PAFTAD

PACIFIC TRADE AND DEVELOPMENT WORKING PAPER SERIES

Paper No. YF37-08

Avoiding "Tiger" Traps: How Human Capital Can Propel Countries beyond Middle-Income Status in East Asia

Emmanuel Jimenez and Elizabeth M. King

DRAFT, NOT FOR CITATION WITHOUT AUTHOR CONSENT

AUTHOR AFFILIATION: World Bank; Brookings Institution

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

DRAFT: DO NOT QUOTE

8 July 2015

Avoiding "Tiger" Traps: How Human Capital Can Propel Countries beyond Middle-Income Status in East Asia

*Emmanuel Jimenez and Elizabeth M. King**

Presented at PAFTAD 37
Singapore 3-5 June 2015

*Jimenez, Director of Public Sector Evaluations at the World Bank Group until December 2014, is currently Executive Director of the International Initiative for Impact Evaluation (3ie); King, Director of Education at the World Bank until June 2014, is currently Non-resident Senior Fellow of the Brookings Institution in Washington, DC, and incoming Member of the Board of Commissioners of 3ie.

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

Introduction

The role of human capital in the growth narrative among the successful economies in East Asia and the Pacific—especially the so-called East Asian "Tigers"—is well-known and has been a formula that other countries have tried to emulate. (Indeed it was the theme of a recent PAFTAD conference; see Dobson, 2013). Falling fertility rates opened a window of opportunity as these countries' demographic profile changed: instead of a predominance of very young children, their population structure produced a large stock of potential workers who were entering the labor force with fewer dependents. The sheer number of these workers, trained and deployed well, relative to those who were not of working-age, produced a demographic dividend. Some estimates showed that up to a quarter to a third of all of the Tigers' growth was due to this demographic phenomenon (Bloom, Canning and Malaney, 2000).

The dividend was not automatic. The demographic shift had to be accompanied by the right policies and institutions. Open economies, good governance and a favorable investment climate allowed countries to reallocate labor from agriculture to initially low-wage manufacturing, including assembly. At the same time countries expanded primary education to ensure that workers had basic skills. As these enterprises succeeded they moved up the value-chain to higher-wage manufacturing, enabled by investments in secondary and tertiary education to meet the demands of higher-order skills.

This growth narrative was not shared by all countries, even within East Asia. In 1960, South Korea and the Philippines had about the same GDP per capita (approximately $640 in US$1975) and population levels were similar (28 and 25 million, respectively). About 26 percent of Philippine GDP was generated from agriculture, compared to 37 percent in Korea; manufacturing accounted for 28 percent in the Philippines and about 20 percent in Korea. All primary-school age boys and about a quarter of those of secondary-school age enrolled in school in both countries, but the enrollment rate at tertiary level in the Philippines was more than double that of Korea (13 instead of 5 percent). All in all, the two countries were statistically equivalent with the Philippines slightly ahead (Lucas, 1993). Fifty years later, South Korea is a major world economy while the Philippines has been unable to escape its lower-middle income status despite some recent growth.

There are many more countries like the Philippines than there are like South Korea. Its experiences have prompted some analysts (Kharas & Kohli, 2011) to warn of a potential 'trap' as countries reach middle-income status. As wages rise, countries that aspire to high-income status will have to compete with countries with much higher levels of productivity. Those that don't will experience a slowdown and are pressed from both ends; they are no longer competitive with the bottom but aren't yet able to compete with the top. Doing the latter has been a 'glass ceiling' which relatively few countries have been able to break.

There are many reasons why some countries are able to join the ranks of higher-income countries and while others remain "stuck". In this paper we consider the role of human capital, focusing on education, given its key role in the East Asian growth narrative. We make the following points:

- Using its human capital well is a critical ingredient in helping a country avoid a middle-income trap, however it may be measured. Moreover, if a country fails to sustain growth during its demographic window of opportunity, the changing age structure of its human capital may actually lead into a potential trap.
- Countries that have succeeded in breaking through, which have been mostly in East Asia, have done so not only by expanding the opportunities for human capital accumulation as measured conventionally by years of schooling or amounts of money spent for education. They have also invested heavily in improving the quality of education and, in doing so, their youth developed the cognitive skills needed for the transition from basic agriculture to higher productivity manufacturing and services. Beyond that, these countries have developed non-cognitive skills that have become increasingly more important in today's workforce. In the future, the hurdle for making the jump will become higher: given the evolving world of work, human capital must also foster creativity.
- There are reasonably clear and sensible hypotheses as to which policies and programs countries need to develop cognitive and non-cognitive skills, many of which derive from the experience of the East Asian economies which successfully broke out of middle-income status, the so-called Tigers. But the specifics need to be tailored to the different country contexts. Unfortunately, the rigorous evidence base for specific policy and programs is paltry in the emerging economies of East Asia and needs to be expanded as countries navigate their own way through to high-income status.

The nature of a "middle-income trap" and what it means for human capital

Who might be trapped?

There is no consensus on exactly which East Asian countries are "trapped" in middle-income status. Some are easier to categorize than others. A country like Japan has had high-income status for a while, even though over the past decade, its growth has stagnated. Countries like Cambodia and Laos have low-income status; they're growing rapidly now but are starting from such a low base that they are not yet in the middle. A country like the Philippines has been on the verge of taking off but is arguably now further away than it was in the 1960s and is decidedly "trapped". But what about countries like China, Indonesia, Malaysia, Thailand and Vietnam?

The recent literature on the trap has had several characterizations of what it means to be in a "middle income trap." Aiyar et al. (2013) characterizes the problem by comparing the evolution of GDP per capita over time. Brazil, Mexico and Peru reached a level of US$3000 per capita about 50 years ago or more but have per-capita income levels that are about 20-30 percent of US levels today. Taiwan, China and Korea, two of the East Asian Tigers, on the other hand took less time; they reached that level later but have progressed to about 60-70 percent of US levels. Other countries in Asia are somewhere in between: Thailand and Malaysia have progressed at a slower pace than their Tiger counterparts but have already outperformed those in Latin America. China is on a faster trajectory, and Indonesia is on a slower one.

Some analysts have stressed the role of slowdowns in economic growth in describing the differentials in countries' rates of progress. Aiyar et al. (2013) focus on the probability of a growth slowdown measured in terms of a large, sustained deviation from the predicted growth path. Eichengreen et al. (2013) develop a similar concept but define it differently. It is measured as an episode whereby a fast-growing country with a seven-year average growth of at least 3.5 percent grows at just two percent in the subsequent seven years. In these definitions, countries may be "trapped" in a slowdown for some time but then can escape and resume growth. Indeed, Korea in the early 1970s and Malaysia in the early 1980s experienced marked slowdowns according to these two studies.

Another approach to the trap is to consider it as being stuck in a level of GDP per capita (which is set somewhat arbitrarily). Felipe (2012) defines the trap by assessing the historical experience of countries graduating from lower- to upper-middle income status and subsequently to high income status. A country is stuck in a trap if it stays in a lower-middle income status longer than its historical experience. By this definition, the East Asian countries that were successful in escaping lower-income status in 1950 and moving to upper middle-income include China, Malaysia, Korea, Taiwan (China) and Thailand (Felipe, 2012). The countries that reached upper-middle income status after 1950 and graduated to high-income are the Tigers which include Hong Kong (China), Japan, Korea, Singapore and Taiwan (China) (Felipe, 2012). The East Asian countries that are considered to be in a trap in 2010 are the Philippines (stuck at lower middle-income status) and Malaysia (stuck at upper middle-income status).[1]

For the purposes of this paper, we compare the human capital development in East Asia's economic Tigers with those that have yet to achieve high-income status. The former include Japan, Korea, Taiwan (China), Hong Kong (China) and Singapore. Some parts of China such as Shanghai and other eastern cities have broken out but by and large the others have not. Middle-income economies of Indonesia, Malaysia, Thailand, the Philippines and Vietnam as still vulnerable to being trapped. While not part of East Asia, this paper also draws on observations from India which has broken through to middle-income country status (MIC) with its quite robust economic growth in nearly two decades.

How can human capital help countries avoid being 'trapped'?

The literature points to two distinct but related dimensions of what it means to avoid the trap. One is to avoid a slowdown after growth episodes—that is, being able to sustain growth, as stressed by Aiyar et al. (2013) and Eichengreen et al. (2013). Another dimension is to reach the GDP per capita of the next "accepted" economic category and maintain that position by competing with higher-income economies and moving up the value-chain in production.[2] The implications for human capital are profound for both dimensions.

[1] The varying definitions of what is a middle-income trap have led to different judgments as to who's in it and who's not. Using a definition closer to that of Aiyar et al. (2013), Watson (2014) claims that Thailand is in the trap, Vietnam is a candidate for it, the Philippines is "shaky but improving" and Indonesia is reasonably solid (p. 14). Much of the discussion is about the institutional framework in these countries.

[2] For example, in Malaysia, from 1987-2007, output per worker in the sector rose almost four-fold.[2] In the services sector productivity doubled. In contrast, agricultural productivity rose less than 20% in the same period (Flaaen et

The accounting of economic growth is deceptively simple. Growth per person comes from four sources: more capital per unit of labor, more labor relative to the number of people, more productive labor, and technical progress. That said, how to stimulate each and in what combination is difficult and complex. The Growth Commission found no one tried-and-true formula for sustaining economic growth (Growth Commission 2008). But in all of these efforts, investments in human capital through education is a necessary (though by no means sufficient) condition for economic growth. It is beyond the scope of this paper to review the extensive literature on education and growth (see Barro and Lee, 2015 for a comprehensive treatment[3]). We provide a brief recap here.

Early models of economic growth presented a growth-accounting framework as mentioned earlier. For 83 economies, Barro and Lee (2015) estimate that almost a quarter of growth between 1960 and 2010 can be attributed to human capital. Later "endogenous" growth theories postulated that human capital had additional economic benefits through externalities such as spillovers of knowledge across workers or the accumulation of technological accumulation and adaptation. Cross-country regressions show that, beyond a certain threshold, educational attainment contributes positively to economic growth (Barro and Lee, 2015). Some of the nuances have changed. Research in the 1990s showed that the economic performance of the East Asian Tigers point to primary education as "by far the largest single contributor to the high performing Asian economies' predicted growth rates" (World Bank, 1993, p.52). Recent studies (e.g., Barro and Lee, 2015) show that secondary and tertiary education contribute more to growth, not surprising given the universal gains in primary education achievement.

There is much less research on the role of education in avoiding the more recent notion of 'growth traps'. Aiyar et al. (2013) does not directly analyze the contribution of human capital per se but the paper discusses how higher dependency ratios—the proportion of non-working age to working-age that is so crucial to the demographic dividend mentioned earlier—increase the probability of a growth slowdown in subsequent periods.

---

al., 2013). Can these gains be sustained? Analysts claim that this will happen only if countries like Malaysia are able to stimulate its exports of modern services in telecommunications, computer and information services as well as financial services which at the moment are still outstripped by traditional services in travel, construction and personal areas.

[3] We are grateful to Jong-Wha Lee, a discussant of this paper, for bringing this work to our attention.

Eichengreen et al. (2013) investigate this issue more directly. The paper finds that while average years of schooling alone has no impact, the number of secondary and tertiary education graduates lowers the likelihood of a slowdown. More advanced education seems to be valuable by moving production into more technologically advanced goods and services. Moreover, they find that when holding constant the number of secondary and higher education graduates, average years of education becomes significant – that is, for countries that have achieved less in higher education levels more education can accelerate growth – but this effect diminishes when they move upmarket and they are challenged from below.

These results support the importance of the other aspect of avoiding the trap – moving up the value chain to raise productivity. Moving upmarket means having more higher-value-added industries and sectors and, within any sector, raising productivity through new technologies. As noted in a recent OECD document, the countries that have avoided the trap succeeded in "export-led growth by targeting strategic industries that facilitated gradual diversification and upgrading into new products that required similar skills and inputs."[4] The main drivers are modernized manufacturing and services sectors.

Another pathway through which human capital helps countries avoid traps is by reducing inequality. There is an increasing body of evidence that shows that higher inequality is not conducive to growth. For example, economists at the IMF find that inequality affects the duration of growth: a one Gini-point increase is associated with a decrease in a growth spell of 7 percent (Ostry et al., 2013, p. 23). Some investments in human capital may be more inequality-reducing than others. Subsidizing the human capital investments for the poor (such as basic education) will reduce inequality compared to costly universal (untargeted) subsidies to higher education.

How might human capital trap countries*?*

As noted earlier, the demographic dividend is not automatic. To realize the gains from a lower dependency ratio (specifically, a prolonged period when there are more people of working age than people of non-working age) as the East Asian Tigers had done, countries aspiring to high-income status have to invest in developing human capital and deploying it

[4] Jankowska, Nagengast and Perea (2012).

productively in their labor force. Moreover, this demographic dividend is not available indefinitely. Inevitably, the bulge in the working age population, which is youthful in the early stages of the demographic transition, will age and eventually retire. To understand this trap, one needs to consider what happens during demographic transitions.

At the initial stages of development, a country experiences high rates of population growth as it benefits from health improvements that reduce mortality rates while fertility remains high. This leads to a population age-pyramid with large numbers of very young children and fewer numbers at older age cohorts. This was the situation in Taiwan, China and the other Tigers in the 1950s, as well as in the high-fertility countries in Africa today.

A demographic transition occurs when fertility declines so that there are relatively fewer young children while more people enter the working ages. The population structure is no longer a pyramid because a bulge occurs in the middle ages. During this period, which could last for several generations, the number of people who are not of working age, either because they are too young or too old, relative to the number of working age (the dependency ratio) declines. A lower dependency ratio leads to a demographic window of opportunity for an economic dividend, one the Tigers reaped earlier and which emerging Asian economies are reaping. It is estimated that about .8 to 1 percent of growth in South East Asia is due to demographic change (Bloom and Williamson, 1998). The study also pointed to a second demographic dividend since a large cohort of working age population typically saves more.

The demographic window of opportunity eventually closes when the bulge of workers age. Japan is confronting an inverted population pyramid and its dependency ratio is rising again due to an aging population. This is a challenge, but having achieved high-income status for some time, it has the resources to sustain its level of income and even to grow. Countries which grow old before they get rich will find it more difficult to sustain growth – hence, the trap. Countries like Argentina and those in Eastern Europe and Central Asia face this challenge. The emerging countries of Asia are not yet in this situation but the reckoning will come inevitably.

The nature of human capital and what it means for avoiding the trap: Building Skills

How precisely does human capital help middle-income countries avoid slowdowns and compete with richer economies? To answer this question it is important to examine how East Asian economies that have successfully reached high-income status have formed different types of skills through the right investments in human capital. Their experiences can offer lessons for those middle-income countries that have aspirations to join them at the next levels. The literature has discussed three types of skills: cognitive, non-cognitive and creative. We discuss these in turn in the next sections.

Developing cognitive skills

Cognitive skills encompass a broad array of skills that go beyond the affective or motor domains but which influence a person's value in the workplace. They include basic numeracy and literacy but also subject matter knowledge in specialized fields. These are the skills that are mostly taught in education systems throughout the world, although these skills can also be self-taught or learned through more informal means.[5]

What kind of skills does it take to avoid a trap? As mentioned in the previous section, avoiding the trap means that countries should move from competing on the low-skill margin to the high-skill margin. This then leads to the question, what is the nature of that high-skill margin? Hanushek et al. (2013) analyzed PIAAC data on 22 countries to estimate individual earnings functions and found that education quality, as measured by cognitive skills, increases individual earnings:

> "Across the 22 countries, a one-standard deviation increase in numeracy skills is associated with an average 18 percent wage increase among prime age workers. Moreover, because of measurement errors in skills, these estimates should be thought of as lower bounds on the return to skill.
>
> "But this overall measure of returns to skill also masks considerable cross-country heterogeneity: Returns are below 15 percent in eight country, including all four participating Nordic countries, and above 21 percent in six countries, with the largest return being 28 percent in the United States.

[5] Korea stands out in this respect because of its high rates of private tutoring (Dang and Rogers, 2008). Korean parents spend considerable resources in private tutoring to boost their children's academic performance, and there is evidence that these investments are positively associated with math and English test scores (Park, Byun, and Kim, 2011).

> Estimated returns tend to be largest for numeracy and literacy skills and smaller for problem solving skills, although the relative importance of different skill dimensions varies across countries. Estimates prove highly robust to different earnings measures, additional controls, and various subgroups." (p. 15)

In an earlier study using standardized test scores from PISA and TIMSS, Hanushek and Woessmann (2008) found that "test scores that are larger by one standard deviation (measured at the student level across all OECD countries in PISA) are associated with an average annual growth rate in GDP per capita that is two percentage points higher over the whole 40-year period" (p. 7). Moreover, this effect of educational quality is larger for higher-income relative to lower-income countries.

There is recognition that the changing needs of the labor market and the greater role of technology are putting more pressure on education systems. When long periods are needed to fill vacancies, one reason is that the skills and competencies of workers do not match the technical requirements of the unfilled jobs. It takes about six weeks to fill professional vacancies in Malaysia and Thailand, and more than four weeks in China and Mongolia.[6] According to employer surveys, in East Asia, "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" (World Bank, 2012, p. 5). Moreover, those firms that are technologically intensive and export oriented are more likely to report skills as a constraint. In China, graduates are ending up in professions unrelated to their major (31 percent of university and 38 percent of vocational college graduates), partly because there are not sufficient job openings related to their major and partly because graduates do not meet the skills requirement for jobs related to their majors (Molnar, Wang and Gao, 2015).

What's the track record? There is no question that the East Asian Tigers achieved impressive increases in school enrolments. In 1950, about one-half of the population in these countries had no education; by 2010, this fraction had shrunk to less than one-tenth. In 1950, one-tenth had secondary education; by 2010 this had increased to nearly one-half. Focusing on the past 20 years, the average years of schooling of the population aged 15 and over increased by about 2 years, faster than the increase in Latin America or Eastern

[6] World Bank (2012).

Europe.[7] There is also a marked difference in post-primary educational attainment between the Tigers and the rest of the region, with Japan's and Korea's net enrolment rates in secondary education being nearly universal (table 1). The average years of schooling attained by the age cohort 25-29 in each country most captures the impact of these high enrolments and continuation rates. Young adults in Korea, Japan and Singapore have continued to increase their educational attainment in the past decade and they are among the most highly educated job entrants in the world.[8]

[Table 1 about here]

The Tigers' record on education quality has been equally impressive. Based on international tests such as the Programme for International Student Assessment (PISA) and Trends in Mathematics and Science Study (TIMSS), students in these countries, on average, outperform students in other countries, including those in the OECD. Singapore, Hong Kong (China), South Korea, Japan, Taiwan (China), and two cities of China (Shanghai and Macao) ranked in the top ten in the 2012 PISA tests (OECD 2012) in mathematics (table 2).[9] Shanghai, Singapore, Hong Kong, Japan and South Korea also ranked as the top five in reading comprehension. Note that five Tigers topped also the 2011 TIMSS math and science tests for eighth graders (IEA 2011).

[Table 2 about here]

The emerging Asian economies—the region's Tiger Cubs—have greatly expanded their school enrolments too, not only at the primary level but also at the secondary and tertiary levels. The net enrollment rates for Malaysia, for example, rose from 84 percent in 1970 to 97 percent in 2005 at the primary level, with nearly all children who enter primary school reaching the last year of the cycle, and from 33 percent to 67 percent at the secondary level during the same period. Tertiary level enrolments have also expanded in these countries—for example, Malaysia's gross enrolment rate is now 36 percent and Thailand's is 51 percent. As a result of these increases in enrolment, these countries have achieved a steady

[7] Barro & Lee (2010); data in http://www.barrolee.com/.
[8] Korea and Singapore, the enrolment rate at tertiary is so high that some analysts, writers in the popular press and policy makers have expressed concern about "overeducation" (for example, Chen, 2015).
[9] Although technically not a 'tiger economy' because it is a city within a country, Shanghai (China) also kept pace with the other Asian countries.

rise between 1950 and 2010 in the average years of schooling of their population aged 15 and above (figure 1).

[Figure 1 about here]

Despite these gains, there are several reasons to be concerned. Less than one-fifth of enrollees complete their first degrees in these countries, except in Thailand where the completion rate is 30 percent; in comparison, the completion rate is 40 percent in Japan and 49 percent in Korea. Progress in the past decade has been slow in the Philippines where the net enrolment rate at the primary and secondary levels in 2000 has fallen behind those of its neighbors and the tertiary enrolment rate has stagnated in the past decade (table 1). India lags even farther behind with just 16.3 percent gross enrolment rate at the tertiary level and strikingly large differences across states—for example, it is 16.8 percent in Uttar Pradesh and 38 percent in Tamil Nadu. Inequality across states and across demographic groups and castes is a major challenge in India.

The performance of the Tiger Cubs on the quality of education, as measured by performance on international tests fall far below that of the Asian Tigers. The test scores of 15-year-old Thai, Malaysian and Indonesian students are between 68 and 77 percent of the average PISA math score of Korean students and between 74 and 82 percent of the average reading comprehension score of Korean students (table 2).[10] But average test scores reveal only one aspect of the academic disparity between these two groups of countries; there are also wide disparities in the distribution of competencies: In Indonesia, three-fourths of students have test scores that correspond to the two lowest levels of competency in math; in Malaysia and Thailand, one-half of the test scores are at these levels (figure 2). By comparison, the corresponding proportion for the Asian Tigers is about one-tenth (Japan) or smaller (Korea, Singapore). These results imply that the basic abilities of young people who enter the labor force in these two groups of countries are also hugely different.

[Figure 2 about here]

[10] Using the 2011 TIMSS data, the average math scores in Indonesia, Malaysia, and Thailand relative to Korea's scores range from 63 percent in Indonesia to 72 percent in Malaysia. The Philippines does not participate in PISA and last participated in TIMSS in 2003; in 2003, its average math score was 64 percent of Korea's average score that year.

The low level of cognitive skills in the Tiger Cubs, despite increases in average years of schooling, may be one reason why wage gaps (or wage premia) persist between those with and without secondary or tertiary education across a number of countries. In 2007–08, the wage premium for workers with upper secondary education and employed in primary (natural resources and agriculture) and secondary (manufacturing) industries ranged from 0.2 to 0.4 in diverse countries like Cambodia, China, the Philippines and Vietnam. In services, the premium exceeded 0.5 in all four countries, double what it was a decade before (World Bank 2011c). Another possible explanation is that technologies have been shifting in favour of higher skills, essentially increasing the demand for and relative productivity of higher-skilled workers.

India was missing from the 2012 PISA round. Two of its states participated in the 2009 round, with the intention of expanding participation to other states in 2012, but the two states together ranked 72nd out of 73 systems and India opted out of the 2012 round. However, a long series of national standardized tests in the early grades portrays the state of education quality in the country. The 2014 annual report by Pratham (2015)[11] which is based on a survey of children in rural areas finds that one-half of Class 8 students cannot read a Class 2 level text, although there have been gains since 2012. Math also continues to be a serious concern, with only one-fourth of Class 3 children able to perform two-digit subtractions and only about one-fourth of Class 5 children able to do division. Kingdon (2007) makes the comparison with countries in East Asia, in particular, China, in quite stark terms: "India is more than 30 years behind China in terms of the proportion of the population with completed secondary and post-secondary schooling."

The hopeful news with respect to learning outcomes is the performance of Vietnamese students who achieved 92 and 95 percent of the average math and reading comprehension scores of Korean students, outperforming even the average OECD student. Vietnam's performance indicates that it is possible for a low-income, emerging economy country to push and support its education system towards academic excellence

Developing non-cognitive skills and personality

[11]Pratham is an Indian non-governmental organization that facilitates and publishes the Annual Status of Education Report (ASER) which is based on an annual rural household survey to assess children's basic learning levels in reading and arithmetic. One government school in each sampled village is also visited. The survey is carried out by a local organization or institution in each district. ASER 2014 is the tenth such report.

What will it take to escape the trap? Due to technological and market changes, the skills demanded by employers have shifted in developed countries, including in the Tiger economies—from skills for manual, routine work to skills for manual, non-routine tasks and even more analytical, non-routine work.[12] These shifts intensify the demands on education systems. Increases in average years of schooling are no longer enough. They must be accompanied by higher cognitive and technical skills as noted above. In addition, students are increasingly expected to demonstrate capacities for critical thinking, problem-solving and communication.

Previous studies have concluded that innate cognitive ability, usually measured by IQ, family economic status, and demographics are the principal determinants of a student's academic success (e.g., Glewwe, 2002). There is also a growing body of evidence from multiple disciplines (psychology, behavioral economics and neuroscience) that aspects of a student's personality predict academic performance too. Indeed, these associations are long-lasting, affecting adult productivity and labor market success. In brief, the evidence indicates that "[t]he hallmark of successful individuals is that they love learning, they seek challenges, they value effort, and they persist in the face of obstacles" (Dweck, 2000).

With respect to academic performance, some evidence in fact indicates that personality may be more important than intelligence. Grit, defined as the tendency to be organized, responsible and hardworking, and focused on pursuing long-term goals with sustained zeal, has been shown to be a robust predictor of achievement in academic, vocational, and avocational domains (Duckworth, et al., 2012; Von Culin et al., 2014). In the United States, for example, increasing non-cognitive ability has a greater effect on lowering attrition from high school and increasing transition to college than increasing cognitive ability (Heckman, Stixrud & Urzua 2006). Not surprisingly, the impact of personality traits seems even larger as a student reaches higher education levels. (Deke & Haimson, 2006).

In the workplace, these positive personality traits distinguish productive workers from others. Self-esteem, generalized self-efficacy, locus of control, and emotional stability are among the best predictors of job performance and job satisfaction (Judge and Bono, 2001; Roberts et al., 2008)). Bowles, Gintis, and Osborne (2001) conclude that, while introducing a measure of cognitive performance into an earnings equation reduces the coefficient of

[12] We wrote about this in Jimenez and King (2013).

years of education by an average of 18 percent, much of this labor market return actually reflects factors that cognitive tests do not capture. In the U.S., "employers of new college graduates report that communications skills, motivation/initiative, teamwork skills, and leadership skills are all more highly valued than academic achievement or grade point average" (Kuhn & Weinberger, 2005). Among German workers, an internal locus of control—attributing success or failure to one's own effort rather than to external circumstances—predicts substantially higher earnings (Heineck & Anger, 2010). Motivated and dependable workers who possess control over their life tend to challenge themselves and so are able to have a job that requires more education than they have acquired.

What's the track record? Because there are no commonly-accepted standard measures of non-cognitive and behavioral skills, it is difficult to get the same kind of evidence in this area that we have for cognitive skills. Nonetheless, data from employer surveys are instructive. In middle-income East Asian countries, employers expect workers to possess technical and cognitive skills such as IT skills. But, as shown in table 3, non-cognitive skills like communications, problem-solving, leadership, and ability to learn continuously also rank very high in employers' 'wish list'.

[Table 3 about here]

Fostering Creativity

One element of individual skills that deserves special mention because it contributes to productivity, both at the individual level and economy-wide, is creativity (King & Rogers, 2014)..

What is creativity and why is it needed to escape the trap? Creativity has many definitions, but the core idea is that it is the ability to generate novel ideas or products that are of value. The future challenge of moving upmarket for emerging economies is daunting given the rapid technological evolution happening in the global economy. The popular press has written about a 'third industrial revolution' in manufacturing sectors. The first such revolution was spawned by the mechanization of Britain's textile industry in the late 18th century which led to the modern factory replacing the handicrafts of hundreds of individual weavers. The second was propelled by the technical change brought about by new forms of energy such as steam, electricity and gasoline and by the practices of mass

production brought about by the moving assembly line. The third promises to be no less disruptive as manufacturing becomes more dependent on digital technology through the convergence of computer technology, robotics, informatics and new processes such as 3-D printing (*Economist,* "Manufacturing: the third industrial revolution," April 21, 2012).

Stimulating creativity isn't only about sparking a person's imagination. Research has identified common traits in personality, lifestyle, and environment in creative people: Most creative people show intense interest in their field even at an early age, and most have benefitted from a highly supportive mentor in their area of interest. One characteristic of creative people is said to be the skill for "divergent production," the ability to generate a diverse but appropriate response to a given situation. Researchers also point to sustained cognitive processes of problem-solving and building expertise in a specific field, requiring a huge number of hours.[13]

What's the track record? The assessment of creative problem-solving in PISA 2012 concludes that East Asian 15-year-old students—in Singapore, Korea, Japan, Chinese Taipei, Hong Kong-China, Macao-China, and Shanghai-China—outperform students in other countries (OECD, 2013a), so perhaps the East Asian education system which has emphasized basic skills has not necessarily stymied creativity. The first OECD survey of skills of adults further shows that adults who engage more often in literacy- and numeracy-related activities and use ICTs more, both at and outside of work, have greater proficiency in literacy, numeracy and problem-solving skills, controlling for educational attainment (OECD, 2013b). In this survey, Japan tops the performance of 22 participating countries; while Korea performs just below the average, its young adults (aged 15-34) are among the top performers, a large generation gap in the country that reflects its recent, rapid educational progress.

Patenting activities are, at best, rough indicators of creativity since many other creative endeavors—in the arts, for example—are generally not patentable. Using this indicator, however, industry in the Tiger economies is clearly able to find creative workers (Veugelers,

[13]Research has shown a negligible relationship between creativity and IQ scores, indicating that even students with low IQ scores can be creative. There are different ways of testing for creativity, and a meta-analysis of hundreds of studies show that "when creativity tests are administered in a game-like context, the creativity test scores have smaller relationships with IQ test scores than when creativity tests are administered in a test-like context" (Kim 2005). The analysis also find that IQ scores are more closely associated with creativity scores for younger groups than for older groups.

2013). Japan is the most important patenting country in the region, and China clearly has the ambition "to become a world leading innovator, creating and capturing high-tech value added, particularly in targeted areas." Despite Korea's smaller population, it has a similar number of patents to China. The patenting activities in these three countries have outpaced their R&D spending, such that their share of world patents is now almost twice as high as their share of world's R&D expenditure.[14]

But can creativity be taught and, if so, how? The evidence on the characteristics of creative people suggests that an education system that promotes both cognitive and personality skills should also be able to promote creativity. However, some have argued that traditional schools are stifling, not stimulating, creativity by promoting uniformity and standardization (Robinson, 2006). Indeed, a common view of education systems in East Asia, especially in the Tiger economies, is that they inhibit creativity (Niu & Sternberg, 2003) because of an excessive focus on rote memorization and test-taking and an excessive respect for hierarchy.

What works to improve cognitive and non-cognitive skills in East Asia?

Directions for policy change

What should countries do to develop cognitive and non-cognitive skills? It is beyond the scope of this paper to make specific policy recommendations—those need to be tailored to each country context—but the general priorities for policy are reasonably clear; they must address both the supply of and demand for human capital.

On the supply side, a paper prepared for PAFTAD 35 (Jimenez, Nguyen and Patrinos, 2012) suggests the following policy directions for Malaysia and Thailand: ensure that public funds are spent so as to optimize social returns; reform various aspects of the education system at all levels; and invest in early child development (ECD).

In their initial phases of development, the successful Tiger economies devoted scarce public resources to expand primary and lower secondary education, which at the time

[14] Note also the success of East Asian emigrants in dynamically innovative areas like Silicon Valley, suggesting that these countries' education systems have stimulated creative thinking (Wadhwa, Saxenian & Siciliano, 2012).

yielded the highest social returns. These investments laid a solid and broad foundation for growth—a generally literate and numerate work force. Korea demonstrates the benefits from having an education system that is able to respond and support its different stages of economic development. In the 1960s, to meet increasing demand for junior secondary education, Korea's government removed entrance examinations to that level and provided short-term teacher training in order to grow its teacher force quickly. In the 1970s and 1980s its priority shifted to senior secondary education, two-year colleges and open universities. The government transformed private schools into "privately managed public schools" and provided subsidies to private providers, effectively expanding school supply at the secondary level and raising the enrolment rate from 70 to nearly 100 percent between 1970 and 2002 (Lee, 2013).

While the emerging economies should improve the reach and quality of basic education, they cannot afford to neglect early child development as well as the post-basic education levels. As discussed below, there is a growing body of evidence on the long-run benefits of ECD. Attention to tertiary education does not necessarily mean providing subsidies for universal access but addressing capital market failures through targeted means-tested stipends and loan programs that enable low-income students to have the same opportunities as better-off students. Also, it means having a diversified system includes general and technical and vocational secondary schools, community colleges, polytechnics, teaching universities, research-focused universities, and shorter training programs. And students should be supported with the right amount of information about the labor markets and their own skills to be able to choose among these options. This requires oversight and the right amount of regulation which are often lacking for non-university tertiary education and for technical vocational education and training institutions.

No one solution or intervention will fix most problems in an education system, that mid-course corrections or refinements to a reform are going to be the norm, and that frequent and rigorous assessments of education outcomes can help improve the reform as well as build political support for its continuation or improvement. According to Murnane and Ganimian (2014):

> "Interventions … will not enable countries to develop high-performing education systems such as those in South Korea and Singapore. The remarkable progress of these educational systems results from system-wide efforts over several decades. These efforts included defining learning

> standards in core subjects for every grade level, developing curricula well-aligned with the learning standards, producing assessments that measured student mastery of the standards, and developing teacher training programs that attracted talented students and prepared them to teach the demanding curriculum effectively. Designing and managing such systemic change successfully requires a remarkably high level of governmental capacity." (p. 13)

Moreover, education reforms need to go beyond investing in school inputs. They involve improving the interrelationships among the key parts of the system and addressing misalignments among its governance framework, management and financing mechanisms, and performance incentives. Countries in East Asia region have tried programs that aim to bring about broad institutional reforms, including decentralizing responsibility and devolving decisionmaking authority to schools and their communities, as in China and Indonesia. East Asian countries have also shown openness to the role of the private sector in education, by mobilizing, or at least allowing, the private sector to help finance, operate, and manage education services. An important policy decision that the countries have faced is how much and for whom governments should subsidize or contract non-state organizations to provide education. Another is how best to ensure good quality and relevance of the services, as well as secure access for disadvantaged students.

Charting the way forward through better evidence: an unfinished agenda

What is the evidence that programs and policies that act on these general recommendations, if implemented, would be effective in raising educational outcomes? This is a crucial question to be asked especially if there is no one formula which applies to all contexts. Impact evaluation methods which have been used primarily in science and medical research are now being used to inform innovations in education policy, much of them related to expanding enrolment and promoting cognitive skills (Glewwe and Kremer, 2012; Glewwe et al., 2014; Kremer, Brannen and Glennerster, 2013; McEwan, 2014).[15] Such evaluations are proving useful for assessing alternative program designs and implementation approaches, as well as for holding program implementers accountable.

[15] For more information on impact evaluations, see the 3ie website: www.3ieimpact.org/.

Unfortunately, the evaluation evidence base on education policies and programs is thin in East Asian countries, and certainly not proportional to the income levels and numbers of children and youth in the region. According to a recent study of all impact evaluations published from 1980-2014 (Cameron et al., 2014; see figure 3), there are 649 education-related evaluations in developing countries. Of these, 121 (or about 6 a year) are on countries in East Asia, with almost half of them on China.[16] Since context matters, countries should build up their own capabilities to conduct such assessments if they are to be useful. India, in contrast to the East Asian economies, has been the subject of a growing body of evaluation research in education, although more research that focuses on building cognitive, non-cognitive and vocational skills is needed.

This evidence gap needs to be filled because knowledge about works and what doesn't can help these countries address their skill deficits more effectively and efficiently. We provide a few examples of how rigorous evidence can be used to ensure that policies and programs are the right ones for the context and time in East Asia.

Early Child Development. As noted earlier, there is ample evidence from several developed countries and now from a few developing countries that ECD is one of the most effective investments in human capital. In the Philippines, longitudinal data on children from birth through the end of the primary cycle suggest that malnutrition up to the second year of life has long-term consequences for cognitive development and later educational outcomes (Glewwe, Jacoby & King, 2001). The study suggests returns to investments in ECD in the order of 3:1, results that are comparable with those found in the US and elsewhere.

However, design and implementation matter; the right policy may fail when implementation is deficient. Consider the mixed results in Cambodia. In one policy experiment, the government implemented three kinds of interventions to stimulate ECD: formal ECD classrooms; community based ECD program; and a home-based ECD program. It then supported a rigorous impact evaluation which relied on the random assignment of these interventions across areas, with the expected outcome being measured with

[16] Much of the China work is done through a partnership between Stanford University and Chinese researchers in an initiative called the Rural Education Action Project (REAP). See Boswell et al (2011) for a description; the website is http://reap.fsi.stanford.edu/research.

standardized tests of problem-solving skills.[17] The result? No significant short-term effects for any of the modalities tested, a disappointing outcome that was attributed to poor implementation and low uptake due to deficiency in promoting the program.

But another early education program in Cambodia appears to have been not only more comprehensive in its approach but also better aligned with the existing Grade 1 curriculum. The School Readiness Program includes a number of components—the development of special curricular documentation, a 14-day training to orient teachers to the program, a regular monitoring regimen, physical upgrading of classrooms, and student assessment for monitoring and reporting purposes. The program evaluation found that children in the treatment group significantly outperformed children in the control group in the language test (Nonoyama-Tarumi & Bredenberg, 2009). This intervention may be one way to compensate for the unavailability of good-quality preschools or ECD centers before children enter primary school.

Improving school quality. Much of the attention to skill building ultimately focuses on reforms of how well schools function. What inputs matter for improving school quality? There are many recent empirical evaluations and studies that help answer this question, though not many involving East Asia, and they have spurred a number of reviews. The clearest findings from one such review by Glewwe et al. (2014) are that the following appear conducive to student learning: (a) "having a fully functioning school—one with better-quality roofs, walls, or floors, with desks, tables, and chairs, and with a school library"; (b) "having teachers with greater knowledge of the subjects they teach, having a longer school day, and providing tutoring"; (c) teachers' knowledge of the subjects they teach; (d) higher teacher salaries, but contract teachers who earn less have a positive effect on student performance compared to regular teachers, perhaps the result of stronger incentives to perform better. Other reviews of evaluations arrive at slightly different conclusions but they tend to agree on the initiatives to improve teachers' ability and effort.[18]

How school inputs are used in the classroom can make all the difference in their impact on learning. For example, many education systems are enthusiastic about the potential

[17] Some 1,500 children were tested between 2009 and 2011 (Bouguen, Filmer, Macours and Naudeau 2013).
[18] See Conn (2014), Glewwe et al. (2014), Kremer, Brannen, & Glennerster (2013), Krishnaratne, White, & Carpenter (2013), McEwan (2014), and Murnane and Ganimian (2014).

benefits of using computers for teaching and learning—and there is good reason for such enthusiasm. In Beijing, the evaluation of a "one laptop per child" program in schools found that, after six months of intervention, the program produced large improvements in learning, gains in student computer skills and math scores of .33 and .17 standard deviations, respectively. The program also increased students' time using educational software and decreased their time watching television (Mo et al., 2013).

However, computers in classrooms haven't always proved to be effective learning tools. In India, an evaluation concludes that when students use computers instead of interacting with teachers during classroom hours, computers have a significant negative effect on test outcomes (.57 of a standard deviation); but when students use computers after school as a complement to their classroom experience, they show some improvement (.28 standard deviation) (Linden, 2008).

Another example on this point is about the effective use of textbooks and learning materials. A short-term (31 day) reading marathon program in the Philippines provided age-appropriate reading materials, trained teachers in their use, supported teachers' initial efforts for about a month and encouraged students to read more on their own at home. The program evaluation found that students' reading skills improved by 0.13 standard deviations (Abeberese, Kumler & Linden, 2013). This positive effect lasted for three months after the program ended but it had diminished to 0.06 standard deviations by then. The results suggest that teachers do need more training in the use of learning materials and also that a longer-running program may have yielded a more lasting effect on reading habits and skills.

Addressing health to improve skills. Sometimes the returns to relatively simple interventions, some of which go outside the school system, such as child health, also pay off handsomely. One such intervention is to ensure that children are well-nourished. Iron deficiency or anemia leads to lethargy, fatigue, poor attention and prolonged physical impairment. China's Centers for Disease Control (CDC) found that up to 40 percent of first-year students in junior high schools suffer from anemia. In Shaanxi province, a randomized control trial gave fourth-grade students a daily dose of iron supplements to reduce anemia; the program significantly raised the standardized test scores in math of the students who received the multivitamins (Luo et al., 2012).

More trials are needed to investigate whether other micronutrients affect various cognitive domains, such as short-term memory, visual perception, retrieval ability, sustained attention, and cognitive processing speed, in different ways. The results of these interventions can vary depending on which outcome is measured. A meta-analysis (Osendarp et al., 2007) of hundreds of evaluations of micronutrient supplementation programs find only the possibility of a small positive effect on fluid intelligence (or reasoning ability), a positive effect on academic performance in only a handful of trials, and no effect on crystallized intelligence (or acquired knowledge).

Another relatively simple health-related intervention with dramatic effects on motor and cognitive outcomes has been to correct for poor vision, a problem that affects millions of children in East Asia. The leading cause of visual impairment among children is refractive error. A recent study in rural western China raised consciousness among parents and teachers and provided free spectacles to randomly selected students. The evaluation found that a nearsighted child performs twice as well in standardized tests if provided corrective eyeglasses (Ma et al., 2014).

Vocational and technical education (VTE). Since the focus of this paper is skills for a growing economy, VTE deserves special mention. Indeed, it may be important to rebalance an education system that is heavily focused on academic programs to one that offers also attractive vocational and technical education and training at the secondary level. This seems like a sensible approach and one that Korea, given its perhaps overly high tertiary enrolment rate, has been attempting to do by expanding its "meister high school" program (Lee, 2013). But what is the evidence that a more vibrant VTE program would build more relevant skills? The relatively scant empirical research on this issue for East Asia signals that caution is needed.

One study in China found that using vocational schooling as a substitute for academic schooling may fail to build the type of skills needed in a competitive economy. A survey of 10,000 students attending academic and vocational high schools in Shaanxi and Zhejiang provinces found that those attending vocational schools did not do well, not only in terms of general skills but also in terms of specific job-related skills (Stanford REAP, 2015). Analyses of longitudinal data from household surveys in Indonesia examine the labor force participation rates and wages of individuals who chose different education tracks (Chen, 2009; Newhouse and Suryadarma, 2011). The studies did not find better labor market outcomes for those who chose a vocational track over the academic track.

These results do not necessarily imply that VTE—through formal schooling or short training programs—is not an effective means to build skills. Rather, such programs may fail to deliver outcomes if they are under-resourced and under-supervised, their teachers ill-prepared for teaching VTE skills, and if their curricula are not sufficiently informed by the needs of employers. In other regions such as in Latin America, new programs that bring in private sector perspectives systematically show some promise.

Gaps in evidence. The topic of teachers deserve special attention because the relationship between teachers and students in the classroom lies at the core of the learning process. Various countries have experimented with ways to raise the motivation and performance of teachers through financial incentives, accountability pressure and professional rewards. In terms of financial incentives, Singapore pays teachers for undertaking 100 hours of professional development each year. In terms of professional rewards, China and Korea encourage teachers who teach the same subject to share information about their experience and solve problems together (Wang, 2012; Lee, 2013). These are promising initiatives that need to be examined so that lessons can be shared with other countries.

In contrast to East Asian countries, there are a larger number of evaluations of teacher-related interventions in India. For example, one experiment in rural primary schools in Andhra Pradesh, India, provided modest financial rewards to teachers and succeeded in raising student outcomes by .27 and .17 standard deviation in math and language, respectively (Muralidharan and Sundararaman, 2011). How well similar rewards would work in different settings in East Asia remains to be seen.

There are no rigorous impact evaluations yet of how to enhance non-cognitive outcomes and creativity in the East Asian context. Past evaluations have focused on assessing interventions to raise enrolment or cognitive skills. Beyond basic education, there is much more to learn from current and future initiatives related to VTE, nonformal skills training and higher education. Important innovations in these largely uncharted areas in the region warrant the type of research that is now being used to understand successful programs in basic education.

Concluding remarks

In this paper we focused on the importance of developing cognitive, non-cognitive and creative skills as part of a country's growth strategy. The rise of the East Asian Tigers

points to high-quality skills as a necessary, albeit not sufficient, condition for escaping a 'middle-income trap' and spurring further growth. As the demand for skills in the workplace continues to shift towards more advanced tasks and as jobs increasingly involve analyzing and communicating information, those individuals (and their countries) with low cognitive and non-cognitive skills are also increasingly likely to be left behind in the global economy.

A small, though key, part of this human capital and growth agenda should be to measure the progress in developing skills. Internationally comparable standardized tests like TIMMS and PISA have been instrumental in raising consciousness about the disparities and changes in skill levels worldwide. The high performance of the East Asian Tigers have made them the standard against which many countries, including those in the OECD, measure their educational performance. Though imperfect measures of the full set of skills in demand now, student assessments galvanize public opinion and set benchmarks for performance that can be tracked. Not all the countries in the region, however, belong to the consortium of countries that apply these tests (table 2). Among the middle-income countries, China (as a whole), India and the Philippines did not participate in the recent assessment rounds; Vietnam joined PISA in 2012 (and did remarkably well). Low-income countries like Lao PDR and Cambodia would reap benefits from participating now, as they reform their education systems. And countries in the Pacific like Papua New Guinea and Fiji should consider measuring themselves against international benchmarks.

As part of building the evidence base for better policies and investments, we have argued also for more analyses of which specific investments do build skills and under what conditions. There are now scientifically valid methods that are being used in the social sciences to measure such impacts. And because context matters for effective design and implementation, there is ample need for more evaluations in the emerging East Asia economies.

Table 1: Selected education indicators, East Asian Countries, 1999-2012

Country	Persistence to last primary grade (%)			Net secondary enrolment rate (%)			Gross tertiary enrolment rate (%)			Average years of schooling, 25-29 years old		
	Mean 1999-2001	Mean 2004-06	Mean 2009-12	Mean 1999-2001	Mean 2004-06	Mean 2009-12	Mean 1999-2001	Mean 2004-06	Mean 2009-12	2000	2005	2010
Japan	100.0	99.9	99.9	99.6	98.8	98.9	48.4	55.2	59.3	13.1	13.4	13.4
Korea, Rep.	98.8	98.2	99.2	95.6	95.3	95.8	78.6	93.7	100.4	13.6	14.2	14.7
Singapore	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12.5	12.6	14.4
China	n/a	n/a	n/a	n/a	n/a	n/a	8.1	18.3	24.0	8.4	8.8	8.9
Hong Kong SAR, China	n/a	99.3	99.2	69.4	72.4	79.1	n/a	32.1	58.1	12.9	14.1	14.0
Macao SAR, China	n/a	n/a	98.3	68.4	83.9	77.9	33.3	65.0	62.7	8.6	9.6	10.3
Taiwan, China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12.2	13.1	13.3
India	n/a	n/a	n/a	n/a	n/a	n/a	7.7	9.3	16.3	6.0	7.0	7.8
Indonesia	85.9	83.4	89.6	50.2	56.7	71.4	14.8	17.5	26.8	5.2	7.7	9.2
Malaysia	n/a	93.6	99.2	65.9	69.3	66.0	24.5	28.8	36.3	10.7	11.6	12.4
Philippines	75.3	71.7	n/a	50.3	59.2	61.4	29.6	27.9	28.2	8.8	9.0	9.4
Thailand	87.6	n/a	n/a	n/a	67.1	79.1	35.8	43.4	50.7	8.1	10.1	10.5
Vietnam	85.5	92.1	95.6	n/a	n/a	n/a	9.7	16.2	22.8	6.3	7.9	8.4

Data sources: UNESCO data at World Bank, EdStats, February 2014; Barro-Lee data on years of schooling

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

Table 2: Average test scores as a percentage of Korea's average test scores, specific years

	Reading, PISA					Math, PISA					Science, PISA					Math, Grade 8, TIMSS			
Country	**2000**	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**	**1999**	**2003**	**2007**	**2011**
Japan	99.4%	93.3%	89.6%	96.5%	100.4%	101.8%	98.5%	95.6%	96.9%	96.8%	99.6%	101.9%	101.7%	100.2%	101.7%	98.5%	96.7%	95.4%	93.0%
Korea	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Singapore	n/a	n/a	n/a	97.6%	101.1%	n/a	n/a	n/a	102.9%	103.4%	n/a	n/a	n/a	100.7%	102.4%	102.9%	102.8%	99.2%	99.7%
Hong Kong	100.0%	95.5%	96.4%	98.9%	101.7%	102.4%	101.5%	100.0%	101.6%	101.3%	98.0%	100.2%	103.8%	102.0%	103.2%	99.1%	99.5%	95.9%	95.6%
Macao	n/a	93.3%	88.5%	90.4%	95.0%	n/a	97.2%	96.0%	96.2%	94.8%	n/a	97.6%	97.9%	95.0%	96.8%	n/a	n/a	n/a	n/a
Shanghai	n/a	n/a	n/a	103.2%	106.3%	n/a	n/a	n/a	109.9%	110.6%	n/a	n/a	n/a	106.9%	107.8%	n/a	n/a	n/a	n/a
Indonesia	70.7%	71.5%	70.7%	74.6%	73.9%	67.1%	66.4%	71.5%	67.9%	67.7%	71.2%	73.4%	75.3%	71.2%	71.0%	68.6%	69.7%	66.5%	63.0%
Malaysia	n/a	n/a	n/a	76.8%	74.3%	n/a	n/a	n/a	74.0%	76.0%	n/a	n/a	n/a	78.4%	78.1%	88.4%	86.3%	79.3%	71.8%
Philippines	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	58.7%	64.1%	n/a	n/a
Thailand	82.1%	78.7%	75.0%	78.1%	82.3%	79.0%	76.9%	76.2%	76.7%	77.1%	79.0%	79.7%	80.7%	79.0%	82.5%	79.6%	n/a	73.9%	69.7%
Vietnam	n/a	n/a	n/a	n/a	95.0%	n/a	n/a	n/a	n/a	92.2%	n/a	n/a	n/a	n/a	98.1%	n/a	n/a	n/a	n/a

Data sources: OECD (2000, 2003, 2006, 2009, 2012), Programme for International Student Assessment; TIMSS 1999, 2003, 2007, 2011

Table 3. Critical Skills for Professionals in East Asia

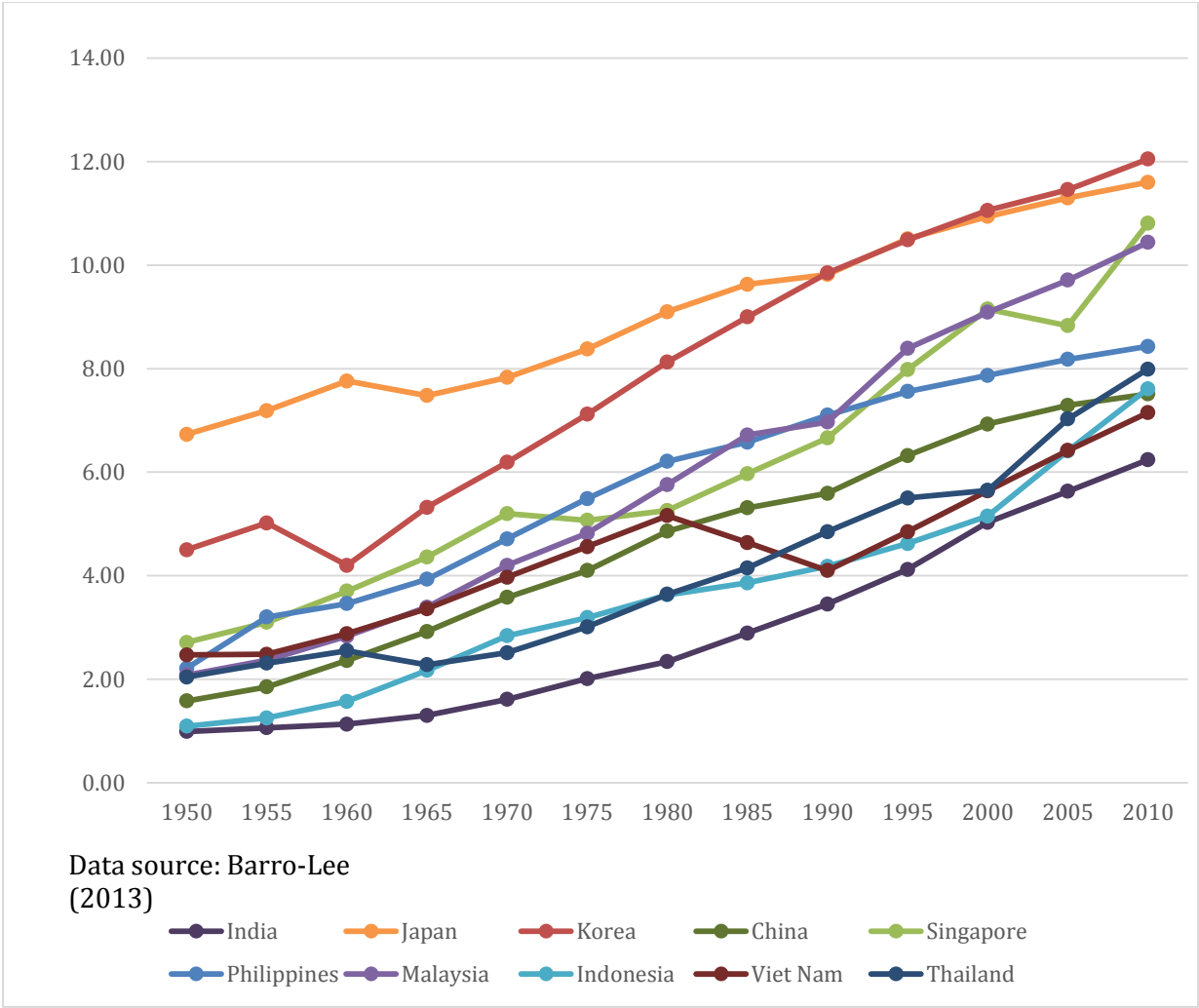
	Vietnam	Indonesia	Malaysia	Philippines	Thailand	Mongolia	Average
Technical	7	5	7	7	5	5	6.0
Communication	6	7	5	5	4	4	5.2
English language	5	3	4	4	7	7	5.0
Problem solving		5	4	6	4	3	4.4
Leadership		4	4	6	4	4	4.4

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

Information technology		4	6	3	6	6	5.0
Creativity		6	5	4	4	4	4.6
Work attitude	7	6	4	4	3	3	4.5

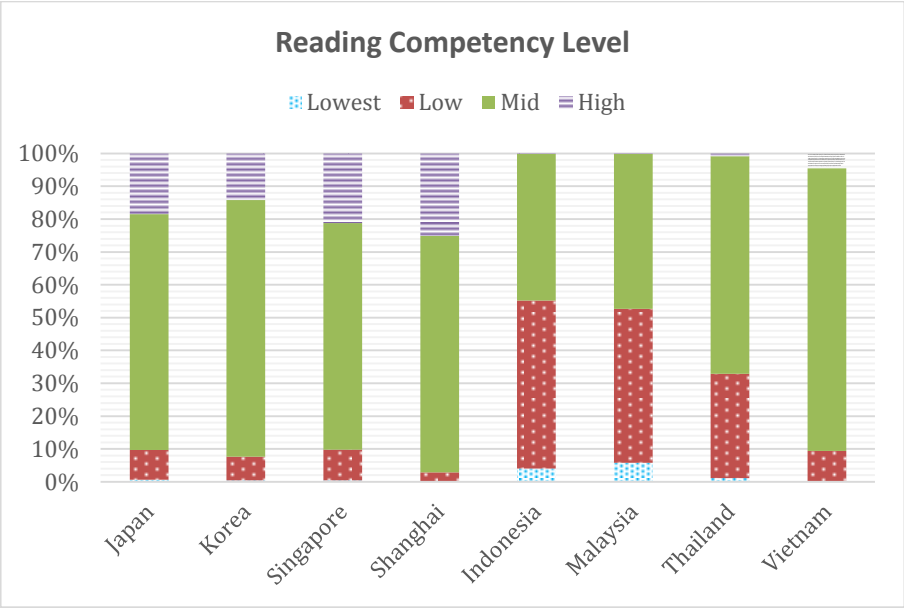
Source: World Bank, 2012

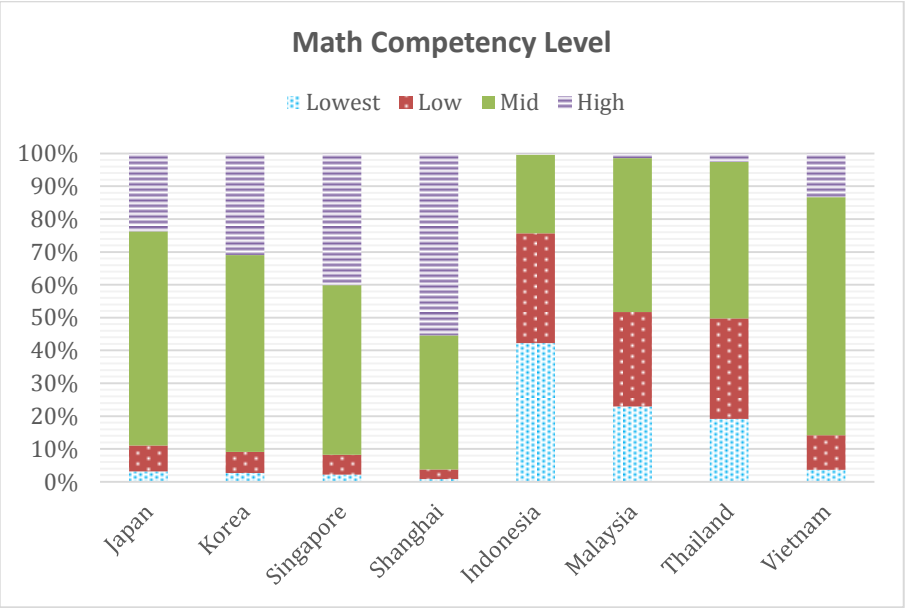
Figure 1: Average years of schooling in East Asia, 1950-2010, population aged 15 + years


14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
Data source: Barro-Lee (2013)
India
Japan
Korea
China
Singapore
Philippines
Malaysia
Indonesia
Viet Nam
Thailand

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

Figure 2: Percentage distribution of competency levels based on PISA test scores, 2012



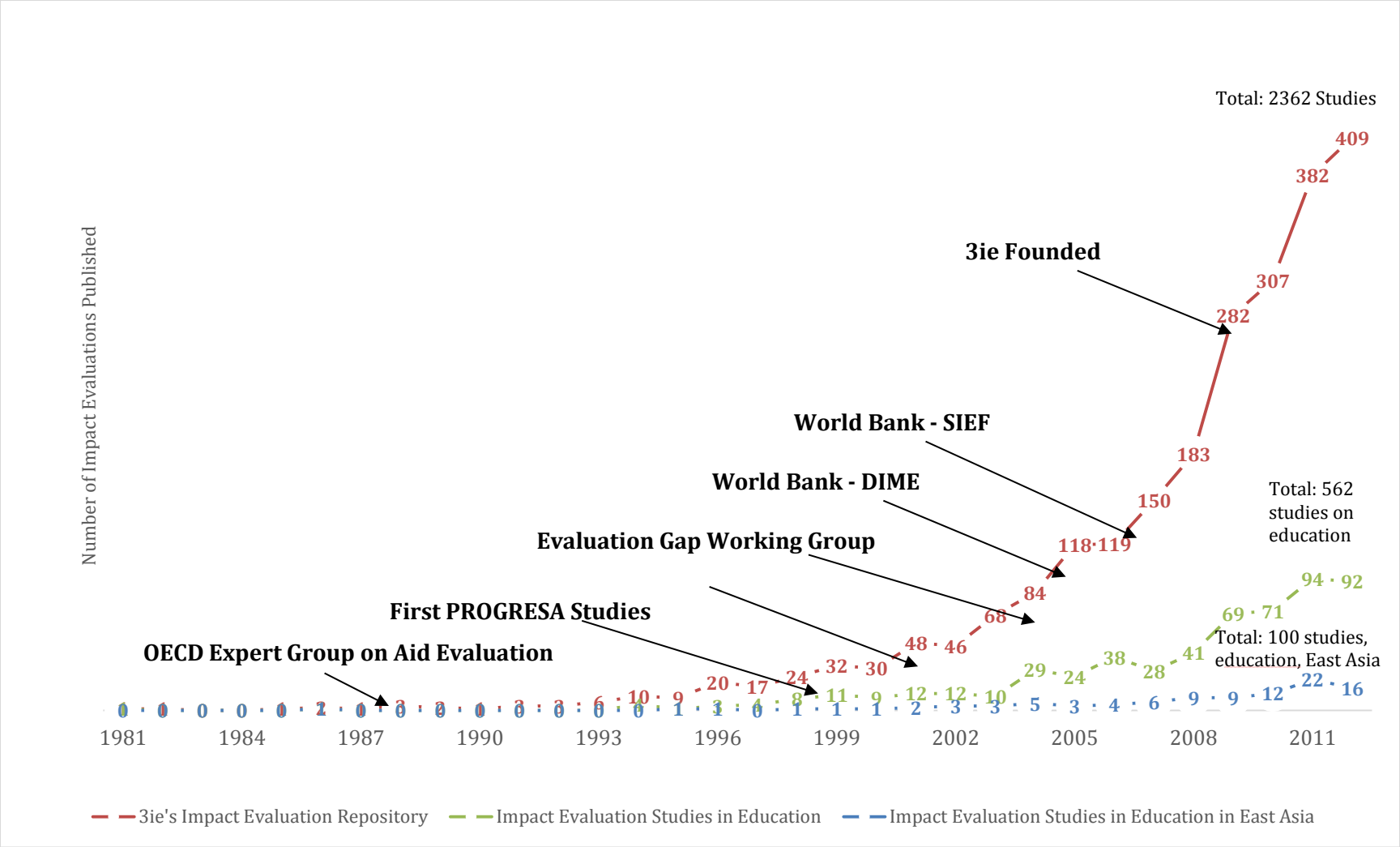


Notes: (1) The "lowest" competency scale pertains to the percentage of 15-year-old students scoring below the lowest proficiency level on the PISA reading scale. Students at this level (less or equal to 262 points) usually do not succeed at the most basic reading tasks that PISA measures. The "low" competency level is the sum of two PISA levels (level 1A and 1B). This includes the percentage who score higher than 262 but lower than or equal to 407. Tasks at Level 1A require the reader to locate one or more independent pieces of explicitly stated information; tasks at level 1B require the reader to locate a single piece of explicitly stated information in a prominent position in a short, syntactically simple text with a familiar context and text type, such as a narrative or a simple list. The "high" competency level pertains to the percentage who score higher than 626 on the PISA reading scale. They are able at least to retrieve information requiring the reader to locate and organize several pieces of deeply embedded information, inferring which information in the text is relevant. (2) The "lowest" competency level pertains to the percentage of 15-year-old students below the lowest proficiency level (scoring 358 or below) on the PISA mathematics scale; students at this level may be able to perform very direct and straightforward mathematical tasks. The "low" competency level pertains to the percentage who score higher than 358 but lower than or equal to 420 points on the PISA mathematics scale; at this level, students can answer questions involving familiar contexts where all relevant information is present and the questions are clearly defined. The "high" competency level pertains to the percentage who score higher than 607, and corresponds to PISA levels 5 and 6. At this level, students can develop and work with models for complex

situations, identifying constraints and specifying assumptions.

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

Figure 3. Impact Evaluations Published, By Year, 1981-2012


Total: 2362 Studies
3ie Founded
World Bank - SIEF
World Bank - DIME
Evaluation Gap Working Group
First PROGRESA Studies
OECD Expert Group on Aid Evaluation
Total: 562 studies on education
Total: 100 studies, education, East Asia
409
382
307
282
183
150
118
119
84
68
48
46
32
30
24
20
17
10
9
6
94
92
69
71
41
38
29
24
28
12
12
10
11
9
22
16
12
9
9
6
5
4
3
3
3
2
1
0
Number of Impact Evaluations Published
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
3ie's Impact Evaluation Repository
Impact Evaluation Studies in Education
Impact Evaluation Studies in Education in East Asia

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

References

Aedo, C., & Walker, I. 2012. *Skills for the 21st Century in Latin America and the Caribbean*. Washington, DC: World Bank.

Aiyar, M. S., Duval, M. R. A., Puy, M. D., Wu, M. Y. & Zhang, M. L. (2013) "Growth slowdowns and the middle-income trap." International Monetary Fund, Working Paper No. 13-71.

Barro, R. & Lee. 2010; data in http://www.barrolee.com/

Bloom, D., D. Canning & P. Malaney. 2000. "Demographic Change and Economic Growth in East Asia," *Population and Development Review*. 26: 257-90.

Bloom, D. and J. G. Williamson 1998. "Demographic Transition and Economic Growth in East Asia," *World Bank Economic Review* 12(3): 419-55.

Bouguen, A., Filmer, D., Macours, K. & Naudeau, S. 2013. "Impact evaluation of three types of early child development interventions in Cambodia." Washington, DC: World Bank Policy Research Working Paper 6540.

Bowles, S., Gintis, H., & Osborne, M. 2001. "The determinants of earnings: A behavioral approach," *Journal of Economic Literature* 39 (4): 1137-1176.

Cameron, D., A. Mishra & A. Brown. Forthcoming. "The growth of impact evaluation for international development: how much have we learned," *Journal of Development Effectiveness*

Chen, D. 2009. "Vocational schooling, labor market outcomes, and college entry." Washington, DC: World Bank Policy Research Working Paper Series

Chen, S. 2015. "Singapore wants kids to skip college: good luck with that", Bloomberg News http://www.bloomberg.com/news/articles/2015-05-03/singapore-wants-kids-to-skip-college-good-luck-with-that

Conn, K. 2014. "Identifying Effective Education Interventions in Sub-Saharan Africa: A meta-analysis of rigorous impact evaluations." Unpublished manuscript, Columbia University, New York, NY.

Deke, J, & Haimson, J. 2006. "Valuing Student Competencies: Which Ones Predict Postsecondary Educational Attainment and Earnings, and for Whom?" Mathematica Policy Research Inc.

Dang, Hai Anh, & Rogers, F Halsey. 2008. "The Growing Phenomenon of Private Tutoring: Does It Deepen Human Capital, Increase Inequality, or Waste Resources?" *World Bank Research Observer*, 23(2): 161-200.

Dobson, W. (ed). 2013. *Human Capital Formation and Economic Growth in Asia and the Pacific*. Routledge.

Dweck, C. S. 2000. *Self-theories: Their role in motivation, personality, and development*: Psychology Press.

Duckworth, A. L, Weir, D., Tsukayama, E., & Kwok, D. 2012. "Who does well in life? Conscientious adults excel in both objective and subjective success," *Frontiers in P sychology* 3: 356-365.

Eichengreen, B., Park, D., & Shin, K. 2013. "Growth slowdowns redux: New evidence on the middle-income trap." National Bureau of Economic Research, Working Paper No. 18673.

Felipe, Jesus. 2012 "Tracking the Middle-Income Trap: What is it, Who is in it and Why?" Asian Development Bank Working Paper No. 306.

Glewwe, P. 2002. "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes," *Journal of Economic Literature*, 40(2): 436-482.

Glewwe, P., Jacoby, H. and King, E. M. 2001. "Early Childhood Nutrition and Academic Achievement: A Longitudinal Analysis," *Journal of Public Economics* 81 (3): 345-368.

Glewwe, P., Hanushek, E. A., Humpage, S. & Ravina, R. 2014. "School resources and educational outcomes in developing countries: a review of the literature from 1990 to 2010." In *Education policy in developing countries*, edited by P. Glewwe. Chicago, IL: University of Chicago Press, 2014, pp. 13-64.

Growth Commission. 2008. *The Growth Report: Strategies for Sustained Growth and Inclusive Development.* World Bank. Washington, DC.

Hanushek, E. A., Schwerdt, G., Wiederhold, S., & Woessmann, L. 2013. "Returns to Skills around the World: Evidence from PIAAC." OECD Education Working Papers, No. 101, OECD Publishing. http://dx.doi.org/10.1787/5k3tsjqmvtq2-en

Hanushek, E. A., & Woessmann, L. 2008. "The role of cognitive skills in economic development." *Journal of Economic Literature* 46 (3): 607-668.

Heckman, J. J., J. Stixrud, & S. Urzua. 2006. "The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior," *Journal of Labor Economics* 24 (3): 411-482.

Heineck, G., & Anger, S. 2010. "The returns to cognitive abilities and personality traits in Germany," *Labour Economics*, 17(3): 535-546.

Jankowska, A., A. J. Nagengast & J. R. Perea. 2012. "The Middle-income Trap: comparing Asian and Latin American Experiences." OECD Development Centre Policy Insights No. 96, May 2012.

Jimenez, E. & E. M. King. 2013. "The Skills of 'Tigers'" in Dobson (2013), pp 19-36.

Jimenez, E., Patrinos, H. A. & Nguyen, V. 2013. "Human capital development and economic growth in Malaysia and Thailand: stuck in the middle?" in Dobson 2013, pp. 141-162.

Judge, T. A. & Bono, J. E. 2001. "Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis," *Journal of Applied Psychology* 86 (1): 80-92.

Kharas, H. & H. Kohli. 2011. "What is the middle-income trap, why do countries fall into it and how can it be avoided?" *Global Journal of Emerging Market Economies,* 3: 281-289.

Kim, K. H. 2005. "Can Only Intelligent People Be Creative? A Meta-Analysis," *Journal of Secondary Gifted Education* 16 (2/3): 57–66.

King, E.M. & F. H. Rogers. 2014. "Intelligence, personality, and creativity: Unleashing the power of intelligence and personality traits to build a creative and innovative economy." Conference Edition. November 2014 Seoul symposium on "Achieving HOPE: Happiness of People through Education. Innovation in Korean Education for a Creative Economy.

Kingdon, G. G. 2007. The progress of school education in India. *Oxford Review of Economic Policy*, *23*(2), 168-195.

Kremer, M., Brannen, C., & Glennerster, R. 2013. "The challenge of education and learning in the developing world." *Science* 340 (6130): 297-300.

Krishnaratne, S., White, H. & Carpenter, E. 2013. "*Quality education for all children? What works in education in developing countries?*" International Initiative for Impact Evaluation (3ie) Working Paper 20, New Delhi.

Kuhn, P. & Weinberger, C. 2005. "Leadership Skills and Wages," *Journal of Labor Economics* 23 (3): 395-436.

Lee, J. H. 2013. *Positive Changes (The Education, Science & Technology Policies of Korea)*. Updated Edition. Seoul: Korea Economic Daily & Business Publications, Inc.

Linden, L. 2008. "Complement or Substitute? The Effect of Technology on Student Achievement in India." JPAL Working Paper, MIT.

http://www.povertyactionlab.org/evaluation/complement-or-substitute-effect-technology-student-achievement-india.

Lindqvist, E., & Vestman, R. 2011. "The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment," *American Economic Journal: Applied Economics*: 101-128. IFN Working Paper No. 794. Available at SSRN: http://ssrn.com/abstract=1367603 or http://dx.doi.org/10.2139/ssrn.1367603

Lucas, R. E. 1993. "Making a Miracle," *Econometrica* 61(2): 251-272.

Ma, X., Zhou, Z., Yi, H., Pang, X., Shi, Y., Chen, Q., Meltzer, M. E., le Cessie, S., He, M., Rozelle, S., Liu, Y., Congdon, N. 2014. "Effect of providing free glasses on children's educational outcomes in China: cluster randomized controlled trial," *BMJ* (September), 349. http://www.bmj.com/content/bmj/349/bmj.g5740.full.pdf

McEwan, P. J. 2014. "Improving Learning in Primary Schools of Developing Countries: A Meta-Analysis of Randomized Experiments," *Review of Educational Research* 20 (10): 1-42.

Mo, D., Swinnen, J., Zhang, L., Yi, H., Qu, Q., Boswell, M., & Rozelle, S. 2013a. "Can One-to-One Computing Narrow the Digital Divide and the Educational Gap in China? The Case of Beijing Migrant Schools," *World Development, 46*: 14-29.

Molnar, M., Wang, B. & Gao, R. 2015. "Assessing China's skills gap and inequalities in education", *OECD Economics Department Working Papers*, No. 1220, OECD Publishing, Paris. http://dx.doi.org/10.1787/5js1j1805czs-en

Muralidharan, K., & Sundararaman, V. 2011. "Teacher Performance Pay: Experimental Evidence from India," *Journal of Political Economy,* 119(1): 39-77.

Murnane, R. J., & Ganimian, A.J. 2014a. "Improving Educational Outcomes in Developing Countries: Lessons from Rigorous Evaluations." National Bureau of Economic Research, Working Paper No. 20284, Cambridge, MA.

Newhouse, D. & Suryadarma, D. 2011. "The value of vocational education: high school type and labor market outcomes in Indonesia," *World Bank Economic Review* 25(2): 296-322.

Niu, W., & Sternberg, R. J. 2003. "Societal and school influences on student creativity: The case of China," *Psychology in the Schools*, 40(1): 103-114.

Nonoyama-Tarumi, Yuko, and Kurt Bredenberg. 2009. "Impact of School Readiness Program
Interventions on Children's Learning in Cambodia." *International Journal of Educational Development* 29 (1): 39–45.

OECD. 2013a. *PISA 2012 Results in Focus: What 15-year-olds know and what they can do with what they know*.

OECD. 2013b. *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*.

Ostry, J. D., Berg, A., and Tsangarides, C. G. 2014. *Redistribution, Inequality, and Growth.* Washington, DC: International Monetary Fund Staff Discussion Note SDN14/02, April.

Park, Hyunjoon, Byun, Soo-yong, & Kim, Kyung-keun. 2011. "Parental involvement and students' cognitive outcomes in Korea focusing on private tutoring," *Sociology of Education*, 84(1): 3-22.

Pratham, 2015. *2014 Annual Status of Education Report*. New Delhi: Pratham.

Roberts, B.W., Harms, P.D., Caspi, A., & Moffitt, T.E. 2007. "Can we predict the counterproductive employee? Evidence from a child-to-adult prospective study. Evidence from a 23-year longitudinal study," *Journal of Applied Psychology* 92: 1427-1436.

Robinson, K. 2006. "Changing Education from the Ground Up." TED Talks.

Veugelers, R. 2013. "The world innovation landscape: Asia rising?" Bruegel Policy Contribution, Issue 2013/02, February.

Wadhwa, V., A.L. Saxenian & F.D. Siciliano. 2012. *America's New Immigrant Entrepreneurs: Then and Now*.

Watson, W. T. 2014. "Beating the Middle Income Trap in Southeast Asia." Special report no. 156, The Heritage Foundation, August 27, 2014

World Bank, 1993. *The East Asian Miracle*, Policy Research Report, Washington DC: Oxford University Press.

World Bank. 2012. *Putting higher education to work: Skills and research for growth in East Asia*. Washington, DC: World Bank Publications.

World Bank. 2013. *Vietnam development report 2014: preparing the work force for a modern market economy. Main report*. Washington, DC. http://documents.worldbank.org/curated/en/2013/11/18556434/vietnam-development-report-2014-preparing-work-force-modern-market-economy-vol-2-2-main-report

World Bank. 2015. EdStats; Education Statistics Dashboard. http://datatopics.worldbank.org/education/.

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia