**



Source: UNESCO Institute for Statistics Data Centre.

The precise challenges vary across the individual countries, but all countries face common imperatives. First, countries need to be selective in deciding their targets and priorities. For instance, increasing enrollment is not urgent in all countries. But research, STEM fields, and scholarships are most often underfunded, making them a more consistent priority. Quantity-quality tradeoffs in the use of public funds need to be considered, and perhaps alleviated by relying more on the private sector to expand the system.

Second, countries need to formulate strategies to fund priority activities. The case is clear for public financing to finance research, STEM fields, and inclusiveness. Box 1 provides examples of needs-based scholarships and other equity-enhancing measures financed by public funds in Vietnam. Particularly in low- and middle-income countries, the public sector can do much in financing basic, early-stage transfer of applied research and technology. Private funding would complement public funding in financing some activities as well as system expansion and diversification. At the same time, because public funds are scarce, and not always efficiently used, countries should find ways to use them more efficiently, to attract more private funds, and to correct market failures by increasing student loans.

Mobilizing and prioritizing public funding

Countries should assess the scope for increasing public funding. The ratios of tertiary spending to total education spending, of total education spending to GDP, and of taxes to GDP show the potential for increasing public funding. Regarding the first two indicators, Mongolia and Thailand have more potential than other countries. More important, all countries should increase their shares of

public spending for research, STEM fields, and scholarships.

There is no ideal benchmark for the research share, and lower-income–lower-technology cluster countries clearly do not have the same room or even scope as other countries for increases in research. But all low- and middle-income countries can learn from upper-income–top-technology cluster countries. Singapore and Hong Kong SAR, China, have been particularly effective in supporting university research through matching fund schemes, thereby increasing the public (and private) resources for research (box 2). In a broader sense, funding for research should also support the development of future researchers for both universities and the private sector, by developing, when possible, domestic PhD programs (particularly STEM related) or supporting scholarships for talented students to earn a PhD abroad.

Increasing the efficiency of public funding

Higher efficiency will permit higher shares of public tertiary spending for research, STEM fields, and needs-based scholarships. This approach requires that funding be more selective and performance-based in the way public funds for teaching and research are allocated across institutions—and better targeted for scholarships and loans.

Increasingly, governments are allocating resources to develop premier research universities and encourage innovation and cost-effectiveness through the provision of competitive funds, payment for results, and performance contracts (box 3).[9]

TABLE 4 Public tertiary education spending as a percentage of GDP and private tuition as a percentage of public institutions' revenues in East Asia, latest year available

	Public tertiary education spending (% of GDP)		
Private tuition (% of public institutions' revenues)	> 1	0.5–1	< 0.05
> 40	Vietnam	Mongolia	
20–40	Indonesia, China[a]	Japan; Korea, Rep.	Cambodia
		Thailand	
< 20	Malaysia		Philippines

Source: Authors' elaboration.
Note: No shading indicates upper income; light shading indicates middle income; dark shading indicates lower income.
a. Public spending share is estimated in China. Tuition share for China, Japan, and the Republic of Korea is based on OECD reviews of higher education.

Leveraging private funds and correcting the source of market failures

One way to increase private funds is to design more efficient and equitable fee structures. (The role of private funding through private provision is examined below.) Variable (or liberalized) fees offer several benefits over flat fees.[10] They can increase the volume of resources entering the higher education system by being

BOX 1 Vietnam's package of equity-enhancing interventions

Since 1998, Vietnam has instituted policies to encourage fee deductions and exemptions benefiting poor and ethnic minority students. In 2006, about 22 percent of disadvantaged university students received fee deductions of up to 50 percent of tuition. Student aid schemes (for poor and ethnic minorities) have also been in place since the mid-1990s, and scholarships for poor students were revised in 2007 to cover the full tuition fees. Vietnam also recently reformed its student loan scheme, increasing the amount by more than 250 percent. The scheme now supports 29 percent of the students in 103 universities.

Although there is no formal impact evaluation of these measures, the improvements in the access to higher education of the poor point to encouraging results. But completion is still a challenge, as is increasing the access of ethnic minorities.

Source: World Bank 2010.

BOX 2 Matching funds in Hong Kong SAR, China, and in Singapore

One of the key reasons Hong Kong SAR, China, and Singapore have been successful in mobilizing public and private funding for research at the university level is that both have instituted effective government matching fund programs along with favorable tax incentives. By using this type of public-private partnership, they have strengthened the capacity for raising independent income of colleges and universities and contributed to a philanthropic culture supportive of higher education.

Beginning in 2002, Hong Kong SAR, China, provided nearly HK$7 million of seed money to 12 institutions to improve their fundraising capacity. In addition, the government raised the ceiling for tax-exempt donations from 10 percent of income or profits to 25 percent to encourage private donations to higher education. It also created a national fund of HK$1 billion for matching grants on a 1-to-1 ratio to support research in universities, setting a floor—a guaranteed minimum amount that each institution could receive by raising donations to that amount. This structure allowed smaller institutions a fair chance to raise funds while encouraging competition among institutions and raising the profile of what private philanthropy could achieve.

Singapore has mobilized a large amount of funds for university research through its matching fund program. Although the government has traditionally invested a large share of public resources in university research, it has augmented this amount by encouraging private participation. In 1991, it began encouraging philanthropic support to research universities with a matching ratio of 3-to-1. Private donations were also made eligible for double tax deductions. The success of both schemes points to strong institutional capabilities, as well as conducive legislative climates and applicable tax laws.

Source: Sutton Trust 2004.

open ended, and they can increase competition among universities, increasing quality and relevance, as well as the efficiency of resource use. They also have the potential to be fairer than other approaches by setting higher rates for those who can afford them and by combining them with redistributive policies to help poorer students pay fees. All low- and middle-income East Asian countries have room to further differentiate their fees, and Malaysia and the Philippines have room for higher overall fees (table 4).

Supporting stronger university-industry links and nontuition private resources are other ways to leverage private funds. (See box 2 on the use of matching grants in Hong Kong SAR, China, and in Singapore.)

Combined with loan schemes, variable fee policies have increased access for the poor and disadvantaged while helping recover costs. Japan and Korea, both with highly privatized higher education, fund their systems through a mix of tuition and other private sources, while long-term loans bearing low interest rates are available to students to facilitate their participation. Korea has no fewer than six types of student loan schemes—targeted to different segments of the population—to increase access and promote cost recovery. Loan schemes targeted to poor students, particularly from farming and fishing villages, offer interest rates of less than 1 percent, are administered through private commercial banks, and are guaranteed by the government. They are cross-subsidized by other loan schemes for wealthier segments of the population, emphasizing cost recovery to ensure sustainability.

Low- and middle-income countries in the region thus face the challenge of improving and setting priorities for their financing of their higher education systems. This effort will bear fruit only in a more flexible and competitive higher education system.

BOX 3 Financing mechanisms to enhance performance

Competitive financing. Peer-reviewed proposals can achieve institutional improvements or national policy objectives. Indonesia and Vietnam have introduced competitive financing, largely through their multilateral funded projects, with positive results.

Payments for results. Output or outcome measures can determine all or a portion of a funding formula. For example, universities are paid for the number of students that graduate, sometimes with higher prices for graduates in certain fields of study or with specific skills. This approach is applied in some upper- and middle-income countries in East Asia.

Performance contracts. Governments can enter regulatory agreements with institutions to set mutual performance-based objectives. Examples in East Asia include Japan, Korea, and Singapore.

Performance set-asides. A portion of public funding for universities is set aside to pay on the basis of various performance measures.

Better management of public institutions

Public tertiary institutions are critical in East Asia because 70 percent of all students are enrolled in the public sector. Several information, capacity, and incentive constraints and the related disconnects are related to management. Limited information on skill and institutional outcomes, or on the research and technology needs of firms—and the related disconnects—suggests that a market failure has not been corrected. Even if institutions receive enough funds for highly qualified faculty members, insufficient autonomy to select the staff members they want and to decide on their own academic programs makes it difficult for them to deliver what firms need. The lack of accountability of university management to representative university boards may also not be conducive to universities' fulfilling the needs of skill or research users. Examples abound of the poor management of public institutions causing many of East Asia's disconnects. In this context, management of the public sector can help tackle the disconnect between higher education institutions and skill and research users through the appropriate mix of institutional autonomy and accountability (addressing information and incentive constraints).

Currently, decision-making autonomy at the institutional level in low- and middle-income East Asian countries remains underdeveloped. Accountability structures fall short in developing accountability relationships to nongovernment stakeholders.

Government intervention in substantive and procedural issues varies around the world, but autonomy is generally on the rise. In low- and middle-income East Asian countries, however, institutional autonomy is limited. Academic and procedural autonomy are misaligned, with more autonomy in academic than procedural issues. This discrepancy results in incomplete autonomy. Table 5 depicts different levels of autonomy, taking into account both the depth (in substantive and procedural areas) and the coverage (in proportions of concerned institutions) of autonomy.[11] Limited autonomy means fewer options for countries to make fully free academic choices and to freely manage their finance and staff. These constraints lead to difficulties in adapting curricula to labor market needs, hiring the best people for research, mobilizing additional funds to offer smaller classes or TVET (technical and vocational education and training) programs, and offering faculty higher pay. Even interactions with firms for technology and research are more complicated under a centralized regime.

TABLE 5 Institutional autonomy and type of accountability in East Asia, 2010

Type of accountability	Level of autonomy: High	Medium	Medium-low	Low or incipient
Full (central level + local level and institutional level)	Singapore			
To central level + some local level and institutional level	Japan; Hong Kong SAR, China	**China**, Thailand, Indonesia		
To central level			**Philippines**, Malaysia	**Korea, Rep.**
				Vietnam, Cambodia, Lao PDR

Source: Authors' elaboration based on Raza 2010.
Note: No shading indicates upper income; light shading indicates middle income; dark shading indicates lower income. Autonomy rankings reflect the share of institutions with autonomy and the intensity of autonomy (Korea, the Philippines, and China [in **bold**] lead their respective autonomy groups). Accountability to local and institutional levels reflects the governing boards' role and representativeness and the disclosure of information for quality assurance.

Limited autonomy is often associated with overly intrusive accountability to the government; accountability is not sufficiently outcome based, further limiting the margin of action. Importantly, there still are limited mechanisms of accountability of the institutions' leadership to communities and to institutions, reducing opportunities to address local needs because of low incentives and incomplete information. Table 5 provides a summary snapshot of countries along the accountability dimension based on evidence in the book. Although even upper-income countries have scope to strengthen accountability to nongovernment stakeholders, most low- and middle-income countries have a longer way to go. China is a bit ahead, on both the autonomy and the accountability dimensions.

Governments must set the proper incentives for public institutions through appropriate autonomy and accountability. Greater autonomy in higher education addresses disconnects through more flexible governance structures, better use of local information, and more effective resource mobilization. These factors allow for better matching of skills and research between higher education institutions and the labor market, addressing differentiated local needs (including the differentiated needs of the service and manufacturing sectors for STEM and other fields of study and for thinking and behavioral skills). They also enable quality-enhancing choices. But accountability is needed for autonomy to bear fruit.

Although autonomy is most urgent for middle-income countries, the beneficial effects of autonomy are valid at all incomes. All countries should therefore aim at completing, or at least advancing toward, the completion of their piecemeal reforms. In the mid-2000s, Japan and Singapore launched reforms geared toward more extensive autonomy that can provide some guidance for other countries. Japan, through the National University Corporation Act of 2004, extended autonomy to all its national universities—87 of its 157 public universities. In 2006, Singapore pushed through extensive autonomy for its two premiere public universities, the National University of Singapore and Nanyang Technological University. These two universities were incorporated as not-for-profit companies in separate acts, joining Singapore Management University, which already had this status. For an understanding in more concrete terms of what higher autonomy entails, table 6 illustrates the level of autonomy by procedural and academic area in Japan's national universities before and after 2004.

It is also essential for all countries to complete their accountability frameworks to ensure that accountability lines to local communities (including employers, households, and students) and institutions are well developed, while accountability to the government remains strong. Along with other measures, accountability to nongovernment stakeholders entails providing higher power to governing boards and providing students with the information to choose and the opportunity to move across institutions.

Well-functioning governing boards will be critical to autonomy's effectiveness.

Universities and other higher education institutions in most countries worldwide are free to set their internal academic structure, within a basic framework stipulated by the law. Both dual (a board or council and a senate) and unitary governance structures have been adopted, with a bit of an edge for dual structures. Alongside the external members who feature in a heavy majority of countries, boards largely comprise academic staff members, nonacademic staff members, and students. Typically, the governing board has responsibility for the mission and goals of the institution; the approval of its policies and procedures; the appointment, review, and support of its president; the oversight of its resources; and an informed understanding of its programs and activities. The board's head tends to be elected (or appointed) by the board or by another internal university body.

Steps to increase mobility and competition, including national qualification frameworks[12] and disclosure and publication of information on institutional and graduate performance, will also be highly instrumental to higher accountability and performance. Box 4 summarizes some of the key actions required to complete decentralization.

Exercising stewardship of the higher education system

Beyond managing the public sector, higher education departments need to coordinate and handle actors and interactions not under their full control but critical to the performance of the sector (in other words, exercise stewardship). Among other aspects, exercising stewardship entails the coordination of (a) higher education departments with other departments and ministries, (b) private higher education institutions, (c) the links between higher education institutions and firms in skills and research, and, increasingly, (d) the links between the domestic and international higher education market. The lack of interaction between higher education institutions

TABLE 6 Higher autonomy and Japan's national universities

	Substantive autonomy			Procedural autonomy				
Year	Set academic structure and course content	Employ and dismiss academic staff	Decide size of student enrollment	Own their building and equipment	Borrow funds	Spend budgets to achieve objectives	Decide level of tuition fees	Set salaries
2003	○	○	X	X	X	X	●	X
2007	○	●	●	●	●	●	○	●

X = no autonomy ● = autonomy ○ = autonomy in some respects

Source: Authors' elaboration based on Raza 2010.

BOX 4 Key actions to complete decentralization

- Align substantive and procedural autonomy.
- Separate the two roles of national government in the higher education sector (government's operational and financial management role versus its policy role).
- Strengthen and empower governing boards (including the appointment of the board head by the board itself or by internal bodies of universities and the capacity of the boards to appoint presidents and rectors).
- Strengthen external quality assurance through disclosure policies, funding for performance, and national qualification frameworks.

and firms to some extent reflects the lack of information on what works and the lack of legal and financial incentives to connect. Disconnects between skill providers and users are also related to a private sector not fulfilling its potential because of overregulation. In this context, adequate stewardship of the higher education system can, for instance, help solve the disconnect between skill users and providers through effective promotion and regulation of the private sector (addressing incentive, information, and even capacity constraints). It can also address the disconnect between firms and providers in skills and research by sharing best practices on what works and putting in place the appropriate legal and financial incentives (again addressing incentive and information constraints), and so on.

Some of the disconnects are aggravated by poor coordination between higher education departments (or ministries) and the other education departments (or ministries) and ministries of science and technology, finance, and labor. There are no obvious solutions to addressing these failures. For instance, the integration of higher education within the ministries of education can help solve the disconnects between education levels but may make the relation with science and technology more distant. But even within ministries, coordination between departments is far from given. Overall, countries need to dedicate more attention to these links and develop stronger capacity for coordination within their governments.

Private delivery is a critical part of service delivery, but the private sector is not yet used to its full potential in low- and middle-income East Asian countries. Governments can improve their stewardship of the entire higher education system by ensuring that private and public providers complement each other in producing social outcomes, especially in meeting the skill needs of employers. The private sector can provide support to more diverse skills (including many of the disciplines and generic skills the service sector requires).

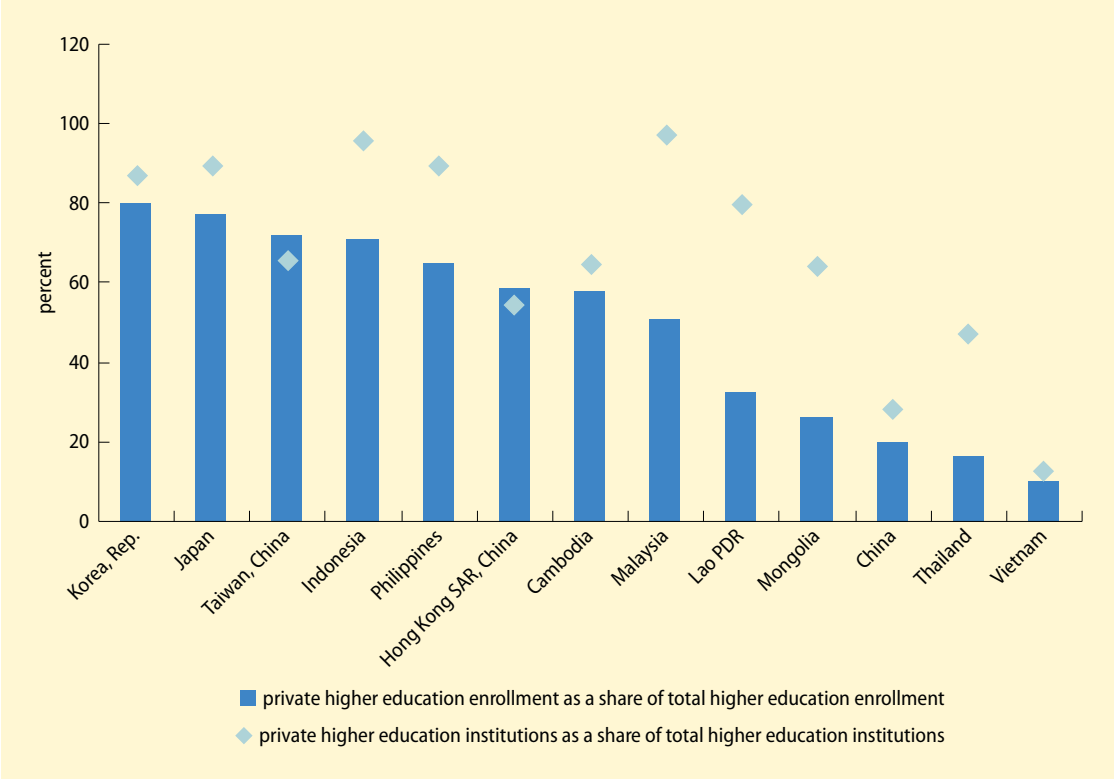
In most East Asian countries, the private sector has a high or very high share of enrollment, but the share is still low in the lower technology cluster and in Thailand and China (figure 9). Some countries face a quantity-quality tradeoff in the middle-income group and middle technology cluster (such as Indonesia and the Philippines) and in the lower technology cluster where the private sector grew quickly (such as Cambodia). This is evident in the absence of a linear relation between the private enrollment shares and income in low- and middle-income East Asian countries.

A combination of factors related to private sector policy, regulation (or lack thereof), and financing are at the root of slow expansion in some countries and the quantity-quality tradeoffs in others. East Asian educational strategies have often postponed higher education growth and then funneled it preferentially to the private sector. In many countries, this practice resulted in a predominant role for the private sector. Government promotion to encourage private supply to meet soaring demand has been particularly evident in Japan, Korea, Indonesia, and the Philippines. In countries with later developing private sectors (Malaysia and Thailand), government stances have not always been as clear. In low-income or socialist-leaning economies, the policy stance has for a long time been an obstacle to private sector expansion, though things have changed.

Although the policy stance bears most of the responsibility for not supporting the private higher education sector, overly restrictive or unclear regulation also constrains expansion in Thailand, Vietnam, and even Malaysia. In some other countries, the constraints are related to the poor implementation of regulation and to a lack of widely available information on quality, labor market, and other outcomes of private institutions—leading to low-quality, demand-absorbing institutions.

Although the broad public financing stance toward the private sector is generally adequate, private higher education institutions in many countries still have limited or no access to student loans or to competitive

FIGURE 9 **Private higher education as a share of total higher education institutions and of higher education enrollment in East Asia, latest available year**



Sources: PROPHE (Program for Research on Higher Education) International Databases, latest available year; World Development Indicators database.

funding for research, thereby constraining access of some disadvantaged groups and healthy competition between the public and private sector.

Countries should enhance the role of private higher education through higher participation and better quantity-quality tradeoffs. In all countries, private higher education will play a large—or larger—role given the constraints on public funds, particularly demand-absorbing institutions, for lower cost provision of highly demanded fields. To the extent that more resources can be mobilized, "semi-elite" institutions can support innovative management and academic practices and compete with the public sector.

Growth is thus imperative in lower-income countries where higher education coverage is still fairly low and in countries with low participation in private higher education. As the sector expands, the challenge will be to avoid sacrificing quality to quantity. So, low- and middle-income East Asian countries should build policy, regulatory, information, and financing environments that encourage a move to more and higher-quality institutions. That approach has several implications for the design of regulatory, information, and financing frameworks for private higher education (box 5).[13]

Korea is a textbook example of effective private higher education. Its private gross enrollment rate rose from less than 10 percent in the 1970s to almost 100 percent in 2008, alongside a massive expansion of private higher education, thanks to a favorable policy and financing stance toward the private sector. Private higher education institutions are a significant beneficiary of both student loans and competitive funding for research.

And incentives to mobilize nontuition private funds have helped establish many semi-elite institutions. At the same time, smart regulation of the sector has maintained minimum quality across the board.

Although better institutional management strengthens links between higher education institutions and firms in building skills and conducting research, other constraints must also be addressed. Some constraints are connected to issues of capacity, while others can be addressed by smart choices in the management of interactions. Policy makers across the region are looking at how to make this work.

In managing their university-industry links, countries need to make choices and decisions on the types of links, while continuing to build capacity. The major hurdle to such links in research and technology remains firms' failure to consider universities as fruitful collaborators or sources of commercializable technical ideas. So, not all countries will have the same potential for strong links, particularly countries in the lower technology cluster, with their very large capacity constraints.

As capacity is built, however, policy makers should start encouraging stronger links by assessing the pros and cons of, and gradually supporting, the development of selected modalities, such as better aligning university teaching with firms' skill demands through collaboration in curriculum development, encouraging entrepreneurship, setting up university incubators, and establishing technology-licensing offices and spinoffs. For all countries, supporting entrepreneurship training for faculty members, students, managers, and workers is a very promising university-industry link. For example, the National University of Singapore has entrepreneurship courses. Singapore has also been at the forefront of collaboration between universities and industry in curriculum development. Box 6 illustrates other examples of university-industry links in East Asia.

Countries should set the incentives to make university-industry links work, bringing in intermediaries, providing matching funds, and targeting sectors and subsectors. Firms should take the lead in initiating and organizing collaboration in R&D, but this rarely happens because of credibility and

BOX 5 Regulation, information, and financing for private higher education

Regulation

- Regulation should be clear and efficient. Excessive and undifferentiated regulation can greatly constrain participation.
- Minimum structures for curricula, granting of degrees, licensing, examinations, use of public sector professors, and, possibly, governing boards should be regulated.

Information

- Information should include indicators of academic, research, and labor market performance.
- Information should be available to all relevant stakeholders, including prospective students, to allow them to make informed choices.

Financing

- There is a strong case for public policy to encourage a variety of nontuition funding mechanisms. Tax policies more supportive of philanthropy and entrepreneurial funding together with regulations favorable to foreign funds would help support a larger semi-elite sector.
- Public policy should be restrained in setting regulatory limits on tuition fees.
- Private higher education should have access to competitive funds for research and student loans.

BOX 6 University-industry links in some East Asian countries

Skill-related university-industry links

The University of the Philippines–Diliman has partnered with the Philippines' Department of Science and Technology to have engineering students and industrial plant workers undertake training at the university and at plant sites, partly under the direction of university instructors. Lessons learned during the training are analyzed in the classroom, in line with theoretical and academic lessons, and then fed back to industry.

In Vietnam, the Ho Chi Minh City University of Technology has been very active in training and skill development for local business. The local government in Ho Chi Minh City has also encouraged links with local businesses, establishing a university council to advise on how to promote training and innovation in universities linked to city development.

Technology-licensing offices

Universities in Taiwan, China, and in Hong Kong SAR, China, have set up technology-licensing offices to facilitate technology transfer and research collaboration. Universities in China are also collaborating increasingly with industry through contracts for technology services, patent licensing, and sales and are working through university-affiliated enterprises, a practice unique to China. The two leading Beijing universities for commercializing ideas have established internal technology-licensing offices.

Fifteen Thai universities have technology-licensing offices which, in a more limited role, promote commercially applicable academic research, support patent registration for academic research, and provide training to university professors and researchers on intellectual property.

communication gaps. Yet examples abound of intermediary groups or associations, such as SME associations and knowledge-integrating communities, bridging the university-industry gap. Innovation funds can also support stronger links by helping provide matching funds to firms or universities to collaborate in adapting or developing technology. Although skill-related university-industry links make sense in all sectors, only a few first-tier universities will ever have the potential for strong formal interactions with firms in R&D. And in these universities, only a few departments representing specific sectors and subsectors will be able to pursue effective university-industry links. High-tech subsectors offer good potential for such links, particularly in information technology and electronics in China, Thailand, and Vietnam. Other more medium-tech parts of an economy may also offer scope, such as the rubber industry in Thailand. And some lower-value-added sectors dominated by SMEs may offer such scope, to the extent they are upgrading their technology, or some subsectors in agriculture may do so.

Governments also need to take up the challenges of internationalization. The mobility of students, faculty members, programs, and institutions are all examples of higher education's internationalization. It offers tremendous opportunities to address some of the skill (and even research) disconnects with end users but also some other challenges that need to be handled. Protecting consumers will be paramount: governments and students need transparent information about the quality and international validity of international programs and institutions. This necessity suggests that accreditation and quality assurance systems need to cooperate at the international level and reference international benchmarks.

From policy to reform: What are the key priorities and how do countries get there?

Starting with broad priorities, the book identifies the set of challenges and constraints affecting low- and middle-income East Asian countries and puts forward broad

policy recommendations. Moving from policy to reform requires two further steps: (a) confirming priorities and policy levers by income group and technology cluster in light of the diagnostic and (b) moving from policy levers to policy implementation.

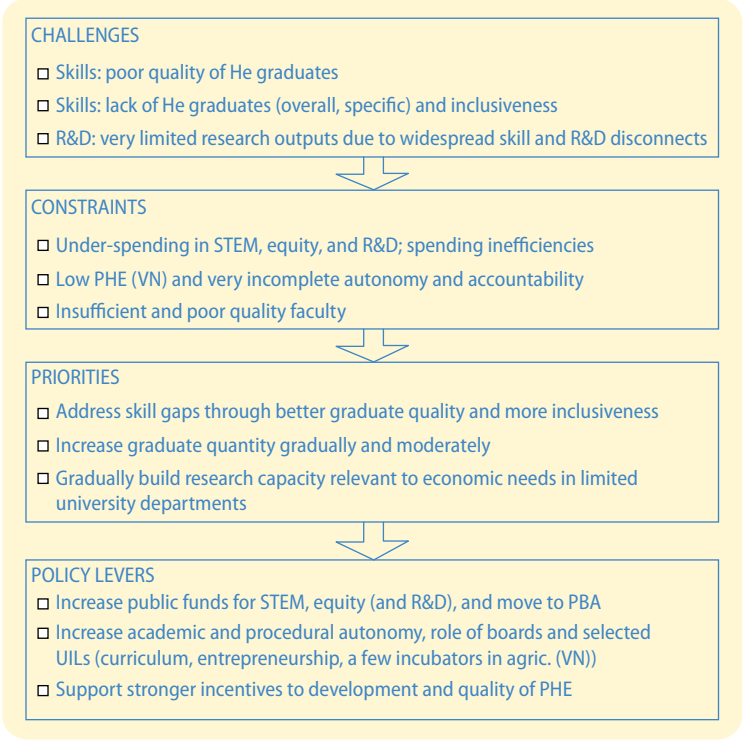
Identifying the priorities and policy levers by income groups and technology clusters

Countries need a vision of where they want their higher education systems to go. This requires defining critical priorities and policies and the reform process to get there (figures 10–13).

Low- and middle-income East Asian countries must start by identifying the critical priorities for reform. Although the final goals of higher education are the same across countries, the challenges, underlying disconnects, and constraints—related to higher education and not—vary, dictating different intermediate goals and therefore immediate priorities. Both the order of magnitude of disconnects and their effect on higher education matter here. For instance, research-related disconnects may be stronger in low-income countries, but addressing skill disconnects may be more urgent for their effect on higher education.

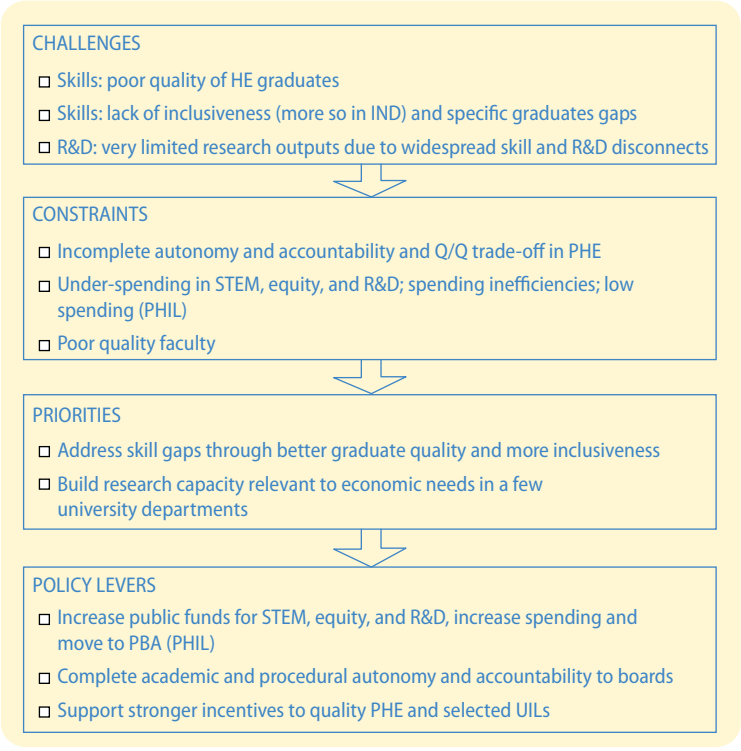
Low-income countries need to increase productivity across sectors, and building a solid human capital base is priority number one. While making sure that they have a solid skill base to support development—from agriculture to manufacturing to services—they should invest in a smaller group of workers with higher-level skills to make sure they can start assimilating and adapting new

FIGURE 10 From challenges to policy levers for low-income–lower-technology cluster countries—Cambodia, Lao PDR, and Vietnam



Source: Authors' elaboration.
Note: HE = higher education; PHE = private higher education; PBA = performance-based allocation; UILs = university-industry linkages; VN = Vietnam.

FIGURE 11 From challenges to policy levers for middle-income–lower-middle-technology cluster countries—the Philippines and Indonesia



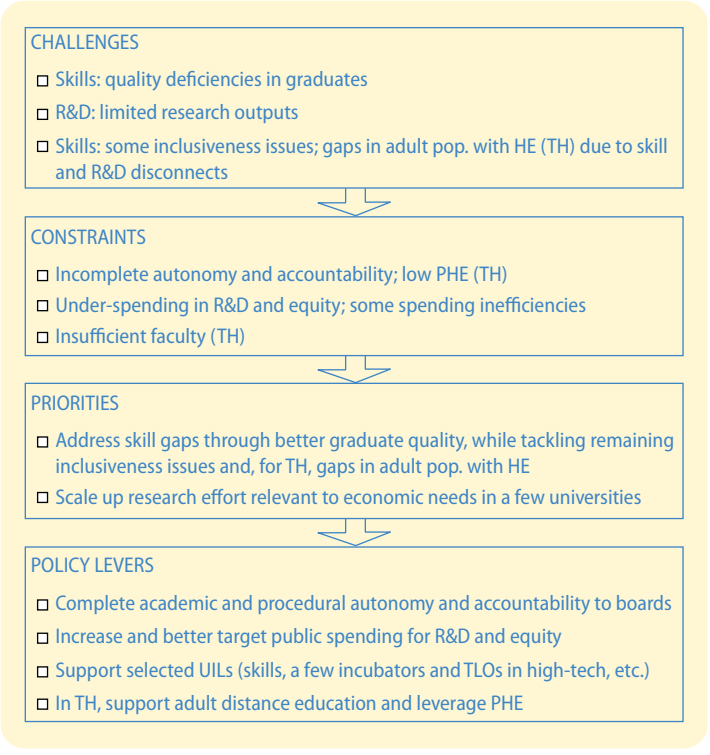
Source: Authors' elaboration.
Note: HE = higher education; IND = Indonesia; PHE = private higher education; PBA = performance-based allocation; PHIL = the Philippines; Q/Q = quantity/quality; UILs = university-industry linkages.

technology to climb the technology ladder. It will be difficult to move to middle-income status without eventually moving to a higher technology cluster. Although the potential may be currently less strong, it will pay off to start building some research capacity in universities to create an environment supportive of technology upgrading in firms (and in agriculture).

Defining more concrete priorities requires a full diagnosis of higher education. The diagnostics in this book confirm and fine-tune what should be the main priorities of low-income countries. Addressing skill gaps through better quality graduates and inclusiveness should be the first immediate goal, followed by gradually and moderately increasing graduate quantity and starting to build research capacity in a couple of universities or university departments relevant to economic needs. Vietnam may be able to go a bit further in this dimension because of its slightly higher technological maturity and the demand for innovation, justifying university research.

Middle-income countries need to increase productivity overall but also need to move up the value chain in manufacturing and other sectors. They need both a solid skill base and a stronger capacity for innovation through skills and research. Higher education is already called on to support all these objectives effectively. Immediate priorities for moving to a higher technology cluster will differ according to the position in the cluster. China is further ahead in both its capacity and its scope for stronger university research. Indonesia, the Philippines, and, even more so, Mongolia have less capacity and urgency. Indonesia and the Philippines

FIGURE 12 From challenges to policy levers for middle-income–middle-technology cluster countries—Thailand and Malaysia



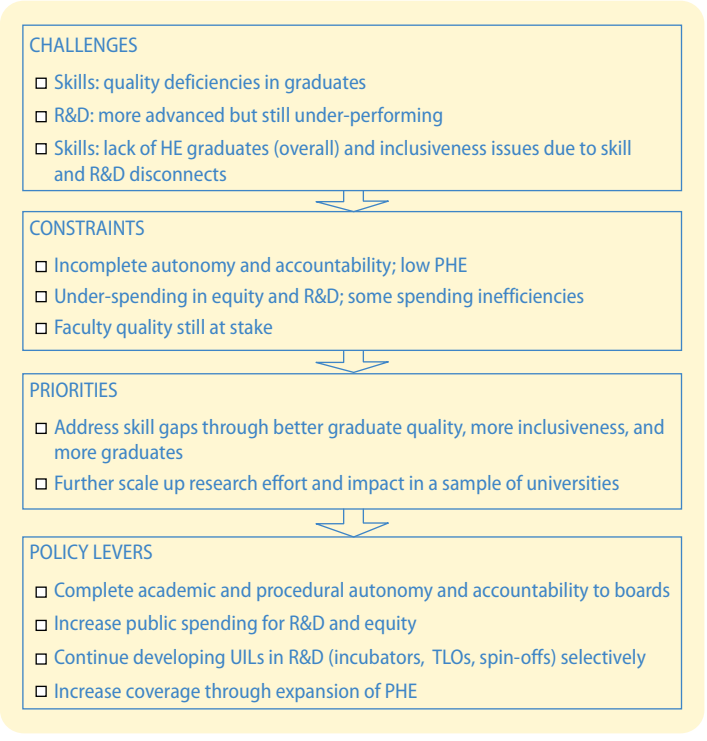
Source: Authors' elaboration.
Note: HE = higher education; PHE = private higher education; pop. = population; TH = Thailand; UILs = university-industry linkages; TLO = technology licensing office.

should focus on improving graduate quality and inclusiveness, while building research capacity in a few universities. China should continue developing its skill base (along with both quality and quantity dimensions) and further scale up its research effort and effect. Malaysia and Thailand are in the middle.

Challenges, constraints, and priorities will then dictate the critical policy levers and specific policy measures for each country and country group. The common imperative will be to start managing higher education as a system of connected institutions and to apply the critical policies to do so. The exact policy pillars and levers will vary according to the most pressing challenges, the underlying disconnects (intensity and type of the various disconnects), and the intensity and nature of the main causes of disconnects. Lower-income–lower-technology countries may have to prioritize public spending on STEM fields and scholarships, while middle-income countries put more immediate emphasis on public spending for research. Middle-income countries may also be in a position to complete institutional autonomy reforms, given their higher initial autonomy, while lower-income countries move more slowly. China, a middle-income country in the upper middle technology cluster may have both scope and potential to move further on the intensity and type of university-industry links in research and technology.

For both low- and middle-income country groups, finer policy details can be provided only by completing individual country diagnostics of disconnects (including a better assessment of the intensity of the various disconnects within each country and their causes). For instance, on the skills dimension, disconnects with earlier education may be stronger than

FIGURE 13 From challenges to policy levers for a middle-income–upper-middle-technology cluster country—China



Source: Authors' elaboration.
Note: HE = higher education; PHE = private higher education; UILs = university-industry linkages; TLO = technology licensing office.

those between higher education institutions in some countries, and vice versa, requiring different levels of attention. And the causes of each disconnect will vary across countries, suggesting different policy remedies.

From policies to reform

After the priorities and related policy pillars, levers, and measures have been identified, decisions need to be made on policy implementation. Big-bang reform is rarely possible and generally not desirable. Therefore, policy makers need to think about policy implementation and sequencing. In truth, there is no blueprint for how, at what speed, and in which order policies need to be implemented once a decision has been made to introduce them. But a few principles can be laid out.

Most important, higher education policies are implemented not in a vacuum but in a broader economic and political environment. Policy makers need to carefully consider this environment when implementing their policy agenda to increase the possibilities of success. This is particularly so when higher education policies have far-reaching implications for the distribution of power and authority among actors (within and even beyond the higher education sector) or are very dependent on the broader economic environment.

The creation of "winners" and "losers"—at least in the short run—will affect implementation. Policies with potentially widespread implications are the transfer of more autonomy to institutions, the expansion of the private sector, the raising of tuition fees, and the use of performance-based allocations for public funding. To succeed, these policies will need to be fine-tuned to the political and

institutional context. Institutional autonomy failed in Mongolia because it was imposed from outside without strong domestic support. More generally, regulation and financial incentives favorable to the surge of private higher education may not be sufficient to spur the sector if the broader policy stance toward the private sector is not favorable in the country.

Clear legislative frameworks, extensive consultations, and capacity-building efforts can create broader support for the reform. Appropriately sequencing implementation across institutions and policies can also help. For instance, in the face of initial opposition, Vietnam's gradual approach to providing greater autonomy to selected higher education institutions may be a good way to gain support for the reform (even if it means substantially slowing down reform). And in Hong Kong SAR, China, the acceptance of performance-based financing in universities was facilitated by the timely introduction of policies supportive of private resource mobilization and the autonomy to manage human resources (and salaries).

Other reforms depend on the broader economic environment. For instance, many efforts to push for strong and widespread university-industry links in R&D have not worked because of the lack of demand for innovation from firms. One way to deal with this is to make sure that initial priorities and expectations are realistic, by aligning research decisions to the position in the technology cluster. Vietnam, for instance, should not go in the direction of widespread university-industry links (as a matter of fact, no country should) in the first place.

But there are some ways to tackle this issue at the implementation stage—where policies not related to higher education come in. Careful sequencing between higher education reforms and specific reforms to liberalize certain sectors may, for instance, increase pressure on firms to innovate and increase their demand for university services. Financing policies spurring firm innovation through financial and fiscal incentives can achieve a similar result. For instance, in moving from low to high innovation, Hong Kong SAR, China, and Taiwan, China, promoted university-industry links, entrepreneurship, and innovation and technology by first supporting the SMEs that make up the bulk of their enterprises. (In Taiwan, China, SMEs make up nearly 98 percent of all enterprises). Attracting foreign investment and multinational companies can additionally bring external knowledge and resources to develop indigenous human capital and entrepreneurship. This is most evident in Singapore's rise from a developing nation to a developed nation by learning from external influences to promote its SMEs, private sector, research institutions, university research, and science parks. In other words, policy complementarities may be able to support faster and more effective reforms.

Although the pace of reform will depend very much on country-specific political and economic conditions, a few additional principles can help. First, some policies will take more time than others to bear fruit and should therefore be initiated earlier. This is the case for some policies aimed at building the human capital stock, such as scholarships to send promising youth abroad. This is also the case for policies to build the capacity of university and other tertiary institution boards. By contrast, the effects of removing a constraint, such as a policy stance or regulation unfavorable to the entry of private institutions, can be noticed fairly quickly (as in Malaysia in the early 1990s).

Second, interactions between reforms need to be taken into account when planning their sequencing. For instance, autonomy and accountability need to go hand in hand to produce the desired results. Focusing public resources in a few centers of excellence in an attempt to spur research is much more effective after governance policies have laid the groundwork for a more competitive higher education sector (where excellence can emerge). And equity interventions in higher education need to be aligned with interventions at other education levels to have more effect on the pool of students enrolled in universities.

•••

Two steps forward, one step back. East Asia's higher-income countries have made spectacular gains in higher education delivery over the past few decades. But the low- and middle-income countries are struggling to replicate the standard bearers' success. This is partly due to fewer resources in hand, but also to governments' poor management and stewardship of the sector. It is time for higher education to fulfill its potential. This is a time of major economic upheaval in East Asia. There is no reason for higher education not to feel it, too.

Notes

1. Cornford 1908.
2. Cornford 1908.
3. World Bank 2011.
4. Thailand very recently transited to upper-middle-income status but was still a middle-middle-income country according to the gross national income per capita Atlas method applied to 2009 data. Hence, it is considered a middle-middle-income country in this book. This classification is also justifiable from the fact that all available higher education indicators are for 2009 or earlier.
5. Vietnam very recently transited to lower-middle-income status, but was still a lower-income country according to the gross national income per capita Atlas method applied to 2009 data. Hence, Vietnam is considered a lower-income country in this book. This classification is also justified because all available higher education indicators are for 2009 or earlier.
6. Higher education and tertiary education are used interchangeably in this book.
7. In fact, there is often a separation between teaching and research within universities themselves.
8. Some policies involve actions to support firms and research centers, for instance, which derive from broader economic and political decisions. This is the case of fiscal, financial, and liberalization policies to encourage innovation behavior in firms. Some others involve actions to be carried out at other education levels. Although not directly under the authority of higher education, these policies need to be carefully considered because they affect actors that are part of the higher education system and therefore affect the outcomes of higher education reforms. It is the combination of all these policies that will ultimately decide the success of higher education reform.
9. Japan; Hong Kong SAR, China; and, to a lesser extent, Korea, Malaysia, the Philippines, and Vietnam all host premier research universities that received priority in fund allocations.
10. Variable fee structures can include charging variable fees at the institutional and course level and greater fees for higher-quality institutions, higher-paying disciplines, and higher-cost disciplines (as in Hong Kong SAR, China, for medicine).
11. Korea is an outlier when it comes to institutional autonomy (also reflected in strong accountabilit y to the government but undeveloped accountability in relation to other stakeholders). Could this at least partly explain why Korea, while an excellent trainer, somewhat lags Japan and Singapore in terms of journals, patents, and university-industry links?
12. Part of the broad quality assurance system, such frameworks help provide nationally consistent recognition of outcomes in postcompulsory education and so are essential for student mobility between education and training institutions. Although they can potentially address disconnects among skill providers (whether in different education levels or even at the same education level) and should therefore be supported, their design and implementation entails challenges reviewed in the book.
13. A supportive legal, strategic, and fiscal framework for private higher education and decisions on public sector expansion constitute the pillars of a favorable policy stance toward the private sector. Officially recognizing the private sector in legislation, as has occurred in China and the Philippines, can facilitate political and public support for private involvement in education.

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