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The Merits of Ability in Developing and Developed Countries

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Abstract

Different economic characteristics between developing and developed countries may require worker with different skills, resulting in different returns to the same ability. Moreover, it is also possible that different countries require different skills depending on their economic fundamentals. This paper provides evidence of the hypotheses above by comparing the labour market returns to numeracy and cognitive ability in Indonesia and the United States. In Indonesia, I find that numeracy has no significant effect on income, while general cognitive ability positively affects income. In the United States, meanwhile, I find that only mathematics ability is significant. Looking at the returns by sex, I find that the benefits of higher cognitive skills only pertain to males in Indonesia, while females have higher returns to numeracy than males in the United States. These results are robust to different specifications. Overall, these differences in returns to ability between Indonesia and the United States indicate that different economic structures indeed demand different sets of skills.

JEL classification: I20, J31.
Keywords: income, ability, mathematics, cognitive, Indonesia, United States.

I. Introduction

Conditional on schooling, there is some evidence that the size of wage premium that cognitive skills attract depends on the level of technology used in the workplace. Krueger (1993) finds that workers who use a computer at work earn higher wages compared to those who do not use any computers. Meanwhile, looking at returns to ability over time, Murnane, Willett, and Levy (1995) find that basic cognitive skills have a higher impact on wages in 1986 than 1978, showing the highly numerate are increasingly demanded in the labour market as the United States economy develops. Similarly, Rubinstein and Tsiddon (2004) find that higher skills are more rewarded in more advanced economies. Therefore, it appears that economies that use more advanced technologies have labour markets that are based more on merit than on credentials.

Given that developed countries in general use more sophisticated technology in their production compared to developing countries, the evidence above implies that the correlation between cognitive skills and wages is higher in developed countries compared to developing countries. In this paper, I test that hypothesis by comparing the returns to ability between the United States and Indonesia. Specifically, I measure the returns to two types of ability: numeracy and general cognition, to examine whether each skill is awarded differently in developing and developed countries. To my knowledge, this is the first comparison of returns to ability between developing and developed countries.[1]

There are two reasons for choosing these two countries. First, their measure of ability is contained in a nationally representative household survey, something that is attributed by Psacharopoulos and Patrinos (2004) as the ideal basis for measuring returns to education. The same authors state that such dataset is very rarely available, as most other studies use employee surveys. The second reason for choosing these two countries is that the tests administered in these two countries are of similar type, which increases the validity of comparing the returns to ability between these countries.[2]

[1] Denny, Harmon, and O'Sullivan (2008) compare returns to literacy in 29 European and North/Latin American countries. Although their dataset includes several Eastern European countries, they do not consider the difference between developing and developed countries.

[2] One argument for not using the United States is because the evolution of wage structure and returns to skills in that country may not be representative of the other developed countries (Machin and Van Reenen, 1998; Denny,

The rest of this paper is organised as follows. Section II discusses results from research on this issue. Section III describes some theoretical framework that may explain the differences in the returns to ability. Section IV defines the econometric models that contaminate this kind of investigation. Section V describes the data that I use. Sections VI analyses the labour market returns to ability in Indonesia and the United States. Section VII provides robustness checks. The final section concludes.

II. The Relationship between Ability and Income

In this section, I discuss a number of studies from developing and developed countries that estimate the labour market returns to ability. Glewwe (2002) writes a large survey article on the impact of schools on the production of cognitive skills and the effect of cognitive skills on labour market outcomes, fertility, and child health. Regarding cognitive skills and income, he asserts that most studies find a positive, large, and statistically significant coefficient on the measure of cognitive skills. Similarly, Hanushek and Woessmann (2008) review nine studies from six developing countries and find that a one standard deviation increase in ability, mostly measured using mathematics and reading tests, increase income by between 12% and 48%.

Among studies that look at labour market returns to human capital, only a handful use test scores as a measure of human capital without controlling for years of schooling. One such study, Glewwe (1996), finds that a one-point increase in a mathematics test score is associated with a 2.8% to 3.5% higher wage among government employees in Ghana, while reading test score has no effect. In contrast, he finds that the test scores are insignificant for those working in the private sector, with the effects ranging between 2.0% and 3.0%. Another study in this category, Jolliffe (1998), uses the same dataset as Glewwe (1996) but focuses on rural households. Using several estimation techniques, he finds the returns to ability to be between 1.0% and 9.0%.

On the other hand, most other studies include both years of schooling and test score as explanatory variables in looking at the effect of education on income. According to Glewwe (2002),

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Harmon, and O'Sullivan, 2008). However, the United States remains the only country whose aptitude tests are the most comparable to Indonesia.

this allows investigation of two issues: the merits of signalling theory and the relative importance of cognitive skills in determining income compared to education attainment.

In the former, signalling means that income mostly depends on education attainment, not actual ability. An indicator of its existence is if the coefficients of test scores are insignificant after differences in education attainment are taken into account. Another way of looking at the issue is the following. A certain education level acts as a condition to have access to jobs that reward higher abilities, hence only those with the necessary education credentials can benefit from their higher ability. Meanwhile, those with low education attainment can only work in jobs whose pay is independent from ability. In one of the earliest studies that look at this issue in developing countries, Boissiere, Knight, and Sabot (1985), using data from Tanzania and Kenya, do not find the existence of signalling. In contrast, Glewwe (1996) finds evidence of signalling in the government sector but not in the private sector in Ghana.

Meanwhile, comparing between the influence of cognitive skills and education attainment on income, Boissiere, Knight, and Sabot (1985) find that the education attainment coefficient declines by 60.4% in Kenya, although still significant, once the test scores are included. In Tanzania, meanwhile, the coefficient experiences a similar drop and loses its significance. In addition, the test score coefficients themselves are significant, ranging from 1.0% to 2.0% increase in wage for each additional point in the test. Meanwhile, Moll (1998) divides education attainment into splines of primary, secondary, and tertiary levels, and finds the coefficients of the primary and secondary schooling to decrease by between 30.0% and 80.0%, from 0.15 to 0.03 in the worst case, once the test scores are included. In addition, among the six specifications he uses, only in two that the primary and secondary schooling coefficients are significant, while the tertiary schooling and test scores are significant in all specifications, with the latter contributing between 10.0% and 30.0% higher income.

There are also studies that focus on rural households. So far only two studies, Jolliffe (1998) and Vijverberg (1999), investigate the impact of ability on household farm and off-farm income; both use data from Ghana. In this paper I only discuss Jolliffe (1998). He uses four measures of ability: household maximum English score, maximum mathematics score, average English score, and average mathematics score. He finds that conditional on selecting to engage in farm work, a one-point increase in the household average mathematics score increases farm income by 2.0%. Meanwhile, a one-point increase in household maximum score in mathematics test increases off-farm income by 4.9%, while a similar increase in household maximum English score and household average mathematics score increase off-farm income by 6.0% and 8.6% respectively.

Results from Developed Countries

In a meta-analysis of 27 studies, Ashenfelter, Harmon, and Oosterbeek (1999) find that controlling for ability significantly lowers the OLS estimate of returns to education among United States studies, but raises the OLS estimate in the non-United States studies. This contrasts the finding in developing countries, where including ability always lowers the OLS estimates.

Looking specifically at the result from several United States studies, meanwhile, Murnane, Willett, and Levy (1995) use two datasets: National Longitudinal Survey of High School Class of 1972 (NLS72) and High School & Beyond 1980 to measure wage levels six years after graduating from high school. They find that adding the mathematics score results in the decline of 41% in the coefficient on educational attainment. On the mathematics score itself, they find that a one point increase in mathematics score increase wage by between 0.4% and 1.1% for males, while the effect is higher among females, between 0.9% and 1.7%. Meanwhile, Neal and Johnson (1996) use National Longitudinal Survey of Youth 1979 (NLSY79) and find that the effect of a one standard deviation higher AFQT score is 17.2% for males and 22.8% for females.[3] In addition, they find statistically insignificant coefficients on squared AFQT. Meanwhile, Murnane et al (2001) also use NLSY79 and find that a one standard deviation increase in AFQT increases wages for males by 19.2%. Finally, Dougherty (2003) finds that a one standard deviation gain in numeracy is associated with a 9.5% increase in earnings, while a similar gain in literacy increases earnings by 1.4%, although surprisingly he neither uses a sex dummy nor separate the sample into males and females. In contrast to all the above studies, meanwhile, Blackburn and Neumark (1995) use the individual components that make up the AFQT and find that none has any statistically significant effect on male earnings.

[3] Armed Forces Qualifications Test (AFQT) is a composite score created from four subtests of Armed Services Vocational Aptitude Battery (ASVAB): mathematical knowledge, arithmetic reasoning, word knowledge, and paragraph comprehension. See section IV for explanation of ASVAB.

Apart from the United States, there are several European studies. Dearden (1999) uses quintiles of mathematics and verbal ability from National Child Development Survey (NCDS) data in the United Kingdom. Employing several specifications, she finds non-linear returns to mathematics ability, with those in the highest quintile of mathematics ability earning around 16.9% higher compared to those in the lowest quintile, while those in third and fourth quintiles earning around 10.7% higher wage compared to the same group. Meanwhile, she finds that those in the highest quintile of verbal ability earn between 12.6% to 13.2% higher wage compared to the lowest quintile, with little evidence of non-linear returns.

In another European study, Uusitalo (1999) uses Finnish data and finds that a one-standard deviation increase in mathematics, verbal, and analytical tests is associated with a 6.0% higher wage among men. Finally, Levin and Plug (1999) find that a one-point increase in IQ is associated with 0.5% to 8.8% increase in income. In order to make the comparison between countries easier, Table 1 shows the effect of a one standard deviation increase in ability on income from the studies I mention in this section.

[Table 1 here]

From the table, it appears that the difference in returns to ability between developing and developed countries is not substantial. However, this is misleading because the studies use vastly different tests to proxy for ability. In addition, some use econometric models that render the results incomparable with the rest. Hence, it is not possible to compare the differences in returns ability of different skills from merely reviewing the literature.

III. Theoretical Framework

In this paper, I investigate the different returns to different skills, in this case mathematics and cognitive skills, and how that could differ between developed and developing countries. One way of explaining the existence of heterogeneity in the returns to mathematics and cognitive ability is through the differences in capital-skill complementarity. Duffy, Papageorgiou, and Perez-Sebastian (2004) use a cross-country macro panel dataset to investigate the hypothesis that capital has a higher complementarity with skilled labour than with unskilled labour. Extending their idea to a different direction, it is possible that returns to mathematics and cognitive ability differ due to differences in the capital-skill complementarity driven by the technology used in the different countries.

To show this, I modify the CES production function used by Duffy, Papageorgiou, and Perez-Sebastian (2004) into three inputs: capital *K*, mathematics skills *M*, and cognitive skills *C* as shown in Equation 1.

$$Y = A\{a\left[bK^{\theta} + (1-b)M\theta\right]^{\frac{\rho}{\theta}} + (1-a)C^{\rho}\}^{\frac{1}{\rho}} \tag{1}$$

where *A* is an efficiency parameter, *a* and *b* are distribution parameters, and θ, $\rho \leq 1$ are the intraclass and interclass elasticity of substitution parameters. With this specification, the elasticity of substitution between *K* and *M* is different to the elasticity of substitution between *K* and *C*. Assuming competitive wage determination and exogenous labour supply, this simple model could therefore explain the different returns to different skills within a country. Differences between developed and developing countries, meanwhile, can be explained through the differences in the parameters.

IV. Econometric Model

To empirically ascertain the different returns to mathematics and cognitive skills, I use a modified Mincer human capital earnings function model, incorporating both education attainment and ability. The main model is described in Equation 2.

$$\ln(w_i) = \alpha + \beta A_i + \gamma M_i + \psi C_i + \kappa E_i + \eta E_i^2 + \vartheta X_i + \upsilon_i \tag{2}$$

where *w* is gross monthly wage of person *i*, *A* is the education attainment dummy, which is equal to one if the person has a high school diploma and zero otherwise; *M* and *C* are mathematics and cognitive skills as measured by test scores; *E* is potential experience; and *X* is a vector of control variables that are widely used in these types of investigations. It includes dummies for region, ethnicity, female, father's education attainment, current school participation, and if the wage is for part-time work.[4]

Finally, I also take several steps in order to ensure that the empirical analysis of labour maker returns to ability between Indonesia and United States are comparable. Firstly, the respondents have similar characteristics. They have similar age and are working in urban areas. Secondly, I choose similar tests. Thirdly, I use the same dependent variable in the models, log of gross monthly wage, and corresponding independent variables.

V. Data

For Indonesia, I use data from the Indonesian Family Life Survey (IFLS), a longitudinal household socioeconomic and health survey that began in 1993. The second and third waves were done in 1997 and 2000. The sample represents about 83% of the Indonesian population living in 13 provinces in Indonesia. Between IFLS1 and IFLS2, the attrition rate is 5.6%, while it is 5% between IFLS2 and IFLS3. Overall, 95.3% of households that participated in IFLS1 also participated in IFLS3.[5] The total respondents in IFLS3 are 10,574 households, consisting of 7,928 panel households and 2,646 new split-off households. In this study, I mainly use the data from IFLS3, the only wave that contains test score data, which I describe in the next subsection.

For the United States, meanwhile, I use the National Longitudinal Survey of Youth 1997 (NLSY97), which is a panel dataset that is administered annually. NLSY97 is designed to document the transition from school to work and from adolescence to adulthood for United States residents who were born between 1980 and 1984. It collects data on respondents' labour market behaviour and educational experiences, as well as their family and community background.[6] The NLSY97's original cohort consists of 8,984 respondents from 6,819 unique households. For the purposes of this study, I use NLSY97 Round 7, which was administered in 2003. This is done in order to ensure that the respondents have similar age range as those in IFLS3, albeit the range is narrower. While the IFLS3

[4] Part-time work is defined as working less than1875 hours per year in Indonesia and 2000 hours per year in the United States.
[5] The information in this paragraph is taken from the IFLS3 official guide (Strauss et al, 2004).
[6] The information is taken from NLSY97's official document (CHRC, 2007).

respondents are between 15 and 24 years old, the NLSY97 respondents are between 19 and 23 years old. I do not limit the IFLS respondents to exactly match the age range of the NLSY97 respondents because the sample size is already quite limited with only 612 total observations.[7]

Measures of Ability

IFLS3 administers two tests: abstract reasoning and basic mathematics for individuals between 15 and 24 years old. The central government's Department of National Education, which is responsible for designing the annual national exit examinations for primary and secondary students across the country, designed the tests. The abstract reasoning test measures general cognitive ability and consists of eight matching shape problems, while the basic mathematics test consists of three mathematical operation questions and two more complex questions. Examples of the questions are in Appendix 1.

For the United States data, meanwhile, NLSY97 administers the CAT-ASVAB (Computerised Adaptive Testing-Armed Services Vocational Aptitude Battery), which is a military enlistment test battery. It contains ten power and two speeded subtests, measuring aptitude in areas from arithmetic reasoning, electronics information, to word knowledge. From the subtests, I use two that are the most similar to the tests in IFLS3: mathematics knowledge and assembling objects. The former consists of 25 questions and the latter consists of 16 questions. Examples of the problems are in Appendix 2.

The ASVAB was administered in 1997, when the oldest cohort of respondents was 17 years old and the youngest cohort was 13 years old. An important issue to note is related to the fact that CAT-ASVAB is a computerised adaptive testing battery, which means more weight is given to harder questions and subsequent questions may differ based on respondents' answer to the previous ones. This means the respondents may not have been asked the same set of questions. Thus, comparing respondents based on raw scores is invalid. In this paper, I used the standardised test scores that have been calibrated by the NLSY97 administrators. Therefore, the scores between respondents are comparable.

[7] Limiting the age range of IFLS to exactly match NLSY does not change the signs of the estimated coefficients, although, as expected, the statistical significances are greatly reduced.

Descriptive Statistics

The mean and standard deviation of the variables are in Table 2. The test scores are standardised, hence they have a mean of zero and standard deviation of one. It is interesting to note from Table 2 that education attainment and participation in further studies are dramatically different between Indonesia and the United States. In Indonesia, 42% of the sample has completed high school, while it is 88% in the United States. Among those in the sample, i.e. young adults who are working, 90% in Indonesia have stopped working, while the share is 60% in the United States. However, it is interesting to note that despite having nine in ten people out of school, only five out of ten are working full-time in Indonesia, while the share of part-time workers in the United States, close to eight out of ten, is more logical.

[Table 2 here]

VI. Labour Market Returns to Ability in Indonesia and the United States

In this section, I estimate Equation 1 for both countries using OLS. The results are shown in Table 3. Columns 1 and 3 provide the returns to education attainment, measured using a high school binary indicator. In Indonesia, those with a high school diploma earn as much as 84.6% higher wage compared to those without the qualification.[8] In the United States, meanwhile, having a high school diploma is associated with around 50.4% higher earning. The higher returns to education attainment in Indonesia confirm the established view that returns to education in developing countries are higher than in developed countries (Patrinos and Psacharopoulos, 2004).

[Table 3 here]

[8] The effect of high school diploma is calculated using a method described by Halvorsen and Palmquist (1980) for calculating semi-elasticities of dummy independent variables, which is exp(x) -1. In this case, the effect is exp(0.613) – 1 = 0.846.

Meanwhile, Columns 2 and 4 add the ability measures. It appears that including ability measures indeed reduce the coefficient of education attainment variable, although not by a large magnitude as observed in Kenya and Tanzania (Boissiere, Knight, and Sabot, 1985). For the United States, meanwhile, including the ability measures shave the coefficient of education attainment by almost a third, echoing findings from other studies I mention in Section II.

Looking at the coefficients of the ability measures themselves, higher numeracy is not associated with higher wage in Indonesia, while in the United States a one standard deviation increase in mathematics ability is associated with 13.6% higher wage. In contrast, one standard deviation higher cognitive skills is associated with 7% higher wage in Indonesia but have a statistically insignificant association with earnings in the United States.

Comparing the result in Column 2 to other developing countries in Table 1, it appears that the magnitude in Indonesia is similar to Tanzania, and lower than Ghana, Kenya, and South Africa. On the other hand, most studies using United States data divide the sample into males and females, and none neither use NLSY97 nor focus on the similar age group as I examine. In a study that looks at the whole sample, Dougherty (2003) finds that a 1 SD increase in numeracy is associated with 9.5% higher earnings. Hence, it appears that the estimations in Table 3 are in line with previous research.

There are two main messages from the estimation results. First, it appears that different skills are valued differently within a country. From the theoretical model, one reason that this could happen is due to the difference in the complementarities between the different skills with capital. Secondly, the abilities are rewarded differently between these two countries. Given that the ability that has a significant association with higher wage is different between Indonesia and the United States, it is straightforward to infer that the returns to cognitive ability is higher in Indonesia than in the United States, and vice versa in the case of mathematics ability.

I next turn to examining the different effects of ability for male and females by estimating the samples separately. Table 4 presents the estimation results for females. Higher ability is not associated with higher wage in Indonesia, while a one standard deviation higher mathematics ability is associated with 15% higher wage in the United States. Looking at males, as shown in Table 5, meanwhile, a one standard deviation higher cognitive ability is associated with 8.8% higher wage in Indonesia, while it is associated with 5.4% lower wage in the United States. With regards to mathematics ability, meanwhile, it is significant for males in the United States, but not for those in Indonesia.

[Table 4 here]

Comparing the results between Tables 4 and 5, there are several interesting findings. Firstly, the returns to education attainment among females are higher than among males. This mimics results from other countries, both developing (for example Schultz, 1993) and developed (for example Murnane Willett, and Levy, 1995; Dougherty, 2005). Secondly, the benefit of higher ability in the United States is higher for females than males. This mimics the findings of Murnane, Willett, and Levy (1995) and Neal and Johnson (1996), who ascertain that although the effect of mathematics skill is still significant for males, the returns are higher among females.

In conclusion, I find significant differences in returns to ability between the United States and Indonesia. Relative to the mean ability, higher mathematics skills are more rewarded in the United States, while in Indonesia it is cognitive skills that are more valued. Generalised to a larger context, this is the first evidence that abilities are valued differently between developed and developing countries.

[Table 5 here]

VII. Robustness Checks

In this section I test whether the results hold when estimated using different variables or when the sample is restricted. The first robustness test uses hourly wage as the dependent variable, as opposed to monthly wage. The main reason for using hourly wage is because it may be more appropriate in estimating the labour market returns to ability, and indeed most studies use hourly wage as their dependent variable. Table 6 provides the estimation results.

Qualitatively, the results that only cognitive ability is statistically significant in Indonesia and only mathematics ability is significant in the United States remain. Moreover, the higher returns to numeracy among females compared to males in the United States persist. However, in terms of magnitude, the coefficients in the United States are smaller for all three specifications, while it is larger for males in Indonesia, but statistically insignificant when using the whole sample. Therefore, while the results are mostly the same as those in the previous section, it appears that the choice of dependent variables may give us different conclusions regarding the overall returns to ability in Indonesia.

[Table 6 here]

The second robustness check excludes those who are still in school from the sample. Given the relatively young age of the sample, in this specification I am looking at the low educated who are quite possibly already on their career paths. Table 7 provides the estimation results. The main difference between using this sample and the whole sample is the fact that returns to numeracy among females are now lower than males in the United States. Although the coefficients are different from those in the previous tables, the main finding of higher returns to cognitive ability in Indonesia and numeracy in the United States still holds.

VIII. Conclusion

In this paper I examine the effect of mathematics and cognitive ability on income in Indonesia and the United States, then compare the results to see whether different abilities are valued differently between developing and developed countries. There are several findings worth reiterating.

Looking at the case of Indonesia, ability in mathematics has no statistically significant effect on income. When I separate the sample into males and females, the coefficients of mathematics score are still statistically insignificant for both males and females. In contrast, cognitive ability is statistically significant when using the whole sample. Separating between males and females, meanwhile, the positive effect of cognitive ability is only significant among males. Finally, comparing the result with other developing countries, the returns to ability in Indonesia is lower than South Africa and Ghana, but similar to Tanzania.

Looking at the results from the United States, meanwhile, I find no effect of higher cognitive ability on wage. In contrast, higher mathematics ability brings higher wage. Different results emerge once I separate the sample by sex. It seems that higher cognitive ability has a detrimental impact among males. In contrast, higher mathematics skill is still significantly rewarded, higher among females than males. Finally, there are no evidence of non-monotonic relationship between ability and income in either country.

Comparing the returns to ability between Indonesia and the United States, I find that mathematics skills is rewarded higher in the United States, while cognitive ability is rewarded higher in Indonesia. I find that the above results are robust to using different dependent variable and isolating those who are out of school, although the estimated coefficients are not as precise. Therefore, my finding lends support to the expectations that not only different skills are rewarded differently within developing and developed countries, but the same skills are also rewarded differently between the two groups of countries.

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Table 1. Summary of the Estimated Effect of a One Standard Deviation Higher Ability on Income

Country	Author(s)	Measure of ability	Dependent variable	Estimated effect
Finland	Uusitalo (1999)	Mathematics, verbal, analytical score, standardised	Log of annual earning	6.0%
Ghana	Glewwe (1996)	Mathematics and reading, raw scores	Log of hourly wage	23.6%-29.5%
Ghana	Jolliffe (1998)	Mathematics and English, raw scores	Log of total, farm, and off-farm income	15.2%-65.2%
Indonesia	This study	Mathematics and cognitive ability, standardized	Log of monthly wage	7% total, 8.6% males.
Kenya	Boissiere, Knight, and Sabot (1985)	Total mathematics and reading raw test score	Log of pre-tax earnings	19.0%-22.0%
Netherlands	Levin and Plug (1999)	IQ raw score	wage, unit unclear	7.5%-132.0%
South Africa	Moll (1998)	Comprehension and computation, raw scores	Log of hourly wage	28.4%-48.3%
Tanzania	Boissiere, Knight, and Sabot (1985)	Total score in mathematics and reading test	Log of pre-tax earnings	7.0%-13.0%
UK	Dearden (1999)	Mathematics and reading, put into quintiles	Log of hourly wage	Those in top math quintile earns 16.9% higher than lowest quintile; Those in top reading quintile earns 13.2% higher
United States	Murnane, Willett, and Levy (1995)	Mathematics, raw score	Log of hourly wage	2.8%-7.9% for males; 6.3%-11.0% for females
United States	Neal and Johnson (1996)	AFQT score, standardised	Log of hourly wage	17.2% for males; 22.8% for females
United States	Murnane et al (2001)	AFQT score, standardised	Log of hourly wage	19.2%, males only.
United States	Dougherty (2003)	Arithmetic reasoning and a composite of word knowledge and paragraph comprehension from ASVAB, standardised	Log of hourly wage	1.4%-9.5%
United States	This study	Mathematical knowledge and assembling objects from ASVAB, standardized	Log of monthly wage	13.6% total; 12.7% for males; 15% for females.

Notes: only statistically significant estimates are reported; the estimates for Kenya and Tanzania are taken from Hanushek and Woessmann (2007), because the original paper by Boissiere, Knight, and Sabot (1985) does not contain standard deviation of the test scores; the estimates for UK are not for a 1SD increase, because the scores are divided into quintiles.

Table 2. Mean and Standard Deviation of Variables from IFLS3 and NLSY97

Variable	Mean	Std Dev	Minimum	Maximum	Dummy
IFLS3					
ln (monthly wage)	12.18	0.91	9.21	14.51	No
Mathematics score	0	1	-1.37	1.83	No
Cognitive score	0	1	-2.63	1.10	No
Potential experience	5.69	3.34	0	16	No
Javanese	0.45	0.50	0	1	Yes
Female	0.44	0.50	0	1	Yes
Lives in Java	0.72	0.45	0	1	Yes
Completed at least 12 years of schooling	0.42	0.49	0	1	Yes
Out of school	0.90	0.30	0	1	Yes
Wage is for part time work	0.50	0.50	0	1	Yes
Father finished 12 years of schooling	0.16	0.37	0	1	Yes
NLSY97					
ln (monthly wage)	6.56	1.16	-0.08	11.84	No
Mathematics score	0	1	-2.66	2.66	No
Cognitive score	0	1	-2.05	2.46	No
Potential experience	3.08	1.84	0	11	No
Black	0.25	0.43	0	1	Yes
Hispanic	0.23	0.42	0	1	Yes
Female	0.51	0.50	0	1	Yes
Lives in South	0.34	0.47	0	1	Yes
Completed at least 12 years of schooling	0.88	0.32	0	1	Yes
Out of school	0.60	0.49	0	1	Yes
Wage is for part time work	0.78	0.42	0	1	Yes
Father finished 12 years of schooling	0.64	0.48	0	1	Yes

Table 3. Labour Market Returns to Ability in Indonesia and the United States

	Indonesia				United States			
	(1)		(2)		(3)		(4)	
Complete high school	0.613	***	0.587	***	0.408	***	0.293	***
	(0.077)		(0.080)		(0.061)		(0.065)	
Mathematics score			0.011				0.136	***
			(0.037)				(0.023)	
Cognitive score			0.070	**			-0.018	
			(0.035)				0.022	
R-squared	0.24		0.25		0.32		0.32	
N	612		612		3408		3408	

Notes: the dependent variable is log of monthly wage; control variables include potential experience and its square, dummies for sex, ethnicity, region, part-time work, school participation, father's education level, and a constant; robust standard errors are in parentheses; *** significant 1%, ** significant 5%, * significant 10%.

Table 4. Labour Market Returns to Ability among Females in Indonesia and the United States

	Indonesia				United States			
	(1)		(2)		(3)		(4)	
Complete high school	0.690	***	0.630	***	0.465	***	0.315	***
	(0.110)		(0.117)		(0.093)		(0.099)	
Mathematics score			0.062				0.150	***
			(0.051)				(0.033)	
Cognitive score			0.037				0.019	
			(0.049)				(0.030)	
R-squared	0.28		0.29		0.27		0.28	
N	272		272		1747		1747	

Notes: the dependent variable is log of gross monthly wage; control variables include potential experience and its square, dummies for ethnicity, region, part-time work, school participation, father's education level, and a constant; robust standard errors are in parentheses; *** significant 1%, ** significant 5%, * significant 10%.

Table 5. Labour Market Returns to Ability among Males in Indonesia and the United States

	Indonesia				United States			
	(1)		(2)		(3)		(4)	
Complete high school	0.551	***	0.564	***	0.353	***	0.272	***
	(0.110)		(0.112)		(0.080)		(0.085)	
Mathematics score			-0.031				0.127	***
			0.051				(0.033)	
Cognitive score			0.086	*			-0.054	*
			(0.047)				(0.032)	
R-squared	0.22		0.23		0.35		0.36	
N	340		340		1661		1661	

Notes: the dependent variable is log of gross monthly wage; control variables include potential experience and its square, dummies for ethnicity, region, part-time work, school participation, father's education level, and a constant; robust standard errors are in parentheses; *** significant 1%, ** significant 5%, * significant 10%.

Table 6. Labour Market Returns to Ability in Indonesia and the United States, hourly wage

	Indonesia						United States					
	Male		Female		Total		Male		Female		Total	
	(1)		(2)		(3)		(4)		(5)		(6)	
Complete high school	0.531	***	0.670	***	0.543	***	0.113	**	0.085	*	0.100	***
	(0.136)		(0.140)		(0.097)		(0.045)		(0.048)		(0.033)	
Mathematics score	0.032		0.031		0.038		0.044	**	0.086	***	0.064	***
	(0.069)		(0.057)		(0.047)		(0.018)		(0.018)		(0.012)	
Cognitive score	0.122	**	-0.026		0.062		-0.005		0.007		0.001	
	(0.058)		(0.060)		(0.042)		(0.019)		(0.017)		(0.013)	
R-squared	0.35		0.37		0.36		0.05		0.06		0.06	
N	340		272		612		1661		1747		3408	

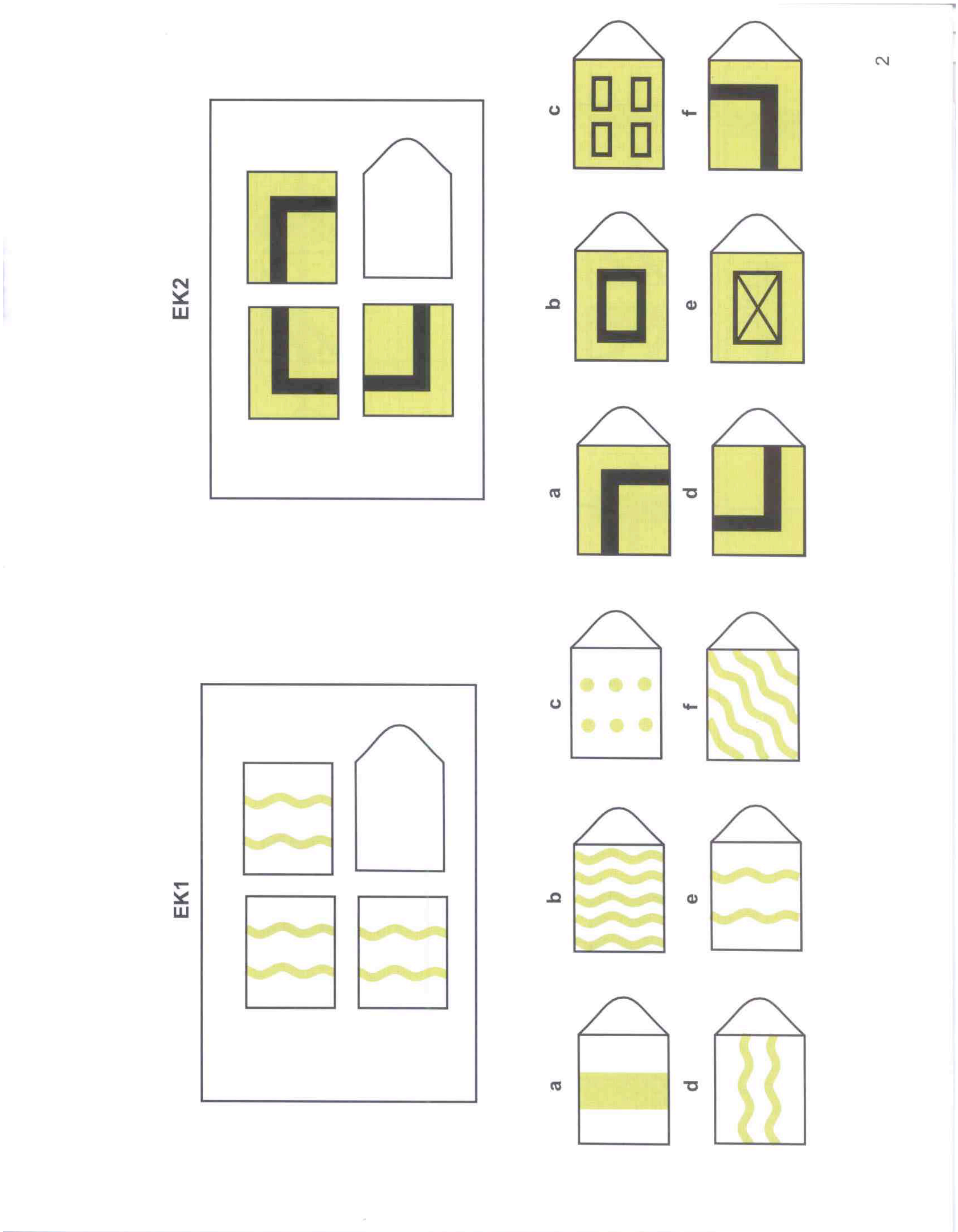
Notes: the dependent variable is log of hourly wage; control variables include potential experience and its square, dummies for ethnicity, region, part-time work, school participation, father's education level, and a constant; estimations of "Total" also includes a female dummy; robust standard errors are in parentheses; *** significant 1%, ** significant 5%, * significant 10%.

Table 7. Labour Market Returns to Ability in Indonesia and the United States, only those out of school

	Indonesia						United States					
	Male (1)		Female (2)		Total (3)		Male (4)		Female (5)		Total (6)	
Complete high school	0.514	***	0.576	***	0.540	***	0.260	***	0.279	**	0.275	***
	(0.117)		(0.118)		(0.083)		(0.089)		(0.110)		(0.070)	
Mathematics score	-0.020		0.058		0.016		0.178	***	0.127	***	0.155	***
	(0.055)		(0.051)		(0.038)		(0.040)		(0.046)		(0.030)	
Cognitive score	0.093	*	0.041		0.077	**	-0.091	**	0.032		-0.036	
	(0.048)		(0.051)		(0.035)		(0.040)		(0.044)		(0.030)	
R-squared	0.16		0.25		0.20		0.35		0.29		0.34	
N	305		250		555		1067		966		2033	

Notes: the dependent variable is log of monthly wage; control variables include potential experience and its square, dummies for ethnicity, region, part-time work, father's education level, and a constant; estimations of "Total" also includes a female dummy; robust standard errors are in parentheses; *** significant 1%, ** significant 5%, * significant 10%.

Appendix 1. Test Question Examples in IFLS3



EK18. $\frac{56}{84} = \ldots$

a. $\frac{4}{7}$

b. $\frac{2}{3}$

c. $\frac{3}{4}$

d. $\frac{5}{6}$

EK19. (412 + 213) : (243 – 118)

a. 125

b. 75

c. 25

d. 5

EK20. 0,76 – 0,4 – 0,23

a. 0,11

b. 0,12

c. 0,13

d. 0,16

EK21. Jika 65 persen penduduk bercocok tanam, sedang penduduknya sejumlah 160 juta, maka banyaknya penduduk yang tidak bercocok tanam adalah…

a. 35 juta

b. 40 juta

c. 48 juta

d. 56 juta

EK22. Uang tabungan si Ali di bank Rp 75.000,00. Jika setahun kemudian bunganya 5%, maka besar bunga yang diterima Ali adalah…

a. Rp 7.500,00

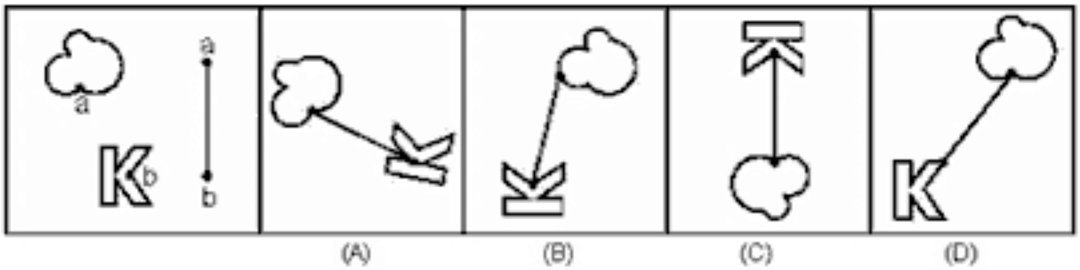
b. Rp 3.750,00

c. Rp 750,00

d. Rp 375,00

Appendix 2: Test Question Examples in ASVAB*

Assembling Objects Test



Mathematics Knowledge Test

In a bag there are red, green, black, and white marbles. If there are 6 red, 8 green, 4 black, and 12 white ones, and one marble is to be selected at random, what is the probability that it will be white?

(A) 1/5

(B) 2/5

(C) 4/15

(D) 2/15

(3+2)(6-2)(7+1) = (4+4)(x). What is the value of x?

(A) 13+2

(B) 14+4

(C) 4+15

(D) 8+12

* These example questions are downloaded from http://www.petersons.com/testprep/quiz.asp?id=1180&sponsor=1&path=ce.pft.asvab on 19 October 2007.