Demand for Education in Indonesia[1]

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Given the size of social spending in the budget and the desire to enhance the quality of fiscal adjustment while pursuing macroeconomic stability, policy makers must increase the effectiveness of expenditure policy which may be estimated by analyzing the demand behavior of receivers toward the services. This paper utilizes logistic regression model to estimate demand for elementary, junior high school and senior high school education in Indonesia. It uses data from National Socio-economic Survey (SUSENAS) of Indonesia..

This paper found that (i) The probability of being enrolled in school increases as household income, parent education and value of scholarship increases (ii) The larger the family size and the higher the respondent's age decrease the probability of school enrollment (iii) lower teacher-student ratio, a proxy of higher school quality and higher school density increase the probability of parents to send their children to school.

Key words: Demand, Education, Logistic Regression, Government Expenditure, Indonesia

1. Background

Education is one of the most important factors of human capital development, whereas human capital has been identified as a key determinant of growth and poverty alleviation. The government of Indonesia has been paying a lot of attention on education for years. Since the beginning of 2000s, for example, Indonesia has experienced an increasing trend in government expenditure in this sector. It received 11.4 per cent of total national expenditure in 2001, increased to 14.3 in 2002, to 16.0 per cent, 14.0 per cent and 13.9 per cent, in 2003, 2004 and

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2005, respectively.   Moreover the Indonesian government is planning to achieve a targeted

number as mandated by law to provide minimum 20 per cent of its budget to the education

sector[3].

However, given the size of social spending in the budget and the desire to enhance the

quality of fiscal adjustment while pursuing macroeconomic stability, policy makers must

increase the effectiveness of expenditure policy which may be estimated by looking at the

response of receivers, individuals or households. The response of households could be analyzed

by estimating their demand function toward the services. Therefore this research tries to analyze

household behavior after the implementation of budget policies, in this case, expenditure for

education service, by estimating the demand for the services.

The remainder of the paper is organized as follows. Section 2 describes the research

questions. Section 3 describes theoretical background, methodology of research and data

sources. Section 4 Analysis demand of education in Indonesia and finally section 5 conclusion

and policy recommendations

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[3]   The Law on National Education (No.20/2003) and the Constitution Amendment III emphasize that all Indonesian citizens have the right to education; that the Government has an obligation to finance basic education without charging fees; and that the Government is mandated to allocate 20% of its expenditure on education

2. Research questions

Based on explanation provided in the background above, this paper attempts to analyze

and answer a question of : ***How does household / individual behave toward public education?***

3. Theoretical Background, Methodology of Research and Data Sources

3.1 Theoretical background

Education is a trade off between enhanced future earnings and foregone earnings during

enrollment in an education system. Education could also be seen as both a consumption and an

investment good. The decision to send a child to school can be modeled using economic models

of household behavior. Parents consider whether the utility of sending a child to school (U_i)

exceeds the utility of keeping the child at home (U_0). If $U_i > U_0$ then parents enroll their child in

school and vice-versa. Assumptions of the model are (i) every household has a utility function

which depend on the human capital of its children and the consumption of all other goods and

services. (ii) Investment in another year of schooling raises a child human capital at the cost of

reduced consumption of other goods and services.

Conditional on deciding to take a child to school, the expected household utility

can be denoted as:

$$U_i = U(S_i, C_i) + \varepsilon_i \tag{1}$$

If parents decide not to send their child to school, the household utility is

$$U_0 = U(0, C_0) + \varepsilon_0 \tag{2}$$

and, the budget constraint is

$$Ci + Pi = C0 = Y \tag{3}$$

Where:

Si : Increment to a child human capital from another year of education from school

Ci : consumption possible after incurring the cost of schooling

Pi : total cost of sending the child to school

Y : household disposable income

Moreover, the model defines that the improvement of human capital is a function of individual characteristic (Ii), Household characteristic (Hi) and school quality (Qi).

$$S_i = S_i(I_i, H_i, Q_i) \tag{4}$$

Utility maximization problem can be written as

$$U^* = \text{Max}(U_0, U_s) \tag{5}$$

And the linear functional form for the utility to send child to school is

$$U_i = \beta_1 S_i + \beta_2 C_i + \varepsilon_i \tag{6}$$

$$U_i = \beta_1 S_i + \beta_2 (Y - P) + \varepsilon_i \tag{7}$$

Substitute equation (4) to equation (7) produces completed linear functional form for the utility to send child to school as

$$U_i = \beta_0 + \beta_1 I_i + \beta_2 H_i + \beta_3 Q_i + \beta_4 Y + \beta_5 P + \varepsilon_i \qquad (8)$$

while linear functional form for the utility not to send child to school is

$$U_0 = \beta_2 Y + \varepsilon_0$$

Finally, parents will send their children to school if Ui – U0 > 0

The decision to send or not to send a child to school is influenced by three group of factors which effect the expected utility of the decision choice. Those are household characteristics individual characteristics, and community characteristics.

3.2 Methodology of research

The logistic distribution (Logit) is used in the case when the dependent variable of the model is a dichotomous variable, that is, in this model, 1 if parents send their child to school and 0 if vice-versa. It is used because (i) the predicted value of dependent variable in logistic model is the probability of a particular choice will be made, p , should satisfy $0 \le \hat{p} \le 1$. Unfortunately linear regression does not ensure that is so. (ii) the observed value do not follow a normal distribution with mean p, but , in case of logistic regression, is based on the cumulative logistic probability function which is specified as

(Pindyck and Rubinfeld, 1991)

$$p_i = F(Z_i) = F(\alpha + \beta X_i) = \frac{1}{1+e^{-z_i}} = \frac{1}{1+e^{-(\alpha+\beta X_i)}} \tag{9}$$

multiply both side by $1+e^{-z_i}$ to get $(1+e^{-z_i})P_i = 1$. Dividing by Pi and then subtracting by 1 leads to

$$e^{-z_i} = \frac{1}{P_i} - 1 = \frac{1-P_i}{P_i}$$

since $e^{-z_i} = \frac{1}{e^{z_i}}$ then $e^{z_i} = \frac{P_i}{1-P_i}$

Finally by taking natural logarithm of both side

$$Z_i = \ln\left[\frac{P_i}{1-P_i}\right] = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + ... + \beta_p X_{ip} \tag{10}$$

The dependent variable in this regression is the logarithm of the odds that a particular choice will be made.

3.3 Data Sources

This research estimates demand for education services by utilizing logistic regression model and obtains data from national Socioeconomic Survey (SUSENAS)[4], BPS- statistics Indonesia, 2005. The Susenas 2005 survey has been conducted in 30 provinces, 407 districts, 4,626 sub-districts and 14,565 villages in Indonesia. It has 1,052,091 respondents that come from 257,906 households in total. This research selects 3 groups of respondents which are 136,614, respondent for elementary school age (7 to 12 years old) , 64,344 and 60,752 respondents for junior (13-15 years old) and senior high school age (16-18 years old) respectively.

4. Analysis on demand of education in Indonesia

4.1. Model Specification

The decision of parent to send or not to send their child to school is a proxy of demand for schooling or education. The model estimates that demand for education depends on monthly household income (LogInc), fathers education (FE), mothers education (ME), family size (FE) which are included as household characteristics. Moreover, individual characteristic includes age (Age) and gender (Gdr). While scholarship (Sch), school density (Sden) and teacher-student

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[4] BPS-statistics of Indonesia has been conducting SUSENAS since 1963. One of the objectives of SUSENAS is to gather complete, accurate and timely data on important characteristics of the population, particularly the ones closely related to measurement of well being in various categories of the population (Surbakti, 1995). The main idea is that it would gather data from household to make available sufficient data in order to examine various social issues.

ratio (TSratio) are community characteristics. The model specification could be written as

follows

$$Z_i = \ln\left[\frac{P_i}{1-P_i}\right] = C + \beta_1 LogInc + \beta_2 FE + \beta_3 ME + \beta_3 FamZ +$$
$$\alpha_1 Age + \alpha_2 Gdr + \alpha_3 Sch + \delta_1 Sden + \delta_2 TSratio \qquad\qquad (11)$$

Where

C	C	Intercept	
HouseHold Characteristics			
$\beta 1$	LogInc	Log Monthly Household Income	
$\beta 2$	FE	Father Education	1 to 5
$\beta 3$	ME	Mother Education	1 to 5
$\beta 4$	FamZ	Family Size	
Individual Characteristics			
$\alpha 1$	Age	Age	
$\alpha 2$	Gdr	Gender	male = 1, female = 0
$\alpha 4$	Sch	Scholarship	Received scholarship = 1 , not received = 0
Community Characteristics			
$\gamma 1$	Sden	School Density	1 to 3 (scale)
$\gamma 1$	Tsratio	Teacher student ratio	1 to 3 (scale)

4.2 Estimation results

Table 1 shows that the probability of being enrolled in elementary school increases

as income increases. Rural areas show higher coefficient than urban areas, implying

higher effect of income to elementary enrollment in rural areas than urban. Parents

education increases the probability of enrollment. Mothers education, especially in rural

areas, is more a important determinant of elementary school enrollment than fathers

education. Family size has an important impact on enrollment. The larger the number of

family member the lower the probability of enrollment, implying competition of

resource.

The probability of being enrolled increases at an increasing rate with age. This is inconsistent with the hypothesis that increasing age corresponds to increasing potential labor income and then children may be withdrawn from school as they grew. Negative sign of gender coefficient shows parental preferences for girls education. Positive sign of scholarship coefficient shows scholarship increases the probability of school enrollment. The impact is stronger in rural than urban areas.

Positive sign of school density indicates higher school availability increases probability of parents decision to send their children to school. It is assumed that the lower the teacher-student ratio the higher the school quality. Negative sign indicate higher school quality increases the probability of enrollment

Table 1 Logistic Regression : Demand for Elementary School

Variable	All			Urban			Rural		
	B	Exp(B)	ΔP_i	B	Exp(B)	ΔP_i	B	Exp(B)	ΔP_i
LogInc	1.23	3.41	0.31	1.23	3.43	0.31	1.26	3.51	0.31
FE	0.25	1.29	0.06	0.23	1.25	0.06	0.26	1.30	0.07
ME	0.29	1.34	0.07	0.21	1.24	0.05	0.34	1.40	0.08
FamZ	-0.15	0.86	-0.04	-0.13	0.87	-0.03	-0.15	0.86	-0.04
Age	0.27	1.32	0.07	0.27	1.31	0.07	0.28	1.32	0.07
Gdr	-0.17	0.84		-0.19	0.83		-0.17	0.84	
Sch	0.62	1.85		0.58	1.78		0.63	1.87	
Sden	0.05	1.05	0.01	0.07 **	1.08	0.02	0.04	1.05	0.01
Tsratio	-0.11	0.89	-0.03	-0.14	0.87	-0.03	-0.10	0.90	-0.03
Location	0.07 **	1.07							
Constant	-6.93	0.00		-6.68	0.00		-7.22	0.00	

Note: Significant at 5 %   ** Significant at 10 %

Table 2 presents the logistic regression of determinant of junior high school

enrollment. The probability of being enrolled in Junior high school also increases as income increases. Rural area has higher coefficient than urban. Higher parents education increases the probability of enrollment. Fathers education, however, in case of junior high school has more important determinant than mothers education. The larger the number of family member the lower the probability of junior high school enrollment.

The probability of being enrolled increases at a decreasing rate with age. This is consistent with the hypothesis that increasing age corresponds to increasing potential labor income and then children may be withdrawn from school as they grew. Negative sign of gender coefficient shows parental preferences for girls education both in all and rural region. This may imply in this age, boys, especially in rural areas, have more potential labor income than girls. Scholarship also has positive coefficient, implying the importance of scholarship for school enrollment.

School density variable has positive significant sign in urban areas, while negative but insignificant coefficient in rural areas. It may be because the transportation cost to school is higher in urban than rural areas. Negative sign of teacher-student ratio indicate higher school quality also increases the probability of enrollment in junior high school level.

Table 2 Logistic Regression : Demand for Junior High School

Variable	All			Urban			Rural		
	B	Exp(B)	ΔP$_i$	B	Exp(B)	ΔP$_i$	B	Exp(B)	ΔP$_i$
LogInc	1.217	3.376	0.304	0.992	2.696	0.248	1.350	3.858	0.338
FE	0.431	1.539	0.108	0.375	1.454	0.094	0.464	1.590	0.116
ME	0.385	1.470	0.096	0.327	1.387	0.082	0.424	1.528	0.106
FamZ	-0.119	0.888	-0.030	-0.150	0.861	-0.037	-0.110	0.896	-0.028
Age	-0.568	0.567	-0.142	-0.552	0.576	-0.138	-0.575	0.563	-0.144
Gdr	-0.071	0.932		0.061 ***	1.063		-0.113	0.894	
Sch	0.628	1.874		0.619	1.857		0.632	1.882	
Sden	0.002 ***	1.002	0.000	0.045	1.046	0.011	-0.007 ***	0.993	-0.002
Tsratio	-0.027	0.973	-0.007	-0.053	0.948	-0.013	-0.020	0.981	-0.005
Location	0.182	1.200							
Constant	1.455	4.284	0.364	3.037	20.852	0.759	0.621	1.860	0.155

Note: Significant at 5 % *** variable is not significant

Table 3 presents the logistic regression of determinant of senior high school enrollment. The probability of being enrolled in senior high school also increases as income increases. Rural areas also has higher coefficient than urban. Parents education increases the probability of enrollment. Fathers education, same as in case of junior high school, has more important determinant than mothers education. Family size also has an important impact on senior high school enrollment.

The probability of being enrolled increases at a decreasing rate with age. This is also consistent with the hypothesis. Positive sign of gender coefficient shows parental preferences for boy education. Scholarship also has positive coefficient. Negative sign of teacher-student ratio indicate higher school quality increases the probability of enrollment.

Table 3 Logistic Regression : Demand for Senior High School

Variable	All			Urban			Rural		
	B	Exp(B)	ΔP$_i$	B	Exp(B)	ΔP$_i$	B	Exp(B)	ΔP$_i$
LogInc	0.87	2.38	0.22	0.37	1.44	0.09	1.32	3.76	0.33
FE	0.36	1.44	0.09	0.35	1.42	0.09	0.39	1.47	0.10
ME	0.25	1.28	0.06	0.18	1.20	0.05	0.34	1.40	0.08
FamZ	-0.06	0.94	-0.01	-0.09	0.92	-0.02	-0.05	0.95	-0.01
Age	-0.63	0.53	-0.16	-0.71	0.49	-0.18	-0.60	0.55	-0.15
Gdr	0.09	1.09		0.21	1.23		0.02 ***	1.02	
Sch	0.48	1.62		0.44	1.56		0.51	1.66	
Sden	0.00 ***	1.00	0.00	0.03 ***	1.03	0.01	0.01 ***	1.01	0.00
Tsratio	-0.03	0.98	-0.01	-0.04	0.96	-0.01	-0.01 ***	0.99	0.00
Location	0.26	1.29							
Constant	4.56	95.51	1.14	9.40	#######	2.35	1.01	2.73	0.25

Note: Significant at 5 %   *** variable is not significant

5. Conclusions and Policy Recommendations

5.1   Conclusions

1. Income, parents education, family size, age, scholarship, and teacher-student ratio have significant influence to demand for education. While gender and school density give varied impact to school enrollment across areas and levels of education.

2. Household income is a very important determinant of school enrollment. It is proved that in all levels of education, the probability of being enrolled in school increases as income increases. Moreover, the probability to be enrolled as income increases is higher in rural areas than urban.

3. In general parents education increases the probability of enrollment. It may reflect the income potential of household and may be also the attitude towards education.

4. Scholarship give significant impact to increase the probability of enrollment in all levels of education.   The impact is higher in rural than urban areas.

5. The larger the family size, the lower the probability of enrollment, implying competition of resources.

6. The probability of being enrolled in junior and senior high school increases at a decreasing rate with age. This is consistent with the hypothesis that increasing age corresponds to increasing potential labor income and then children may be withdrawn from school as they grew. However, positive coefficient of age variable in elementary level may imply that parents have not yet considered potential labor income for elementary school age range.

7. It is assumed that the lower the teacher-student ratio the higher the school quality. Negative sign indicate higher school quality increases the probability of enrollment

8. In general, but not in all cases, school density has positive sign. It indicates that higher school availability increase the probability of school enrollment.

5.2   Policy Recommendations

1. Significant positive coefficient of household income and scholarship variables indicates the importance of these variables to increase the probability of school enrollment. Therefore, increasing government budget for scholarship is a very important policy to increase school

enrollment. It may increase the opportunity of children from low-income household to access schools.

2. Increasing the number of schools and teachers are also a very important policy to increase school enrollment. Increasing number of schools means increasing the accessibility of the schools. Increasing number of educated teachers may increase the quality of education.

3. Government should continue family-planning policy, since it will create a small-prosperous family. Moreover, children from small family has higher probability than children from big family to be sent to school.

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