Human Capital Policy: Building a Competitive Workforce for 21st Century Thailand

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The views expressed in this paper are those of the authors and do not necessarily represent those of the Bank of Thailand.

Abstract

This paper identifies policy challenges to the skill formation process in Thailand. Specifically, we examine whether the foundation of current policies help foster skill acquisition and prepare our labor force well for heightened competition in the 21st century. Human capital is a major source of competitiveness and growth. Better educated and more able citizens contribute to civic affairs, crime reduction, and intergenerational transfers of skills. We view skill formation as a life-long process and consider 3 major sources of learning: formal schooling, labor market and families. We also draw on a wealth of literature and suggest a comprehensive life-cycle framework for public policies to foster human capital accumulation. Based on the choice of students, parents, trainees and firms, this framework aims to get the incentives right through increased interaction between the labor market, formal education institutions and families.

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Executive Summary

Human capital policy: Building a competitive workforce for 21st century Thailand

Human capital is a major source of growth and competitiveness. Better educated and more able citizens contribute to civic affairs, crime reduction, and intergenerational transfers of skills. In the age of heightened competition, countries the world over emphasize education and training. While personal financial rewards for skills in the labor market can be large, implying individuals should pay to train and upgrade their abilities, the role of public policy in fostering skills has taken central stage. Given limited public resources, government has to make a choice between investing in skill acquisition in the young and training working adults, for instance. Efficient investment implies that we put priority where the rate of return is highest while equity implies that we target public resources to the needy. This paper proposes a human capital policy framework and specific ways to upgrade Thailand's labor force quality today and over time, taking into account both efficiency and equity in public investment in skills.

Cross-country and national test score comparisons show that the challenge to skill quality improvement is particularly formidable outside of Bangkok, particularly rural areas in the North and Northeast. Pure cognitive ability (IQ) of average Thai children and adolescents residing outside of the municipal areas are equivalent to those living in Bangkok at birth, but become lower as they grow up. These statistics agree with the findings in neuroscience that poverty can overwhelm genetic capacities when it comes to IQ. To make matter worse, average school and teacher quality is also skewed in favor of bigger cities and schools, which is a chronic distribution (inequality) problem. Public resource distribution does not target those who are most needy. In the workplace, surveys have identified mismatch between skills supplied by schools and universities and those desired by firms as a major near-term challenge. In fact, the fast changing world will always pose a problem to an education system anywhere.

There are three major education providers or sources of learning in a modern economy: family, school, and workplace. Children, students and workers learn from parents, teachers and on the job along the stages of the life cycle. Government is a crucial supporting player at all stages. The Thai government has consistently ranked among the big purchasers and providers of public education in the world. It spends roughly 20% of the budget, equivalently 4% of GDP, on education. It has achieved great success at putting children to school as well as eliminating the gender gap in school enrollment over the past 50 years. What it needs to do better is to ensure that more young adults graduate from high school and universities, upgrade overall education quality and reduce the skill mismatch. In more ways than one, all three challenges share causes and cures.

In forming policy, government needs to recognize the basic human skill formation process. Skills are products of genetic and environmental inputs. They are multiple. Their acquisition is sensitive to life-cycle stages. Skills acquired early can make further acquisition less costly and more productive. Given the same amount of investment in acquiring one skill, what we know suggests that the rate of return is always positive and declining with age. Consequently, society should find it optimal to invest public resources in people of all ages—life-long learning—but more in the young and less in adults with low skills or abilities.

Our findings indicate that that the Thai labor market values both cognitive and non-cognitive skills equally. Success depends on getting the job done well. To do that, a person needs not only intelligence (cognitive ability), but also motivation, self-control, patience and social skills. Parents and education professionals should recognize this.

Repairing earlier shortfalls later in life and upgrading low-skilled adults into high-skilled labor is highly costly, which suggests that society be selective on whom to train. In the workplace, for example, firms are more qualified than government in making that decision, but government can help upgrade skills of non-salary workers through tax incentives for training.

Education is too important and vast for the traditional regulatory approach to human capital building to be effective. Empirical results show that it is not only a matter of how much resource we use, but *how* these resources are deployed. We suggest a comprehensive and coherent reformed framework for public policies to foster human capital accumulation. The framework encompasses strong, focused and uni-directional incentives to providers and purchasers of education and training to solve the efficiency problem; more public resources targeted to the needy young who gains the most and to overcome inequality of access; and lastly, enabling Thai parents to involve more in all stages of school life.

During the early childhood years, government should enable disadvantaged parents to care for their offspring. Policy should focus on parents' health-related areas during and post-pregnancy, child-rearing skills and sufficient nutrients for parents and children. Since the goal is to get young children school-ready, pre-school education can help; support is needed for disadvantaged working parents.

In school, students should be subject to consequential national standardized exams at every grade. The school average scores should be announced. To better motivate students, national merit-based scholarships should be rewarded. The scholarship should cover education related expenses and partial wages foregone for working-age students. The goal is to raise the transition rate into high school and beyond.

Schools are to provide nutritious lunch and meal supplements for students and remedial education for weak pupils at the primary level to enable catching up and raising the chance of transitioning to upper secondary later on. The idea is to repair early deficiency quickly. We propose that teachers and administrators' pays be based on merit and hardship, linked to student performance in two ways: absolute national test scores and improvement. School should have independence in decision making regarding resource allocation, subject to local board of education.

At higher education levels, vocational schools and universities should seek to promote more interaction between learning and the workplace. We believe apprenticeship programs sponsored by individual or network of firms should provide needed incentives for students to perform for better future jobs. Firms also have incentives to provide learning opportunities to secure the best future workers. Universities should rely more on private fundings and loans and promote more flexibility in their curriculum to better adjust to ever-changing market demand.

The tax system has crucial effect on decision to invest in human capital. We also recommend studies on tax incentives, particularly less progressive personal income tax, tax deduction for individual's training expense and lower tax on capital income.

Within this framework, specific measures, some currently being used, can become more effective. It will help ensure that we have a capable 21st century workforce that succeeds in global competition.

Human Capital Policy:
Building a Competitive Workforce for 21st Century Thailand

I. Introduction

One of the most overwhelming challenges facing Thai policymakers in the coming decades is to build a competitive workforce that is capable and competitive to withstand the pressure from newly emerging, low-wage countries such as China and India.

Human capital is a major source of growth and competitiveness. Better educated and more able citizens contribute to civic affairs, crime reduction, and intergenerational transfers of skills. In the age of heightened competition, countries the world over emphasize education and training. While personal financial rewards for skills in the labor market can be large, implying that individuals should pay to train and upgrade their abilities; the role of public policy in fostering skills has taken central stage. Given limited public resources, government has to make a choice between investing in skill acquisition in the young and training working adults, for instance. Efficient investment implies that we put priority where the rate of return is highest, while equity implies that we target public resources to the needy. This paper proposes a human capital policy framework and specific ways to upgrade Thailand's labor force quality today and over time, taking into account both efficiency and equity in public investment in skills.

This paper begins by organizing the available evidence on our labor force and the current education system. We also compare the current labor force of Thailand against those of other countries so as to gain the understanding of its strength and weakness. Section II then describes the human capital accumulation process in Thailand and important areas of shortcomings that need to be addressed. Section III outlines an appropriate policy framework that should help foster the skills of Thailand's labor forces based on facts and evidences. Finally, section IV concludes the paper.

Recent evidence indicates that Thailand's labor force is quite competitive in the face of intensified challenges from existing players and newcomers in Asia such as China, India, and Vietnam. Although Thailand ranks 32 among 61 countries in term of overall competitiveness by World Competitiveness Yearbook 2006, our labor force ranks 6. Low costs, low unemployment, high level of overall and female labor force participation, as well as high level of labor force growth all contributing to its strength.

Table 1: How Competitive is our Current Workforce?

	Overall Competitive-ness among 61 Countries	Labor Market				Education		
		Overall	Costs (US$/hr)	Availability of Skilled Labor	Labor Productivity ($PPP/Hour)	Overall	University Education (%)	Qualified. Engineer
Hong Kong	2	2	22 (5.5)	22	28.8	24	14 (37)	19
Singapore	3	3	29 (7.6)	9	26.6	13	3 (49)	11
Japan	17	31	39 (21.5)	18	32.4	23	2 (52)	28
Taiwan	18	10	25 (6.2)	16	25.2	19	5 (43)	20
China	19	5	5 (0.8)	53	5.4	51	-	57
Malaysia	23	4	14 (2.3)	20	12.9	30	37 (18)	18
India	29	1	3 (0.6)	3	3.5	59	53 (10)	1
Thailand	32	6	8 (0.9)	37	7.0	48	37 (18)	46
Korea	38	43	32 (10.9)	47	17.8	42	4 (47)	54
Philippines	49	15	4 (0.7)	19	5.5	57	40 (17)	34
Indonesia	60	32	1 (0.3)	55	3.8	61	57 (5)	53

Sources: IMD, World Competitiveness Yearbook 2006

According to IMD, the competitiveness of the Thai labor force lies in its low wages and its relatively productive labor relation with low industrial disputes and high average working hours. Nevertheless, there are several areas of weakness in our labor market that are causes for concern, especially in the medium run: the low supply of skilled labor and low labor productivity.

Moreover, our education system ranks 46 among 61 countries, with low level of secondary enrollment and low higher-education attainment, high level of pupil-teacher ratios in primary and secondary schools (relative to OECD countries), low test scores, lack of financial and language skills, as well as lack of qualified engineers and knowledge transfer between companies and universities. In fact, the World Bank's Private Investment Climate Survey (2004) finds that companies rank skill deficiency of the available workers as their topmost concern.

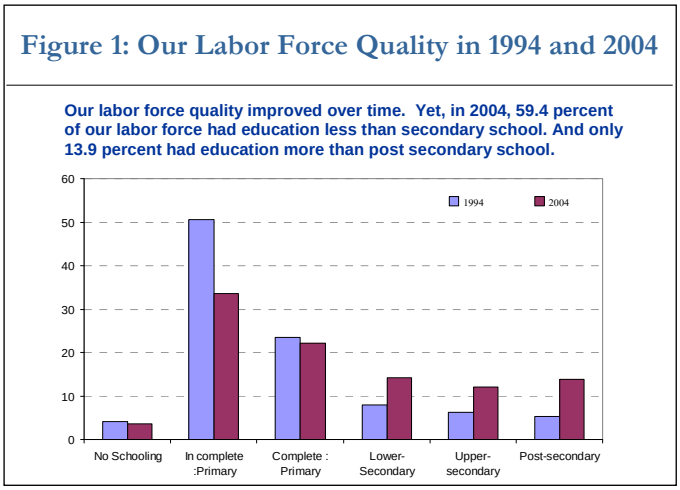
From policymaker's point of view, the strategy of relying on low wages as the source of competitiveness is not sustainable in the long run. To be competitive against China, India as well as other regional players, we have to look for a new strategy: investing in our workers and raise the level of human capital.

II. Human capital accumulation in Thailand in context: the challenges ahead

Human capital is one of the most important assets a country may process. [1] It determines the national competitiveness, the country's attractiveness in the eyes of multinational corporations, as well as the innovativeness of the corporate.

Thailand's education system is at the center of the skill formation process. So far, there have already been several waves of education reforms in Thailand since the mid 1950s. Quality and access of our education system have been gradually improved over time and the required basic education extended from 4 years in 1921, to Pratom 7 in 1965, and 9 years in 2002.[2] Despite the achievement thus far, the majority of the current labor force, 78.3 percent in 1994 and 59.4 percent in 2004, still graduate less than secondary school. Only 5.3 and 13.9 percent have college degrees and above in 1994 and 2004, respectively.

Figure 1: Our Labor Force Quality in 1994 and 2004



Sources: NSO, LFS 1994 and LFS 2004

Data from the Socio-economic survey conducted by the National Statistical Office in 2004 reveals that our education reforms so far have helped in gradually raising the education attainment of the new cohorts of our labor force overtime. Figure 2 shows that population with age 80 and above attended on average 2 years of schooling, reflecting the lack of formal education system during the time. However, gradually the average level of educational attainment rose for each subsequent cohort. The improvement began among those that are now 65-75 years old, steady among those between 40-65 year old, and then accelerated slightly for those between 25-30 years old. The 24-year-old cohort has the highest level of education attainment at roughly 11.2 years[3], reflecting the end of their formal schooling years. Ten years earlier, in 1994, the cohort with 17-18 years of age had the highest level of average education attainment – around 8.9 years.

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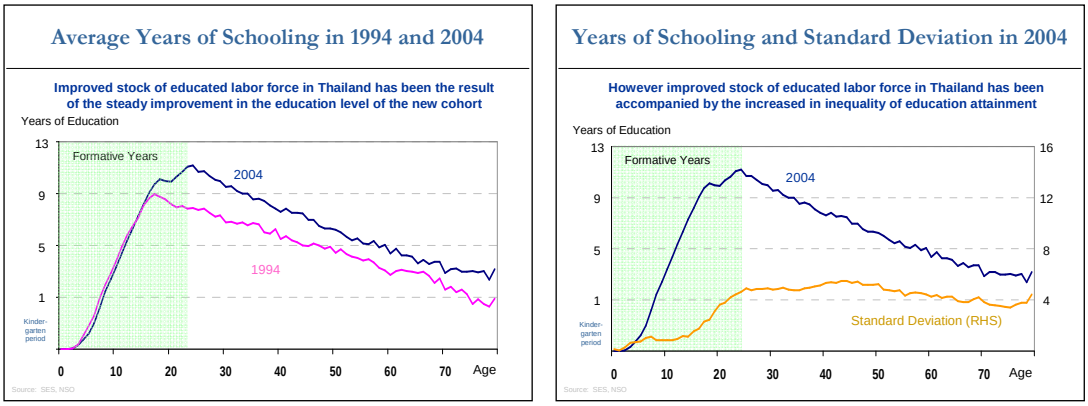
[1] Shiller (1998) estimates human capital to be the most important assets for the US economy. It accounts for 73 percent of the estimated national wealth; financial assets account for 16.2 percent; real estate wealth accounts for 7.9 percent; and consumer durables accounts for 2.2 percent.

[2] The current constitution requires the government to provide free-of-charge quality education for all up to 12 years.

[3] This figure already excludes three years of pre-rpimary school.

Figure 2: Average Years of Schooling of the Population

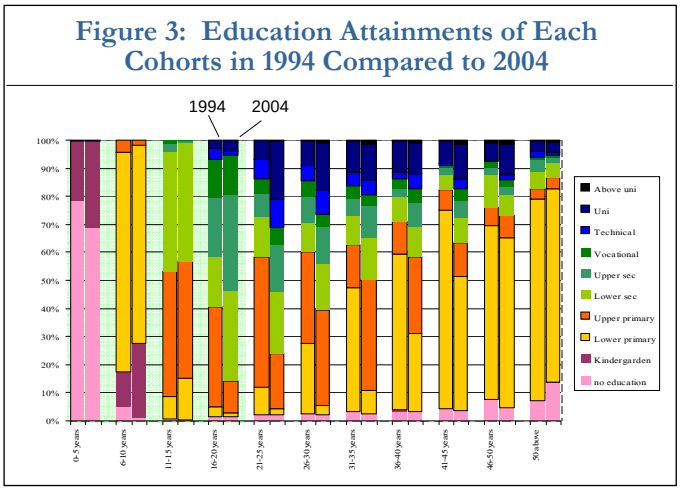


Source: NSO, SES 1994 and SES 2004

On average, years of schooling have been rising at roughly 0.15 years for each subsequent year.[4] This improvement, however, is accompanied by the rising inequality of education attainment among those who are currently between 45-80 years old (with low level of inequality among those above 70 years old as most of them received no formal education). Inequality in education attainment accelerated slightly for those between 40-45 years old. Interestingly, the leveling off of the inequality of education attainment within the age group of 25-45 years despite the improvement in the overall level of education attainment of the country is testimony to the success of education reforms that did not come at the expense of rising inequality within each cohort.

Examining more disaggregate data based at least in terms of years of schooling from the socioeconomic surveys to compare each cohort with that of the same age 10 years later, we find that during 1994 and 2004, each cohort of 25 years of age and above received more education. In particularly, 30 percent of those between 21-25 years of age (the new inflow to our labor forces) now having education more than the upper secondary school, a remarkable improvement from roughly 15 percent in 1994.

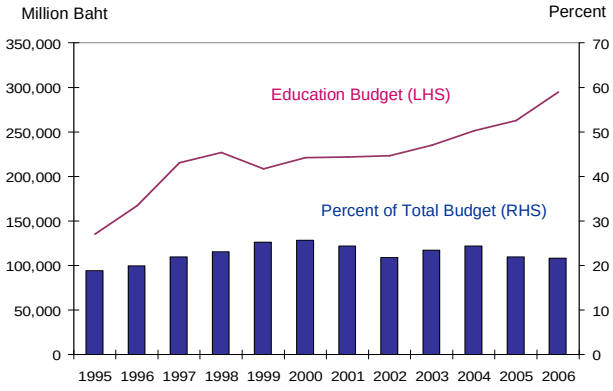
Figure 3: Education Attainments of Each Cohorts in 1994 Compared to 2004



Sources: NSO, SES 1994 and SES 2004

[4] According to the SES 2004 data, for the cohorts between 65-75 years old, 40-65 years old, 30-40 years old, and 24-30 years old, average years of schooling increased at the rate of 0.1, 0.16, 0.21, and 0.28 year per each subsequent year, respectively.

Figure 4 : Education Budget as a Percentage of Total Government Budget



Sources: Ministry of Education

The improvement in our education system is partly a consequence of steady rise in inputs over the last several decades. Representing that increase is the annual education budget that totals almost 300 billion Baht – around 3.9 percent of GDP or 22.8 percent of the total government budget between 1995 and 2005. Furthermore, a sizable part of the workforce is also devoted to the education sector with the number of teachers in the total labor forces in 2005 totalling at 651,801 persons or roughly 1.84 percent of the entire workforce. In fact, compared with other countries with similar average income, with the exception of Malaysia, which spend around 8.0 percent of its GDP on education, Thailand has already spent a good portion of its GDP on formal education.

Table 2: Public Expenditure on Education as a Percentage of GDP in 2004

Country	% of GDP
Malaysia	8.0
Israel	7.3
USA	5.9
Hong Kong	4.7
Korea	4.6
Thailand	3.9
Japan	3.7
Singapore	3.7
India	3.3
Philippines	3.0
China	2.1
Indonesia	0.9

Sources: UNESCO

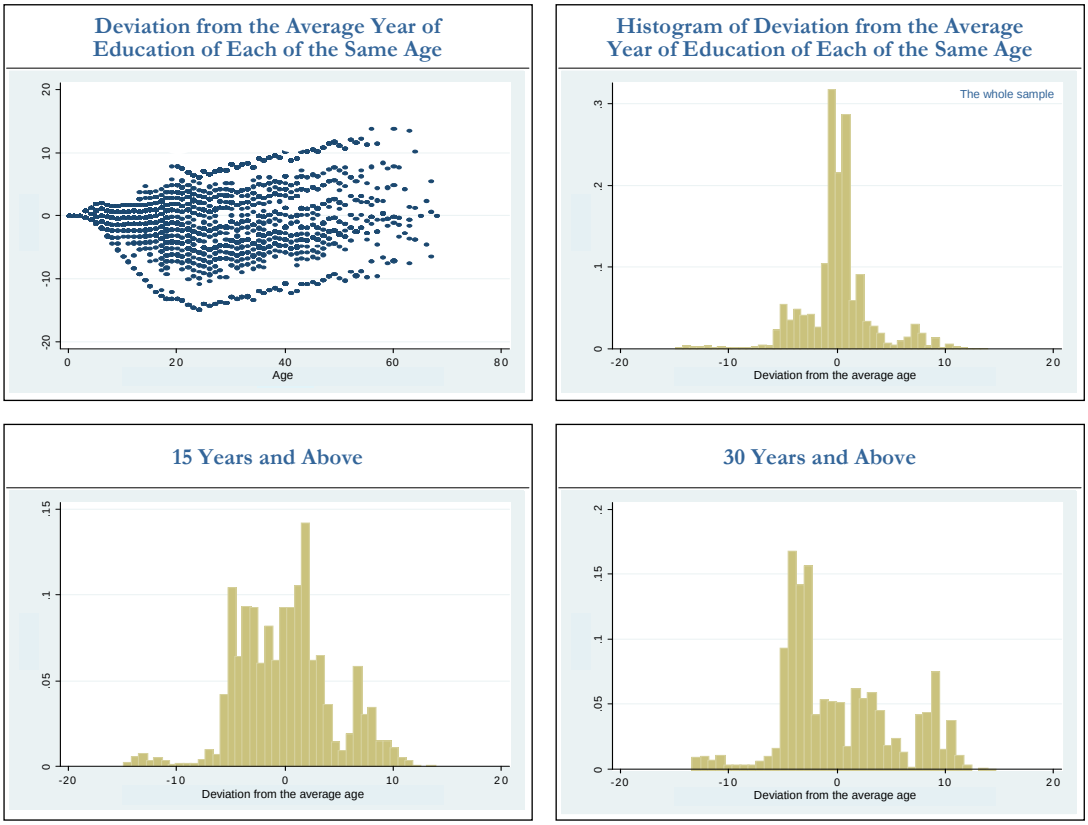
II.1 Shortcomings in our education system

Despite the steady improvement of our workforce in average years of schooling achieved over the past several decades, there are four important areas of shortcomings within the current education system. They are (1) the inequality of education attainment and low transition rate into high school and further, (2) the uneven quality of our schools, (3) the level of school readiness of our children, as well as (4) the rigidity of our higher education in responding to market demand for skills.

II.1.1 The inequality of education attainment

One of the most prevalent features of our education system is the persistent inequality of education attainment. There is a large variation observed within each cohort. Figure 5 illustrates the degree of inequality within each age group. Each dot represents the deviation of each person's level of education attainment from the average level of those within the same age. Owing to compulsory education, there is not much variation in the education attainment within each cohort up until Grade 9 (below 15 years). But, the variation starts to increase noticeably from 15 to 24 years. The inequality becomes even more evident at 30 years and above.

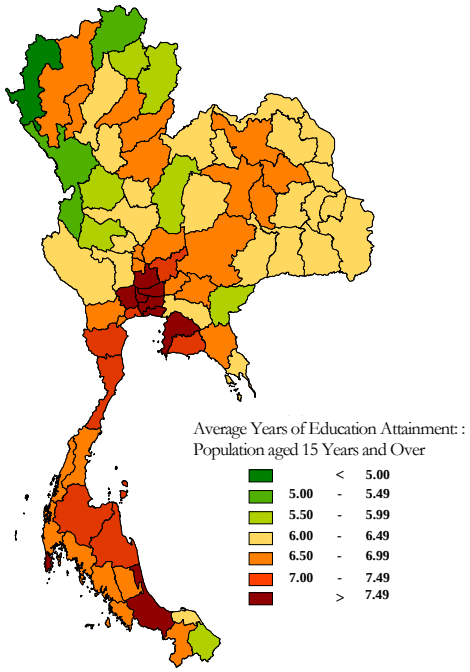
Figure 5: Deviation of Education Attainment



Source: NSO, SES 2004

Upon closer examination, what is troublesome is that the inequality in the education attainment level in Thailand appears to be systematic and concentrates in the rural areas, which account for more than 50 percent of our population. Figure 6 provides an illustrative map of average years of schooling by provinces. It indicates that the level of education attainment is highest in Bangkok and its vicinities followed by provinces in the South. And provinces in the north and northeast have the lowest level of average education attainment.

Figure 6: Average Years of Education Attainment: Population aged 15 Years and Over



Source: Ministry of Education

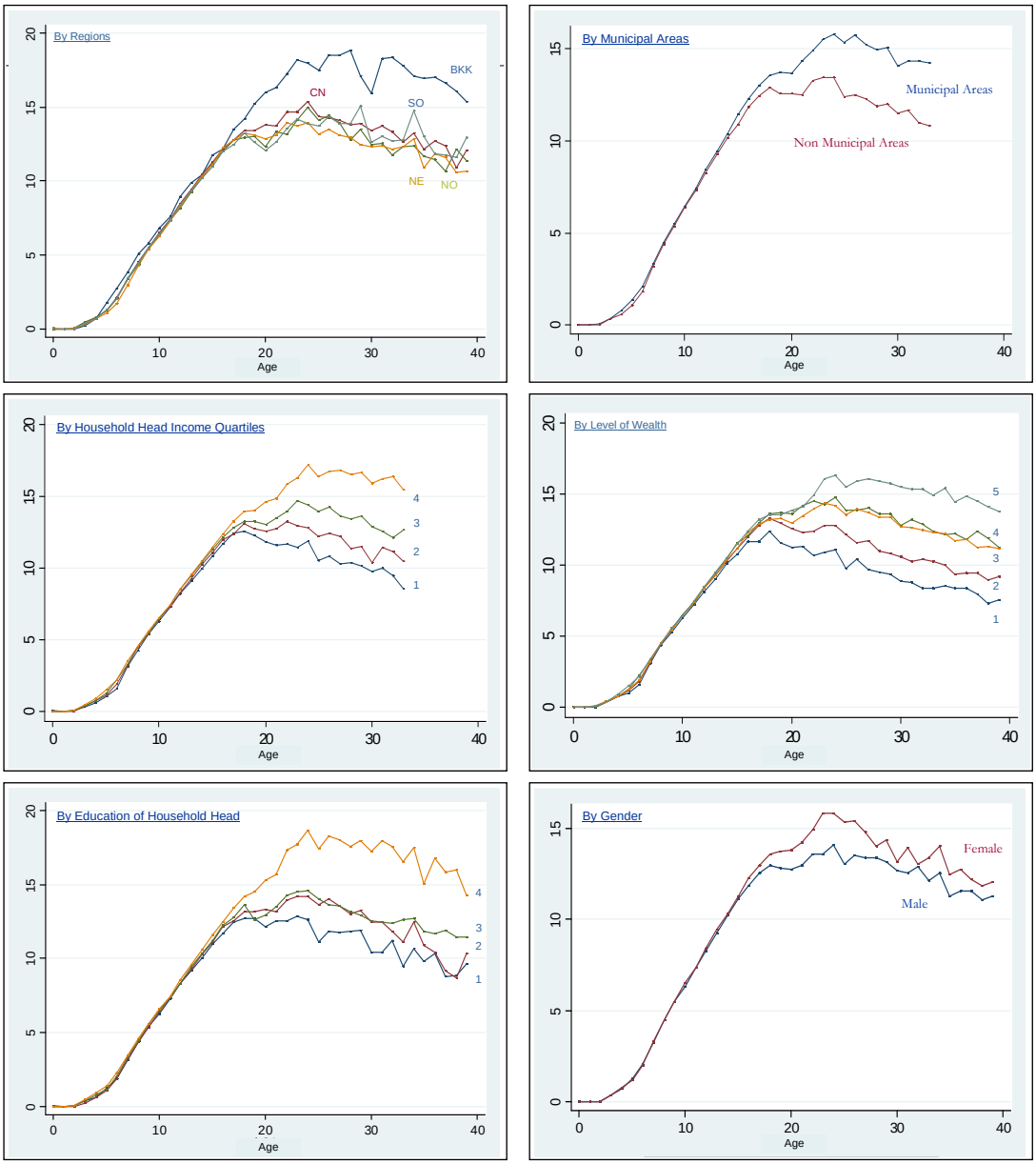
We utilize the SES data which provide characteristics of households and year of schooling of offspring within the household. Figure 7 shows average years of schooling of the offspring by regions, income, wealth, parents' education, and gender.

Bangkok resident have the highest level of education followed by those who live in the central and southern regions. Northeasterners have the lowest level of educational attainment. The divergence between Bangkok and the other regions can be of up to 5-6 years for some age group. In addition, within the same provinces, offspring in the municipal areas have consistently higher level of education attainment than those living outside. Female attains slightly higher average education than male in the last decade.

But the most striking difference between the levels of education attainment comes from the difference along income classes. We divide the households along 4 income classes and find that offspring of those with the lowest income rank achieve much lower level of education attainment. Similar results appear if we divide families based on household wealth.[5]

[5] Appendix 3 provides the method for calculating the household wealth index.

Figure 7: Inequality of Education Attainment by Household Characteristics



Sources: NSO, SES 2004

Factors associated with education attainment

What drives the observed deviation in education attainment? Our preliminary analysis of the data suggested that socio-economic background such as family income, family wealth, relative education level[6], and marital status of the household head as well as location factors.

[6] Education level of the household head is measured here as the deviation of the household head's years of schooling from the average years of schooling of the household heads of the same age. This is done given that the average education attainment varies systematically over time. Household head with secondary school education 60 years ago can be considered to be very well educated compare to his peer at the time and will have some effect on the years of schooling of his offspring.

Table 3: Difference in Characteristics of Top and Bottom Performers in the Deviation in the Level of Education Attainment from Peers (15 Yrs up)

Main Characteristics	Whole Sample	Offspring	
		Bottom 20%	Top 20%
1. Family Socio-Economic Background			
- Household Head Years of Education (Yrs)	6.4	2.9	7.7
- Total income of Household Head (Baht/month)	10,281	4,655	11,699
- Family in the Lowest Income Rank	17%	28%	3%
2. Other Family Characteristics			
- Single Parent Family (Widow)	23%	33%	25%
3. Location			
- Non-Municipal Area (Percent)	41%	57%	22%
- Bangkok (Percent)	6%	2%	16%
5. Others			
- Family engages in farming	24%	32%	6%
- Construction Workers	13%	18%	5%
- Clerical, Sales, and Services Workers	16%	13%	18%
- Employed Professional Workers	13%	2%	32%

Source: NSO, SES 2004 (Authors' Calculation)

Table 2 displays the family characteristics of those offspring age 15 years and up in the two top and bottom ends of the distribution of education achievement of the offspring. The education attainment is computed based on an individual deviation of years of schooling from her peers of the same age. We find additional evidence that indicate close relationship between socio-economic backgrounds of the families and the level of education attainment of the offspring.

The household head of the offspring in the bottom 20 percent of the distribution has less education and less income than the household head of those in the top 20 percent: 2.9 years of education versus 7.7 years. Monthly incomes of the household head of those offspring in the bottom quintile are much smaller as well: 4,655 baht per month against 11,699. In addition, 33% of the bottom-quintile offspring comes from families whose head of household is widowed, compared with 25 percent for the top quintile.

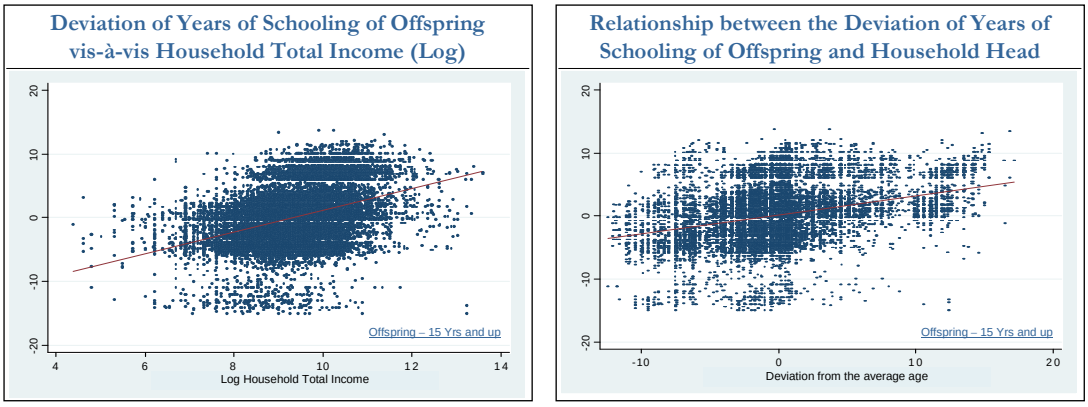
Location has a strong association as well. Fifty seven percent of for the bottom-quintile offspring live outside municipal areas and only 2 percent live in Bangkok, compared with 22 percent and 16 percent, respectively, for the top quintile.

Occupation choices of the family are also important. The bottom quintile of the offspring are associated more with those families which derive most of their income as farm owner, farm renter, farm worker as well as being construction workers. On the other hand, the top quintile is associated more with those families that reported that their family income is based on clerical, sales, and services work as well employed professional work.

Figure 8 provides additional insight into the relationship between the household socioeconomic condition and the offspring's level of education attainment. There is a positive correlation between the deviations of the education attainment of the household head from his peer with the same age, and the deviation of education attainment of the offspring with their peer with the same age. Closer inspection reveals further that if the household heads have greater level of education attainment, their offspring will likely to attain the same level of education as his/her peer of the same age. The same is also true for the case of the household with higher level of total income.

In sum, if the families have adequate resources, the children will be able to continue in his school as his peer does on average. In a way, if the household head has higher level of education attainment than his peer, his preference for more education may pass on to his/her offspring to some certain extent. And with greater resources, the household head will be in a better position to ensure that his/her offspring has education no less than those with the same age.

Figure 8: Relationship between Household head education and income level and offspring education attainment compare to his peers of the same age



Source: NSO, SES 2004

Given that these socio-economic factors are inter-related, the linear regression model as reported in Table 4 yields additional insights. The dependent variable of the model is years of schooling of the offspring while the dependent variables are the family socio-economic characteristics and the offspring own characteristics such as gender, age.

From the regression, we find that for family socio-economic status such as household income class as well as wealth contributes significantly and positively to the educational attainment. Offspring of families from the richest income quartile on average have additional 3.153 years of education compare to those from the poorest income rank. In addition, the level of education of the household head contributes positively and significantly as well, even after controlling the household wealth and income. This partly suggests parental influence on the offspring with respect to their taste for education.

Marital status of the household head is also important. Being single parents, either widowed or divorced reduces the offspring's years of education attainment by 0.70-0.75 years. Family size is also important: additional family members reduce the years of schooling of each offspring by 0.34 years.

Table 4: Linear Regression Estimates for Education Attainment for those Offspring with Age 20 Years Old and Up

Socioeconomic Survey (2004)

Variables	Coefficient	Base Unit	Survey Sample Mean Estimate
1. Individual Characteristic			
- Ages	-0.133***	-	31.02
- Male	-0.870***	Female	0.48
2. Family Socio-economic Background			
- Household Head Years of Education (Measured as deviation from peers)	0.133***	-	-0.67
- Household Head Income (log)	0.284***	-	8.22
- Household Wealth	2.421***	-	0.36
- Household Income Rank: First Quartile (Poorest)	-3.153***	Fourth Quartile	0.16
- Second Quartile (Lower Middle Class)	-2.333***	"	0.22
- Third Quartile (Upper Middle Class)	-1.240***	"	0.27
3. Other Family Characteristic			
- Family Size	-0.343***	-	4.85
- Widows	-0.705***	Married Couple	0.30
- Divorces	-0.745**	"	0.02
- Separated	-0.371	"	0.03
4. Location / Environments			
- Average Years of Education in the Village	0.179***	-	6.17
- Living in Non-Municipal Area	-0.575***	Municipal Area	0.41
- Living in Central	-0.713***	Bangkok	0.32
- Living in North	-0.755***	"	0.20
- Living in Northeast	-1.268***	"	0.26
- Living in South	-0.583***	"	0.16
5. Other factors: **Profession of the family**			
- Entrepreneur	-2.609***	Professional	0.23
- Farm (own)	-3.524***	"	0.14
- Farm (rent)	-3.849***	"	0.04
- Farm worker	-4.831***	"	0.06
- General worker	-4.373***	"	0.02
- Services worker (sales, clerical etc.)	-2.509***	"	0.17
- Construction worker	-3.7.9***	"	0.13
- Pensioners (incl. retired public officer)	-3.342***	"	0.09
- Properties income earner	-3.246***	"	0.01

Number of observation: 10,360
Number of Jangwat: 76; Number of blocks/Villages: 3639; $R^2 = 0.4020$

Note: ***,** and * denote 1, 5, and 10% Significance levels, with heteroskedasticity-robust standard errors controlling for survey sample design

The location where the family lives is also important. Being in the rural areas is associated with lower years of educational attainment. In particular, if we compare the families of similar characteristics who live in the Northeastern region and in Bangkok, the offspring of those families in the Northeastern region have 1.268 years of education less than the offspring of those who locate in Bangkok.

Family's primary occupation contributes strongly to the educational achievement of its offspring. Being a farmer reduces the number of years of schooling of the offspring by 4.8 years of schooling compared to the offspring of professional workers. Offspring of land-owning farmers do better than offspring of land-renters and farm workers. Offspring of general workers and construction workers also do not do well, with the penalty being in the same order of magnitude as the offspring of farmers.

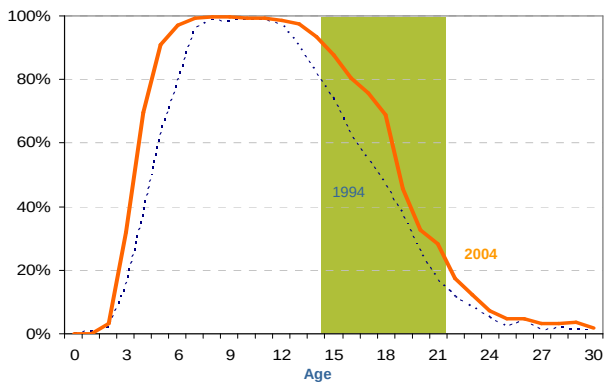
As for individual characteristics, female have roughly 0.87 years of schooling more than male. Age contributes negatively to the year of educational attainment which captures the observed overall improvement of our education system that has been occurring over the last 60 years (the estimate was around 0.133 years per each passing years –similar to what we calculated from the simple time trend of average years of schooling of each age group as in p.4).

In sum, these results from our linear regression not only confirm the importance of the family characteristics in the determination of the offspring's education achievement, but it also indicates that the problem of inequality in education is concentrated in some specific group of our population, especially those in the rural areas, in the Northeastern region, in the lowest income class, who work in the agricultural and construction sectors. With this, we now turn to the next important question that will help us understand the existing inequality in our current educational system.

Why some people decide to leave school early and who are they?

The SES data indicate that the proportion of offspring who attend schools reaches 99 percent during the compulsory education period, i.e. up to 14-15 years old. However as the students reach the age of 14, the proportion of those who continue attending schools begin to drop sharply till the age of 24. (We observe the same pattern

Figure 9: Proportion of Offspring who Attending School in Each Age Group in 1994/2004



Source: NSO, SES 1994 and SES 2004

in 1994. However, in 2004, as a result of continued education reforms, greater proportion of offspring of all age groups attended schools.) In fact, it is these differences in the decision of household whether to let their offspring continue in school during the ages of 14-21 years old that give rise later on to the observed variation in the level of education attainment in the general public. So, if we would like to lessen the problem of inequality in educational attainment, it is important to begin by asking why some people decide to leave school early and who are they?

In answering this question, we employ a logistic regression analysis for offspring between the ages of 14-21 years old, with the dependent variable being their school attendance which reported in the SES data. From our analysis, we find that the probability of being in school depends on similar socioeconomic factors as reported in the case of years of education attainment.

There are some important differences, however. First, for household income rank, being an offspring from the family in the poorest income rank significantly reduces the chance of continuing in school as compared to all other income classes. This suggests the possibility of some forms of financial constraints for the very poor people.

Second, household wealth contribute positive and significantly to the probability of continuing in school.

Third, as for the occupational choices of the household, offspring of construction workers have lower chances of continuing in school during the age of 14-21 than any other occupation choices. This is followed by the case where household heads work as general workers, farm workers, and service workers, in that order. Interestingly, while being farm owner reduces the average years of education attainment in similar magnitude as the case of construction and farm worker (compare to the baseline case of professional worker), the problem for their offspring is not as severe as in the case of farm workers.

Fourth, location is also important determining factors. Living in the non-municipal areas is associated with the chance of leaving school early. Furthermore, living in the northeastern region reduces the probability of continuing in schools more than being in other regions, following by being in the central and southern regions. Note that, the chance of continuing in school for offspring in families in the northern area is not significantly different from the case of Bangkok, despite the fact that the northern region has much lower level of average education attainment.

Fifth, living in the villages where people have higher educational attainment than average also raises the probability of the offspring continuing in school. This effect may come from the fact that these villages have better schooling systems. It may also be the case that in the presence of other well-educated families encourages the family to continue sending their offspring to school.

Sixth, as for other family characteristics, living in large families reduces the chance of continuing in school. In addition, marital status of the parents also matter: single parent (a widow) also reduces the chance that the offspring continuing in school.

Finally, individual characteristics matter, being male is associated with leaving school early and older offspring have higher chance of leaving school.

Table 5: Logistic Regression Estimates for Probability of continuing School for Sample Group of age between 14 and 21 Years old

Socioeconomic Survey (2004)

Variables	Marginal Effect	Base Unit	Survey Sample Mean Estimate
1. Individual Characteristic			
- Ages	-0.114***	-	17.08
- Male	-0.059***	Female	0.49
2. Family Socio-economic Background			
- Household Head Years of Education (Measured as deviation from peers)	0.031***	-	-0.64
- Household Wealth	0.288***	-	0.31
- Household Income Rank: First Quartile (Poorest)	-0.043***	Fourth Quartile	0.18
- Second Quartile (Lower Middle Class)	-0.008	"	0.26
- Third Quartile (Upper Middle Class)	-0.005***	"	0.29
3. Other Family Characteristic			
- Family Size	-0.017***	-	4.42
- Widows	-0.046***	Married Couple	0.12
- Divorces (only 226 observation)	0.002	"	0.02
- Separated (only 316 observation)	-0.007	"	0.03
4. Location / Environments			
- Average Years of Education in the Village	0.010***	-	6.60
- Living in Non-Municipal Area	-0.031***	Municipal Area	0.39
- Living in Central	-0.079***	Bangkok	0.30
- Living in North	-0.018	"	0.19
- Living in Northeast	-0.097***	"	0.26
- Living in South	-0.066***	"	0.18
6. Other factors: **Profession of the family**			
- Entrepreneur	-0.049***	Professional	0.24
- Farm (own)	-0.056***	"	0.13
- Farm (rent)	-0.080***	"	0.04
- Farm worker	-0.202***	"	0.06
- General worker	-0.208***	"	0.02
- Services worker (sales, clerical etc.)	-0.159***	"	0.16
- Construction worker	-0.220***	"	0.13
- Pensioners (incl. retired public officer)	0.087***	"	0.12
- Properties income earner	-0.041	"	0.01

Number of observation: 11,903
Number of Jangwat: 76; Number of blocks/Villages: 3639; Pseudo $R^2 = 0.3109$

Note: ***,** and * denote 1, 5, and 10% Significance levels, with heteroskedasticity-robust standard errors controlling for survey sample design

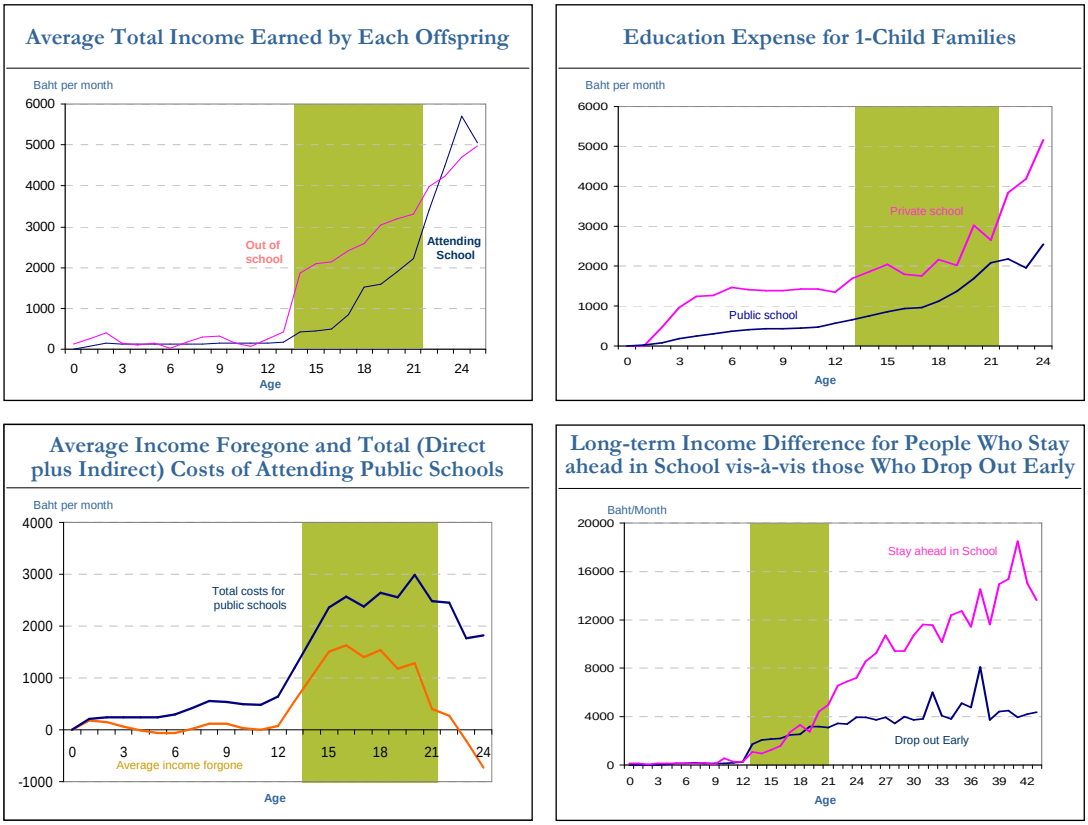
Opportunity costs of going to school

The fact that male and older offspring have higher chance of leaving school suggest another important explanation for the fall in the proportion of school attendance during the age between 14-21 years: the opportunity costs in term of forgone wages and the direct cost of education itself. As children enter the age of 15 years, not only have they finished compulsory education, but they are old enough to enter the labor market either part time or full time.

We compute the opportunity cost of attending schools from the SES dataset, and find that if the offspring decide to quit school at age 14, they would earn an average of 1,860 baht/month, or roughly 1,450 baht/month more than those who continue to attend school and invest further into their education.

As they age, their income would rise to 4,000 baht per month by the age of 22.[7] When we compare income earned by those who quit school earlier to those who decide to continue their schools and receive part-time income, the difference is high at the beginning but closing up by the age of 22 years, indicating that leaving school early only result in higher income for only 6-7 years period only. Evidence indicates that those who leave school earlier and thus end up in the lowest quintile of education attainment distribution will usually suffer in the long run, compared with those who stay on and studying further. In particular, by the age of 40, the difference between the incomes of the two groups can be as large as 300 percent.

Figure 10: Indirect and Direct Costs of Attending Schools



Source: NSO, SES 2004

[7] Note that the opportunity cost for offspring of farm operators on average is roughly half of the national average at all ages between 14-21 years old, reflecting the lack of productive possibility in the rural areas.

There is also a direct cost of schooling and school lunch for the offspring. From the survey data of educational expenditure, the cost of sending offspring to private schools during the primary school is roughly 1,400 baht per month for the average family. And it rises quickly as the offspring enter high school and university levels where cost can reach as large as 4,000 baht/month for the offspring with the age of 22 years. The cost for the public school follows similar pattern, but it is around 1,000 baht less for the average family.

As a result, sending offspring to a public high school would cost the family directly and indirectly around 2,500 baht per month, increasing from around 1,500 baht per month for lower secondary schools. This is partly why *some* families, especially poor families, find sending offspring to high school costly and decide to stop attending instead.

Interestingly, these decisions by household to stop sending offspring to schools seem to be dominated by short-term gain or cost saving consideration during the offspring's age of 14-21 years. The fact that continuing in schools will yield more income later on (which can be as large as three times more each month) and that the problems are found to concentrate in the case of offspring of the poorest families suggests the presence of some form of financial constraints problem.

II.1.2. The uneven quality of the education system

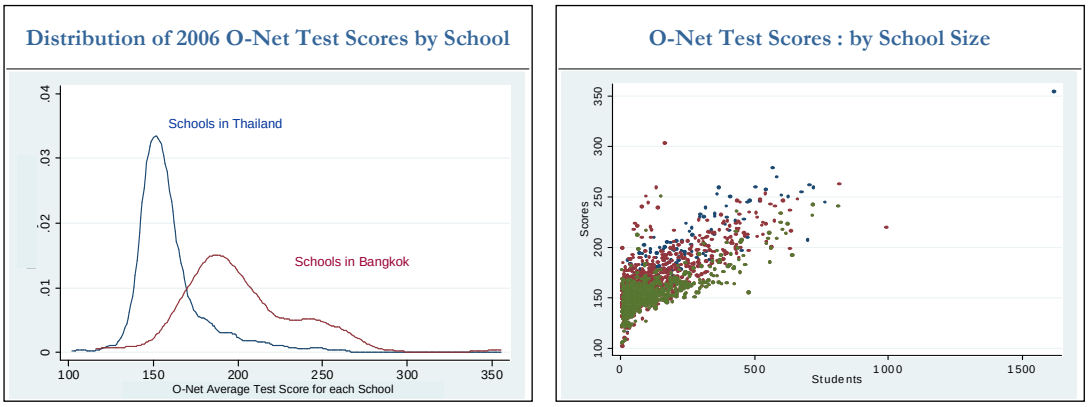
In addition to the problem of inequality in the level of educational attainment mentioned in the previous section, there is a serious problem of uneven quality of our education.

In 2005, there are a total of 38,331 education institutions in Thailand, with a total of 14.44 million students and 651,801 teachers. Despite the often reported statistics that our compulsory education has been quite successful in getting almost all the children (around 99 percent of those in the relevant ages) to attend school up until Grade 9 with low level of student dropout (averaged at 1.9 percent for Grade 1- 12 in 2005), some of those students who graduate from our schools have substandard quality of education.

O-Net test

According to the recent data from the O-Net, taken by 254,472 students from 2,598 high schools around Thailand in 2006 (under the supervision of the Office of Basic Education Commission), there is a wide variation in the scores, with the school-average scores ranging from 102.2 to 355.6. By region, high-schools in Bangkok having the highest average scores of 201.55 points (out of the total of 500 points) following by high-schools in the central, south, north, and northeast regions at 164.3, 162.8, and 162.4 points, respectively. While the northeast region account for 43 percent of all high-schools in Thailand, these schools scored the least at 152.9 points, almost 10-12 points below the achievement of high schools in other regions.

Figure 11: O-Net Test Scores by Regions and School Size



Source: O-Net Test 2006

If we approximate the school size with the numbers of students who took the O-Net test, we find the test scores are positively correlated with school sizes. Most schools in Bangkok are of large size and perform quite well with the exception of 6 out of 118 schools that have average-scores below the sample mean of 160.2 points. (These are small schools with an average of 24 students taking the O-Net test.) On the other hand, schools in the northeast region have much lower scores than schools of the same size in other regions. Quick multivariate analysis, given the available parameter, reveals that being a school in the central, south, north and northeast region is associated with a reduction of test scores of 17.8, 17.8, 19.6, and 27.2 points, respectively, compared to schools of the same size in Bangkok. Furthermore, an increase school size of 100 students is associated with an increase in O-Net test scores of 13 points, controlling for the region variables. This indicates that small schools often associated with the production of substandard graduates.[8] It also suggests that in our policy section below we should give some considerations to the issue of school size (scale) and come up with some policies that will help consolidate or increase efficiency of small schools in the countryside.

PISA test scores

Thus far, we have been using the SES data to examine the relationship between the human capital accumulation process of offspring and their family/community characteristics that form the important environment to that process. Nevertheless, one of the most important inputs into human capital accumulation is schools, especially the formal schooling system.

The 2003 OECD Program for International Student Assessment (PISA) provides us with a rich source of information that will help us understand how school, family and student characteristics interact and together produce the skills that are embodied in our offspring. The variables in this database encompass not only student and family characteristics, but it also includes data on school characteristics and resources as well as students' attitude toward learning.

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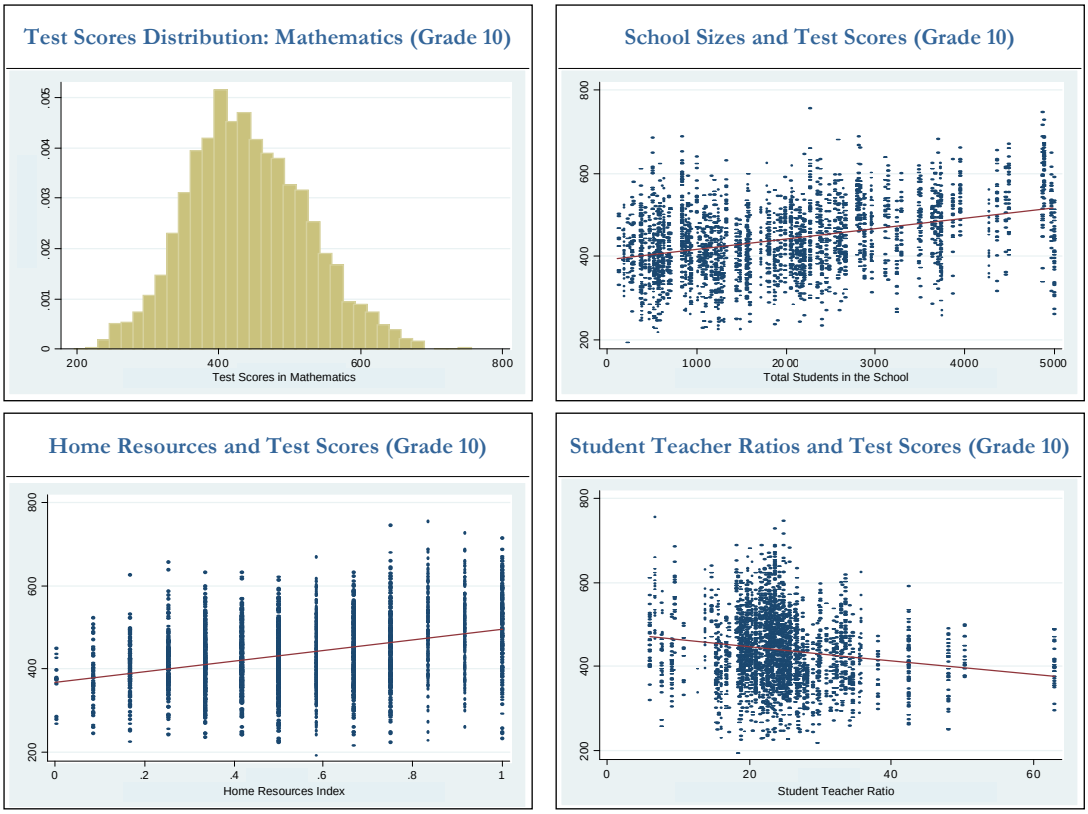
[8] Note that the positive correlation between the size of school and test scores might represent several factors beside the school size and resources (such as number of buildings, number of faculties, quality of faculties and other important facilities), it may also reflects the quality of the students. Good students may self-select themselves to school with good scores and thus help raise the average score of the school. So, the impacts reported above should be taken with care and regarded as a first approximation.

Figure 12: PISA 2003 Test Scores - Mathematics



Source: PISA 2003

Findings from the 2003 PISA Test[9] for 5,236 15-year old students from 175 schools around Thailand confirms our earlier findings that students from small schools tends to perform worse than their peers from larger schools, and schools in the rural areas and small towns usually perform worse than those schools in the city areas.[10]

Since 15-years old students who take the 2003 PISA test may be in Grade 9 and Grade 10 at the time of testing, we find systematic variation in their test scores: those with 1 more year of education having higher test scores of roughly 40-50 points. Thus, in some part of our analysis below, we restrict our samples only to those who attend Grade 10 at the time.

Before we conduct multivariate regression analyses, quick data examination reveals further that there exist some associations between students' scholastic achievement (as measured by test scores) and (1) school characteristics such as size of the school and student/teacher ratio, (2) students' family characteristics such as his home resources and (3) students own characteristics such as his attitudes.

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[9] The OECD conducts PISA tests every 3 years with the first test given to the students in the OECD countries and several partner countries. For Thailand, more than 5,000 students took the test in 2003.
[10] PISA covers four subjects (Mathematics, Sciences, Problem Solving, and Reading), subject scores are highly correlated. And given that 2003 PISA focuses on students' mathematical achievement and attitude concerning mathematics, we focus our analysis mainly on the mathematics test scores.

Table 6: Differences in Characteristics of Top/Bottom Performers in Test Scores

Main Factors	Whole Sample	Groups of Students	
		Bottom 20%	Top 20%
PISA Test Score			
- Mathematics	423	328	564
1. School Factors			
- School Size	1,718	1,471	2,785
- Student to Teacher Ratio	23.5	25.2	21.6
- Studying in School in big cities (1 million up)	17%	8%	35%
- Studying in School in villages (less than 3000)	15%	23%	4%
- Schools Resources: having enough qualified teachers in Mathematics	42%	38%	53%
- Schools Resources: having "adequate" library	53%	34%	74%
2. Family Factors			
- One parent has education at least university level	20%	8%	42%
- At least one parent is working in full-time job	63%	53%	76%
- Living with brother, sister, cousin, grandparents	38%	30%	53%
- Home Resources : Number of books	66	51	128
3. Student Characteristics			
- Hours spent doing homework per week	7.1	5.3	10.6
- Never arrive late for school in the last 2 weeks	70%	62%	76%
- Attending kindergarten for more than one year	76%	67%	88%
4. Other Factors: Student attitudes			
- Strongly disagree that "school is a waste of time"	59%	51%	63%

Source: PISA 2003, Authors' Calculation

If we divide the students into quintiles based on their mathematics test score, Thai students in the top quintile have on average a score of 564 points, compare with an average score of 328 point for those in the bottom quintile. Table 6 provides an analysis of the difference in the characteristics of these two groups of students.

For school characteristics, school size has some association with test score. For students whose scores are in the bottom quintile, their average school size is around 1,471 students and for the top quintile, their average school size is around 2,785 students. Student to teacher ratio also differs between the two groups with larger average ratio of 25.2 students to teacher for those in the bottom quintile and 21.6 students to teacher for the top quintile. Whether school is in big cities or not is also important: 35 percent of the top scorers are in big cities, whereas for the bottom quintile, only 8 percent are from big cities. Other school resources are important as well such as having adequate library and sufficient qualified teachers.

For family factors, parent education also positively correlates with test scores of their offspring: 42 percent of the top quintile came from the families that at last one of the parents has university education or degrees, compare with only 8 percent for the bottom quintile. Other important family factors are availability of home resources such as number of books or computers at home.

In addition, students' own characteristics are also important. For instance, their love for studying is associated with higher test scores, with the top quintile spending 10.6 hours on the homework per week, compared with 5.3 hours for the bottom quintile group. Other positive factors are the students' preparation during the kindergarten period. Eighty eight percent of the top quintile spend more than one year in the kindergarten compare with only 67 percent of the bottom quintile.

How are test scores associated with inputs?

Multivariate regression analyses of the PISA 2003 data with the test scores for mathematics for Thai students in Grade 9 and Grade 10 as dependent variable[11], yield further insights on the relationship between test scores and the characteristics of schools, families and students.

First, among the school characteristics, school sizes and its location are quite important. Schools with larger size are associated with higher test score. Without the presence of school size variable, going to schools in the village, small town, town, and city will result in less test scores of 43, 40, 27, and 25 points respectively, compared with going to school in city with more than 1 million population such as Bangkok. But since school size correlates closely with school location, once we control for the school size variable, school location becomes less important and less significant as reported in Table 7.

Other important school characteristics are the availability of the school resources for learning purposes such as library, textbooks, computers, science laboratory, etc. The index of school resources is positively associated at 10 percent significance level with the test scores[12].

Second, for family characteristics, parents' occupation as full-time workers and parents' education (at least at a university level) are helpful in improving test scores of the offspring who attend Grade 9-10. Other important variables are the availability of books at home and the home resources index[13]. In addition, students living in large family that include the presence of brothers, sisters, cousins, and grandparents have higher test scores.

Third, for student characteristics, their discipline in studying such as hours spent on studying per week and hours spent on tutoring are also associated with higher scores. Interestingly, student preparation as measured by the amount of time spent in kindergarten is also significantly correlated with higher scores, if the students spent more than one year in the kindergarten school.

These results together suggest that the outcomes of the education system in term of what the students learn and absorb at school and are able to perform in scholastic tests are byproduct of several interacting factors that include not only school resources, but also home resources, parenting, as well as students' own determination and motivation to succeed in schools. The problem of unevenness of the quality of our education likely has the root cause in the inequality in family inputs and school inputs. In some sense, education inequality is also income inequality.

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11 We analyze the relationship between test score and its determinants using pv1Math from PISA 2003.
12 If the school size variable is removed from the regression, school resource variable is significant at 1%.
13 The index is constructed from variables such as availability of study desk, own room, quiet place to study, internet, calculators, computer, educational software, dictionary, classical literatures, book of poetry, books to help with your school work, etc.

Table 7: Linear Regression Estimates for Students Test Scores in Mathematics
PISA (2003)

Variables	Coefficient	Base Unit	Survey Sample Mean Estimate
1. School Characteristics			
- School size	0.015***		1,718
- Student to teacher ratio	-1.23***		23.5
- Math quality teacher index	19.63**		0.82
- School resource index (Material)	-11.52*		0.62
- Number of computers to student	2.27***		5.34
- Compare result with other school (competitive pressure)	9.00***	No comparison with other school	0.60
- Assess teachers by student's test	8.13**	No assessment	0.93
- Assess teacher by external inspector	6.15***	No assessment	0.52
2. Other school characteristics			
- Public school	17.98***	Private	0.89
- Location: village	-10.42*	Large city	0.23
- Location: small town	-14.28***	"	0.18
- Location: town	-6.10	"	0.31
- Location: city	-15.04***	"	0.15
3. Family Characteristics			
- One of the parent finished high school	0.63	Lower than Grade 9	0.10
- One of the parent has university degree	22.98***	"	0.16
- One of the parent working full time	-0.343***	Working Part-time	0.59
- Large family (brother, cousin, grandparent)	16.40***	Single family	0.22
- Home resources index	14.82**		0.54
- More than 100 books at home	8.36**	Less than 100 books	0.09
- More than 200 books at home	19.56***		0.04
- More than 500 books at home	34.02***	"	0.02
4. Student Characteristics			
- Male	7.39***	Female	
- Hours spending on studying per week	1.51***		8.77
- Hours spending on tutoring	0.74**		2.10
- Grade 10	18.46***	Grade 9	0.55
- Repeat class	-33.40***	Never repeat class	0.02
- Attending kindergarten less than 1 years	4.56	Never attend	0.20
- Attending kindergarten more than 1 years	13.57***	"	0.75
5. Others factors			
- Good peers in mathematic classes	85.69***		0.71
- Teacher enthusiasm index	55.56***		0.79
- Attitude toward school index	30.97***		0.81
- Attitude toward class index	19.42**		0.70

Number of observation: 4,442
Number of School: 175 ;R^2 = 0.3552

Note: ***,** and * denote 1, 5, and 10% Significance levels, with heteroskedasticity-robust standard errors controlling for survey sample design

How competitive is our future labor forces? Evidence from test scores

It is informative to compare our students' PISA test scores with those of other countries to gauge the level of competitiveness of our future labor force.

As mentioned earlier, the performance of Thai students in term of test scores differ greatly between those who study in the rural areas and those who are in large cities such as Bangkok. Figure 13 provides the summary of the finding in term of Thai students ranking vis-à-vis students from other selected countries.[14] First, the average test score of Thai students is still below OECD average in all areas and we rank 38-39 from 43 participating countries.

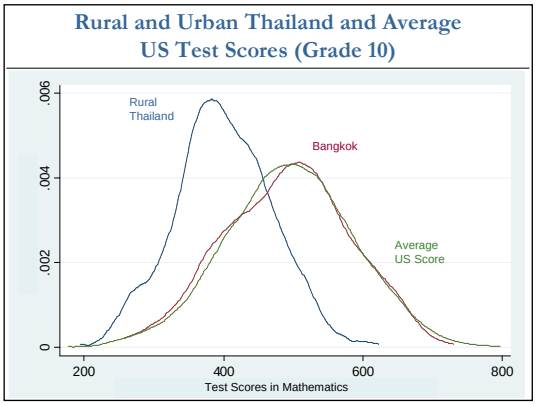
Second, comparing the quality of education in Thailand to the US, we find that students in Bangkok perform as well as students in the US, distribution-wise. In other words, going to schools in Bangkok produces similar result in term of PISA test scores, as going to an average school in the US. However, our rural schools which currently serve a large proportion of our children still lag much further behind the average US school.

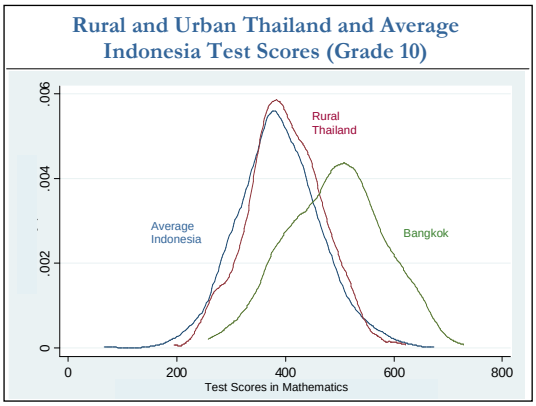
Third, comparing ourselves with four Asian competitors such as Korea, Japan and Indonesia, we find that the score distribution of Bangkok students lags behind those of Korea and Japan. Nevertheless, Indonesia's test score distribution for the whole country looks roughly the same as that of students in rural Thailand.

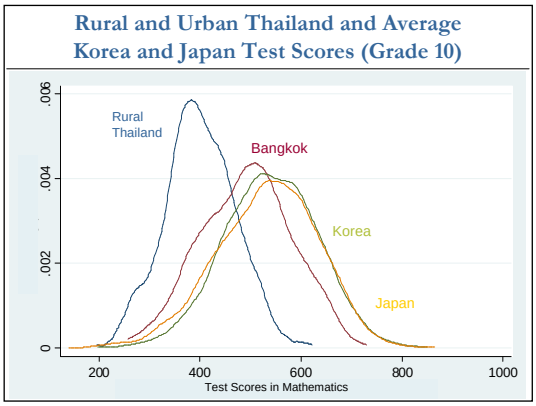
Figure 13: International Comparison of PISA Test Scores

PISA Students' Test Scores

PISA 2003	Literacy	Math	Science
Korea	534	542	538
HK	510	550	539
OECD Average	494	500	500
Thailand	420	417	429
Indonesia	382	360	395
Ranking	**38/43**	**39/43**	**39/43**







Source: PISA 2003

[14] Note that the 2003 PISA test does not cover countries of our interest such as China, India, and Malaysia since they are not a member of partner OECD countries.

II.1.3 The level of school readiness of our children

Associated with the problem of the uneven and substandard quality of education during the basic education process, is the problem of the readiness of our children in taking in and absorbing lessons from their schools and teachers. On this particular issue, the formative years, the pre-schooling period, are the most important and family environments prove to be critical input. Heckman (1999) wrote that:

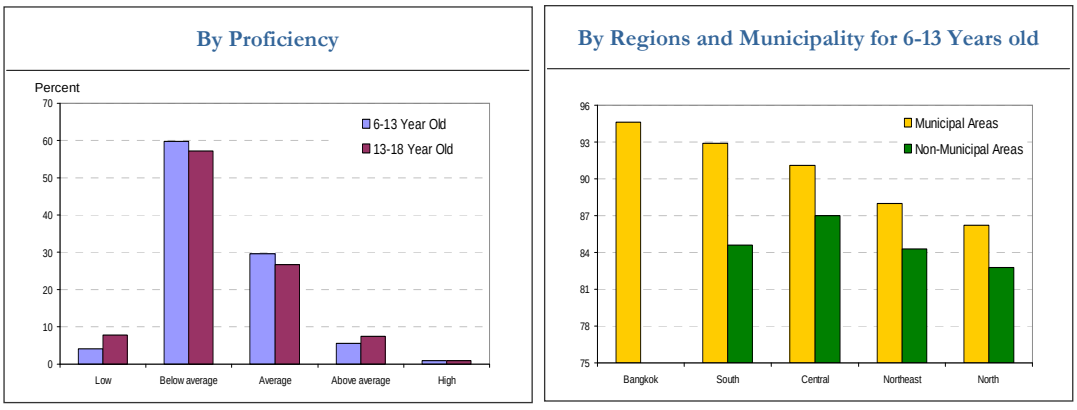
> "Learning starts in infancy long before formal education begins and continues throughout life. Recent research in psychology and cognition demonstrates the vital importance for skill formation of the early preschool years when human ability and motivation are shaped by families and non-institutional environments. Success and failure at this stage feed into success or failure in school which in turn leads to success or failure in post school learning. Early learning begets later learning and early success breeds later success just as early failure breeds later failure."

In the case of Thailand, a recent research on the cognitive development of our children and adolescents between 1 and 18 years and the correlation between the children's cognitive development and affecting factors such as child-rearing practice by Ruangdaraganon, et al. (2006) indicates that:

> "…during the first few years of early childhood period, Thai children's development was commensurate with their chronological age referring to western standard. As the children are older, their cognitive development was more behind. … The total of 3,135 six to twelve years old children, who were tested, had the mean intellectual quotient (IQ) of 88.0 (with standard deviation of 12.6). While 64 percent of the children had IQ less than the normal range of 90-110, only 6.4 percent had IQ above the normal range."

Interestingly, Figure 14 indicates that the intellectual quotient of children age 6-13 and 13-18 years are quite similar in term of their distribution of proficiency with more than 60 percent of children in both age groups having IQ less than the normal range. This suggests that cognitive ability as measured by IQ scores are set early before adolescence. Furthermore, when we examine the IQ scores by regions, we find that those in Bangkok have the highest average scores while those in the northeastern and northern areas have the lowest average scores. Those who live in the non-municipal areas have lower scores than those in the municipal areas. Moreover, those from the poor families also have lower IQ scores.

Figure 14: Intellectual Quotient of Thai Children by Proficiency and Regions



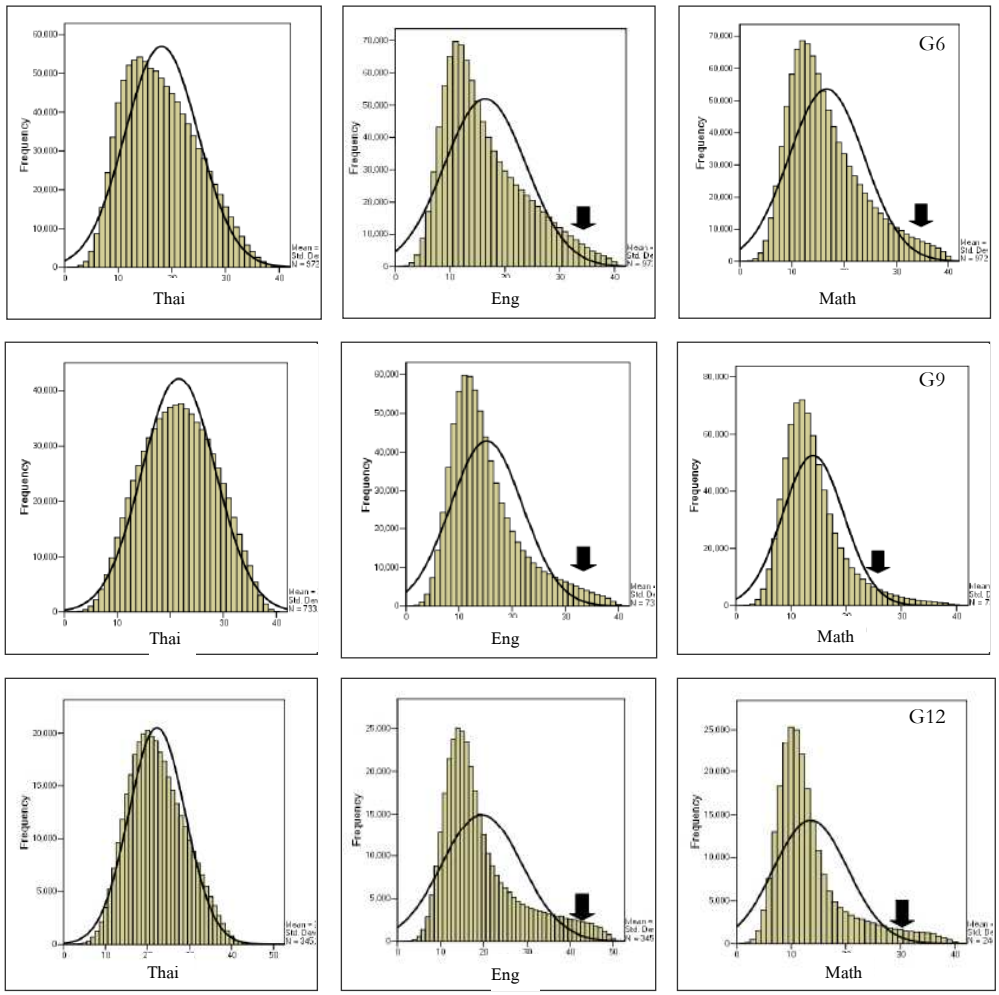
Source: Ruangdaraganon et. al. (2006)

These findings have much implication for our policymakers since it is consistent with the observed low O-Net and PISA test scores in the rural areas of Thailand, especially in the north and the northeast regions as well as the observed low educational attainment for those in the poorest income rank. It is possible that substandard educational achievements of some of our offspring are part and parcel of the relative impoverished environment in the period before they enter primary schools. Policies that aim to improve only school environments and teacher qualities but not their pre-schooling experience may not succeed in letting our children reach their full potential at birth.

GAT test scores

The test scores from the 2003 General Achievement Test (GAT) of the Ministry of Education also points to another related problem. As students pass through the education system, each step of their education also lays the foundation for the next steps. If the foundation is not well laid, then it will be difficult to move on effectively and the problems will aggravate overtime. Figure 15 illustrates the GAT test score of students from Grade 6, 9, and 12. It indicates that for Thai as a subject that has been well taught in Grade 6, students are well positioned for more advanced learning in Grade 9 and 12. When the students take another GAT test on this subject in Grade 9 and 12, their scores continue to conform to a normal distribution as expected.

Figure 15: Result of 2003 General Achievement Test for Grade 6, 9, and 12



Source: Ministry of Education

Compare this successful case to the case of English and Mathematics where a good portion of students were found to be not very well taught in both subjects as early as in their Grade 6. Once these students move further to more advanced lessons in higher grades, their lack of firm foundations in Grade 6 will prevent them from absorbing and learning the subjects effectively. This helps explain why the test scores in English and Mathematics for students in Grade 9 are again found to be tilted further in the same direction as found earlier in Grade 6. Even a larger portion of students have difficulties with both subjects by the end of their lower secondary schools. And this problem becomes even more pronounced once the students take the test again in Grade 12.

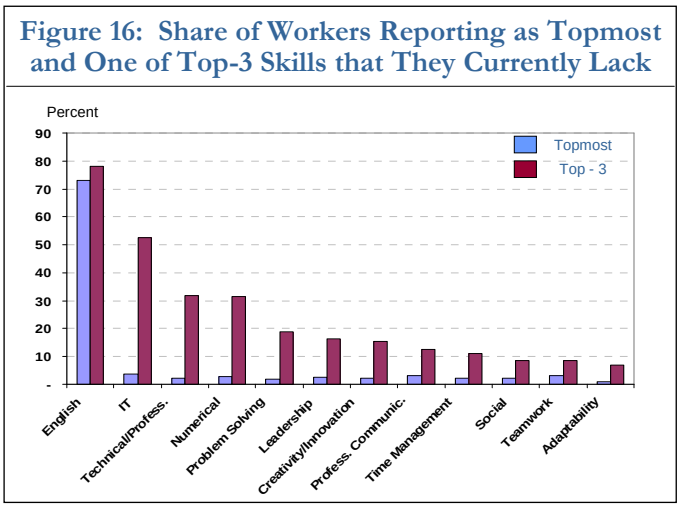
This together indicates that quality education should begin from the early years and throughout, from the beginning to the end (i.e. from Grade 1 to Grade 12 and beyond). Failure to do so earlier will resulted in more deficiencies later. Thus, the quality of the education during the early years of schooling must receive more attention from the policy maker as they discuss their educational reform. Unless poor quality of early education is resolved, the problem of substandard education will likely persist over time.

II.1.4 Skill mismatch and rigidity of the education system

The other major shortcoming in our education system is that of the rigidity of our education system in responding to the need of the workplace and the shortages of skilled labor. There are several evidences for this shortcoming.

First, according to the Private Investment Climate Survey (2004), workers who graduated from our schools and higher education institutions, continue to lack several critical skills that are needed in the workplace. From the survey, workers reported English as the skill that they lack the most. Specifically, seventy two and seventy eight percent of the workers report English as the topmost and one of the top three skills that they feel that they lack. IT ranks second, following by technical skills and numerical skills. Furthermore, the survey on the managers also yields similar finding. A large proportion of the Thai managers rank Thai professional and production workers as having poor skill in English, IT, numerical and creativity as well as having poor non-cognitive skills such as leadership, social and professional communication.

Figure 16: Share of Workers Reporting as Topmost and One of Top-3 Skills that They Currently Lack



Source: PICS 2004

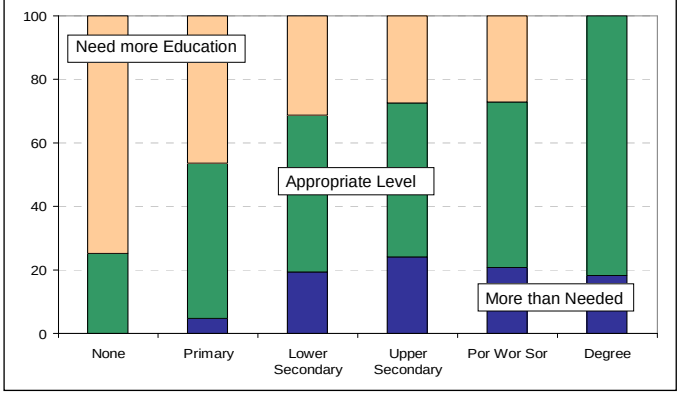
Second, once firms are asked whether they have difficulties filling their vacancies, a large portion of managers reported the lack of appropriate basic and technical skills as one of their main reasons for not hiring.

Third, as already mentioned earlier, according to the survey, managers rank lack of skill and education of the available workers as their topmost current concern.

Fourth, a sizable portion of current workers feel that their current level of education is not adequate for the task that they are working at and more skills are needed, especially those who have no education and primary education.

This evidence points to the fact that our current education system still does not produce sufficient graduates with the skills required by the workplace. This rigidity may be partly the result of our current system of education from the lower levels to the university level that produce students based on the availability of teachers and professors and according to prescribed curriculum. It is this (quality) supply rigidity that prevents our education system from responding flexibly to the rising demand for certain profession and skill in the marketplace.

Figure 17: Share of Workers Reporting Mismatch Between Job Requirements and Their Education



Source: PICS 2004

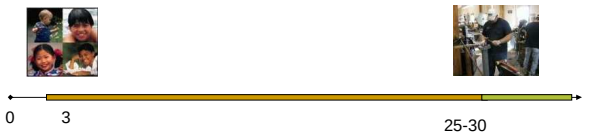
II.2 Summary of the shortcomings in our education system

So far, we have been identified four important shortcomings that cut across various stages of our education system. But, as we try to find solutions for our problems, it is important to point out that at the magnitudes of these four problems do vary as we move along from pre-schooling to university level.

During the pre-schooling period, the question of children health and nutrition is the most important. During the period of compulsory education, enrollment is not the problem since almost all students attend school: what is most pressing is the question of uneven quality of the education. There are large disparities between the test performance of each student and each school. What is most worrisome is that this disparity is systematic with low scores concentrated in the rural areas and those with poor socioeconomic status.

Furthermore, as students enter the high school period, there are additional problems of inequality of access and education attainment with some of our children decide to stop attending school early and go to work instead. It is the divergence of education attainment in this particular period in our offspring's lives that later result in the inequality of the education attainment in the population. A vicious circle may continue for generations. So, in the high school period, not only the problem of quality of education is still present as ever, but there are new pressing concern that some of the students decide to leave school early. And some of them do for reason of financial constraint.

Figure 18: Summaries of the Areas of Shortcomings in our Education System



Main Problems in each stage of human capital formation

Pre-schooling	Compulsory Educ.	High Schools	Degrees
• Poor nutrition and upbringing • Lead to Poor Foundation for Subsequent Education	• Uneven and Substandard Education	• Inequality of Education Attainment	• Rigidity and inadequate responsiveness to market Demand

Finally, as we move on to the vocational and university levels, the rigidity of the education system and the low responsiveness to market demand became a pressing concern.

These are the important shortcomings to which our policymakers should attend as they try to build a competitive workforce for the 21st century Thailand.

III. Human capital policy for 21st century Thailand

In the previous section we discuss challenges in the human capital formation process. This section focuses on policy that helps promote investment in skills.

Consistent with the rest of the human capital literature, we use the terms *quality*, *skill* and *ability* interchangeably. We classify skills or abilities into two categories: 1. Cognitive ability or ability to perceive, think and reason based on intelligence and 2. Non-cognitive ability, such as motivation, discipline, attitude and patience. We call them skills because both are *acquired* attributes, which are affected by environments, investment and genetic dispositions (see below for more discussion).

First, we outline the major theme of the policy framework. Then we examine the foundations of current policies that aim to promote productive skills. At every step, we present the key ideas for a focused policy discussion based on organized evidence from recent empirical literature and our findings in sections II.

Thailand's human capital policy should aim to enable education providers and receivers to discover and develop talents to full potential and instill in them the passion for life-long learning.

Human capital policymakers should recognize 3 producers (or providers) of productive skills in a typical modern economy: (1) formal educational institutions, (2) firms (the workplace) and (3) families. Prior to the education reform movement in mid-1990s that culminated in the National Education Act of 1999, mainstream Thai education planners and economists had consistently put a disproportionately large emphasis on formal schooling as the major source of learning. They placed relatively little weight on the role of firms and families in fostering productive skills. The body of knowledge and debates about human capital policy in Thailand today still reflect this bias and center on skill formation through formal schooling.[15]

Ample evidence exists to indicate that formal schooling is an important source of learning. But as much as one third to one half of all skill formation in a modern economy takes place outside of schools (Heckman, Lochner and Taber, 1998). Job search, on-the-job learning and workplace training all take place in informal environments. Formal schooling is important, but not necessarily the most important source of learning.

A comprehensive human capital policy should therefore engage family, educational institutions and workplace with appropriate state support and encourage the synergistic relationship between them through an incentive-system design that is uni-directional, focused and forceful. We propose a human capital policy framework that is concrete, challenging and realistic. Such framework rests on 3 pillars:

Pillar 1 (Competition): Encourage competition in all sectors, at all levels, so that education providers and receivers utilize resources and technology efficiently to compete on merit and based on clear rules of the game.

Pillar 2 (Access): Focus public spending, NGO and private charity resources on the deprived and disadvantaged, with clear and overwhelming priority assigned to the young, and attach the disabled and low-skilled old citizens to society through subsidy.

Pillar 3 (Family): Enable and motivate parents and families to care for children's health and education with involvement until later stages.

The proposed human capital policy framework recognizes the reality that moving a country on to a higher growth path in a sustained fashion and a better overall quality of life requires involvement of all sectors in society. Unlike the regulatory approach to running schools, "incentives," financial and non-financial, under Pillar 1 provide Thai society the value of concentrating on outcome without knowing in details the approaches

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[15] Discussion and most publications on education reform are associated with the Ministry of Education and relatively limited to formal schooling (see work produced and published on the website of the Ministry of Education before 2002). Chaiyuth et al. (2005) is a recent example while work of equivalent quality that focuses on other sources of learning is lacking. World Bank (2005), which examines the Thai labor market and skill needs, is one of the few exceptions, even though it emphasizes on a mismatch between the skill sets market demands and those that Thai educational institutions provide. Essentially, we are not aware of any informed proposal of a comprehensive, life-long incentive-system design or, for example, a discussion on how tax measures can help promote human capital investment (which simultaneously competes with and complements investment in physical capital).

to achieve them. Pillar 2 recognizes that the rate of return to investment in skills is highest for the young and declines in age. It also stresses the need to target public and charity resources to those with highest potential for improvement while ensuring that the disabled or senior citizens are attached to society. Pillar 3 demonstrates policymakers' trust in parental goodwill toward their children and recognition in their natural role as provider or purchaser of education. It enables them to perform their role effectively. We also believe the proposed framework is also realistic, both in terms of the economic benefit a well-educated citizenry brings and the cost of acquiring that human capital stock.

In the following pages, we justify the soundness of this policy framework both on efficiency and equity grounds. We demonstrate how this policy framework and specific policy recommendations can tackle the challenges identified in the previous section.

Having stated the policy goal and framework, we look at the challenges in turn, starting with resource availability. We begin with why we think current public spending as a percentage of our national income is *sufficient to motivate* Thai society strongly toward our stated goal, under the proposed framework.

III.1 Public spending on education and return to society

Policy should take into account what we know about the social benefits of education and human capital accumulation. Society justifies extensive public support for education based on a number of rationales, chief among which is the positive externality education produces. A well-educated citizenry may bring extra benefit to society above and beyond benefits separately accrued to individuals. Among the commonly cited social benefits of human capital (or skill) enhancement are citizen involvement in civic affairs, better child rearing (the role of mother's education in intergenerational transfer of abilities), as well as crime reduction (the lower social and direct costs of crime). A strand of economic growth literature argues that competitiveness and economic growth itself is a result of *social* benefit of education.[16]

If these external returns are sizeable, the market outcome, derived from decentralized individual decisions to accumulate human capital based on private returns, will be suboptimal. Theory predicts that a social planner with perfect information who recognizes the economic value of schooling will invest more on education than individuals making decisions on their own. The stock of human capital should be larger with government support. As a result, the relevant question for policy makers *at current level of public support* is whether the external return to education is larger than the economic returns to public funds devoted to it. If so, it may justify more public spending. If not, there are better investments the government can make on behalf of the public.

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[16] A strand of endogenous growth literature suggests a strong causal impact from human capital to growth based on the externality argument (Lucas 1988 and Romer 1990). In Lucas (1988), worker productivity depends on the aggregate skill level. Romer's (1990) idea is based on network externality—larger number of skilled labor generates more ideas, making the economy grow faster. Murphy, Schliefer and Vishny (1991) suggests that skills of the most talented individuals create external returns. Benabou (1996) proposes that inequality in human capital depresses aggregate productivity. Some neoclassical growth economists also suggest that international income differences are linked to differences in human capital stocks (Mankiw, Romer and Weil 1992, for example).

We know little about the magnitude of the wedge between social and private benefit of education and training in Thailand. But if one surveyed economists' opinions, the average guess would tend toward a very large number.

This is what we know: Much of the change in Thailand's average schooling pattern from our entry into modern economic growth in the 1960s follows the early- to mid-20th century development phase of today's advanced economies. Using data on wage-education profile of white men aged 40-49 during the 1960-80 censuses, evidence suggests that external return to education is no larger than 3 per cent (and is statistically insignificant) in the US (Acemoglu and Angrist, 2000).[17] This cohort of workers was the chief beneficiary of the 1910-1940 high school movement in the US, which is argued to be responsible for much of the human capital accumulation in 20th century US. As a result, we think that the social-private benefit wedge of this magnitude may approximate Thailand's case under the "basic education for all" movement in recent years.

Furthermore, there is no empirical evidence to infer a relationship either between total education expenditure as a percentage of GDP or spending-per-pupil and long-term economic growth (Barro and Lee, 2001; Hanushek and Kimko, 2000). Much less certain is whether a better educated workforce leads to economic prosperity or the other way around (Bils and Klenow, 1998).

Cross-country comparison reveals that Thailand consistently ranks near the top of the list in terms of education expenditure. Estimates of total spending range from 5-7 percent of GDP, which include public, household and the corporate sector expenditure in that order (Chaiyuth et al., 2005; Hanushek, 2002). Given what we know from the literature and with limited resources and competing needs for them, evidence on external return to education of such magnitude should caution us against more public support for education in aggregate terms. It does suggest, however, that we reallocate public resources to better deal with the challenges identified earlier.

III.2 What skill types should education providers promote?

Human capital policy should recognize that skill types that contribute to success in school, the labor market as well as good social outcome, are multi-dimensional.

To place our result in the context of the literature for purpose of policy discussion, we classify the 12 skills reported in the Private Investment Climate Survey (PICS) as cognitive and non-cognitive abilities. Specifically, *cognitive* skills include abilities in English language usage, information technology, mathematics, analytical ability, communication, creativity and job-specific technical skills. *Non-cognitive* skills include abilities to adapt to change, socialize as well as teamwork, time management, and leadership ability.

The informed reader may find this classification crude (see below for more discussion). The listed cognitive skills or abilities are not equivalent to an individual's "pure" cognitive ability (e.g. IQ). We make an assumption based on data availability and on the impression that individuals in sizeable possession of the first set of skills

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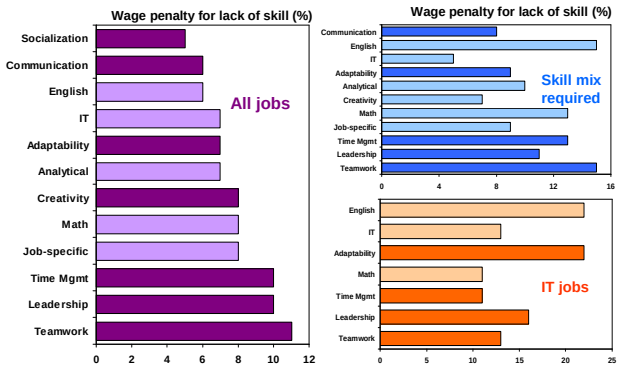
[17] The number could be lower if one polls followers of the Spence (1973) "signaling" school. Believers in the signaling value of education effectively argues that market has insufficient information to reward correctly the education content embodied in a person, so it relies on the signals degrees or diplomas give out. As a result of this signaling effect, externality is actually small.

(cognitive) *alone* are more likely to be able to think and reason logically based on cognitive intelligence than individuals in sizeable possession of the second set of skills (non-cognitive, e.g. social) *alone*. Additionally, we point out that these skills all have an *acquired* (as opposed to *innate*) character.

The skill price result from the Thai labor market underscores the importance of both skill types in labor market success (Ahuja, Chuenchoksan and Pootrakool, 2006).[18] Indeed, market prices non-cognitive at least as high as cognitive abilities in general and in every subgroup of job characteristics. That is, for an average job, a job that especially requires a variety of skill mix, a job that requires relatively more non-cognitive abilities or for an IT worker,[19] market consistently rewards non-cognitive skills at least at par with cognitive skills. Time management and teamwork skills are among the most valued for every job characteristic.[20]

Figure 19: Skills are multiple. Cognitive and non-cognitive skills contribute equally to labor market success



Source: Ahuja, Chuenchoksan and Pootrakool (2006)

As ACP (2006) uses cross-section data, we are mindful that short-term economic disturbances may affect wages and some of the explanatory variables. We do not think the key explanatory variables listed in their results are affected more than any similar regression reported in the literature. In any case, extensive and careful research based on longitudinal survey of youth in the US also shows that cognitive and non-cognitive skills have *equal* impact on schooling choices, wages, employment, work experience and

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[18] Ahuja, Chuenchoksan and Pootrakool (2006) utilizes a rich dataset from the World Bank's Private Investment Climate Survey (PICS) of companies and workers (12,330 samples) for 2004. Controlling for ability (through lack of common skills), job class, experience, and family background, they report estimates of the rate of return to education. The paper also discusses the large estimated average male-female wage gap between in the Thai workforce. The most revealing results, however, are the estimates of prices the labor market is willing to pay for a variety of skills. We can interpret these skill-price estimates as an average worker's willingness to pay to acquire a skill she identifies as lacking in performing her job competently. They also consider the possibility that there are errors in measuring the "relative degree of skill deficiency" in PICS. Measurement errors suggest that the reported skill prices may be biased toward zero or underestimated. We take it to mean that each estimated skill premium provides a lower bound of the true skill premium.

[19] ACP (2006) defines workers in IT-specific job as those with advance computer skill (programming ability in PICS) whose job characteristic especially requires the use IT skill.

[20] As noted in ACP (2006), the small sample size of IT workers does not afford precise estimation. Specifically, statistical analysis may not be able to distinguish small effect from zero.

occupational choices, not to mention a variety of correlated risky or anti-social behaviors (Heckman, Stixrud and Urzua, 2006).[21]

Evidence indicates that achievement test scores, motivation and attitude develop in lockstep.[22] For example, there is high correlation between PISA test scores by subject and "attitude" of the test takers toward the test subjects and school in general. Students with better attitude tend to score higher (OECD 2004). We cannot tell the direction of causality from this example: high student confidence or self-esteem may imply high scores, or *vice versa.*

From a purely static perspective, since returns to the two skill types are roughly equal across job characteristics, the decision whether to acquire more cognitive or non-cognitive skill (through training) should rest largely on the cost of skill acquisition.

Anticipating what high-value-added jobs will be in the future may be useful. But regardless of what those jobs turn out to be, our result indicates that Thai families and schools should focus today on *how and when* children learn to acquire both types of skills.

ACP (2006) also finds that the male-female wage gap is substantial across the board in favor of male wage earners with 15-17% advantage over female. The gender gap is even larger (up to 20%) in jobs that especially require both cognitive and non-cognitive skills. Thus, paying particular attention to skill formation of both types in female from the early age may help narrow the wage gap later in life.

Skills and abilities are multiple. Policy should aim to enhance Thai students and workers' ability to perceive, think and reason based on intelligence as well as instill discipline, motivation, enterprise, ability to persevere and social skills.[23] Policy and schooling evaluation and reinforcement should take into account *both cognitive and non-cognitive "test scores"* or outcomes.

III.3 General principles to guide policy

Thailand's human capital policy design should be grounded in the knowledge about the process of skill formation:[24] 1. Genetic endowments and environmental influence interact to form skills; impoverished environment can overwhelm genetic capacities (Turkheimer et al., 2003) 2. Skills are multiple 3. There are sensitive and critical

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[21] HSU (2006) address the reverse causality problem that is the hallmark of conventional studies of skills that regress earnings and other outcomes on skill proxies. It also addresses the problems of measurement error and imperfect proxies.

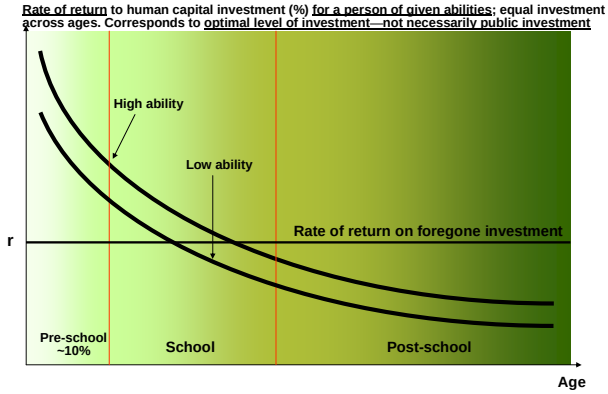
[22] In fact, higher levels of non-cognitive skills promote success in achievement tests even when they do not affect IQ. This effect operates because non-cognitive skills affect schooling and schooling raises measured achievement. (Hansen, Heckman and Mullen, 2004; Heckman, Larenas and Urzua, 2004).

[23] Interestingly, the abilities we and the literature classify as non-cognitive coincide with the core values of the capitalist society (see Weber, 1905 in a 1958 reprint, and Chernow, 1998). Self control, temperament, discipline, patience, self reliance and enterprise (initiative) underlie the Protestant work ethic. Weber, Max (1958). The Protestant Ethic and the Spirit of Capitalism, New York, Scribner's Press.

[24] The knowledge about IQ in this part draws heavily from discoveries in neuroscience and child psychiatry, based on Herrnstein and Murray (1994), Turkheimer (2003) and Capron and Duyme (1989). The list of facts we provide contains all the important features of the multi-stage human capital production technology in Cunha, Heckman, Lochner and Masterov (2005).

stages of skill formation over a human life cycle[25] 4. Skills acquired at one stage persist and promote other skills at later stages in life (self-productivity) and 5. Skills produced at one stage raises the productivity of investment at *later* stages (dynamic complementarity; Heckman, 2000).

Figure 20: Skills acquired early promotes later acquisition and raises productivity of investment at later stages



Based on this knowledge, the returns to human capital investment in a given ability vary inversely and (approximately) exponentially with age (see Figure 20). Much like the concept of compound interest, the earlier the investment is made, the longer life-time there is to harvest the benefit (Becker, 1993). Moreover, self-productivity and dynamic complementarity suggest that in the case of human capital investment, choosing how much to invest based on the rates of return (efficiency) and guaranteeing equal access to human capital investment (equity) has no tradeoff in the *early* years.

Effectively, the classic efficiency-equity tradeoff, which besets most public investment decisions, only becomes evident in late child investment. Evidence indicates that remedial education or intervention at late ages (adolescence to adulthood) can be prohibitively costly and may not completely reverse the deficiency in some cases.[26] The tradeoff may widen at later stages. Therefore, it is crucial that we begin young.

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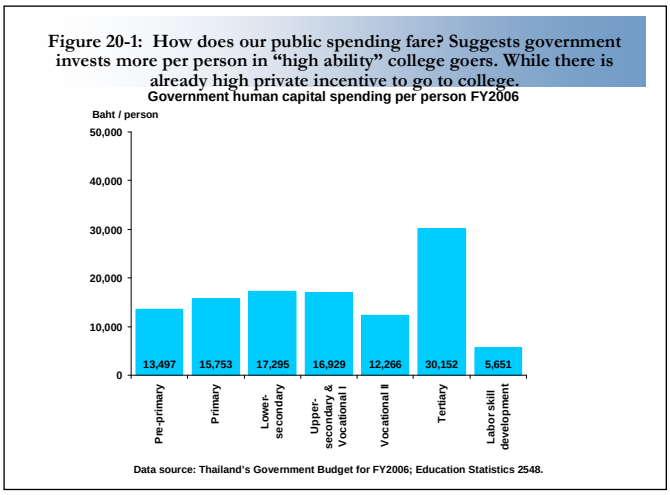
[25] A sensitive period is the stage that certain inputs or investments are more productive (or conducive) in producing certain skills. A critical period for forming a skill is the only stage to produce that particular skill effectively. The critical period length may differ, depending on the skills to be acquired. For instance, for language development as a whole, it appears that the critical period is much longer than it is for sight.

Except for a few well-defined sensitive periods for certain types of vision, hearing, and first-language learning, the brain is flexible and capable of growth well beyond the first few years of life. An important part of the growth happens just before puberty and well into adolescence. For example, the fiber systems influencing language learning and associative thinking grow more rapidly than surrounding regions before and during puberty (a similar period to the growth of the frontal cortex), but fall off shortly after. These findings reinforce studies on language acquisition that show that the ability to learn new languages declines after the age of 12. (Thompson et al., 2000)

For certain functions, neurologists have found a critical period of time at which a child must have sensory or motor input. If particular stimuli (or inputs) are not present at that time in early development, the window closes and the opportunity is lost forever. For a child's native language, both grammar and accent appear to be best learned young, and the window does seem to close slowly around puberty. This is true of second-language learning, too.

[26] We must put a cautionary note here: Most human learning is not dependent on sensitive or critical periods or on lessons being taught at a particular age (Spinks, 2002). But having learned skills early in life may make acquiring more skills later in life easier.

In this light, a cost-effective[27] policy to generate a more able workforce and maximize the chance of achieving a more equitable society clearly should focus on family and school *starting from* the early childhood years. Since abilities generate more abilities, investing in the young today means that later public spending to support life-long learning in mature adults will be more productive. Figure 20-1 shows that Thailand's per-person public subsidy is tertiary-heavy and relatively light on the younger section of the population (see details in appendix.



III.4 From birth to school (0-6): Skill formation during early childhood

How early is early? Family, human capital endowment and investment

Both cognitive and non-cognitive skill formation takes place from the early pre-school years. In the process that begins from infancy (and by nature outside of formal schooling), families and other non-institutional actors, such as community and networks of non-government organizations) are vital. Findings from neuroscience indicate that *pure* cognitive ability (as measured by intellectual quotient or IQ) develops from birth (*in utero* experience) and becomes well set by the age of 8-10, rendering this period its "critical" stage of production (see e.g. Hernnstein and Murray, 1994; Shonkoff and Phillips, 2000; and Caneiro and Heckman, 2003). Non-cognitive abilities and traits—motivation, discipline, patience, temperament, self-control—are more malleable until a later age (18-20 years), as they are associated with the development of the prefrontal cortex, an area of the brain that appears to be growing again just before puberty. As the prefrontal cortex matures, teenagers can develop more control over impulses as well as reason and make judgments better.[28]

The nationwide cross-sectional random survey of Thai children aged 1-18 using a variety of cognitive tests (verbal and non-verbal) in 2001 by Ruangdaraganon, et al. (2006) shows that Thai children measure up to western standard in cognitive development during the first few years of life (at 12-35 months old). The mean IQ of

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[27] An intervention measure may be effective but not more so when compared to another alternative that is less costly.

[28] The prefrontal cortex sits just behind the forehead. It acts as the leadership of the brain, controlling planning, working memory, organization, and modulating mood. In fact, this part of the brain has been dubbed "the area of sober second thought" (Spinks, 2002).

children aged 6-12 is below western standard, however.[29] Adolescents (aged 13-18 in the survey) also have lower mean IQ scores than western standard. What we now know about IQ—that it can be affected by environmental factors until approximately up to ages 8-10—indicates that Thai children's mean IQ likely deteriorates as they pass the early childhood years.

Through family environment *and* genetic endowments, family is reliably the major source of learning that may significantly affect IQ in the early years.[30] Turkheimer et al. (2003) is the most discussed recent work in the area. They use data on twins, both identical (monozygotic—MZ) and fraternal (dizygotic—DZ), from the National Collaborative Perinatal Project (US). Identical twins share all their genes while fraternal twins share only half of theirs. If genes explain most of the difference in intelligence, then the IQ scores of identical twins should be closer than those of fraternal twins. The researchers find that almost all the variation in IQ scores for 7-year-old twins in their sample with wealthy parents can be attributed to genetics. *For the poorest families*, however, the IQs of identical twins vary just as much as those in fraternal twins. Essentially, the impact of growing up in poverty overwhelms these children's genetic capacities.[31] *Home life is critical* to cognitive development for children in poor income households. Enabling parents to care for their children well is the key.[32]

Beyond these cognitive shortfalls, evidence exists to the effect that average Thai children ages 1-6 also have substandard motivation, while children ages 6-12 score poorly in motivation, patience, discipline and self-reliance (Ruangdaraganon, et al., 2006).

Being physically healthy, rested, and well-nourished; being able to communicate needs, wants and thoughts verbally (a cognitive skill); being enthusiastic, curious, and able to pay attention are all important determinants of school readiness (Currie, 2001). While we do not have concrete evidence to demonstrate the degree of school readiness in Thai children, we think the shortfalls in IQ scores and social skills cited above already give a strong impression that children of impoverished families are likely not to be school-ready at the time they enter school.

Since below-normal IQ (and likely lack of school readiness) is found *in all age groups* in children from less wealthy families, mostly residing outside of Bangkok and municipal areas especially in the North and Northeast (see Ruangdaraganon et al., 2006), cost-effective policy that aims to raise Thai children's school-readiness levels must have a

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[29] The mean IQ of this age group (6-12) is 88.0 (with standard deviation of 12.6), which is below the normal range (90-110). Only 6.4% of children have above-normal IQ (>110) while 64% are below-normal. See Ruengdarakanon (2006) for detailed discussion of methodology used and other results.

[30] Caprone and Duyme's (1989) research on adopted children in France confirms this finding: how genes are expressed depends on the family environmental context. See Christiane Capron and Michel Duyme (1989), "Assessment of Effects of Socioeconomic Status on IQ in a Full Cross-Fostering Study," Nature, August 17, 552-554.

[31] Turkheimer et al. (2003) finds that the proportions of IQ variance attributable to genes and environment vary nonlinearly with socioeconomic status. In impoverished families, 60% of the variance in IQ is accounted for by the shared environment, and the contribution of genes is close to zero; in affluent families, the result is almost exactly the reverse.

[32] We use the term parents because there is no conclusion that mother's education and therefore income matters for inter-generational transfer of skills or benefit to the child. A causal impact analysis of *mother*'s education on her children in a study of identical twins (effectively clones who share all their genes) in USA shows the impact is much smaller than believed and may even be statistically no different from zero. But the causal impact of father's education is positive (Behrman and Rosenzweig, 2002; and Behrman and Rosenzweig, 2005).

clear focus on promoting pre- and post-natal *family environments* and supplementing family resources for young children in these families. The current income tax deduction of 15,000 baht per child, for instance, does not benefit this target group, as their annual taxable incomes are well below the 100,000-baht threshold.

Public policy to supplement family resources during early childhood in the Thai context

We search for cost-effective ways to remedy these shortfalls in early childhood with *lasting* effects.[33] We find a few experiments that track participants into adulthood and are shown to be successful under rigorous evaluations. They can be made suitable to the Thai context with some adaptation.

Currie (2001), Barnett (2004) and Cunha, Heckman, Lochner and Masterov (2005) document how small-scale enriched early childhood intervention experiments for pre-school children can make lasting improvement on motivation and discipline for disadvantaged children with below-normal IQ scores. Although cost-benefit is not an exact science, they also report cost-benefit studies on a variety of programs. We highlight the cost-effective ones.

The finest early childhood intervention programs reviewed in the literature are the small-scale North Carolina Abecedarian (entry age starts from a few months old) and the Perry Preschool Project, as well as the large-scale Chicago Child-Parent Centers (CPC). The first two programs randomly assign participants into control and treatment groups. The large-scale CPC uses "matching" methodology to evaluate their participants against untreated children of similar backgrounds. All three programs follow the participants from program entry into adulthood.[34]

While they may *not* substantially alter IQ, by raising non-cognitive abilities substantially these intervention programs ensure higher chance that disadvantaged children would remain in school longer, which helps increase there academic achievement as measured by test scores. Our interview with the principal and officers of the Duang Prateep Foundation's kindergarten school for children from low-income parts of Bangkok confirms this view, that the impact on their pre-schoolers is more likely to be significant in non-cognitive (social skills) developments. Statistical analysis of student test scores provided by the Duang Prateep kindergarten also reveals that school attendance (measured in days) is statistically significant in explaining variation in children's test scores at the end of the last school term (Ahuja, Chuenchoksan and Pootrakool, 2006).

Enlarging the scale of the program without sacrificing quality and the intensity that is the key to their success is also an important issue. The CPC program provides useful lessons. The locally-managed program serves impoverished families in inner-city Chicago public schools. When school is in session, the program provides 3-hour daily pre-school services to 3 to 4-year-olds, with health and social services and free meals, plus a 6-week summer program. It also involves the parents by making home visits, helping parents complete school and including parents in field trips. With more funding,

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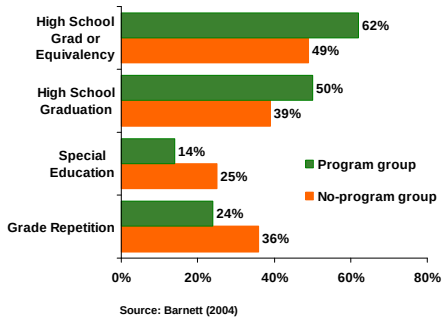
[33] Even if we could find economic justification for such interventions, we have to know that those interventions will be effective in the long-run.

[34] See extensive review of these and other early childhood intervention programs in Barnett (2004), Currie (2001), Heckman and Klenow (1997), Heckman (2000), for example.

it eventually extends to 3rd grade, including a full-day kindergarten service and after-school activities (much like the Duang Prateep Foundation, but at a much larger scale). Child-teacher ratios are 17:2 for pre-school and 25:2 for kindergarten (Duang Prateep's ratios are roughly 20:2 for kindergarten). Primary school class size is limited to 25, compared to 35 in other Chicago public schools. Teachers have access to teaching aides, instructional materials and educational activities. The program produced substantial *long-range* impacts on improving high school graduation rates, reduction in remedial education, grade repetition and juvenile crime and arrests.

In order to adapt them successfully to the social context of provincial Thailand, we search for the key elements that make these programs successful. This is what we learn: Since Thai infants are never raised completely alone and they often have much to explore at home, enriched family resources in the Thai context means a focus on parents' health-related behavior during and post-pregnancy, sufficient amount of nutritious food for mother and child, child-rearing skills, stable and warm family relationship and personal development, such as job search assistance and family planning.[35] Health care professionals know what other supplemental resources (e.g. vitamins and minerals) may be helpful in different localities. Children should have access to those basic supplements. In short, access to modern healthcare and child-rearing knowledge is crucial to school-readiness in the pre-school young in Thailand. Public policy that fosters human capital accumulation should focus on these issues.

Figure 21: CPC academic benefits: Programs do not improve IQ over time, but improves non-cognitive skills



If findings from the inter-disciplinary literature are any guide, early investment in Thai children should yield much higher return than investment made later to repair early year shortfalls. The longer the neglect, the costlier is the remediation. The earlier the investment, the larger is the economic and social returns.

We recommend that policymakers direct a large bulk of investment to this age range. There are two reasons why we should target resources to the needy: 1. Those with means can provide for their children through their own resources, and 2. Improvement is shown to be higher for needy, impoverished children (see e.g. Currie, 2001 for review).

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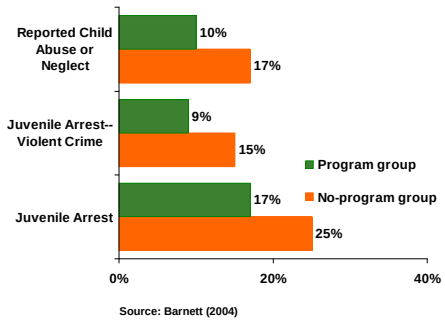
[35] Extra stimulation such as mobiles, flashcards, Mozart CDs or music lessons that are much cited may not be necessary. See also an attempt to educate parents through a parenting manual published by the Foundation for Children, with support from the Ministry of Public Health (MOPH) at http://www.childthai.org/cic/ca394.htm. Recent research also indicates the value of story-telling to children as valuable to their cognitive ability development.

Clearly, public spending that targets the needy young is sound on equity ground with no loss to economic efficiency.

As the public school system is currently overwhelmed, we think that such pre-school services should be separate from the public school system but is subject to public oversight.

Figure 22: CPC social benefits.
Benefits largely related to crime reduction & higher in countries with social welfare



Source: Barnett (2004)

III.5 The formal schooling years: Class-room resources and family involvement

Much of the work in economics of education (including those that link education with economic growth) focuses on formal schooling as a major source of learning (for an expansive literature survey, see Hanushek, 2002). They emphasize education attainment level of the labor force, or quantity, as a proxy for labor force "quality". Years of schooling of labor force participants are easy to find, reliable, and may contain information on quality. However imperfect, this measure is popular with empirical economists (see for example, the proliferation of regression-based studies generated from the Barro-Lee dataset; Barro and Lee, 2000).

Studies that focus on quantity usually lead to policy that stresses on enrollment, completion and retention rates. In this light, policy centers on tuition subsidy to lower the cost to students, thus enhancing enrollment. Thailand has successfully relied on tuition subsidy to expand the coverage of schooling through the compulsory education law. Today, only 1.5% of our young who must be in school have dropped out and average education attainment of working age Thai, at 8.7 years in 2004, is projected to be 9-9.5 years in 2008 (Ministry of Education, 2006).

In recent years, the basic thinking on human capital promotion has shifted from an emphasis on quantity—e.g., years of schooling, enrollment and retention rates—to quality. Countries have also shifted toward standardized achievement test scores as a measure of labor force and schooling quality. A large literature takes achievement test scores to be a measure of an individual's cognitive ability and find substantial and robust linkage between better test scores and higher future wages (Hanushek, 2002). This literature suggests that cognitive ability is important to that person's success in the labor

market. It suggests that policy focus on raising students' standardized test scores and workers' cognitive ability.[36]

Variations in students' achievement test scores are not all due to differences in IQ. Demonstrated cognitive ability, e.g. academic test scores, depends also on environmental factors, e.g. family and schooling inputs and how they are deployed, as well as non-cognitive skills (Cunha, Heckman, Lochner and Masterov, 2005). As a result, *measured* cognitive and non-cognitive abilities are susceptible to environmental influence and can be affected until later ages. Because the vast majority of Thai children enter school at age 6 and stays on until ages 15-18, the value of investment in schooling and worker training is in developing these non-cognitive and other cognitive traits that pure cognitive scores (IQ) may not capture.

Schooling helps build both *measured* abilities. Because of that, we should use both types of student achievement—academic achievement and non-cognitive (social and emotional) test scores—to measure and evaluate school and teacher quality.

Since achievement test score signifies a set of abilities to compete successfully in the labor market, unfavorable cross-country test-score comparison may portend our inability to compete in the long run. The immediate issue here is how to raise the average performance of Thai students vis-à-vis other countries with similar resources. In the pages that follow, we address the challenges Thailand faces in raising transition rate into high school, improving student performance in all levels, particularly outside of Bangkok and municipal areas where school resource distribution and teacher quality are below standard.

The focus of the debate and policy proposals is usually on educational expenditures and other resource-based measures in schools. They include proposals to reduce or limit pupil-to-teacher ratio or class size, increase teacher experience and education attainment, more budget and subsidy to augment school facilities and textbooks as well as teachers' compensation.[37]

Will more school inputs help Thai students perform better? What inputs and where?

Various international test scores, particularly TIMMS, OECD's PISA in 1995, 2000 and 2003, show that an average 15-year-old Thai student consistently ranks well below mean in reading, mathematics, science and problem solving (OECD, 2004). In fact, the average Thai students rank 34 out of 43 OECD and other developing countries in reading, mathematics and science in 2000, and 38 and 39 out of 43 in literacy, mathematics and science in 2003, respectively. The test score distributions are much lower for students attending schools outside Bangkok and vary inversely with city size while Bangkok mathematics score distribution mimics nearly perfectly that of USA. The low test score result occurs despite the fact that Thailand's education expenditure as a percentage of GDP is roughly in line with countries in the same income range (and at par with OECD average). In fact, Thailand spends more on primary education than an average *lower*-middle-income country (our income range) and less on secondary level than an average middle-income country (Chaiyuth et al., 2005). Yet our 15-year-olds, the

[36] Test scores measure more than acquired cognitive abilities, and indeed are important summary statistics of quality. This fact implies that raising other non-cognitive skills can help improve academic performance.
[37] They also cover provision of stationeries, free lunch, uniform and milk, scholarships, etc.

beneficiaries of relatively high-resource fundamental years (smaller average primary-year class size than other countries), perform below par.

Several popular classroom resource-based (or input-based) policy proposals are at odd with overwhelming *recent* evidence in the international empirical literature, both based on cross-country and within-country evidence. In fact, recent literature and a collection of rigorous, randomized experiments have become increasingly clear on the ineffectiveness of *some* resource-based policy on student quality outcome even in resource-poor countries. Given the ineffectiveness, their cost-effectiveness is not even an issue. We devote some space here to highlight the results and lessons.

Studies using US data find no support for systematic improvement in US student quality through lowering pupil-teacher ratios and hiring teachers with more graduate education. The result may not be surprising: The principle of diminishing marginal returns suggests that contribution from additional school resource to test scores may be small at high-resource levels.[38]

On this level, there is little evidence to suggest any systematic or close relationship between the variations in *cross-country* international test performance and school system's resources (Hanushek, 2001). Moreover, there is mounting evidence against the single most popular resource-based proposal, class-size reduction, both internationally and in Thailand, on the ground that it is cost-ineffective (Hanushek, 2002; and Chaiyuth et al., 2005).[39]

More teachers or simply better distribution? How about teacher quality?

If they are important, evidence of school-resource effect should appear in poorer countries. We draw lessons from the most extensive study on Thailand's basic education production process to date, which is Chaiyuth et al. (2005). Then we examine case studies in other developing countries that are particularly relevant to Thailand.

While we do not know enough to compare average productivity in terms of resource-to-outcome ratio in education production across countries, Chaiyuth et al. (2005) extensively documents technical (production) efficiency shortfall in the allocation of basic education resources in Thailand. They study variations in nationally administered tests (GAT and SAT) and find—albeit with considerable reservation as data on student, family and school characteristics are limited—that teacher's education level (at master's degree level) and class size are crucial inputs that determine student (test score) performance. Despite this, their analysis of the cost structure recommends raising the national average pupil-to-teacher ratio, confirming that the current "small" national-average class size is not efficient. Indeed, holding quality constant, cost minimization appears to suggest that the current class size is too small and class-size reduction is not cost-effective at the current level of public spending.[40] This result is consistent with our finding in section II where we suggest that small school size may lower school performance (in average test scores). School mergers or network sharing of resources

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[38] In a relatively well-equipped school with an already small class size, student performance is unlikely to improve significantly if the school builds one more science laboratory or hire one more math teacher.

[39] Hanushek (2002) provides a definitive and expansive empirical literature review (over 300 international studies) taking into account the quality of the studies based on model specification and estimation.

[40] The result is based on the assumption that we know how to spend the saved budget on other (undisclosed) cost-effective inputs.

may also help raise efficiency in these cases. Aware of glaring systemic inefficiency in education production, inequitable resource distribution and declining capital investment in schools, Chaiyuth et al. (2005) also recommends that *targeted* spending on learning facilities and textbooks for disadvantaged students, as well as better distribution of teachers away from big cities, can improve student performance noticeably.

An average Thai teacher with 15 years of experience earns 2.21 times the country's income-per-capita, almost twice as high as teachers in most advanced countries do (in terms of income-per-capita) and at par with teachers in Brazil, Korea, Malaysia, Paraguay and the Philippines (OECD data, 2005). Thai teachers earn 0.9 times GDP-per-capita at entry level. At entry-level at least, there is no clear incentive to become a teacher, but there is no outright disincentive either *for a person with average ability*. Fifteen years into the job, Thai teachers enjoy higher compensation than advanced countries' teachers do, relative to an average worker in those respective countries. There is an incentive to being a teacher for a person of certain ability. Since this level of compensation is near that which is determined by the market for private school teachers, it implies that the pay is commensurate with the average ability of existing public school teachers. Whether the current financial incentive scale is what we want to promote is another matter entirely. We return to this point below.

One thing is clear: With 430,000 teachers in Thailand's (public) basic education system, current spending on personnel dominates at roughly 80% of total spending while capital spending is on a declining trend. Raising teachers' compensation across-the-board without evidence that it would raise existing teacher quality is not sound public policy. Neither is it viable.

We emphasize here that we do not reject the importance of resources on education outcome; neither does the literature. We agree with the spirit of Chaiyuth et al.'s (2005) finding that targeting resources at underprivileged schools, teachers and students is wiser. At basic level, raising teacher's education level or reducing class size is unlikely to be cost effective at the current level of spending.

To accomplish that, we look for ways to reallocate public spending toward resources that matter most and find ways to deploy them.

Reallocation: What school resources matter most at the basic level?

Unfortunately, there is no simple solution to address inefficiency within the current incentive system. A careful review of the evidence from developing countries suggests little to no relationship between various standard school resource measures and student performance *within a given country* (Hanushek, 2002). This result implies that impact of resources on student outcome depends not so much on the "how much" but *how* resources are utilized.

Cross-sectional regressions, the type analyzed by Chaiyuth et al. 2005,[41] do not provide a clear and reliable case on how we can achieve efficiency gains through resource

[41] The problem begins with interpretation of performance-inputs regression result. They are aware of 1. The deficiency of the functional form of the regression (in level not flow) 2. Standard endogeneity problem such as reverse causality or omitted variables that are likely related to the right-hand-side explanatory (input) variables, all of which contribute to make OLS estimators inconsistent and/or bias. Worse, through their acknowledgment, it is difficult to tell which way the bias runs.

reallocation. Because education is a cumulative process, we should view findings on the relationship between student performance and contemporaneous inputs with some skepticism. Deficiency in education outcome is also cumulative. It seems likely that Thai students' underperformance in PISA or TIMMS or the variations in Thai national-level tests (GAT and SAT) reflect deficiency in the early years when they learn basic skills. Relying on regression results alone could mislead policy makers into thinking they know the relative influence of different resources on student performance.

We need to supplement the findings based on regression analysis with those from rigorous, school-level randomized experiments—the gold standard in empirical research. We are not aware of any such evaluation performed for Thailand, so we look for results from other resource-poor countries.

Available randomized evaluations that track student-participants through time in Kenya and India consistently show that *additional* inputs, such as textbooks (Glewwe et al., 2000), flipcharts (Glewwe et al., 2004), which are ostensibly more accessible to weak pupils, additional teachers (Banerjee et al. 2004) or significant class-size reduction (up to a half) with no change in pedagogy (Banerjee et al. 2005) have *no* impact on within-country student test scores.[42]

Quality improvement: It's not only how many teachers or computers we have, but how we deploy them

What we look for are tried-and-tested methods of quality improvement that can be applied to Thai context with relative ease. The education literature is filled with trials; most of them either have never been evaluated properly or do not stand up well to rigorous evaluation. The ease with which they can be applied improves the chance of their success. In fact, probability of success increases when existing teachers do not perceive innovation as a threat to their career.

There are at least two recent randomized evaluations that reveal the effective impact of resource deployment on student performance in western India's municipal schools.[43] The first is the case of a large-scale remedial education for first and second graders and the second is a computer-assisted learning program. Both programs are administered by Pratham, a network of India-based NGOs with support from UNICEF that now serves 300,000 children and employing thousands. Both evaluations were administered on 15,000 students over 3 years.

The remedial education program, called Balsakhi or "the child's friend" in Hindi, provides a trained secondary-school-educated local young woman to work with first and second graders identified as lagging behind their classmates in municipal schools. The instructor meets with a group of 15-20 children for two hours a day during school hours (half the school day). She focuses her teaching on basic numeracy and literacy skills through standardized curriculum developed by Pratham, which is *different* from standard curriculum used in schools. The instructor receives only two weeks of training at the beginning of the school year and ongoing reinforcement during the school term.

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[42] Cross-sectional analysis using the same data would suggest that textbooks and flipcharts have dramatic effects on test scores (for more discussion, see Kremer, 2003). Ordinary least square estimates are usually biased upward in these cases, suggesting that omitted variable bias is a serious concern (Heckman, Stixrud and Urzua, 2006).

[43] This section draws heavily from Banerjee et al. (2005).

An important characteristic of the program is that a young woman from the community can provide individualized, non-threatening attention to children with low ability, as judged by the standard curriculum, in a tailor-made way. Teachers do not object because she takes the weakest (and generally most difficult) students off their hands for half of the day. The strength of the program is that it is cheap (400-600 baht per month per Balsakhi, converted from Indian rupees at today's exchange rate) and can easily be scaled up. Overhead and capital costs are low since she works in free classrooms, playground or even hallways. The high turnover of Balsakhis, each staying for an average of one year, shows that the success of the program depends not on highly determined individuals, but on pedagogical inventiveness.

The program succeeds in improving the treated weak children's average school test scores by up to 0.6-1 standard deviations (see distributional effects in Banerjee et al., 2005). More important, the result persists (at least one year after leaving the program), but gains become smaller after they leave the program. While the follow-up period is still short, the test score improvement is phenomenal in the context of the literature on random evaluations of school inputs and the improvement takes place in all years and cities. Because this is a pull-out program, the children who remained in class could have benefited from a smaller class size and better average peer quality—the so-called "peer effect". It turns out that they did not. This result suggests that smaller class size with no change in pedagogy may not be helpful.

A program like this can work well in developing country context, especially in rural Thailand (particularly North and Northeast) and inner-city Bangkok, with minimal adaptation. It helps ease children with low school-preparedness into the first two years of primary school at low cost to the taxpayer. What matters are the training and reinforcement, plus the curriculum that is more suited to the weaker children, as well as the school and classroom environment it still preserves.

The second program, computer-assisted learning or CAL, proves to be successful in Indian municipal schools. It raises math scores by 0.35 standard deviations for the first year and 0.47 in the second year. More important, it is equally effective for all students.

The Indian CAL enjoys the advantage of the Balsakhi infrastructure and the Gujarat government policy of delivering four computers each to 80% of the public primary schools. The computers were previously used for administrative tasks and not by students.

Pratham hires local instructors and provides them with five days of computer training—minimal training. For the treated schools, the instructors work with groups of two children in two hours of shared computer time per week. The children play with a variety of computer games and programs that work on basic competencies in the standard math curriculum. The key ingredient is in letting the children learn *independently* through softwares that challenge their comprehension, explaining only what the tasks required of them are, and provide no instruction in mathematics. Children also complete the worksheet to record their progress at the beginning of each session. The control schools do not employ computers for instructional purposes.

The positive impact on test scores in the CAL program in India shows the importance in the quality of teaching (software versus existing teachers). It may also help remove the dullness of school experience. To us, this program also reveals children's

preferred learning method, which also turns out to be effective. We suspect that the success of the program can be higher in the subject area in which qualified teachers are in short supply at the current public spending level—a priority area that Thai schools can easily identify.[44] Like the Balsakhi program, CAL can be applied with ease in Thai public schools at low cost to the taxpayers. Improvement can be made in conjunction with regional universities that have the know-how in instructional software development—another possible synergistic relationship between different levels of formal schooling.

Why don't more Thais graduate from high school and university? How can the government help?

High enrollment rates up to Lower Secondary 3 (M. 3) show that policymakers know how to put more Thai children to school. The ingredients are tuition subsidy and the compulsory education law. This low retention rate is a challenge to our national competitiveness.

Socioeconomic data clearly reveal that students from low income households, particularly those that are not homeowners, are at risk of dropping out at this stage (see Figure 7). Policymakers should wonder why so many students fail to respond to increasing economic return to higher education (high school and college). Why are the poor prevented from taking advantage of higher return to skills? Are drop-outs motivated and able students whose families face financial constraint when they reach high-school (or college) age? Or are they students who lack high-school readiness due to long-term family factors? In any case, policy direction depends acutely on what the real cause is.

Human capital investment differs from physical capital investment in one important way: Unlike fixed capital, it is not common to securitize a person's future labor income against education borrowing today. One needs collateral for education borrowing in the market. Not every person who is capable of additional schooling at high-school (or university) age has access to that financing. For efficiency reason alone, society should not deny motivated high-school-ready students the chance of a decent basic education. The same reason applies to college-ready individuals, although different financing methods and burden sharing may be more appropriate at that level.

Thailand currently spends less than average on secondary education among middle-income countries. Besides, at 15-18, these young adults can choose to work, suggesting that there are financial costs for foregoing work to go to school. Consequently, *additional* public support may be warranted at this level of education through subsidies, scholarships, education loans (with tax-deductible interest payment) for *high-school-ready* students. This argument also applies to college-age students, although we argue that loans are more appropriate so that students shoulder more of the burden at

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[44] We should point out that the impact of computer usage in school on educational outcome around the world is not so clear-cut. Computer-assisted learning in math and Hebrew exams in Israeli schools for fourth to eighth graders is reported to be ineffective and even put some children at a disadvantage (Angrist and Lavy, 2002). A randomized evaluation of the commonly used language software "FastForWord" in US schools also shows no impact on student performance (Krueger and Rouse, 2004). Banerjee et al. (2005) suspects that the Israeli and American experiments yield disappointing results because they replace time spent in well-equipped classrooms with high quality instructors.

that level. According to the SES data, we approximate the wages foregone to be about 1500 baht per average high-school-age student per month.

SES data also reveal that home-owning parents tend to have more educated children. It is likely that children who receive sufficient goodwill from home-owning parents (access to collateral) have an advantage over those of the same ability whose parents rent. To some extent, parents' wealth matters. Existing mortgage-interest tax deductibility, which favors homeowner's borrowing for higher education as well as for other investments, also encourages home-ownership. Tax deductibility for education borrowing can be more specific at promoting human capital investment.

The latter cause of low retention rate, long-term family factors, is much more complex and difficult to remedy when the person becomes older. Ability deficiency may result from persistently low family wealth, parents' taste and attitude about education as well as expectation in the child's life, and deficiency in the process of skill formation from the early years, all of which are inter-related.

If long-term family factors cause low readiness level, then borrowing ability is not the answer particularly when the student is in late-adolescence or at university age. The challenge, in this case, is clear—we need to tackle deficiency earlier in the process.

Sound public policy requires that we separate the two causes to help target resources to motivated individuals in need.

Data in our web appendix show that the tuition cost to income ratio for public and private secondary schools, the extent of financial constraint, has been fairly steady during 1998-2004 in all regions.[45] The financial constraint is more binding for the poorest income-quartile. Associated with this steady financial constraint trend, the rate of transition into high school is flat. Based on available evidence, we do not know for certain the extent short-run financial constraint presents a problem for Thai families. But our best guess is that it is not as severe a problem as long-term family factors are. Students who are short-term constrained are most likely also long-term constrained as well. The challenge more likely involves supplementing family income over time.

In this case, having means-tested application for those in need of financial aid with proof of school readiness (acceptance into high school, vocational school or college) can help. This merit-based grant or loan provides good incentive for schools, parents and students alike.

Motivation and support need not be financial. What some disadvantaged adolescents need is a role model, a mentor, who aids the parents in monitoring their progress and providing encouragement and support, which may include high school or

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[45] Unfortunately, we have access to data dated back only to 1998. The same ratio is also steady for public tertiary education in most regions while falling in the Northeast and rising in the North after 2002. Private tertiary education tuition as a percentage of regional income falls substantially in the North and Northeast in 2002, but steady elsewhere during 1998-2004. The rate of transition from lower secondary (M.3) into upper secondary, including lower vocational (Por Wor Chor), declines noticeably from 92 per cent in 1996 to around 80-82 per cent post-1997. Almost the entire decline in the transition rate is attributed to lower vocational (from 42 to 32 per cent). The data do not cover vocational education tuition cost, so we do not know how much of this is due to tighter short-run financial constraint. The transition rate from upper secondary to tertiary, which depends more on the business cycle, is harder to discern from existing data with inconsistent definition over the years.

university-related expense. Thai universities and private sector can get more involved in this area to help mould lower secondary and high school students for higher education or the workplace.[46] From our interview with Duang Prateep Foundation's officers, we gather that programs that are effective are those that target motivated adolescents who use them as second chance opportunities.

Schooling helps build abilities. More able students tend to do better, have better attitude toward school, are more motivated and progress further in school. In effect, there is a "dynamic complementarity" *between abilities and schooling*. The key to ensuring higher transition to high school lies in enabling the students to do well in their foundation years. We write this knowing that the constitution mandates that government provide quality high school education for all at no cost to students. But to obtain able high school graduates, we need to upgrade the quality of primary and lower secondary schools. With some resources taken away from the tertiary years and government direct spending on worker training, the government will have a better chance in fulfilling this constitution mandate. For university, society should provide financial support only to motivated and ready individuals. On this basis, with prudent loan monitoring system in place, the current income-contingent education loan policy is appropriate for university level and should be enlarged to reduce government subsidy to higher education.

III.6 Formal education and the job market: How they all fit together and a *systematic* revamping of incentives

Standard growth theory predicts that returns to physical and human capital in an economy increases with the level of technical progress or total factor productivity (TFP), which is a summary statistic of long-term competitiveness and standard of living (Prescott, 1997). Individuals will find it more worthwhile to invest in education and skill formation as TFP rises.

A leading theory of TFP predicts that an economic arrangement a society chooses matters for the dynamic of TFP and long-term economic growth (Prescott, 1997 and Parente and Prescott, 1999). With a competitive economic arrangement that is attached to the global economy, Thailand's long-term GDP should be multiple times larger than if we choose to protect our industries and labor force from global competition at the same level of inputs (Ahuja and Moenjak, 2002). The underlying mechanism is that the competitive market promotes the use of the best available technology in firms and schools. As our firms and labor force can access the best knowledge and technology, TFP will increase on a sustained basis, and our human-capital-poor society will become human capital rich. In the process, Thailand's physical capital stock will also grow by leaps and bounds.

Policy lesson from the growth literature is that economic competition helps foster human capital stock and skill formation. Instead, the pressure to compete successfully will necessitate an interaction between the labor market and universities down toward schools and training institutions at all levels. It will ultimately give the

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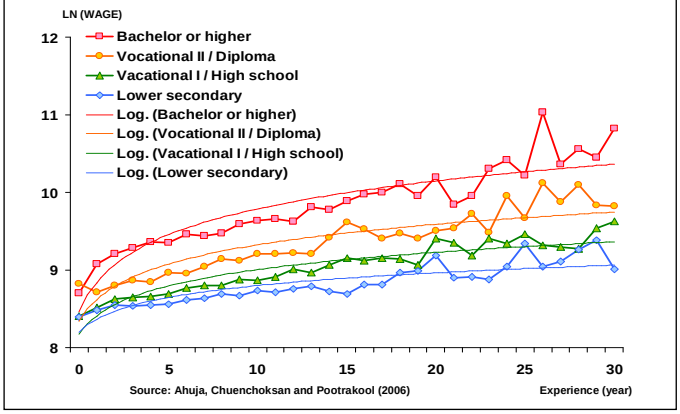
[46] Thailand-based NGOs also provide second-chance remediation programs for adolescents. We do not know yet whether they are cost-effective.

incentives for change faced by firms, workers, parents and students with minimal increase in aggregate inputs.

An incentive-based decentralized education system is superior to the traditional regulatory approach in many ways. The regulatory approach also carries with it a set of incentives. The issue is not their existence, but the direction, force and focus of those incentives. Unlike the regulatory approach to running schools, "incentives" provide the value of concentrating on outcome without knowing in details the approaches to achieve them. Moreover, unlike the omniscient social planner in optimal-control models, policymakers and education bureaucrats do not have sufficient knowledge about the supply function (i.e., the production process and cost structure) in *various* local situations. The incentive approach has the advantage of not requiring that detailed knowledge. It simply relies on the credibility and accountability in Thailand's labor and education markets—the concept that, with larger probability, those who outperform will earn more.

There is considerable financial incentive for attending school at all levels. The Thai labor market pays considerably for school premium at every level and especially at university level. The premium widens with experience (see Figure 23). Foreign education also carries a sizeable premium.

Figure 23: Wage gap between different schooling levels diverges with experience. Suggests better skill acquisition comes with better education on average



In fact, entering the labor market, an average four-year university graduate earns approximately 34 per cent more than a two-year college (or vocational II equivalent—Por Wor Sor) graduate. An average Por Wor Sor earns roughly 14 per cent more than a high school (or Por Wor Chor) graduate, who in turn earns 8 per cent higher wage than a Lower Secondary 3 (Mor 3) graduate. A Mor 3 graduate earns 12 per cent higher wage than a primary school graduate. For workers with different schooling attainment levels, the wage gap widens with experience. This suggests a possible association between level of formal schooling attained and ability to acquire additional skills on the job. An average foreign-educated worker with at least a bachelor's degree earns a sizeable premium (of 60 per cent) over her locally educated counterpart.[47]

[47] In the dataset, 77% of workers with foreign education identify that they have completed bachelor's degree or above.

For schools, the key is to engineer different incentives that involve teachers, parents and students, not an isolated teacher-specific incentive game. Also crucial to this game of accountability is an accurate and reliable measurement of performance. (The reader can introduce firms and trainees in this argument when appropriate.) Having a consequential central examination for every school grade gives students incentives to perform. Parents will now motivate them and evaluate the schools through more rigorous feedback. Link school administrators and teachers' pay and promotion (or manage down and out) directly to student performance on those standardized tests, instead of classroom tests administered by the teachers—a form of merit pay. Teachers and administrators should have the freedom to decide where they want employment. Because teacher's distribution is skewed away from rural areas, which generally have weaker and more challenging students, teacher's pay should be tied also to improvement in test scores and the level of geographic hardship involved.

Differentiation and differentiated pay should start from the selective hiring process, to monitoring and evaluating, and to retaining teachers, administrators and students. The incentive works best if schools are not wedded to the improving the performance of *existing* teachers alone, but to acquiring future teachers with "better" skill sets. This system has to be forward-looking because it takes time to change any complex bureaucratic organization.

Policymakers should recognize that if student's behavior can change in response to new incentives, so can teacher's performance. With the right incentives in school, which answers to a local board of parents and the civic leadership, local and central government will be more accountable to teachers and parents. They are more likely to provide equal opportunity for rural schools in terms of material resources. Schools that do not reach economies of scale can be merged, location permitted, or modes of transportation can be provided for students to attend the merged schools. The pressure for change will be felt and change will more likely result in this incentive system.

The interaction between schools and the labor market ends not with the hiring of teachers. We have already seen evidence of a severe disconnect between the skill sets demanded by firms and those supplied by Thailand's education system. Firms identify this skill mismatch as highly problematic to our national competitiveness, as it deters new firms with better technologies and is costly to existing firms in terms of training, among other things (World Bank, 2005). With fast-changing technology, we cannot hope that an education system that is insulated from that change will eliminate such mismatch.

A key policy question is to ask what incentive system works best to minimize such mismatch. Specifically, what are the characteristics of labor-education markets' interaction that we think will constantly raise the potential of our workforce and let it realize its potential? Imagine an education system that gives high school age students the choice to integrate work and learning as an alternative to strictly formal academic education. This system breaks down the artificial barriers between work and learning that is far beyond informational. It provides firms and the apprentices a variety of learning situations. It motivates students to perform well with an incentive of securing the most desirable apprenticeships. It also motivates firms to provide valuable training opportunities to secure the best future workers. Smaller firms can form alliances to train students. Small schools can also form networks. Thailand has a robust vocational school system. What we need is to connect them more systematically with the workplace.

Although we do not have well-measured evidence for systematic efficiency gain of this sort in Thailand (or anywhere for that matter), these are the embodiments of the successful German Apprenticeship Program and the US market for universities. Our vocational students and educators can also benefit from more interaction with firms operating in the local area and improve. Increased competition will force the system to become more transparent, accountable, and finally deliver better outcomes. In the process, the school-labor market disconnect will have largely diminished.

Tax system and human capital investment

The tax system is also an important incentive system. In a modern economy, high earners tend to have high skills. Income tax progressivity penalizes more skilled, high earning individuals. In comparison, proportional (flat) income taxation does not penalize decisions to accumulate human capital at the margin. Thai tax rules encourage investment made on the job over investment in training that requires substantial out-of-pocket tuition costs.

We examine the influence of taxes on human capital through its costs and returns. The costs of investment are 1. Earnings foregone net of taxes; and 2. Additional out-of-pocket expense, including tuition cost. Higher proportional taxes reduce the cost of spending an hour in school or training (through reducing after-tax wages foregone) by the same amount they reduce the return to working an hour in the market. Hence, assuming that tuition expense is all tax deductible, changes in the flat wage-income tax have no effect on decision to accumulate human capital. The ratio of marginal returns to marginal costs is unaffected. If tuition expenses are not tax deductible, however, higher proportional tax implies that the *return* to investment will be lowered more than the *cost* is reduced. For example, a 10 per cent increase in the tax rate will lower the return to investment and the cost of foregone income equally by 10 per cent; but, the tuition cost is not reduced.[48] In this case, tax deductibility of education expenses under a flat tax regime helps promote human capital investment over the current progressive personal income tax regime.

Thai firms can immediately expense training cost (effectively 100-per-cent tax deductible) and finance it through lower wages (making them tax deductible as well). The only major cost of human capital investment for individuals that is not tax deductible is out-of-pocket college tuition and training cost. These costs can be substantial for some. For the majority of people, the out-of-pocket tuition costs are not substantial, and so proportional wage tax should have little effect on human capital investment

In short, flat labor income tax is neutral (non-distorting) to human capital investment. Progressive labor income tax discourages human capital investment because it taxes earning gains from human capital investment at a higher rate than that which the cost is expensed.

Personal income taxation in Thailand has been less progressive than in the past. Compared to China, Thai personal income tax is much flatter and therefore is more conducive to human capital formation. India has moved toward less progressive regime, but theirs is still steeper than Thailand's. Singapore has a flatter personal income tax profile than most in the Asian region (see Figure 24).

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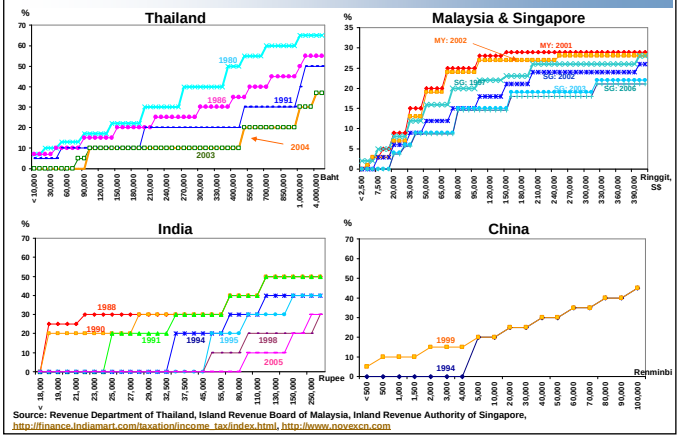
[48] The key here is that foregone earnings are 100 per cent tax deductible—if the tax rate is 10 per cent and one earns 1000 baht less, one pays 100 baht less in taxes and the net loss is only 900 baht, not 1000 baht.

Figure 24: Personal income tax rates in selected Asian countries



Source: Revenue Department of Thailand, Island Revenue Board of Malaysia, Inland Revenue Authority of Singapore, http://finance.indiamart.com/taxation/income_tax/index.html, http://www.novexcn.com

Thai and Malaysian firms can generally deduct 200 per cent of job training expenses. It is clear that the intention of the Thai government is to promote firm's choice in training, not that of the trainees. Malaysians can also deduct training fees and expense on reading material (up to 500 ringgit) directly from individual income tax. Malaysia, however, gives trainees the choice to train themselves.

Taxes on physical capital can also affect human capital investment decisions. Rising physical capital stock have positive feedback effects on wage income. We suspect that a revenue-neutral shift toward less personal income tax progressivity and lower tax on capital should promote human capital accumulation without affecting overall income inequality in the long run. This aspect of human capital policy formation in Thailand is fertile ground for further research.

The Thai government gives families incentives to send their children to school in Thailand through extra 2,000 baht support on top of the 15,000 baht child-relief tax deduction, which the poor never enjoys. Singapore promotes female participation in the workforce through working-mother child relief deduction. This tax relief helps reduce the burden for working mothers and may go to support child care expenses.

Figure 25: Foregone earnings and firm-financed training cost are 100 per cent tax deductible.

- **Foregone earnings: The amount that workers could have earned if no training cost has been financed out from their true income.**
- **Typical young workers spend up to 1/3 of working hours for training at work.**
- **Training costs paid by lower wages (foregone earnings).**

Case 1: Absence of foregone earning	
True income	15,000
No foregone earning or training by firms	0
Received income	15,000
Tax payment 10%	1,500
Self-human capital investment	5,000
Net income	8,500

Case 2: No tax on foregone earnings	
True income	15,000
Foregone earning incurred for human capital investment	5,000
Received income	10,000
Tax payment 10%	1,000
Self-human capital investment	0
Net income	9,000 ✓

Current tax rule encourages workers to be trained by firms, not out-of-pocket.

There is some unintended distortion in favor of homeowners in Thailand. Interest payments on home mortgage loans are tax deductible, thus favoring homeowners' human capital investment over renters'. Human capital investment incentives would be more pronounced for renters if government allows renters to deduct housing rent from individual income tax. India is a case in point, giving incentive to home-owning and renting household alike. India seems to be compensating for its steeper progressive income tax rates by giving specific deduction on children's education expense (up to 2 children).

Given mortgage interest deductibility and zero capital gains tax, Thais face stronger direct incentive to accumulate physical and financial assets over human capital. Malaysia and Singapore does not promote homeownership through mortgage tax deduction, but promotes individual's human capital and financial investment (no tax on interest income or capital gains). India promotes all three with a capital gains tax exemption for financial assets held over 1 year. Thailand may benefit from more flexibility by allowing individual choice in training through tax deduction of training fees. While firms can immediately expense training cost, they must amortize physical investment. In this sense, tax policy already favors human over physical capital accumulation.

Countries can also selectively promote certain skills over others. For example, in response to demand in high-technology professionals, India promotes human capital investment in engineering, medical management as well as applied and pure sciences by allowing for deduction in interest on education loan for full-time graduate work in these fields. Thailand promotes certain professional skills through direct subsidy to universities instead. The downside of this specific promotion is that it distorts decisions by individuals to invest when the government has no better information about the jobs of the future than the market itself.

In summary, steep progressivity in income taxation is not appropriate for countries that wish to promote human capital accumulation. Our personal income tax profile is less steep than in the past, but is still steeper than Singapore. Because skills required for success in the labor market are built over time, it is neither easy nor cost-effective to lift every less skilled *adult* into skilled status through training. Public policy to foster human capital accumulation in the workplace should target those who are most trainable. Firms, schools and individuals have more information and respond faster to market developments than government. They should decide whom and when to train. Training cost for non-salary workers should be tax deductible to promote skill upgrade.

IV. Conclusion

In forming policy, government needs to recognize the basic human skill formation process. Skills are products of genetic and environmental inputs. They are multiple. Their acquisition is sensitive to life-cycle stages. Skills acquired early can make further acquisition less costly and more productive. Given the same amount of investment in acquiring one skill, what we know suggests that the rate of return is always positive and declining with age. Consequently, society should find it optimal to invest public resources in people of all ages—life-long learning—but more in the young and less in adults with low skills or abilities. Targeting public spending on the needy young is both efficient and equitable. The immediate public investment goal is to encourage more Thai

children to reach their potential. Evidence shows that enabling parents to care for their pre-school young pays off well to the children and society in small and large-scale randomized experiments. The Thai government should use local health and school infrastructure as well as coordinate with NGO networks to boost intervention capacity.

Findings also indicate that the Thai labor market values both cognitive and non-cognitive skills equally. Success depends on getting the job done well. To do that, a person needs not only intelligence (cognitive ability), but also motivation, self-control, patience and social skills. Parents and education professionals should recognize this.

Repairing earlier shortfalls later in life and upgrading low-skilled adults into high-skilled labor is highly costly, which suggests that society be selective about whom to train. Empirical results show that it is not only a matter of how much school resource we use, but *how* these resources are deployed. In the workplace, for example, firms are more qualified than government in making that decision, but government can help upgrade skills of non-salary workers through tax incentives for training.

Education is too important and vast for the traditional regulatory approach to human capital building to be effective. Because our knowledge is never going to be complete, a human capital policy design has also to be accommodative to future developments. An incentive-based approach is most appropriate to the task.

We suggest a comprehensive and coherent reformed framework for public policies to foster human capital accumulation. The framework rests on 3 pillars: 1. (Competition) Strong, focused and uni-directional incentives to providers and purchasers of education and training to solve the efficiency problem; 2. (Access) More public resources targeted to the needy young, who gains the most, to overcome inequality of access; and lastly, 3. (Family) Enabling Thai parents to involve in all stages of their children's school life.

The proposed human capital policy framework recognizes the reality that moving a country on to a higher growth path in a sustained fashion to achieve a better overall quality of life requires involvement of all sectors in society. Within this framework, specific measures, some currently being used, can become more effective. Changing mindset takes time as well as determination. A systematic incentive revamping will help ensure that we have a capable 21st century workforce that succeeds in global competition.

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