

Human Capital and Indonesia's Economic Development

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Introduction

Studies of countries' growth trajectories indicate that a key factor in managing the transition from middle-income living standards to high-income ones has been human capital formation. A fifty-country study by Hanushek and Woessmann (2008) found that controlling for GDP per capita and levels of schooling in 1960, those countries with higher skills experienced per capita income growth rates that averaged two percentage points higher over the next forty years. They also found that skills as measured by performance in international assessments played a role in sustaining strong economic growth after controlling for differences on such acknowledged determinants of growth as trade openness, security of property rights, fertility, and geography.

Human capital is broadly defined as individuals' attributes that determine their ability to produce economic value. It is considered to be a significant source of economic growth. Conceptually, human capital has both a quantity dimension, the breadth of different attributes of an individual – and a quality dimension, the depth of each attribute. Unlike physical capital, human capital contributes to growth as both a direct input to production and as a vehicle to improve the technology used in production. Indonesia is in the enviable position among middle income countries of having the potential to become a high-income country in the next two or three decades. A key determinant of realizing its potential is how the country takes advantage of the anticipated demographic dividend, where its dependency ratio¹ will decline to an estimated 40 percent between 2015 and 2030 (World Bank, 2009a). In addition, it has a large domestic market, and a maturing democracy. The World Bank (2011) predicts Indonesia will be among six countries – along with China, India, Brazil, South Korea, and Russia – accounting for more than half of the global growth rate between 2011 and 2025.

Looking at conditions in other Asian countries that have maintained their growth rates and achieved high-income status, a necessary ingredient is the level of skills, or the human capital, of the population. In the next section we provide an

overview of Indonesia's stock of human capital and then examine the major sources of human capital accumulation in the third section. In the fourth section we study the relationship between human capital and economic development at macroeconomic and microeconomic levels, showing the low quality of Indonesia's education system and low levels of secondary and tertiary school attendance. In the fifth section we list the challenges to be addressed in improving Indonesia's performance and conclude with a series of policy recommendations.

Economic Growth: Trends and Sectoral Composition

Since 1970 Indonesia's economic performance can be divided into six periods (Hill, 1994; Basri and Hill, 2011). After coming out of the hyperinflation period in late 1960s, the global oil boom helped Indonesia to grow quite rapidly between 1971 and 1981; real GDP grew by at least five percent annually and averaged 7.7 percent over the period. The second period began in 1982 and lasted up to 1986, when lower oil prices and currency devaluation slowed annual growth averaged only 4.6 percent. Growth picked up after 1987 as internal and external imbalances were addressed. Growth returned to an annual average of 7-8 percent between 1987 and 1996 but slowed when the Asian crisis struck in 1997 and Indonesia went through political change. Between 1998 and 2000 the economy contracted before recovering in 2000 and gradually accelerating in the 2004-07 period, only to slow somewhat during the global financial crisis in 2008 (Figure 1).

[Figure 1 here]

Examination of the sectoral structure of growth (Figure 2) provides the basis for understanding the types of human capital required, both now and in the future. In 1970, more than half of the Indonesian economy was in agriculture, which then shifted toward industry as Indonesia benefited from the oil boom; by 1980, industry accounted for 40 percent of output. By 2005, agriculture had declined to a 15 percent share with industry making up close to half of the economy. Even though industry replaced agriculture, however, both continued to be labor intensive.² As can be seen in Figure 2, the pace of substitution has steadily declined, implying that productivity in the industry sector will need to rise if it is to remain dominant in the economy.

[Figure 2 here]

The Stock of Human Capital

The most common measures of human capital stocks are educational attainment and enrollment. Increasingly, however, these measures are viewed as ‘input’ measures when what matters to economic growth is educational ‘outputs’ such as skills which better explain variations in living standards and economic growth.

Beginning with educational attainment (Figure 3) we rely on measures of the average years of schooling for Indonesians aged 15 years and older.³ All estimates display steady increases in educational attainment from as low as one year in 1950 to double that twenty years later in 1970. The growth rate picked up in the early 1980s following major programs of construction and staffing for primary schools and after primary school completion became compulsory (Suryadarma et al., 2006)

By 2000, the average educational attainment by Indonesian adults was 5.7 years – but since then the growth rate has slowed, probably due to supply constraints. However, studies show a significant demand-side constraint as well. Suryadarma, Suryahadi, and Sumarto (2006) find a significant trade-off between work and schooling among primary school graduates. Children in areas with relatively abundant employment opportunities have a higher probability of abandoning their educations.

[Figure 3 here]

Time patterns of the distribution of educational attainment are also revealing (Figure 4). Between 1972 and 2009 the education mix among Indonesian adults shows massive upgrading. In 1971, slightly more than 40 percent of Indonesian adults had no schooling, while 58 percent attended primary level and only about two percent attended secondary or tertiary level.

The education mix then began moving to the lower right-hand corner of the triangle as more Indonesians attended primary (grades 1-6) and junior secondary (grades 7-9) schools. Almost all adults had achieved primary education. But attendance at senior secondary (grades 10-12) and tertiary levels remained low up to 1990 with less than 20 percent of adults either attending or completing this level.

Attainment then increased over the next two decades, reaching 20 percent by 2000, and 30 percent by 2009.

[Figure 4 here]

Education enrollment rates (Figure 5), while subject to discontinuity, show progress towards 100 percent primary school enrollment with secondary and tertiary much lower and changing more slowly. These trends are troubling because they suggest a continuing shortage of highly educated individuals well into the future. While identifying the demand and supply side constraints of secondary education is beyond the scope of this paper, it remains a puzzle as to why the government could not emulate at higher levels the kind of primary school expansion achieved in 1970s and 1980s.

[Figure 5 here]

The composition of secondary school enrollment provides further insights, particularly with respect to trends in vocational versus general school enrollment. Many studies argue that expanding access to vocational education can be an attractive way to improve labor market outcomes because it better equips students with skills in demand in the workplace. The range of choice available in vocational schools produces a range of skills in business management and technical (which includes machinery and information technology) – the two most popular; agriculture and forestry; community welfare; tourism; arts and handicraft, and health care. In addition, some specialized vocational schools focus on aviation and shipbuilding.

Tanzania prioritized vocational education in the late 1960s (Kahyarara and Teal, 2008) in response to perceived skills shortages, and South Korea followed suit thirty years later. The Indonesian government pledged in 2006 to reverse the current ratio of general school graduates from 70 percent to 70 percent vocational by 2015 in order to reduce high unemployment rates (Newhouse and Suryadarma 2011). Although this target is probably not feasible, construction of new public general senior secondary schools has been frozen and selected general schools have been converted to vocational schools.⁴

The steady decline in vocational school enrollment (Figure 6) provides a clear signal of parental preference for general secondary education for their children – at least until the vocational school expansion policy took effect in 2007.

[Figure 6 here]

In 2010, only about 10 percent of the Indonesian labor force, or 4.3 million people, had tertiary level education (Chatani, 2012) with concentrations in education (teacher training), economics, and law. More recently, technology studies have replaced law as the third most popular choice. In 2010 tertiary graduates numbered 655 thousand compared to a mere 22 thousand between 1972 and 1975 (Table 1).

[Table 1 here]

The final measure of the human capital stock is skills. In countries where school quality is low, attainment and enrollment measures are not good proxies for output (Dumas, 2008). As well, skills are better measures of human capital stocks since variations in skills provide better explanations for the variation on personal income and economic growth and employers value skills rather than educational attainment or enrollment (di Gropello et al., 2011). General skills perceived by employers to be lacking in the Indonesian labor force include basic aptitude, mathematics skills, and English proficiency. In this subsection, we show the average level of mathematics and general skills of Indonesian adults.

The first skill we examine is numeracy skills. We use data from the Indonesia Family Life Survey (IFLS) 2000, which asked respondents between 15-24 years old to do five numeracy problems.⁵ To our knowledge, IFLS is the only publicly available survey in Indonesia that measures numeracy skills for the working age population in Indonesia.⁶

As shown in Figure 7, about a quarter of test takers could not provide any correct answers, while 10 percent could answer four questions correctly and only about seven percent answered all questions correctly. The average score in the test is 1.9, with the median person scoring 2. If this were a test with a 50 percent passing grade, only one-third of the test takers would have passed. Relating this result to those

of di Gropello et al. (2011), we find support that mathematics skills of Indonesian adults are indeed very low.

[Figure 7 here]

The second skill is general cognitive skills, also measured in a test in IFLS 2000. The test is a Raven's Progressive Matrices test, which measures general ability, and consists of eight questions. As shown in Figure 8, only less than five percent of test takers scored zero in the test, while close to 40 percent scored seven or above. As a whole, only 30 percent of test takers score four or below. This result shows that different from mathematics skills, the majority of adult Indonesians have relatively high general aptitude.

[Figure 8]

In summary, Indonesia's stock of human capital Indonesia measured by completed years of schooling has significantly improved over the past four decades. But enrollment at the senior and tertiary levels remains low and the stock of skills, measured with mathematics and cognitive tests, continues to be very low. In the next section, we examine the sources of human capital accumulation in Indonesia as a way to explain the causes of the low levels of skills.

Sources of Human Capital Accumulation

These sources include the formal education system, informal sources such as on the job training and externally-generated sources of knowledge and skills such as foreign direct investment, alliances, technology licensing and imports of capital goods.

Formal Education

The formal education system is the main source of human capital formation which in Indonesia consists of the general system of secondary and vocational schools and the Islamic system.⁷ Both systems have similar structures and both include publicly- and privately-administered schools.

Both public spending and the presence of private schools are significant variables in considering the sources of human capital accumulation because public schools dominate the primary education level while private schools are more common at secondary and tertiary levels.

The history of public spending on education is summarized in Figure 9.⁸ Better data are available after 2001 when responsibility for primary and secondary education were decentralized to local governments. This left the central government with responsibility for tertiary education, yet it continues to spend significant amounts on national education programs targeted at primary and secondary schools. Local government spending increased at first relative to central government's and in 2004 the passage of an education law required that 20 percent of total spending be allocated to education. The effect was immediate, as can be seen in Figure 9.

[Figure 9 here]

Examining the major beneficiaries from the increase may be informative, because if the additional funds are mostly spent on less productive uses, rather than on books or other teaching supporting material, then the additional funds will have little or no impact on educational quality. Since local governments are responsible for primary and secondary education, we focus on education spending by the provincial and district governments. There are basically two types of spending: routine and development. The former is used for paying salaries, operational and maintenance costs, travel, and purchasing non-durable goods, while the latter is used to build new infrastructure. Based on data provided by the World Bank (2009b), routine spending made up an average of 80 percent of total education spending between 2001 and 2006 and 95 percent was used to pay salaries between 2002 and 2006.

The second aspect of formal education in Indonesia pertains to privately administered schools. Private schools have a substantial presence. As shown in Table 2, the share of students enrolled in private schools in 2010 ranged from 15 percent at the primary level to 50 percent at the senior secondary level. The ratio of public to private institutions is even more skewed at the tertiary level. According to Asian Development Bank (2011), 71 percent of tertiary level students were enrolled in private institutions by 2007.

[Table 2 here]

In view of this reliance on private schools at the secondary level, assessing the relative quality of public versus private schools is important. Newhouse and Beegle (2006) who analyzed junior secondary school students' national examination performance found that public school graduates score 0.2 to 0.3 standard deviations higher than private school graduates, a differential that could be explained by better input quality in public schools, such as teachers and per student spending. Newhouse and Suryadarma (2011) found at the senior secondary level that male private school graduates earn substantially less than their publicly-schooled peers, implying that private senior secondary schools are of lower quality than their public counterparts. Another finding from these two studies is that parents appear to choose private schools only because of capacity constraints in public schools. These findings imply that expanding public schools, while keeping quality constant, may produce positive benefits both socially and at individually.

Over the past four decades, the Indonesian government has rolled out several major education programs.⁹ The main purpose of the earlier programs was to increase education enrollment, while the latter programs are more focused on increasing the quality of education.

The first major education program was the *SD Inpres* (Presidential Instruction Primary School) program, which took place from 1973 to 1979. During this period, the government constructed over 61,000 primary schools around the country. The impact of the program on school participation was huge. The primary school net enrollment rate jumped from 69 percent in 1973 to 85 percent in 1978 (Duflo, 2001). Due to this program, primary school participation in Indonesia was universal by 1988 (Suryadarma et al., 2006). The second program is the School Operational Aid Fund, known by its Indonesian acronym as BOS. It basically transfers funds directly to schools, with the amount calculated on a per student basis. In 2005, primary schools received US\$25 per enrolled student, while junior secondary schools received \$35. The transfer then increased to \$44 and \$63 in 2009. The current transfer amount in 2012 is \$63 and \$77 for each enrolled student in primary and junior secondary schools respectively. It is unclear how the amount is determined.

The third large education program implemented by the central government is the teacher certification program, designed to provide sufficient premium on a teacher's competency in his/her specific subject – basically by doubling the teacher's salary. The additional salary is thought to incentivize individuals to continue as teachers, motivate low competency teachers to upgrade their skills, reduce teacher absenteeism, and attract high quality individuals to the teaching profession (World Bank, 2010b; Jalal et al., 2009). World Bank (2010b) and Hastuti et al (2010) evaluated the certification program and found that program implementation did not go as planned. The ultimate goal was to improve the quality of student learning outcomes but political pressures and lack of planning by governments doubled teacher salaries but failed to increase teaching quality. Further, since teacher certification is permanent, without any requirement to renew, incentives to continue performing well no longer exist.

On the Job Training

Other than formal education, another source of human capital accumulation is on-the-job training on which detailed data are rare. di Gropello et al. (2011) found evidence that the main purpose of on the job training is to upgrade and complement the insufficient skills of graduates from the low-quality education system. For this reason, young already-educated workers made up a significant proportion of on the job training participants.

External Sources of Knowledge

The other source of human capital is technology and skills transfers from abroad. Successful technology transfer occurs when the foreign investor is willing to share knowledge and the recipients have the capacity to absorb and apply this knowledge. Without these conditions transfer is incomplete. We have discussed the latter in the previous sections. Discussing the former, this may be intentional on the part of foreign firms in order to maintain product differentiation with the same industry (Thee and Pangestu 1998). Since employee turnover is quite high in Indonesia and such turnover is the main channel for knowledge spillovers one way to control it is to limit the skills transferred to domestic workers.

Technical licensing agreements do appear to enhance production skills. In a study of the impact of Japanese firms on Indonesian economy, Thee and Pangestu (1998) and Lindblad et al. (2002) find that domestic firms with licensing agreements from Japanese firms are able to enhance the investment, adaptive, and innovative skills of their workers, leading to a wider and more complete skill set. The final two channels, namely capital goods import from Japan and technical assistance from Japanese buyers, only have a limited effect on local technological capabilities. They are successful in enhancing production skills, but not the adaptive or innovative skills of local workers.

Blalock and Gertler (2008, 2009) show that sectors and regions with a high foreign share of output is a good environment for spillovers to take place especially if a technology gap exists and local firms possess capabilities to learn as indicated by the presence both of educated labor and an R&D unit. Such spillovers work better when local firms join the supply channel of the foreign firms, enabling the spillover effect to flow down through the vertical linkages.

In summary, this discussion of the channels by which Indonesia is upgrading the stock of human capital has brought out issues with inefficient patterns of public spending, the strong influence of privately administered, but often of inferior quality, schools, and the lack of workers' skills resulting in employers having to invest significant amount of resources in skills upgrading. In addition, the lack of capabilities to absorb foreign knowledge undermines external knowledge spillovers. The clock is ticking in the sense that before the demographic dividend turns into a deficit less than two decades from now, Indonesia's training and educational institutions must supply the more advanced skills that will be required to make what will be a smaller labor force relative to the rest of the population more productive. In the next section we examine this relationship in more depth.

Human Capital Formation and Economic Development

Macroeconomic Analysis

The relationship between human capital formation and economic growth is much studied but empirical evidence is scant. Indeed, some scholars argue that the causality may run in the other direction: high growth induces human capital formation. One cross-country study (Bils and Klenow 2000) argued that when technical learning

applied to production is the measure of human capital (that is, human capital formation is an endogenous learning process), the channel from schooling to growth is weak and explains about one-third of the overall correlation. This result suggests that the more likely channel is from growth to schooling.

Bayhaqi (2006) and van Leeuwen and Foldvari (2008) find that human capital is not a major contributing factor. Taking the various channels through which human capital can affect growth, both as a factor of production and as a technology-augmenting factor, van Leeuwen and Foldvari (2008) and van der Eng (2010) found that the role of human capital in Indonesia is still limited to being a factor of production rather than as a technology-augmenting factor.¹⁰

The choice of the proxy variable measuring human capital is contested in the macroeconomic literature and most studies rely on educational attainment measures. But others (van Leeuwen and Foldvari 2008; Judson 2002) argue the more appropriate measure is the quality of human capital as measured by education expenditures. We see such a measure as less than ideal in part because we have not been able to find a correlation between educational spending and student test scores (Suryadarma 2012).

Hanushek and Woessmann (2008) used performance in literacy and numeracy tests. Cross-country assessments such as PISA, TIMSS, are now available for many countries over several years, allowing a cross-country panel analysis.¹¹ They compared the correlation between human capital and economic growth using educational attainment and PISA/TIMSS results and found that while education attainment as a measure does not explain much variation in economic growth, the PISA/TIMSS results do, and further, that there is a positive causal relationship between high PISA/TIMSS results and economic growth.

Microeconomic Analysis

Most microeconomic studies that investigate the relationship between human capital and economic development employ a model developed by Jacob Mincer, in which earnings are the dependent variable and human capital is the main independent variable. Our examination of this relationship at the individual or household level focuses on studies to establish causal relationships between education and earnings.

Duflo (2001) used the exogenous regional and cohort variation in school availability caused by the *SD Inpres* program in the 1970s, to identify the causal effect of schooling on wages. She found that the program increased schooling by 0.25 to 0.40 years of education on average. More importantly, she found that these exogenous increases in education resulted in 1.5 to 2.7 percent increase in wages. Using these two sets of information, she calculated that the economic returns to an additional year of education range from 6.8 to 10.6 percent.

Following the Duflo's strategy Comola and de Mello (2010) estimated the returns to education using data from 2004 (Duflo used 1995 data). Their estimates showed that an additional year of schooling will increase earnings by between nine to 10.8 percent. Therefore the two studies that use data from Indonesia and attempt to correct for the endogenous nature of schooling find similar returns to education of about 10 percent. In addition, there appears to be suggestive evidence from comparing the two studies that the returns to education in Indonesia are relatively stable over time.

Newhouse and Suryadarma (2011) took a different approach, estimating the relative labor market returns of different types of senior secondary education (ie, based on the vocational/general and public/private differentiations). Although unsuccessful in strongly establishing causality, the authors used a rich longitudinal dataset – IFLS – that allows them to include a richer set of control variables than most studies in the literature. In addition, the longitudinal nature of IFLS allows a separation of age and cohort effects when estimating the returns over time. The results suggest that whether high schools are publicly or privately administered and whether the curriculum is vocational or general are both important factors influencing graduates' subsequent labor market outcomes. With regards to public and private schools, male private school graduates earn substantially less than their publicly schooled peers. Private general school graduates perform particularly poorly. Among public school graduates, meanwhile, the authors found a large drop in the wage premium for the most recent cohort of male public vocational graduates.

Therefore, the fact that vocational graduates have traditionally fared slightly better than general graduates in the labor market, is no longer true among men. In general, attending public vocational school attendance has a mild, positive, and statistically insignificant correlation with wages. For women, the results suggest a

positive effect of public vocational education, although this effect is only clearly discernible for the oldest cohort of women. In contrast to men, the outcomes for female public vocational graduates in recent years have, if anything, improved.

This review of recent empirical studies using a variety of measures helps to convey an appreciation of the measurement difficulties in confirming the growth-human capital formation relationships, with the stronger relationship more evident in the microeconomic studies.

Human Capital Challenges

The next step is to consider what all this theoretical and empirical evidence implies for Indonesia. The macroeconomic studies conclude that Indonesia's human capital is augmented mainly by quantity rather than quality; that its growth contribution is limited to being a factor of production rather than a source of technological upgrading. We also conclude that the real issue is that human capital fails to be a source of growth when the quality of education is low. Increasing educational quality is much more complex than increasing the quantity of graduates.

Indonesia's low education quality afflicts all education levels. Suryadarma (2011) found that the performance of eighth grade Indonesian students in international science and mathematics assessments lags far behind the performance of students in neighboring countries and countries with a similar economic and health conditions (Indonesians performance is 0.4 to 1.9 standard deviations lower than Malaysia, Singapore, and Thailand from 1999 up to the latest available data in 2007). At the senior secondary level, di Gropello et al. (2011) found in an employer survey that 23-30 percent of firms in manufacturing and non-education services consider skill shortages to be mainly the result of inadequate numbers of skilled graduates.

Since the majority of Indonesian tertiary students attend private institutions, we only examine the quality of private institutions.¹² The accreditation results show that only 55 percent of programs in private institutions are given the passing grade, and only 11 percent are considered excellent. In the popular engineering, social sciences, and teacher training fields, most institutions rate only a passing grade.

The gravity of Indonesia's quality issue cannot be over-estimated. Pradhan et al. (2011) mentioned that the most successful education interventions can improve school quality by about 0.3 standard deviations. This finding implies that Indonesia

needs to implement six extremely successful school interventions in order to close the quality gap. Unfortunately, we are not aware of any school intervention that has been able to improve quality by more than 0.3 standard deviations. Thus, finding six successful interventions is a very tall order.

The Indonesian government thus faces a number of challenges in improving the quality of education at the primary and secondary levels. These include:

- Teacher absence. Twenty percent of teachers are absent without permission, a rate that is higher than Bangladesh, Ecuador, and Peru. More worrying, the absence rate has been constant for the past decade.
- Teacher distribution: On average, Indonesia's student-to-teacher ratio of 12 is similar to Japan and France, and is much lower than Germany or Singapore. The problem lies in the skewed distribution. According to del Granado et al. (2007), approximately 55 percent of primary schools have too many teachers, while 34 percent have too few.
- Lack of community participation in school management. The official channel for community participation in school affairs in Indonesia is the school committee. Regulations on the role and structure of school committees became law in 2002. They established the school committee's role as being to advise and support the school principal and teachers, to act as a mediator between school and community, and to improve parental and community involvement in school activities. In addition, a school committee can make recommendations pertaining to teaching programs, school budgets, performance benchmarks, teacher qualifications and school facilities. In a survey of parents in 2007, Pradhan et al. (2011) found that only about one-fifth of parents know the names of the school committee members at their children's school, and less than half of the respondents have met their children's teacher.

Although we focus mainly on education quality in this chapter, we believe that the government still faces a challenge in improving educational access at secondary (especially senior secondary) and tertiary levels. As we have discussed earlier, the latest data show net enrollment rates at the senior secondary level to be below 50 percent, while the World Bank (2010a) found that the gross enrollment rate at the tertiary level is only 27 percent.

Policy Recommendations

These challenges imply a number of policy recommendations to upgrade educational quality as a key determinant of the skills Indonesia will need to sustain future economic growth. As we document in this chapter, Indonesia's education system is low quality at all levels, school participation at the senior secondary and tertiary levels remains low, with little progress in the past decade. As a result, Indonesia is constrained in its ability to adapt and produce innovative technology. Indonesian policy makers need to improve and upgrade the education system significantly, both in terms of quality and access, if Indonesia is to realize its growth potential. More research is obviously required in view of the lack of systematic and generalizable evidence of successful high-impact education interventions so far. We offer the following policy recommendations.

The first priority is to supply more teachers of higher quality. Assuming that recruitment is mainly to replace retiring teachers, the quality of the new recruits must be higher than that of the outgoing ones. Attracting these new teachers to rural areas will be difficult. These priorities imply the importance of a more attractive incentive framework, beginning with salaries. The average teacher salary has more than doubled in the past five years, but there is no analysis to determine whether the improved wages are sufficient to attract skilled individuals to choose teaching over working in the private sector. To ensure a more equitable geographic distribution of teachers, policymakers should consider rotating teachers between urban and rural areas. Raising both teacher quality and wages may also reduce teacher absence.

The second priority is to invite the community to participate in increasing school accountability. Given the lack of community involvement in service delivery, we think that policies to intensify community participation may be more successful in areas where the education level of the general population is relatively high. In a field experiment, Pradhan et al. (2011) found that establishing formal linkages between school committee and the village council significantly increased learning outcomes. However, the fact that the experiment was implemented in districts with relatively developed infrastructure and educated parents imply that the results may not be generalizable to regions in Indonesia that do not have these characteristics.

The third priority is to address the lack of relevance between skills taught in school and those demanded by employers, an issue especially relevant for vocational schools. A promising option might be a close collaboration with local and multinational companies, which is the path taken by Singapore. Our fourth priority is more analysis on the constraints, both supply and demand sides, to explain the low senior secondary and tertiary enrollment. Lack of quality may be a major constraint, because parents could find sending their children to school as an inefficient investment if they do not learn much. If this conjecture is correct, then there is a direct relationship between school quality and low enrollment, especially at the levels where the costs of education are significant.

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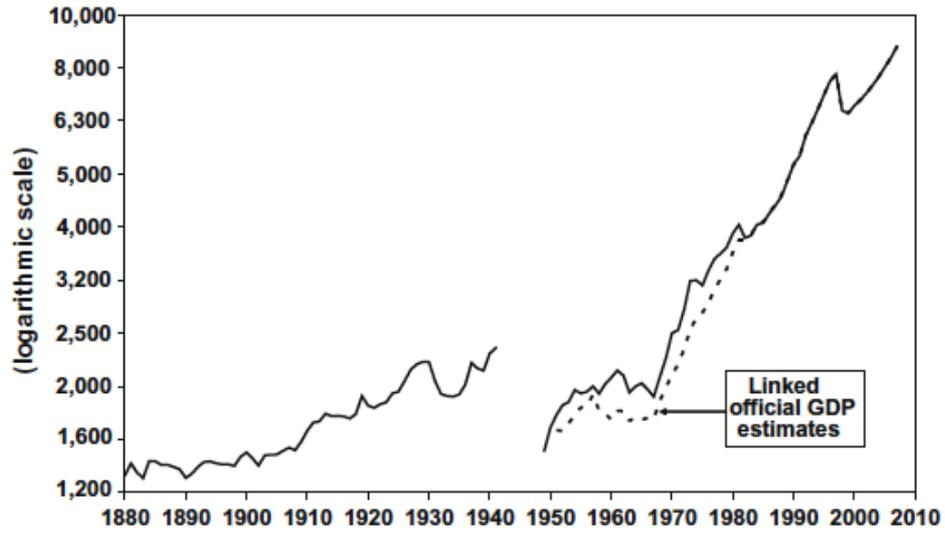
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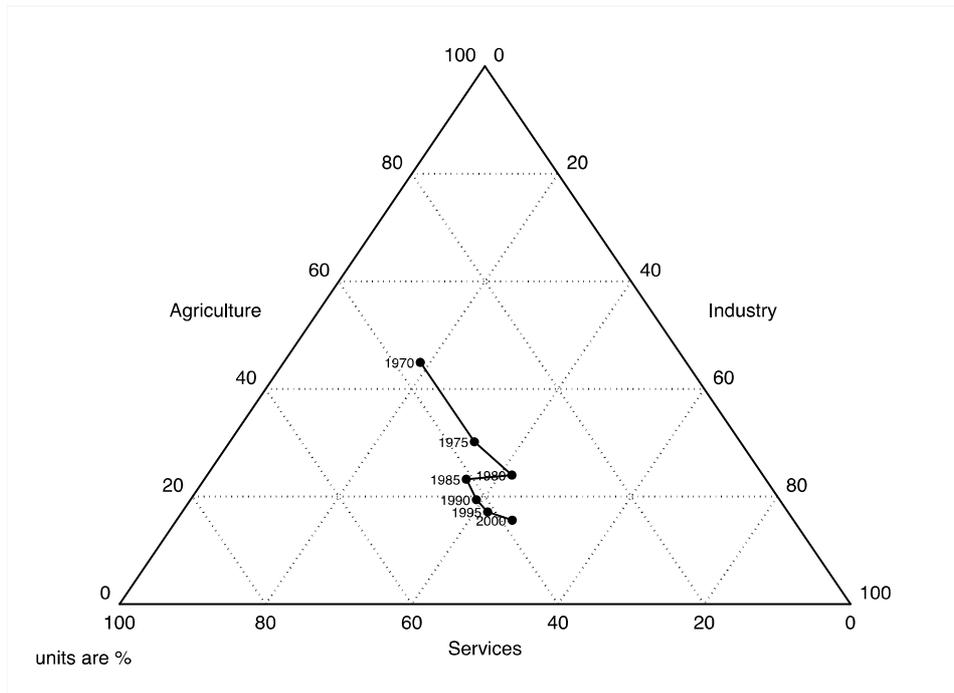
World Bank, 2009b. *Investing in Indonesia's Education at the District Level: An Analysis of Regional Public Expenditure and Financial Management*. Jakarta: World Bank.

Figure 1. GDP per capita, 1880-2008



Source: van der Eng (2010)

Figure 2. Share of GDP by Sector, 1970 - 2005



Source: World Development Indicators

Figure 3. Average Years of Schooling, Adult Population, 1970 - 2012

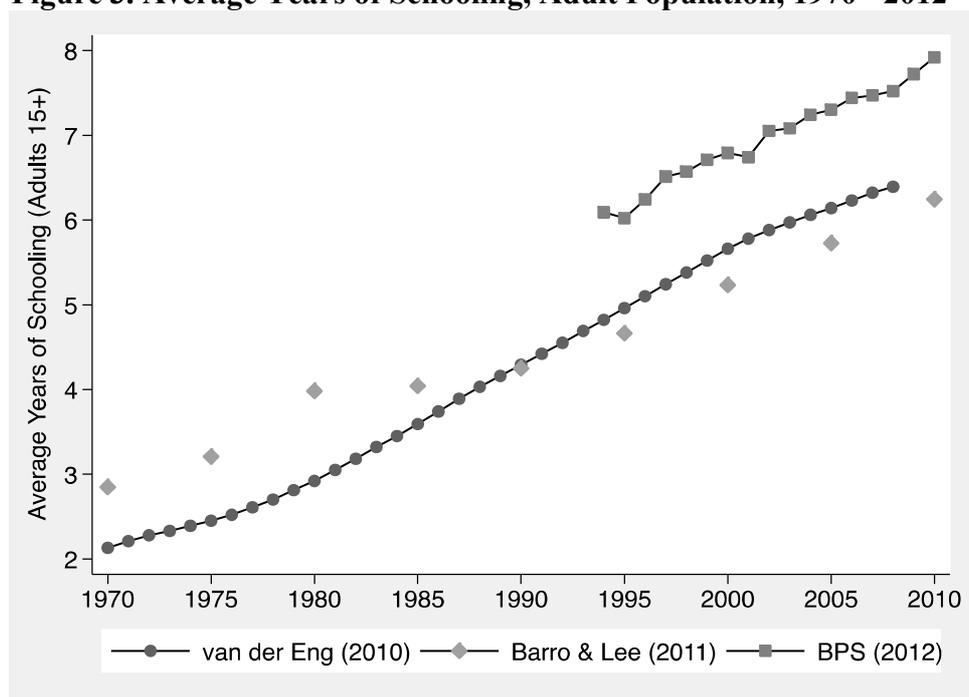
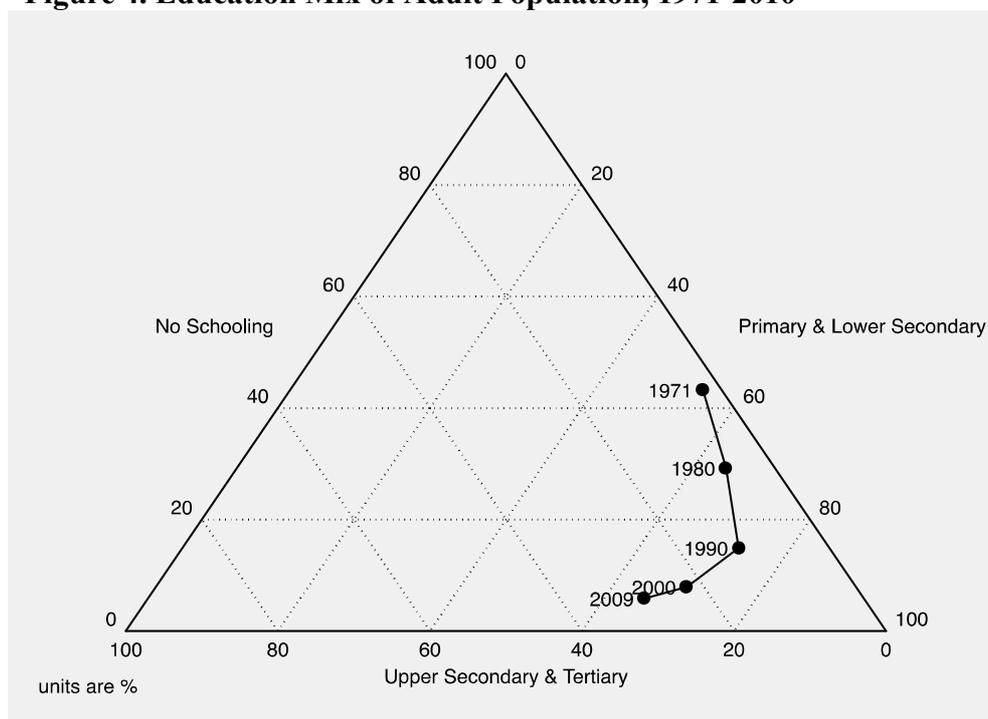
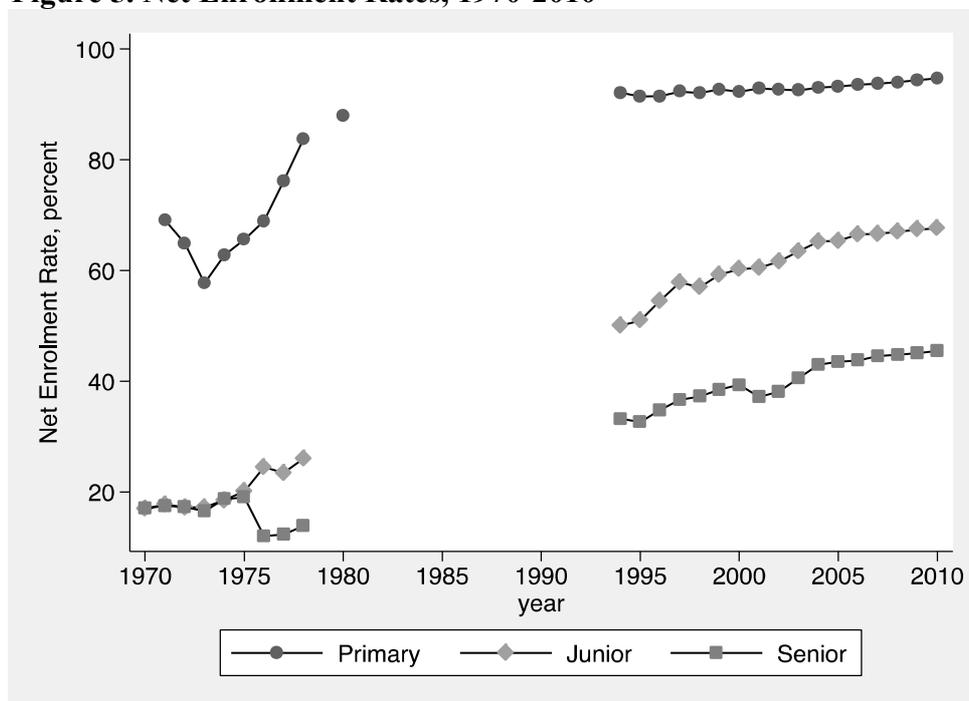


Figure 4. Education Mix of Adult Population, 1971-2010



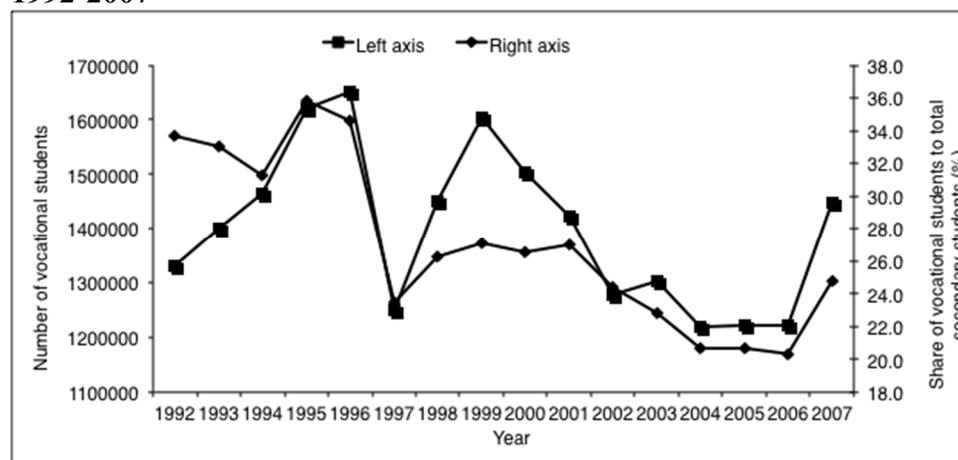
Source: Statistik Indonesia, various years

Figure 5. Net Enrollment Rates, 1970-2010



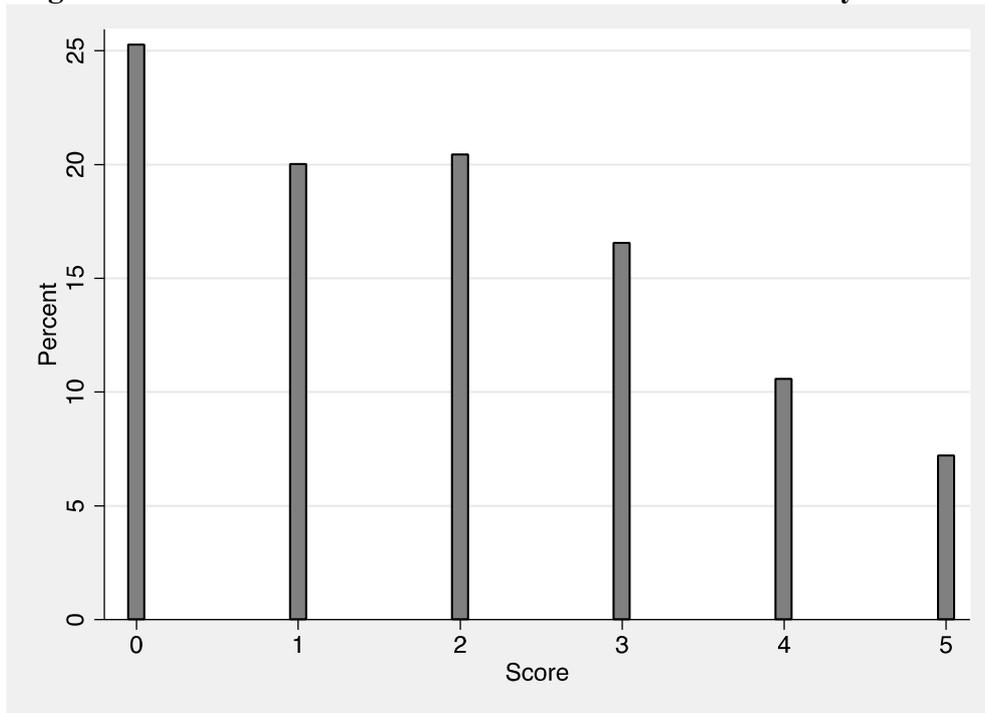
Source: Statistics Indonesia; UNESCO; Nations Encyclopedia World Statistics.

Figure 6. Student Body and Share of Vocational School Enrollment, 1992-2007



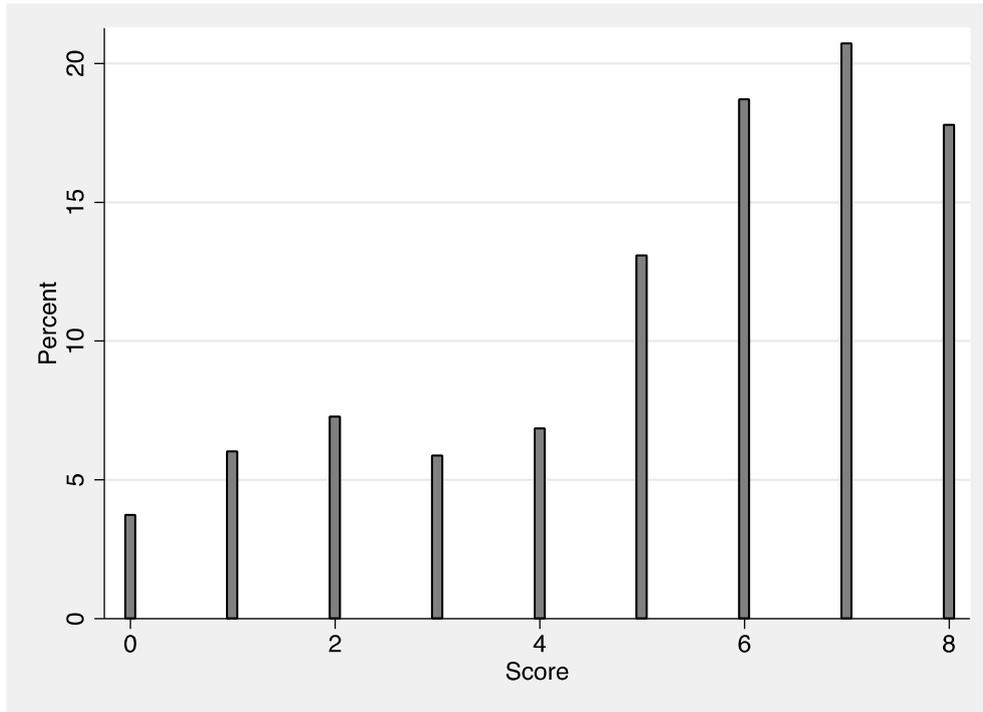
Source: Newhouse and Suryadarma (2011)

Figure 7. Distribution of Performance in the IFLS Numeracy Test



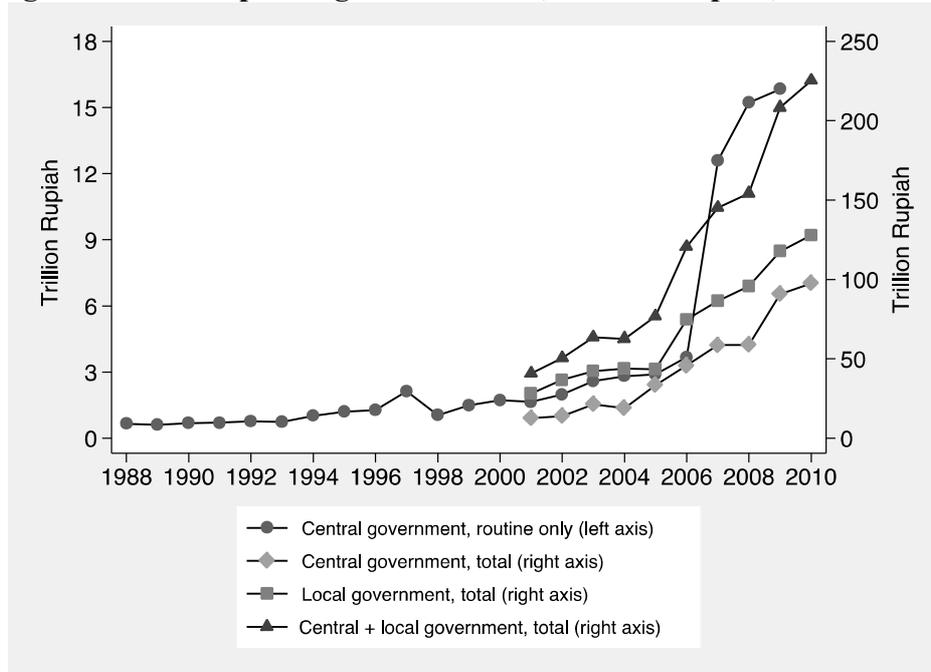
Source: Indonesia Family Life Survey 2000

Figure 8. Distribution of Performance in the IFLS Raven's Test



Source: Indonesia Family Life Survey 2000

Figure 9. Public Spending on Education, current Rupiah, 1988 – 2010



Source: UNESCO, Ministry of Finance, and World Bank datasets, various years.

Table 1. Tertiary Graduates and Field of Study, 1970s and 2010

Field of study (wide definition)	Number of graduates		Composition (%)	
	1972-75	2010	1972-75	2010
a. Natural Sciences & Technology:				
Natural Sciences & Math	1,336	54,031	5.91	8.25
Engineering	6,023	103,291	26.67	15.77
Health Sciences	4,486	25,029	19.86	3.82
Agro Sciences	2,669	36,909	11.82	5.63
Sub Total	14,514	219,260	64.26	29.65
b. Social Sciences & Education:				
Social Sciences	4,951	345,633	21.92	52.77
Teacher Training (Education)	3,121	115,148	13.82	17.58
Sub Total	8,072	460,781	35.74	70.35
Grand Total	22,586	655,012	100.00	100.00

Source: data 1972-75 is from Hutagaol (1985), while 2010 come from Higher Education Statistics 2009/2010. Data 2010 is reclassified to match the categorization in 1972-75.

Table 2. Number of Schools and Students in Indonesia, 2010

Level/Type of Education	Number of Schools			Number of Students		
	Public	Private	Total	Public	Private	Total
Primary Education	132,239	33,253	165,492	25,239,525	5,102,518	30,342,043
General Primary School	130,563	12,689	143,252	24,863,936	2,464,665	27,328,601
Islamic Primary School (MI)	1,676	20,564	22,240	375,589	2,637,853	3,013,442
Junior Secondary Education	19,132	24,756	43,888	7,515,806	4,281,039	11,796,845
General Junior Secondary School	17,714	12,152	29,866	6,905,458	2,349,548	9,255,006
Islamic Junior Secondary School (MTs)	1,418	12,604	14,022	610,348	1,931,491	2,541,839
Senior Secondary Education	8,000	17,269	25,269	3,959,309	3,996,398	7,955,707
General Senior Secondary School	5,034	6,002	11,036	2,594,977	1,347,799	3,942,776
Islamic Senior Secondary School (MA)	748	5,149	5,897	319,499	597,728	917,227
Vocational Senior Secondary School	2,218	6,118	8,336	1,044,833	2,050,871	3,095,704
Total	159,371	75,278	234,649	36,714,640	13,379,955	50,094,595

Source: Suharti (2012)

Endnotes

¹ Dependency ratio is the proportion of children and elderly to the working age population.

² The dominant industries in Indonesia are labor intensive, such as footwear, textile, and electronics. This is not surprising, as the country is labor abundant.

³ We use three sources: the latest Barro-Lee dataset, a longer time series compiled by van der Eng (2010), and data calculated by Statistics Indonesia (BPS, 2012).

⁴ In Indonesia, separation of school types into general and vocational only takes place at the senior secondary level. These school types are distinct. Only a small portion of the curriculum used in general and vocational schools overlap, mostly in the subjects of English and Indonesian.

⁵ Both tests took an average of 11 minutes in total. See Strauss et al. (2004) for a description of the IFLS 2000 survey. An important note is that 88 percent of the samples were no longer in school.

⁶ Indonesia has actively participated in various students international assessments since the late 1990s. As discussed in Suryadarma (2011), the country has been performing well below the average and its neighbors, without any indication of a catching up.

⁷ There is also a non-formal education system, which caters to only a small proportion of the population. See Appendix 3 for the breakdown of the Indonesian education structure.

⁸ 1 US\$ is equivalent to about Rp. 9,300.

⁹ This includes the education scholarship program specifically targeted at poor students, which was implemented during the economic crisis towards the end of 1990s. We do not specifically discuss the scholarship program, because it is formally part of the social safety net, not the education portfolio.

¹⁰ Van der Eng also incorporated a measure of human capital but it is embedded in labor and as such does not have a stand-alone effect on growth.

¹¹ TIMSS: Trends in International Mathematics and Science Study; PISA: Programme for International Student Assessment; PIRLS: Progress in International Reading Literacy Study.

¹² Accreditation results indeed show that on average public institutions are significantly better than private ones.